US Army Corps
of Engineers®
New York District

Final
Environmental Impact Statement

for the
Route 92 Project

proposed by the
New Jersey Turnpike Authority

Appendicies

October 2006

In cooperation with

U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
N.J. Department of Transportation

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Appendices

Lead Agency

United States Army Corps of Engineers New York District

Cooperating Agencies

United States Environmental Protection Agency
United States Fish and Wildlife Service
New Jersey Department of Transportation

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Appendix A
Soil Series Description

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Soil Series Description

The following descriptions are taken from the Middlesex County Soil Survey (USDA, 1987).

Atsion Series
The Atsion series consists of deep, poorly drained soils that formed in acid, sandy Coastal Plain sediments and are in low positions on the landscape. The slope ranges from 0 to 2 percent but is generally less than 1 percent. Atsion soils occur near Klej, Manahawkin, Lakehurst, and Hammonton soils.

At – Atsion sand. This soil is nearly level and poorly drained. It is located along drainageways, in basins, and in low-lying flats throughout the southern part of Middlesex County in irregular areas that range from 6 to 200 acres.

The surface is generally covered by a layer of loose leaves and peat 2 inches thick. The surface layer is black sand 4 inches thick. The subsurface layer is gray sand 12 inches thick. The upper part of the subsoil is dark brown loamy sand 6 inches thick, and the lower part is brown sand 14 inches thick. The substratum is brown sand to a depth of 60 inches or more.

The permeability is moderately rapid in the upper part of the subsoil and rapid in the lower part of the subsoil and in the substratum. The available water capacity is low, with additional water available from the seasonal water table. The organic matter content is moderate. The root zone is restricted by a seasonal high water table that is close to the surface during the winter and spring and is at a depth of 2 to 4 feet in summer. In unlimed areas the surface layer is extremely acid and the subsoil is very strongly acid. Runoff is slow.

Wetness limits most types of crop production unless drainage is provided. The soil is poorly suited to woodland production. The seasonal high water table limits this soil for most types of community development.

Chalfont Series
The Chalfont series consists of deep, somewhat poorly drained soils that are formed in a silty mantle over material weathered from metamorphosed shale and argillite bedrock. The Chalfont soils are on uplands near Heathcote Brook and consist of slopes ranging from 0 to 5 percent. Chalfont soils generally occur near Fallsington, Reaville Variant, and Mount Lucas soils and Humaquepts. These soils have a well-developed fragipan, gently sloping to steep areas, and are generally not subject to flooding.

ChA - Chalfont Silt Loam on 0 to 2 percent slopes. This soil is nearly level and somewhat poorly drained. It is located on divides, side slopes, toe slopes, and areas irregular in shape ranging from 5 to 200 acres.

Typically, the surface layer is dark grayish brown silt loam 6 inches thick. The subsoil is yellow-brown, mottled silty clay loam 44 inches thick. The lower 24 inches of the subsoil is very firm. The substratum is olive-brown silty clay loam to 60 inches or more.

The permeability in the subsoil and substratum of this Chalfont soil is slow. Available water capacity is high. Root growth and air and water movement are restricted to a depth of 26 inches by the firm part of the subsoil. The organic matter content is slight, and natural fertility is medium. Runoff is slow, and the erosion hazard is moderate. The water table is perched on the subsoil from late fall to early spring. In unlimed areas the surface layer is extremely acid and the subsoil is very strongly acid.

The soil is moderately well suited to most cultivated crops and to pasture and hay, but most of the acreage is in native vegetation. The soil is moderately well suited to a variety of trees. The water table and low permeability are a limitation of the soil as a site for local roads and streets.

ChB – Chalfont Silt Loam on 2 to 5 percent slopes. This soil is gently sloping and somewhat poorly drained. It is located on divides, side slopes, toe slopes, and areas irregular in shape ranging from 5 to 200 acres.

Typically, the surface layer is dark grayish brown silt loam 6 inches thick. The subsoil is yellow-brown, mottled silty clay loam 44 inches thick. The lower 24 inches of the subsoil is very firm. The substratum is olive-brown silty clay loam to 60 inches or more.

The permeability in the subsoil of this Chalfont soil is slow. Available water capacity is high. Root growth and air and water movement are restricted to a depth of 26 inches by the firm part of the subsoil. The organic matter content is moderate, and natural fertility is medium. Runoff is medium, and the erosion hazard is moderate. The water table is perched on the subsoil from late fall to early spring. In unlimed areas the surface layer is extremely acid and the subsoil is very strongly acid.

The soil is moderately well suited to most cultivated crops and to pasture and hay, but most of the acreage is in native vegetation. The soil is suited to a variety of trees. The water table is a limitation of the soil as a site for local roads and streets.

Downer Series
The Downer series consists of deep, well-drained soils that formed in acid, moderately coarse textured Coastal Plain sediments. They are found on divides, terraces, side slopes, and toe slopes. They are generally found near Hammonton, Evesboro, Fort Mott, Klej, and Sassafras soils.

DnC – Downer loamy sand, 5 to 10 percent slopes. This soil is sloping and well drained. It is found on smooth or convex slopes in long and narrow or irregular areas ranging from 10 to 40 acres. Typically, a layer of dark brown peat about 2 inches thick covers the surface. The surface layer is very dark brown loamy sand 2 inches thick. The subsurface layer is very dark brown or strong brown loamy sand 11 inches thick. The

subsoil is strong brown sandy loam 17 inches thick. The substratum is strong brown loamy sand to a depth of 60 inches or more.

The permeability is moderate or moderately rapid, and available water capacity is moderate. Organic matter content and natural fertility are low. The root zone extends to a depth of 60 inches. Runoff is medium. The erosion hazard by water or wind is severe. In unlimed areas the surface layer is extremely acid and the subsoil and substratum are strongly acid.

This soil is suited to farming and trees, and potential productivity is moderately high. The sandy surface limits this soil for recreation uses. Erosion and sedimentation are hazards in areas that have been cleared of trees.

Elkton Series
The Elkton series consists of deep, poorly drained soils that are formed in acid, moderately fine textured Coastal Plain sediments. These nearly level soils are on broad low-lying flats, basins, and drainageways. These soils generally occur near Keyport, Woodstown, and Manahawkin soils and Humaquepts and contain more clay than the Woodstown, and Manahawkin soils and Humaquepts.

Ek – Elkton loam. Elkton loam is nearly level and poorly drained. It is in Coastal Plain basins, slopes are concave, and areas are irregular in shape ranging from about to 4 to 200 acres. Typically, the surface layer is grayish brown loam about 8 inches thick. The subsoil is mostly gray clay loam about 27 inches thick. The substratum is mottled, gray and yellowish brown clay loam to a depth of 60 inches or more.

The permeability of this Elkton soil is low. Available water capacity is high. Organic matter content is moderately low. Runoff is slow, and the erosion hazard is slight. The root zone extends to a depth of 60 inches. Water is frequently ponded on the soil in late winter and in spring. In unlimed areas the surface layer is extremely acid and the subsoil and substratum mainly strongly acid. In places the substratum turns extremely acid when excavated.

Most of the acreage of this soil is in woodland. Some areas have been drained and used for cultivated crops and pasture. Unless drained, this soil is poorly suited to crop production. If adequately drained, the soil is suited to pasture. Drainage can be accomplished with open ditches or shallow surface drains. This soil is also suited to trees.

The seasonal high water table, the permeability and low strength are the main limitations of this soil. The low strength is a limitation of the soil as a site for local roads and streets.

Evesboro Series
This series consists of deep, excessively drained soils that formed in acid, coarse textured Coastal Plain sediments containing small amounts of silt and clay. The soils are

found on uplands, sandy knolls and terraces, and slope ranges from 0 to 15 percent. Evesboro soils generally occur near Klej, Downer, Lakewood, and Lakehurst soils.

EvB – Evesboro sand, 0 to 5 percent slopes. This soil is nearly level or gently sloping and is excessively drained. It is found on stream terraces in low positions, on convex slopes ranging from 4 to 150 acres.

The surface layer is typically dark grayish brown sand 3 inches thick. The subsoil is strong brown sand 37 inches thick. The substratum is reddish yellow sand to a depth of 60 inches or more.

The permeability is rapid in the subsoil and substratum and available water capacity is low. Organic matter content and natural fertility are low. Tilth is good, and the soil is easily worked. The root zone extends to a depth of 60 inches or more. Runoff is slow, and in unlimed areas the surface layer and subsoil commonly are very strongly acid. Wind erosion is a hazard in unprotected areas.

The soil is poorly suited to cultivated crops and to hay and pasture, manly because of the available water capacity. The soil is suited to woodland, and much of the acreage is wooded; potential productivity is moderately high. The sand in the surface layer, and permeability, and the available water capacity are the mail limitations of the soil for community development.

Fallsington Series
The Fallsington series consists of deep, poorly drained soils that formed in acid, moderately fine textured Coastal Plain sediments. These soils are located in low-lying flats and basins. The Fallsington soils generally occur near Nixon and Nixon Variant soils. The slopes of this soils series ranges from 0 to 2 percent but is dominantly less than 1 percent; while the permeability is moderate to moderately rapid and the available water capacity is moderate.

Fb – Fallsington loam. Fallsington loam is level to nearly level and is poorly drained with areas irregular in shape ranging from 5 to 150 acres. Typically, a layer of dark brown peat about 3 inches thick covers the surface. The surface layer is very dark gray and is 4 inches thick. The subsoil is mottled and gray and about 23 inches thick; it is loam in the upper part and sandy clay loam in the lower part. The substratum is light yellowish brown to yellowish brown gravelly loam sand and loamy sand to a depth of 60 inches or more. The permeability is moderate to moderately rapid. Available water capacity is moderate. The frost-action potential is high. The subsoil is slightly sticky and has a moderate shrink-swell potential. The seasonal high water is between the surface and a depth of 1 foot from late fall to late spring. The root zone is restricted to depth of 25 inches by the wetness. Runoff is slow and organic matter content is moderate. In unlimed areas the surface layer is extremely acid and the subsoil is very strongly acid.

Unless drained, this soil is poorly suited to cultivated crops. The seasonal high water table and lack of suitable drainage outlets are major limitations. Similarly, most areas of this soil that are used for pasture require surface drainage. This soil is suited to a wide variety of trees, and the potential productivity is high. The seasonal high water table is a major limitation of this soil for urban use, especially for roads and streets.

Fallsington Variant Series
The Fallsington Variant consists of deep, poorly drained soils that formed in acid, moderately fine textured Coastal Plain sediments. The Fallsington Variant soils are in low-lying flats and basins. Slope ranges from 0 to 2 percent but is generally less than 1 percent. Fallsington Variant soils are found near with Nixon and Nixon Variant soils, and resemble Fallsington soils except for small amounts of red shale fragments and detroidal shale.

Fd - Fallsington Variant loam. Fallsington Variant loam is level to nearly level and is poorly drained. Typically, the surface layer is gray loam about 5 inches thick. The subsoil is 24 inches thick and consists of gray silt loam in the upper part and weak red clay loam in the lower part. The substratum extends to a depth of 60 inches or more, and is brownish gray, yellowish brown and dark gray stratified sandy loam and loamy sand or loam.

The permeability is slow in the subsoil, and available water capacity is high. The root zone generally extends to a depth of 60 inches or more but is seasonally restricted by wetness to a depth of about 25 inches. Organic matter content is moderate. In unlimed areas the surface layer is extremely acid and the subsoil is very strongly acid. Areas near streams are frequently flooded for brief periods in winter, spring, and early summer.

The soil is poorly suited to cultivated crops and pasture, due to flooding and the seasonal high water table. The soil is suited to trees, and most of the acreage is wooded.

The seasonal high water table, flooding, and the slow permeability of the subsoil are major limitations for community development, especially as a site for septic systems, dwellings with basements, and local roads and streets.

Hammonton Series
The Hammonton series consists of deep, moderately well drained or somewhat poorly drained soils that have formed in acid, moderately coarse textured Coastal Plain sediments and are located on terraces. Slopes range from 0 to 3 percent. These soils are on the landscape with Downer, Fallsington, Sassafras, Woodstown, and Klej soils.

HeA – Hammonton loamy sand, 0 to 3 percent slopes. This soil is nearly level to gently sloping and is moderately well drained. It is found on terraces, on smooth or concave slopes in areas ranging from 5 to 100 acres. The soil is generally found with Downer Fort Mott and Woodstown soils.

The surface layer is typically brown loamy sand about 8 inches thick. The subsurface layer is yellowish brown loamy sand 10 inches thick. The subsoil is yellowish brown loamy sand 12 inches thick. The substratum is mottled, dark yellowish brown and gray loamy sand to a depth of 60 inches or more.

The permeability is moderate or moderately rapid, and available water capacity is moderate. Organic matter content is low. The seasonal high water table is at a depth of 1.5 to 4 feet. Runoff is slow and the erosion hazard is slight, but wind erosion is a hazard in winter. In unlimed areas the surface and subsurface layers are extremely acid and the subsoil is very strongly acid.

This soil is moderately well suited to cultivated crops and is suited to pasture and trees. The seasonal high water table is the main limitation of Hammonton loamy sand as a site for community development.

HmA – Hammonton sandy loam, 0 to 2 percent slopes. Hammonton sandy loam with 0 to 2 percent slopes is nearly level and moderately well drained. It is found on divides and terraces in East Brunswick, South Brunswick, Monroe and Plainsboro Townships. Slopes are smooth or convex and areas are long and narrow ranging from 5 to 60 acres.

Typically, the surface layer is brown sandy loam about 8 inches thick. The subsurface layer is yellowish brown sandy loam 10 inches thick. The subsoil is mottled, yellowish brown sandy loam 12 inches thick. The substratum is mottled, dark yellowish brown loamy sand to a depth of 60 inches or more.

The permeability is moderate or moderately rapid. Available water capacity is moderate. Organic matter content is moderate. The root zone extends to a depth of 60 inches but is restricted by a seasonal high water table of a depth of about 30 inches from late fall to late spring. In unlimed areas the surface and subsurface layers are extremely acid and the subsoil is very strongly acid.

Most of the acreage of this soil is used for cultivated crops. A few areas are in woodland and pasture. Some areas are in urban uses. The soil is also suited to pasture and well suited to trees. The seasonal high water table limits this soil for most urban uses.

Humaquepts
Humaquepts consist of somewhat poorly drained to very poorly drained soils on flood plains that are subject to flooding several times each year. The soils formed in stratified sandy or loamy sediments of fluvial origin with slopes ranging from 0 to 2 percent. The solum ranges from 24 to 48 inches in thickness. These soils are extremely acid to slightly acid. Pebbles make up 0 to 20 percent of some lower horizons.

HU – Humaquepts, frequently flooded. Humaquepts that frequently flood consist of nearly level, deep, somewhat poorly drained to very poorly drained soils on flood plains along small, permanent and intermittent streams. Slopes range from 0 to 2 percent.

These soils consist of material that ranges in texture from sandy to clayey. Most of the areas are covered by recent alluvium, mainly loamy, and consist of sediments deposited by the stream during flooding. The water covering some areas is several feet deep during flood stage.

Most areas of this unit are in woodland. Flooding and the instability and variability of the soil material make the unit generally unsuitable for crops, pasture, or woodland and for most urban uses.

Keyport Series
The Keyport Series consists of deep, moderately well drained soils that formed in acid, moderately fine textured Coastal Plains sediments. They are located on divides, terraces, side slopes and toe slopes. Slopes range from 0 to 15 percent. They are generally found with Woodstown, Elkton, and Sassafras soils.

KeA – Keyport sandy loam, 0 to 2 percent slopes. This soils is nearly level and moderately well drained. It is mostly found on divides. The areas are irregular in shape and range from 5 to 100 acres.

Typically, the surface layer is brown sandy loam about 8 inches thick. The subsoil is 32 inches thick. The upper part of the subsoil is yellowish brown sandy loam 7 inches thick. The middle part is yellowish brown sandy clay loam 12 inches thick. The lower part is light brownish gray clay loam 13 inches thick. The substratum is mottled, light brownish gray clay loam to a depth of 60 inches or more.

The permeability of this soil is slow. Available water capacity is high. Organic matter content is moderate. The lower part of the subsoil has a moderate shrink-swell potential. Frost-action potential is high. The root zone extends to a depth of 60 inches or more. The seasonal high water table is at a depth of 1.5 to 4 feet from late fall to late spring. Runoff is slow and the erosion hazard is slight. In unlimed areas the surface layer is extremely acid and the subsoil is very strongly acid.

The soil is suited to cultivated crops and to trees. Potential productivity is high. The slow permeability, moderate shrink-swell potential in the subsoil, and seasonal wetness limit this soil for most urban uses.

KeB – Keyport sandy loam, 2 to 5 percent slopes. This soils is gently sloping and moderately well drained. It is found on divides, side slopes, and toe slopes. The areas are irregular in shape and range from 5 to 100 acres.

Typically, the surface layer is brown sandy loam about 8 inches thick. The subsoil is 32 inches thick. The upper part of the subsoil is yellowish brown sandy loam 7 inches thick. The middle part is yellowish brown sandy clay loam 12 inches thick. The lower part is light brownish gray clay loam 7 inches thick. The substratum is mottled, light brownish gray clay loam to a depth of 60 inches or more.

The permeability of this soil is slow. Available water capacity is high. Organic matter content is moderate. The lower part of the subsoil has a moderate shrink-swell potential. Frost-action potential is high. The root zone extends to a depth of 60 inches or more. The seasonal high water table is at a depth of 1.5 to 4 feet from late fall to late spring. Runoff is moderately slow and the erosion hazard is moderate. In unlimed areas the surface layer is extremely acid and the subsoil is very strongly acid.

The soil is suited to cultivated crops and to trees. Potential productivity is high. The slow permeability, moderate shrink-swell potential in the subsoil, and seasonal wetness limit this soil for most urban uses.

KfA – Keyport loam, 0 to 2 percent slopes. This soil is nearly level and moderately well drained. It is found on high terraces and divides. The areas are irregular in shape and range from 5 to 100 acres.

Typically, the surface layer is brown loam about 8 inches thick. The subsoil is yellowish brown mottled clay loam 32 inches thick. The substratum is a firm layer of mottled, grayish brown silty clay loam to a depth of 60 inches or more.

The permeability of this soil is slow. Available water capacity is high. Organic matter content is moderate. The lower part of the subsoil has a moderate shrink-swell potential. Frost-action potential is high. The root zone extends to a depth of 60 inches or more. The seasonal high water table is at a depth of 1.5 to 4 feet from late fall to late spring. Runoff is slow and the erosion hazard is slight. In unlimed areas the surface layer is extremely acid and the subsoil is very strongly acid.

Most of the acreage of this soil is used for crops and pasture. A few areas are used for homesites. This soil is suited to cultivated crops and to trees. Potential productivity is high. The slow permeability, high frost-action potential, and seasonal wetness limit this soil for most urban uses.

Lansdowne Series
The Lansdowne Series consists of deep, moderately well drained and somewhat poorly drained soils that formed in acid, fine-textured Piedmont sediments. They are located on low-lying flats at the base of the Piedmont. Slope ranges from 0 to 5 percent. They are found with Fallsington Variant, Keyport, Klinesville, Penn, Reaville, and Reaville Variant soils.

LnA – Lansdowne silt loam, 0 to 2 percent slopes. This soil is nearly level and moderately well to somewhat poorly drained. It is on divides and low-lying flats in irregular areas between 5 and 100 acres.

The surface layer is typically dark brown silt loam about 7 inches thick. The upper part of the subsoil is yellowish red silty clay loam 9 inches thick. The middle part is mottled, yellowish red silty clay 20 inches thick. The lower part is mottled, red silty clay 14 inches thick. The substratum is red very shaly silty clay to a depth of 60 inches or more.

The permeability of this soil is slow. Available water capacity is high. A seasonal high water table is at a depth of 1 to 2.5 feet from October to June. Organic matter content is moderate. Runoff is slow, and the erosion hazard is slight. The rooting zone extends to a depth of 60 inches. Unless the soil has been limed, the surface layer is very strongly acid and the subsoil and substratum are strongly acid or very strongly acid.

Most of the acreage of this soil is used for cultivated crops and pasture. If drained, it is suited to cultivated crops and pasture, and trees. The seasonal high water table, slow permeability, frost-action potential, and low strength are the main limitations of the soil for community development.

LnB - Lansdowne silt loam, 2 to 5 percent slopes. This soil is gently sloping and moderately well to somewhat poorly drained. It is on side slopes and toe slopes in irregular areas between 5 and 100 acres.

The surface layer is typically dark brown silt loam about 7 inches thick. The upper part of the subsoil is yellowish red silty clay loam 9 inches thick. The middle part is mottled, yellowish red silty clay 20 inches thick. The lower part is mottled, red silty clay 14 inches thick. The substratum is red very shaly silty clay to a depth of 60 inches or more.

The permeability of this soil is slow. Available water capacity is high. A seasonal high water table is at a depth of 1 to 2.5 feet from October to June. Organic matter content is moderate. Runoff is slow, and the erosion hazard is slight. The rooting zone extends to a depth of 60 inches. Unless the soil has been limed, the surface layer is very strongly acid and the subsoil and substratum are strongly acid or very strongly acid.

Most of the acreage of this soil is used for cultivated crops and pasture. It is suited to cultivated crops and pasture, and trees. The seasonal high water table, slow permeability, frost-action potential, and low strength are the main limitations of the soil for community development.

LUA – Lansdowne-Urban land complex, 0 to 5 percent slopes. This unit mainly consists of nearly level to gently sloping, moderately well drained and somewhat poorly drained soils and areas that are used for urban development. It is located on terraces and in draws, in irregular areas that range from 20 to 400 acres. About 40 percent of this unit is Lansdowne soils. Typically, they have a surface layer of dark brown silt loam about 7 inches thick. The upper part of the subsoil is yellowish red silty clay loam 9 inches thick. The middle part is mottled, yellowish red silty clay 20 inches thick. The lower part is mottled, red silty clay 14 inches thick. The substratum is red very shaly silty clay to a depth of 60 inches or more. About 40 percent of this unit is areas covered mainly by concrete, asphalt, buildings or other impervious surfaces.

The permeability in this unit is slow in areas where the soils are relatively undisturbed and is variable in areas dominated by cuts, fill, and Urban land. Runoff is slow, and the erosion hazard is light. The available water capacity is high in the relatively

undisturbed areas, and is low to very low in areas dominated by cuts, fills, and Urban land. Most unlimed areas are very strongly acid.

Matapeake Series
The Matapeake series consists of deep, well drained soils that formed in acid, medium-textured Coastal Plain sediments, on divides and side slopes. These soils, with slopes ranging from 0 to 5 percent, are located on the landscape with Mattapex, Sassafras, and Woodstown soils. The Matapeake soils do not have the mottles in the Bt horizon that are common to Mattapex and Woodstown soils and have a higher silt content than the Sassafras soils.

MeA – Matapeake silt loam, 0 to 2 percent slopes. Matapeake silt loam on 0 to 2 percent slopes is nearly level and well drained on areas ranging from about 10 to 400 acres.

The surface layer is typically dark brown and yellowish brown silt loam about 13 inches thick. The substratum is strong brown gravelly sandy loam to a depth of 60 inches or more.

The permeability is moderate to moderately slow. Available water capacity is high, runoff is medium, and the erosion hazard is slight. The soil is moderate in organic matter content. In unlimed soils, the surface layer and subsoil are very strongly acid.

This soil is well suited to crops, hay and pasture, and most of the acreage is used for farming. The erosion hazard and the need to maintain organic matter content are the major management concerns. The soil is also well suited to trees, and potential productivity is moderately high. There are few limitations for most nonfarm uses. The permeability limits the soil as a site for septic tank absorption fields and most recreation uses.

MeB - Matapeake silt loam, 2 to 5 percent slopes. Matapeake silt loam on 2 to 5 percent slopes is gently sloping and well drained on areas ranging from about 10 to 400 acres.

The surface layer is typically dark brown and yellowish brown silt loam about 13 inches thick. The upper part of the subsoil is strong brown silt loam about 8 inches thick. The lower part of the subsoil is yellowish brown loam 10 inches thick. The substratum is strong brown gravelly sandy loam to a depth of 60 inches or more.

The permeability is moderate to moderately slow. Available water capacity is high, runoff is medium, and the erosion hazard is slight. The soil is moderate in organic matter content. In unlimed soils, the surface layer and subsoil are generally very strongly acid.

This soil is well suited to farming, and most of the acreage is farmed. The erosion hazard and the need to maintain organic matter content are the major management concerns. The soil is also well suited to trees, and potential productivity is moderately

high. There are few limitations for most nonfarm uses. The permeability limits the soil as a site for septic tank absorption fields and most recreation uses.

Mattapex Series
The Mattapex series consists of deep, moderately well drained soils that formed in acid, moderately-fine textured Coastal Plain sediments, on divides and side slopes. These soils are located on the landscape with Matapeake, Woodstown, Sassafras, and Fallsington soils. The Mattapex soils contain more silt in the solum than the Woodstown, Sassafras, or Fallsington soils and are not so gray in the solum as the Fallsington soils. Slopes range from 0 to 5 percent.

MgA – Mattapex silt loam, 0 to 2 percent slopes. Mattapex silt loam on 0 to 2 percent slopes is nearly level and moderately well drained, and is commonly found in long or irregular areas ranging from about 4 to 100 acres.

Typically, the surface layer is dark grayish brown silt loam about 10 inches thick. The subsoil is 30 inches thick. It is yellowish brown silt loam in the upper part and yellowish brown silty clay loam in the lower part. The substratum is yellowish brown fine sandy loam to a depth of 60 inches or more.

Permeability is moderate to moderately slow. Available water capacity is high, runoff is slow, and the erosion hazard is slight. Tilth is fair, and the soil is moderate in organic matter content. The root zone extends to a depth of 60 inches or more. In unlimed areas the surface layer and the subsoil commonly are very strongly acid. The seasonal water table is at a depth of 1.5 to 2.5 feet from January to April.

This soil is well suited to cultivated crops and to hay and pasture, and most of the acreage is farmed. Water ponds for short periods in depressions, and such areas are usually difficult to drain. It is also suited to trees, although little acreage is wooded. The permeability and the seasonal high water table limit this soil for most nonfarm uses, especially as a site for septic tank filter fields, dwelling foundations, and local roads and streets.

MgB – Mattapex silt loam, 2 to 5 percent. This soil is gently sloping and moderately well drained. The slopes are smooth or convex, with areas commonly long or irregularly shaped, ranging from 4 to 100 acres. Typically, the surface layer is dark grayish brown silt loam about 10 inches thick. The subsoil is 30 inches thick. It is yellowish brown silt loam in the upper part and yellowish brown silty clay loam in the lower part. The substratum is yellowish brown fine sandy loam to a depth of 60 inches or more.

The permeability of this Mattapex soil is moderate to moderately slow. Available water capacity is high, runoff is slow and the erosion hazard is moderate. Tilth is fair, and the soil is moderate in organic matter content. The root zone extends to a depth of 60 inches ore more. In unlimed areas the surface layer and the subsoil commonly are very

strongly acid. The seasonal water table is at a depth of 1.5 to 2.5 feet from January to April.

This soil is well suited to cultivated crops and to hay and pasture, and most of the acreage is farmed. Water ponds for short periods in depressions, and such areas are usually difficult to drain. The soil is also suited to trees, but little acreage is wooded. The permeability and the seasonal high water table limit this soil for most nonfarm uses, especially as a site for septic tank filter fields, dwelling foundations, and local roads and streets.

Mount Lucas Series
The Mount Lucas series consists of deep, moderately well drained soils that formed from weathered diabase and basalt rocks. Mount Lucas soils are on south-facing slopes and slight knolls and flats. Slope ranges from 0 to 5 percent. They are generally found with Watchung, Keyport, Elkton, Woodstown, and Chalfont soils.

MoA – Mount Lucas silt loam, 0 to 2 percent slopes. This soil is nearly level and moderately well drained. It is found on narrow, convex ridge tops and side slopes, in oblong or irregular areas from 5 to 80 acres.

Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. The subsoil is yellowish brown and strong brown silty clay loam about 24 inches thick and is 10 to 15 percent diabase rock cobbles and stones. The substratum extends to a depth of 60 inches or more. It is strong brown gravelly clay loam and is 40 to 50 percent diabase cobbles and stones.

The permeability of this soil is moderate to slow. Available water capacity is high. Runoff is slow. Tilth is fair, and the soil is high in natural fertility and moderate in organic matter content. The subsoil has a moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more. Unless limed, the surface layer and subsoil commonly are medium acid. Bedrock is commonly at a depth of 6 to 10 feet. The seasonal high water table is at a depth of 6 inches to 3 feet.

This soil is moderately well suited to cultivated crops and to pasture and hay, and is suited to trees. Low strength, slow permeability, the seasonal wetness, and the shrink-swell potential limit the soil for many urban uses.

MsB – Mount Lucas very stony silt loam, 0 to 5 percent slopes. This soil is nearly level to gently sloping and is moderately well drained. It is found on narrow, convex side slopes adjacent to streams and on undulating uplands in South Brunswick Township. The areas of this soil commonly are oblong or irregular in shape and range from 5 to 80 acres.

Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. The subsoil is yellowish brown and strong brown silty clay loam about 24 inches thick and is 10 to 15 percent gravel, cobbles and stones. The substratum extends to a depth of 60

inches or more. It is strong brown gravelly clay loam and is 40 to 50 percent diabase cobbles and stones.

The permeability of this soil is moderate to slow. Available water capacity is high. Runoff is medium. Tilth is fair, and the soil is high in natural fertility and moderate in organic matter content. The subsoil has a moderate shrink-swell potential. The root zone extends to a depth of 60 inches or more. Unless limed, the surface layer and subsoil commonly are medium acid. Bedrock is commonly at a depth of 6 to 10 feet. The seasonal high water table is at a depth of 6 inches to 3 feet.

This soil is too stony for cultivated crops or pasture, but is suited to trees. Low strength, slow permeability, the seasonal wetness, and the shrink-swell potential limit the soil for many urban uses.

Mullica Series
This series consists of deep, very poorly drained soils that formed in acid, moderately coarse textured Coastal Plain sediments. They are found in low, wet areas that receive runoff from the surrounding soils. Slope generally is less than one percent. They are found on the landscape with Hammonton, Woodstown, and Fallsington soils.

Mu – Mullica sandy loam. This soil is nearly level and very poorly drained. It is found in low-lying upland flats, slight depressions, and along drainageways in irregular areas that range from 5 to 500 acres.

Typically, the surface is covered with black muck about 4 inches thick. The surface layer is very dark gray sandy loam about 7 inches thick. The subsoil is mottled and is about 21 inches thick. It is light brownish gray sandy loam in the upper part and light brownish gray gravelly sandy loam in the lower part. The substratum extends to a depth of 60 inches or more and is greenish gray sandy loam, sandy clay loam, and loamy sand.

The permeability is moderate in the subsoil and moderately rapid in the substratum. If the soil is drained, available water capacity is moderate but water is available to plants from the water table. The seasonal high water table is at the surface from December to May and some areas have water ponded on the surface. The root zone extends to a depth of 60 inches but is generally restricted by the seasonal high water. Organic matter content is high, and natural fertility is medium. In unlimed areas, the surface layer is extremely acid and the subsoil and substratum are very strongly acid. Runoff is very slow.

The soil is suited to cultivated crops and pasture if drained, and also suited to trees. Potential productivity is moderate. The seasonal high water table limits the soil for most urban uses.

Nixon Series
The Nixon series consists of deep, well-drained soils that formed in acid, moderately fine-textured Coastal Plain sediments. These soils are found on high terraces, divides, and side slopes ranging from 0 to 5 percent. Nixon soils are on the landscapes with Nixon Variant, Lansdowne, Fallsington Variant, and Sassafras soils.

NaA – Nixon loam with 0 to 2 percent slopes. Nixon loam with 0 to 2 percent slopes are nearly level and well drained with slopes that are dominantly convex, ranging in length from 100 to 300 feet. The areas are irregular in shape and range from 5 to 200 acres.

Typically, the surface layer is brown loam about 8 inches thick. The subsurface layer is strong brown loam 3 inches thick. The upper part of the subsoil is yellowish red loam 19 inches thick. The lower part is yellowish red sandy loam 10 inches thick. The substratum extends to a depth of 60 inches or more. It is strong brown stratified sandy loam.

The permeability is moderate in the subsoil and moderately rapid in the substratum. Available water capacity is moderate, natural fertility is medium, and the organic matter content is moderate. The water table is rarely perched in the subsoil for more than a few hours. The root zone extends to a depth of 60 inches or more. In unlimed areas the surface layer and the subsoil are very strongly acid. Tilth is good, runoff is slow, and the erosion hazard is slight.

The soil is well suited to such cultivated crops as corn, soybeans, hay, fruit, and nursery crops, and much of the acreage is used for crops. It is also suited to trees, and potential productivity is high. This soil is generally suitable for most urban uses.

NaB – Nixon loam, 2 to 5 percent slopes. Nixon loam with 2 to 5 percent slopes are gently sloping and well drained soils, with slopes ranging in length from 100 to 300 feet. The areas are irregular in shape and range from 5 to 200 acres. Typically, the surface layer is brown loam about 8 inches thick. The subsurface is strong brown loam 3 inches thick. The upper part of the subsoil is yellowish red loam 19 inches thick. The lower part is yellowish red sandy loam 10 inches thick. The substratum extends to a depth of 60 inches or more. It is strong brown stratified sandy loam.

The permeability is moderate in the subsoil and moderately rapid in the substratum. Available water capacity is moderate, natural fertility is medium, and the organic matter content is moderate. The water table is rarely perched in the subsoil for more than a few hours. The root zone extends to a depth of 60 inches or more. In unlimed areas the surface layer and the subsoil are very strongly acid. Tilth is good, and the soil is easily worked. Runoff is slow, and the erosion hazard is slight.

The soil is well suited to such cultivated crops as corn, soybeans, hay, fruit, and nursery crops, and much of the acreage is used for crops. It is also suited to trees, and potential productivity is high. This soil is generally suitable for most urban uses.

Nixon Variant Series
The Nixon Variant series consists of deep, moderately well drained soils that form in acid, moderately fine-textured Coastal Plain sediments. These soils are found on high terraces, intermediate positions on the landscape, and the toe slopes ranging from 0 to 5 percent. Nixon Variant soils are located on the landscape with Nixon, Lansdowne, Fallsington Variant, and Sassafras soils.

NfA – Nixon Variant loam, 0 to 2 percent slopes. Nixon Variant loam with 0 to 2 percent slopes are nearly level and moderately well drained with slopes that are smooth or convex, ranging in length from 50 to 300 feet. The areas are irregular in shape ranging from 5 to 100 acres. Typically, the surface layer is very dark grayish brown loam about 8 inches thick. The subsurface layer is dark brown and strong brown loam 8 inches thick. It is loam in the upper part and sandy loam in the lower part. The substratum is very pale brown sandy loam to a depth of 60 inches or more.

The permeability is moderate in the subsoil and moderately rapid in the substratum. Available water capacity is high. A seasonal high water table is at a depth of 1 to 4 feet from late winter to early spring. The soil is subject to frost heaving. Water is perched in the subsoil for short periods following heavy rains. Runoff is slow. The root zone extends to a depth of 60 inches or more. Natural fertility is medium, and organic matter content is moderate. In unlimed areas the surface layer and subsoil are strongly acid. Tilth is fair, and the soil dries slowly in the spring.

Most of the acreage of this soil is farmed; a few acres are in pasture and a few are in woodland. The seasonal high water table and the permeability limit this soil for nonfarm uses.

NfB – Nixon Variant loam, 2 to 5 percent slopes. Nixon Variant loam with 2 to 5 percent slopes is smooth or convex ranging in length from 50 to 300 feet. The areas are irregular in shape and range from 5 to 100 acres.

Included with this soil in mapping are small areas of soils with a surface layer of silt loam; Nixon, Woodstown, and Sassafras soils; and soils with a sandy surface layer or a surface layer that has a small amount of cobbles in it. Together, they make up as much as 30 percent of the unit, and they generally are managed the same as this soil. Also included are small areas where red shale bedrock is at a depth of less than 60 inches and areas of Fallsington Variant soils. They make up as much as 20 percent of the unit. The soils with a surface layer of sandy loam, those with cobbles in the surface layer, and those with red shale bedrock are on slight knolls. The soils with a surface layer of silt loam are throughout the unit. The Fallsington Variant soils are in slight depressions and drainageways.

The permeability is moderate in the subsoil and moderately rapid in the substratum. Available water capacity is high. A seasonal high water table is at a depth of 1 to 4 feet from later winter to early spring. This soil is subject to frost heaving. Water is perched in the subsoil for short periods following heavy rains. Runoff is slow. The root zone

extends to a depth of 60 inches or more. In unlimed areas the surface layer and subsoil are strongly acid. Tilth is fair, and the soil dries slowly in the spring.

Most of the acreage of this soil is farmed. A few acres are in pasture, and woodland. The seasonal high water table and the permeability limit this soil for nonfarm use, especially for shallow excavations, septic tank absorption fields, and dwellings with basements.

NGA – Nixon Variant-Urban land complex, 0 to 5 percent slopes. This unit is nearly level to gently sloping and moderately well drained Nixon Variant soils and areas that are used for urban development. It is generally found on high terraces and divides in areas that are irregular in shape and range from 20 to 200 acres.

About 40 percent of this unit is Nixon Variant soils. Typically, the surface layer is very dark grayish brown loam about 8 inches thick. The subsurface layer is dark brown and strong brown loam 8 inches thick. The subsoil is yellowish red and is 22 inches thick. It is loam in the upper part and sandy loam in the lower part. The substratum is very pale brown sandy loam to a depth of 60 inches or more. About 40 percent of the unit consists of areas covered by concrete, buildings, or other structures.

The permeability of the Nixon Variant soils is moderate in the subsoil and moderately rapid in the substratum. Available water capacity is high in the undisturbed areas and low in the areas dominated by cuts, fills, and Urban land. Runoff is slow and the erosion hazard is slight.

Phalanx Series
The Phalanx series consists of deep, well drained soils that formed in acid, moderately coarse textured Coastal Plain sediments. They are found mostly on hills, mountains, and side slopes, generally at the highest elevation in the area. Slope ranges from 2 to 15 percent. They are generally found near Downer, Evesboro, Sassafras, and Keyport soils.

PhD – Phalanx loamy sand, 2 to 15 percent slopes. This soils is gently sloping to moderately steep and is well drained. It is found on side slopes and on caps or divides of knolls or mounts in South Brunswick Township.

Typically, the surface layer is yellowish read loamy sand 7 inches thick. The subsoil is yellowish red gravelly sand loam 23 inches thick and is 30 percent angular ironstone fragments. The substratum is red gravelly loamy sand to a depth of 60 inches or more and is up to 40 percent angular ironstone fragments.

The permeability is moderate in the subsoil and moderately rapid in the substratum. Available water capacity is moderate. Organic matter content is low, and natural fertility is medium. In unlimed soil the surface layer is extremely acid and the subsoil and substratum are very strongly acid. Runoff is medium. Ironstone fragments restrict rooting depth in the soil.

This soil has limited use for crops or pasture, but is suited to trees. Slope limits the soils for most recreational uses.

Pits, sand and gravel - PM
This unit is dominantly the spoil that remains in a borrow or sand or gravel pit after mining has taken place. Some pits have been smoothed and others have mounds.

The characteristics of this unit are variable. The water table is within several feet of the surface, and there is a wide range in the texture of the soil.

Onsite investigation is needed to determine the suitability of the unit for any use.

Psamments
Psamments in Middlesex County consist of moderately deep to deep, excessively drained to somewhat poorly drained soils that formed in stratified or graded sandy fill material.

PN – Psamments, nearly level. This unit consists of deep, well drained or moderately well drained soils dominantly in regraded sand pit or borrow areas that have been smoothed.

The thickness of the fill material in this unit is as much as 48 inches, but in most areas it is about 24 inches. The content of pebble is as much as 50 percent. The other characteristics are variable.

Some areas of this unit are used for building sites, but the variability of the unit makes onsite investigation necessary to determine the suitability of the unit for any use.

Reaville Series
The Reaville series consists of shallow, moderately well drained soils that are formed in acid, medium-textured red shale. They are found on divides and side slopes and have slopes from 0 to 5 percent. They are found on the landscape with Lansdowne, Klinesville, Ellington, and Rowland soils.

ReA – Reaville silt loam, 0 to 2 percent slopes. This soil is nearly level and moderately well drained. It is found on side slopes, divides, and toe slopes in irregular areas that range from 50 to 100 acres.

Typically, the surface layer is dark reddish brown silt loam about 10 inches thick. The subsoil is light reddish brown and reddish brown shaly silt loam about 12 inches thick. The substratum is reddish brown shaly silt loam 6 inches thick. Reddish brown, partially weathered shale bedrock is at a depth of 28 inches.

The permeability is moderate to slow. Available water capacity is moderate. This soil is subject to severe frost heaving. The subsoil is friable to firm. Excess water is perched in the subsoil in winter and early spring and following heavy rains. Runoff is slow, and

the erosion hazard is slight. Root penetration is restricted by the shale bedrock. Natural fertility is medium and organic matter content is moderate. In unlimed areas the surface layer and subsoil are slightly acid.

If drained, this soil is suitable for cultivated crops and pasture. It is also suited to trees, and potential productivity is moderate. The seasonal high water table and the depth to bedrock are the main limitations of the soil for community development.

Reaville Variant
The Reaville Variant series consists of moderately deep, moderately well drained and somewhat poorly drained soils that are formed in residuum from siltstone or shale. These nearly level and gently sloping soils are on upland flats, in depressions, and on concave lower slopes at the heads of drainageways. This series, having slopes ranging from 0 to 2 percent, is found on the landscape with Reaville, Lansdowne Variant, and Parsippany soils.

Rh – Reaville Variant silt loam. Reaville Variant silt loam soils are level or nearly level and poorly drained. They are found mainly on convex slopes and oblong flats or depressions at the upper end of streams and adjacent to the stream heads. Some areas border drainageways where slopes range from 0 to 2 percent, and areas range from 10 to 100 acres.

Typically, the surface layer is dark reddish brown silt loam about 8 inches thick. The upper part of the subsoil is mottled gray, firm silty clay loam about 12 inches thick. The lower part is mottled, reddish brown silty clay loam about 5 inches thick. The substratum is dark reddish brown very shaly silty clay loam 5 inches thick. Red shale bedrock is at a depth of 30 inches.

The permeability is moderate to moderately slow. Available water capacity is high, runoff is slow, and the erosion hazard is slight. The depth to bedrock is 20 to 40 inches. Natural fertility is medium and organic matter content is moderate. The root zone extends to a depth of about 30 inches. Unless limed, the soil ranges from medium acid near the surface to strongly acid in the subsoil. During winter and spring this soils has a seasonal high water table spring between the surface and a depth of 6 inches.

Because of the high water table this soil is poorly suited to cultivated crops. This soil is suited to woodland and potential productivity is moderately high. Seasonal wetness, the permeability and a severe frost action potential limit the soil for local roads and streets.

Rowland Series
The Rowland series consists of deep, moderately well drained or somewhat poorly drained soils that formed in medium-textured alluvium. The Rowland soils are in stream bottoms and their slope ranges from 0 to 2 percent. They are generally found near Reaville Variant, Klinesville, Lansdowne, Dunelle, Ellington, and Reaville soils.

Ro – Rowland silt loam. This soil is nearly level and moderately well drained or somewhat poorly drained. It is found on flood plains along streams and large drainageways. It extends to the toe slopes of the valley sides in long, narrow areas that range from 5 to 100 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The subsoil is dark brown and reddish brown silt loam 33 inches thick. The substratum is gray silt loam and dark gray sandy loam to a depth of 60 inches or more.

The permeability of this soil is moderate or moderately slow. Available water capacity is high. The water table is at a depth of 1 foot to 3 feet from late winter to early spring. The rooting depth is restricted by the seasonal high water table. Runoff is slow, and the erosion hazard is light. Flooding usually occurs at least once a year. In unlimed areas the surface layer is medium acid and the subsoil is strongly acid.

Flooding limits this soil for cultivation, but it is moderately well suited to pasture and well suited to a variety of trees. The seasonal high water table and flooding limit the soil for many urban uses.

Sassafras Series
The Sassafras series consists of deep, well-drained soils that formed in acid, moderately fine textures Coastal Plain sediments. These soils are on uplands and side slopes, ranging from 0 to 15 percent. Sassafras soils are on the landscape with Woodstown, Downer, Matapeake, and Mattapex soils.

SaB – Sassafras sandy loam, 2 to 5 percent slopes. Sassafras sandy loam with 2 to 5 percent slopes are gently sloping and well drained soils found on high terraces and divides and side slopes that are smooth or convex, ranging in size from 5 to 200 acres.

Typically, the surface layer is dark brown sandy loam about 8 inches thick. The subsurface layer is yellowish brown sandy loam about 9 inches thick. The subsoil is about 25 inches thick. It is yellowish brown and strong brown sandy clay loam and strong brown sandy loam. The substratum is strong brown gravelly loamy sand and extends to a depth of 60 inches or more.

The permeability is moderate in the subsoil and moderately rapid in the substratum. Available water capacity is moderate, runoff is medium, and the erosion hazard is slight. Natural fertility is medium, and organic matter content is moderate. The root zone extends to a depth of about 60 inches. In unlimed areas the surface layer and the subsoil are very strongly acid.

This soil is well suited to cultivated crops, and most of the acreage is farmed. It is also well suited to trees, and some of the acreage is wooded; potential productivity is high. This soil has few or nor limitations for urban uses.

SaC – Sassafras sandy loam, 5 to 10 percent. Sassafras sandy loam with 5 to 10 percent slopes are well drained and found on high terraces and divides and side slopes that are smooth or convex, irregular in shape, and range in size from 5 to 200 acres.

Typically, the surface layer is dark brown sandy loam about 8 inches thick. The subsurface layer is yellowish brown sandy loam about 9 inches thick. The subsoil is about 25 inches thick. It is yellowish brown and strong brown sandy clay loam and strong brown sandy loam. The substratum is strong brown gravelly loamy sand and extends to a depth of 60 inches or more.

The permeability is moderate in the subsoil and moderately rapid in the substratum. Available water capacity is moderate, runoff is medium, and the erosion hazard is moderate. Natural fertility is medium, and organic matter content is moderate. Tilth is good, and this soil is easily worked. The root zone extends to a depth of 60 inches. In unlimed areas the surface layer and the subsoil are very strongly acid.

This soil is suited to cultivated crops, and most of the acreage is farmed. It is also well suited to trees; some of the acreage is wooded and potential productivity is high. Slope limits this soil for some urban uses.

SgB – Sassafras gravelly sandy loam, 2 to 5 percent slopes. Sassafras gravelly sandy loam with 2 to 5 percent slopes is gently sloping and well drained. They are found on high terraces and divides and side slopes. Slopes are smooth or convex with areas irregular in shape ranging from 5 to 200 acres in size.

The surface layer is typically dark brown gravelly sandy loam about 8 inches thick. The subsurface layer is yellowish brown sandy loam about 9 inches thick. The subsoil is about 25 inches thick. It is yellowish brown and strong brown sandy clay loam and strong brown sandy loam. The substratum is strong brown gravelly loamy sand and extends to a depth of 60 inches or more.

The permeability is moderate in the subsoil and moderately rapid in the substratum. Available water capacity is moderate, runoff is medium, and the erosion hazard is slight. Natural fertility is medium, and organic matter content is moderate. The root zone extends to a depth of about 60 inches. In unlimed areas the surface layer and subsoil are very strongly acid.

The soil is well suited to trees and cultivated crops, and most of the acreage is farmed. It is also well suited to trees; some of the acreage is wooded and potential productivity is high. The permeability in the subsoil is a limitation of this soil as a site for waste disposal. The slope and gravel content limit recreation uses.

SgC – Sassafras gravelly sandy loam, 5 to 10 percent slopes. Sassafras gravelly sandy loam with 2 to 5 percent slopes is gently sloping and well drained. It is found on high terraces and divides and side slopes. Slopes are smooth or convex with areas irregular in shape ranging from 5 to 200 acres in size.

The surface layer is typically dark brown gravelly sandy loam about 8 inches thick. The subsurface layer is yellowish brown sandy loam about 9 inches thick. The subsoil is about 25 inches thick. It is yellowish brown and strong brown sandy clay loam and strong brown sandy loam. The substratum is strong brown gravelly loamy sand and extends to a depth of 60 inches or more.

The permeability is moderate in the subsoil and moderately rapid in the substratum. Available water capacity is moderate, runoff is medium, and the erosion hazard is moderate. Natural fertility is medium, and organic matter content is moderate. The root zone extends to a depth of about 60 inches. In unlimed areas the surface layer and subsoil are very strongly acid.

The soil is well suited to trees and cultivated crops, and most of the acreage is farmed. It is also well suited to trees; some of the acreage is wooded and potential productivity is high. The permeability in the subsoil is a limitation of this soil as a site for waste disposal. The slope and gravel content limit recreation uses.

SlA – Sassafras loam, 0 to 2 percent slope. Sassafras loam with 0 to 2 percent slopes is nearly level and well drained. They are found on high terraces and divides with smooth or convex slopes and generally occupy areas that are irregular in shape ranging from 5 to 200 acres.

Typically, the surface layer is dark brown loam about 8 inches thick. The subsurface layer is yellowish brown loam about 4 inches thick. The upper part of the subsoil is yellowish brown loam 13 inches thick, and the lower part is strong brown sandy clay loam 6 inches thick. The substratum is yellowish brown gravelly loam sand to a depth of 60 inches or more.

The permeability is moderate in the subsoil and moderately rapid in the substratum. Available water capacity is moderate, runoff is slow, and the erosion hazard is slight. Natural fertility is medium, and the organic matter content is moderate. In unlimed areas the surface layer and the subsoil are very strongly acid.

This soil is well suited to cultivated crops, and most of the acreage is farmed. It is also suited to a variety of trees; potential productivity is high. This soil has few or no limitations for urban uses.

SlB – Sassafras loam, 2 to 5 percent slope. Sassafras loam with 2 to 5 percent slopes is gently sloping and well drained, on high terraces and divides. Slopes are smooth or convex and uniform. The areas are irregular in shape ranging from 5 to 200 acres.

The surface layer is typically dark brown loam about 8 inches thick. The subsurface layer is yellowish-brown loam about 4 inches thick. The upper part of the subsoil is yellowish brown sandy clay loam 6 inches thick. The substratum is yellowish brown gravelly loamy sand to a depth of 60 inches or more.

The permeability is moderate in the subsoil and moderately rapid in the substratum. Available water capacity is moderate, runoff is slow, and the erosion hazard is slight. Natural fertility is medium, and the organic matter content is moderate. In unlimed areas the surface layer and subsoil are very strongly acid.

This soil is well suited to crops, and most of the acreage is farmed. It is also suited to a variety of trees; potential productivity is high. This soil has few or no limitations for urban uses.

Udorthents
Udorthents in Middlesex County consist of moderately deep to deep, well drained to somewhat poorly drained soils. They formed in stratified or graded, sand or loamy fill material containing up to 35 percent gravel. Slope ranges from 0 to 3 percent. These soils have been disturbed in some way, mainly by filling or cutting an excessively drained to very poorly drained area.

UB – Udorthents, bedrock substratum. This unit is nearly level to gently sloping. The areas are irregular in shape and range mainly from 2 to 15 acres. This unit has been cut and smoothed or otherwise extensively disturbed to a depth of 3 feet or more. The original soil has been removed. Some areas are in native vegetation. Some areas are used for parking lots, landfills, or recreation areas. The variability of the characteristics of this unit makes onsite investigation necessary to determine the suitability of the unit for any use.

UC – Udorthents, clayey substratum. This unit consists of deep, moderately well drained to somewhat poorly drained soils mostly in regraded clay pits or borrow areas. The surface has been smoothed and the areas are nearly level. Most areas are used for residential, commercial, or industrial development. The variability of the characteristics of the unit makes onsite investigation necessary to determine the suitability of the unit for any use.

Urban land - UL
This unit consists of areas where industrial plants, shopping and business centers, and other structures cover more than 80 percent of the surface. The areas generally range from 2 to 1000 acres. Most are nearly level to moderately sloping, but a few are strongly sloping and steep. Fill material has been used in places to build up we t soils. Most areas have been excavated or filled with material that is now almost totally paved. Onsite investigation is needed to determine the potentials and limitations of this unit for any use.

Watchung Series
This series consists of poorly drained soils that formed in acid, fine-textured material weathered from diabase and basalt rocks. Slope ranges from 0 to 2 percent. They are generally found on the landscape with Mount Lucas, Chalfont, Woodstown, and Manahawkin soils. They are underlain with hard diabase or basalt bedrock.

Wa – Watchung very stony silt loam, 0 to 2 percent slopes. This soil is nearly level and poorly drained. It is found on toe slopes and in low-lying flats and basins in irregular areas from 5 to 100 acres. Stones cover 3 to 15 percent of the surface.

Typically, the surface is covered by about 3 inches of loose leaves and twigs. The surface layer is 8 inches thick. It is dark brown silt loam and mottled, light gray silt loam. The subsoil is mottled, light gray silty clay 29 inches thick. The substratum extends to a depth of 60 inches or more. It is brown to strong brown loam that is mottled in the lower pert. The substratum contains 5 to 25 percent rounded diabase or basalt stones or rocks.

The permeability is slow. Available water capacity is moderate and the soil has a seasonal high water table that is at or near the surface from November to May. This soil is subject to sever frost heaving. The subsoil is firm and has a moderate shrink-swell potential. Runoff is slow, and the erosion hazard is slight. The root zone of most crops extends to a depth of about 27 inches. Natural fertility is medium and organic matter content is moderate. In unlimed areas the surface layer is strongly acid and the subsoil is medium acid. Some areas of this soil have water ponded on the surface.

The seasonal high water table and a high stone content make this soil generally unsuitable for crops. It is suited to pasture if drained and is suitable to trees. The wetness, slow permeability and abundance of stones limit the soil for urban and recreational uses.

Woodstown
The Woodstown series consists of deep, moderately well drained soils that formed in acid, moderately fine textured Coastal Plain sediments. These soils are on intermediate positions, on terraces, and on toe slopes. The slopes of this series ranges from 0 to 5 percent. The soils are located on the landscape with Sassafras, Fallsington, Downer and Hammonton soils.

WdB – Woodstown sandy loam, 2 to 5 percent slopes. Woodstown sandy loam on 2 to 5 percent slopes is moderately well drained. These soils are found on the side slopes of depressions and draws and on slight knolls in South Brunswick, Monroe, East Brunswick and Cranbury Townships. Slopes are concave or convex and uniform. The areas are irregular in shape ranging from 5 to 100 acres.

The surface layer typically is dark grayish brown sand loam 8 inches thick. The subsurface layer is yellowish brown sandy loam 4 inches thick. The upper part of the subsoil is mottled, yellowish brown sandy clay loam 13 inches thick. The lower part is mottled, yellowish brown sandy loam 11 inches thick. The substratum is yellowish brown loamy sand to a depth of 60 inches or more.

The permeability of this Woodstown soil is moderate. Available water capacity is high and additional water is available seasonally from the water table. Runoff is moderately slow, and the erosion hazard is moderate. Natural fertility is medium, and organic

content is moderate. The root zone extends to a depth of 60 inches or more. The surface layer is extremely acid, and the subsoil and substratum are very strongly acid. A seasonal high water table is at a depth of 18 to 30 inches in late winter and early spring.

This soil is well suited to cultivated crops, and most of it is farmed. The soil is also well suited to woodland, and potential productivity is high. The seasonal high water table limits the soil for most urban uses including local roads and streets.

WkA – Woodstown sandy loam, clayey substratum, 0 to 2 percent slopes. This soil is nearly level and moderately well drained. These soils are found on terraces and slight knolls in irregular areas ranging from 5 to 100 acres.

The surface layer typically is dark grayish brown sandy loam 8 inches thick. The subsurface layer is yellowish brown sandy loam 4 inches thick. The upper part of the subsoil is mottled, yellowish brown and strong brown sandy clay loam 13 inches thick. The lower part is mottled, yellowish brown sandy loam 11 inches thick. The substratum is yellowish brown loamy sand to a depth of 45 inches and is yellowish brown sandy clay from 45 inches to a depth of 60 inches or more.

The permeability of this Woodstown soil is moderate in the upper layers and slow n the substratum. Available water capacity is high and additional water is available seasonally from the water table. Runoff is slow, and the erosion hazard is slight. Natural fertility is medium, and organic content is moderate. The root zone extends to a depth of 45 inches or more. The surface layer is extremely acid, and the subsoil and substratum are very strongly acid. A seasonal high water table is at a depth of 18 to 30 inches in late winter and early spring.

This soil is well suited to cultivated crops. The soil is also well suited to woodland, and potential productivity is high. The seasonal high water table and slow permeability in the substratum limit the soil for some urban uses.

WlA – Woodstown loam, 0 to 2 percent slopes. Woodstown loam with 0 to 2 percent slopes is nearly level and moderately well drained. They are found in slight depressions, in draws, and on terraces. Slopes are smooth or convex and uniform, areas are irregular in shape ranging from 5 to 400 acres.

The surface layer typically is dark grayish brown loam about 8 inches thick. The subsurface layer is yellowish brown loam 4 inches thick. The upper part of the subsoil is mottled, yellowish brown sandy clay loam 13 inches thick. The lower part is mottled, yellowish brown sand loam 11 inches thick. The substratum is yellowish brown loamy sand to a depth of 60 inches or more.

The permeability is moderate. Available water capacity is high, and additional water is available seasonally from the water table. Runoff is slow, and the erosion hazard is slight. Tilth is good. Natural fertility is medium, and organic content is moderate. The root zone extends to a depth of 60 inches ore more. In unlimed areas the surface and

subsurface layers are extremely acid and the subsoil and substratum are very strongly acid. A seasonal high water table is at a depth of 18 to 30 inches in this soil in late winter and early spring.

This soil is well suited to cultivated crops, and most of it is farmed. It is also well suited to woodland, and potential productivity is high. The seasonal high water table limits the soil for most urban uses, especially local roads and streets.

WlB – Woodstown loam, 2 to 5 percent slopes. Woodstown loam with 2 to 5 percent slopes is gently sloping and moderately well drained. These soils are found on the side slops of depressions, draws and terraces. Slopes are smooth or convex and uniform and are irregular in shape ranging from 5 to 400 acres.

Typically, the surface layer is a dark grayish brown loam about 8 inches thick. The subsurface layer is yellowish brown loam about 8 inches thick. The subsurface layer is yellowish brown loam 4 inches thick. The upper part of the subsoil is mottled, yellowish brown sandy clay loam 13 inches thick. The lower part is mottled, yellowish brown sandy loam 11 inches thick. The substratum is yellowish brown loamy sand to a depth of 60 inches or more.

The permeability is moderate. Available water capacity is high, and additional water is available seasonally from the water table. Runoff is moderately slow, and the erosion hazard is moderate. Tilth is good. Natural fertility is medium, and organic content is moderate. The root zone extends to a depth of 60 inches or more. In unlimed areas the surface and subsurface are very strongly acid. A seasonal high water table is at a depth of 18 to 30 inches in late winter and early spring.

This soil is well suited to cultivated crops and pasture. Most of the acreage is farmed, but some has been converted to urban uses. It is also well suited to woodland, and potential productivity is high. The seasonal high water table limits the soil for use for most local roads and streets.

Appendix B
Air Quality

Appendix B
Air Quality
1.0 Overview and Objectives

This document outlines the procedures used for conducting the air quality emissions modeling and carbon monoxide "hot spot" modeling analyses for the Route 92 Environmental Impact Statement (EIS). The goals of this analysis were to:

- Estimate the potential regional carbon monoxide (CO), nitrogen oxides (NO_x) and volatile organic compound (VOC) emissions;
- Determine whether or not the project meets USEPA transportation conformity requirements; and
- Estimate resulting one-hour and eight-hour ambient CO concentrations at the most affected roadway intersections.

The analysis was prepared based on the procedures set forth in the Federal Highway Administration (FHWA), U.S. Environmental Protection Agency (EPA) and New Jersey Department of Environmental Protection (NJDEP) regulations and guidelines, and guidance documents.

Regional air emissions modeling impacts were analyzed for:

- Existing Year (2001)
- Horizon Year (2028) No Action
- Horizon Year (2028) EPA Modified No-Build
- Horizon Year (2028) Route 1 Six-Lane Widening
- Horizon Year (2028) Route 1 Six-Lane Widening with Signal Removal, and
- Horizon Year (2028) Route 92.

The Horizon Year is the estimated year of completion plus 20 years, in accordance with FHWA guidance.

The emissions estimates for each alternative were compared with the Existing year emissions estimates to determine whether they would comply with EPA transportation conformity requirements.

In addition, a qualitative screening-level analysis of three sub-alternatives to the four-lane Route 92 alternative was conducted to determine how their transportation and environmental impacts might be different from the proposed four-lane Route 92. These sub-

alternatives, which are fundamentally modified designs and implementations of the currently proposed Route 92 project, consist of:

- A two-lane design for proposed Route 92 (one lane in each direction);
- A four-lane design for the proposed Route 92 (preferred alternative); and
- A four-lane proposed Route 92, without the Perrine Road interchange.

A CO "hot spot" analysis was conducted for worst-case intersections determined by a traffic level-of-service analysis conducted for 17 intersections within the traffic study network area for both Horizon Year No Action and Build (Route 92) scenarios. This analysis did not include the Route 1 alternatives as they present conditions conducive to lower CO emissions due to reduced congestion and increased network speeds, relative to the No Action alternative.

This document presents a summary of regulations and procedures to conduct a regional air emissions modeling and CO "hot spot" air quality analyses. Section 2.0 summarizes the applicable regulations and ambient air quality monitoring data. Section 3.0 contains a discussion on the data requirements needed to conduct the air quality modeling analysis. Procedures for conducting the air quality impact analyses are contained in Section 4.0, and Section 5.0 provides the results of the analyses. Section 6.0 presents conclusions and recommendations and Section 7.0 presents the references used in this air quality impact analysis. Following the text, the regional emissions and CO hot spot modeling results are presented.

2.0 Summary of Regulations and Ambient Air Quality Data

2.1 National Ambient Air Quality Standards

One of the primary purposes of the Clean Air Act (CAA) is to protect and enhance the quality of our nation's air resources. To accomplish this goal, the CAA requires the EPA to promulgate primary and secondary National Ambient Air Quality Standards (NAAQS). Primary NAAQS are those, which allow for an adequate margin of safety, to protect the public health. Secondary NAAQS are those required to protect the public welfare. The CAA delegates to state environmental agencies (i.e., NJDEP) the responsibility for attaining and maintaining these NAAQS by requiring that they adopt a plan which provides for the implementation, maintenance, and enforcement of the NAAQS. The EPA must review and approve each state implementation plan (SIP) consistent with the requirements of the CAA.

Criteria pollutants are those for which NAAQS have been established. The "criteria" air pollutants CO, VOC, and NO_x are contained in motor vehicle exhaust. VOC and NO_X are known precursors to ozone (smog) formation. **Table 1** lists the NAAQS for NO_X, CO and ozone (O_3).

Pollutant	Averaging Time	Concentration	Primary/Secondary
Nitrogen oxides (NO_X)	Annual	100 µg/m³ (0.05 ppm)	Primary
Carbon Monoxide (CO)	1-hour	40,000 µg/m³ (35 ppm)	Primary
	8-hour	10,000 µg/m³ (9 ppm)	Primary
Ozone (O_3)	1-hour	235 µg/m³ (0.12 ppm)	Primary and Secondary

Primary standards are not to be exceeded more than once per year.

Table 1
National Ambient Air Quality Standards

2.2 EPA/DOT Conformity Requirements

EPA's final conformity regulations provide the criteria and procedures required by the Clean Air Act (CAA). The regulations appear in two forms: 1) under 40 CFR 51 – State Implementation Planning, and 2) 40 CFR 93 – Determining Conformity of Federal Actions to state or Federal Implementation Plans. The transportation conformity regulations were effective November 24, 1993 and apply to EPA-designated air quality nonattainment and maintenance areas. On September 15, 1997, EPA amended the transportation conformity rule to be more streamlined and flexible. This amendment gave state and local governments more authority in choosing performance measures used to examine conformity and more discretion when a transportation plan does not conform to the SIP. These regulations require that the U.S. Department of Transportation (DOT) and Metropolitan Planning Organizations (MPOs) must make conformity determinations for metropolitan transportation plans and transportation improvement programs (TIPs) before they can adopt, accept, approve, or otherwise support such plans and programs. Further, the Federal Highway Administration (FHWA) and the Federal Transit Authority (FTA) must make conformity determinations for highway, or transit projects before DOT or a MPO approves or funds such projects.

On September 5, 2002, EPA created two minor amendments to the Transportation Conformity Rule. The first provides a one-year grace period before conformity is required in areas designated nonattainment for a given air quality standard for the first time. The second amendment requires states to determine conformity within 18 months of EPA's affirmative finding that SIP's motor vehicle emissions budgets are adequate.

The North Jersey Transportation Planning Authority (NJTPA) is the MPO responsible for air quality conformity throughout the region. The Route 92 Corridor is within the NJTPA. Transportation improvement programs are revised and updated annually in the planning process to monitor improvements to air quality conditions throughout the region. The planning year of analysis is 2007 for the MPO, which represents the year that ozone

attainment is mandated by the Clean Air Act Amendments of 1990. The planning year horizon for the Route 92 project is 2028.

On December 16, 1999, the EPA proposed to approve New Jersey's demonstration of attainment, provided the State address a number of conditions (64 Federal Register 70380). The State's proposed SIP revision provides an update to the demonstration of attainment to meet EPA's conditions. One the conditions is a commitment to achieve New Jersey's fair share of an additional level of emission reductions that were identified by the EPA as necessary for attainment of the ozone National Ambient Air Quality Standard (NAAQS). The EPA is allowing states to take credit for the emission reductions from the recently promulgated federal Tier 2 Motor Vehicle Standard/Low Sulfur Gasoline Program. New Jersey's proposed SIP revision provides a revised transportation conformity budget for attainment year 2007 (New York, Northern New Jersey Non-Attainment area) incorporating the predicted benefits from the federal Tier 2 Motor Vehicle Standard/Low Sulfur Gasoline program for that year (*NJDEP, Proposed State Implementation Plan (SIP) Revision for the Attainment and Maintenance of the One-Hour Ozone National Ambient Air Quality Standard, February 4, 2000*).

The EPA released the MOBILE5 Information Sheet #8 to incorporate the benefits of the Tier 2/Low Sulfur Gasoline program (hereafter referred to as Tier 2) on May 3, 2000 (*USEPA, MOBILE5 Information Sheet #8 Tier 2 Benefits Using MOBILE5, EPA420-F-00-001, April 2000*). The Tier 2 program is designed to reduce emissions of precursors of ozone (NO_x and non-methane organic compounds (NMOG) which contribute to ambient VOC concentrations). The Tier 2 program is built into the MOBILE6.2 model, which was released October 2002.

The regulations apply to all "regionally significant" highways and transit projects in nonattainment and maintenance areas, not just those that trigger a federal action or receive federal funds. A "regionally significant" transportation project is a principal arterial roadway or higher functional classification, plus any other facility that serves regional travel needs, and would normally be included in the SIP emissions modeling for the transportation network. The MPO or DOT responsible for the approval or support of the affected transportation-related plans, programs, or projects must conduct a conformity analysis. The regulations also require a regional emissions analysis of transportation-related plans and programs, and transportation projects funded or approved by FHWA or FTA must also be analyzed for local impacts in certain nonattainment areas.

The transportation conformity regulations only apply in nonattainment and maintenance areas to transportation plans, transportation improvement programs, FHWA/FTA projects, and non-FHWA/FTA projects that are regionally significant. Middlesex County is classified as either in attainment or unclassified for all NAAQS, except for ozone.

2.2.1 Conformity Determination Criteria

The Clean Air Act requires transportation plans and projects to conform to applicable state implementation plans to attain ambient air quality standards. Conformity determinations are to be based upon the most recent emissions budgets contained in the most recently approved plan prepared by the MPO having jurisdiction over the air quality area. The

Clean Air Act Amendments of 1990 define project level conformity to an implementation plan as:

- eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards (NAAQS) and achieving expeditious attainment of such standards; and
- that such activities will not:

  (i) cause or contribute to any new violation of any standards in any area;

  (ii) increase the frequency or severity of any existing violation of any standard in any area; and

  (iii) delay timely attainment of any standard or any required interim emission reductions or other milestone in any area.

Under 40 CFR 93.109, the general requirements for a project not from a conforming plan and TIP to demonstrate conformity of a transportation plan are that projects should meet the following criteria in the Final Transportation Conformity Rule:

- 93.110 Criteria and Procedures: Latest Planning Assumptions
- 93.111 Criteria and Procedures: Latest Emissions Model
- 93.113 Criteria and Procedures: Timely Implementation of TCMs
- 93.116 Criteria and Procedures: Localized CO and PM_{10} violations (hot spots)
- 93.118 Criteria and Procedures: Motor Vehicle Emissions Budget, or
- 93.119 Criteria and Procedures: Emission Reductions in Areas without Motor Vehicle Emissions Budgets

The Route 92 Corridor is located in an ozone nonattainment area and in a CO attainment area (See Section 2.3). Therefore, the conformity determination must be conducted using either the budget (93.118), or emission reduction test (93.119) procedures. For this air quality analysis, conformity determination criteria are based on the emission reduction tests. The conformity determination for ozone must follow the procedures set forth in 93.119.

The emission reduction test (Section 93.119(b) of the final conformity rule) is that the long-range (2007 and project build out year) transportation plan must contribute to a reduction in ozone and CO in nonattainment areas. That is, project emissions must be less than the "baseline" emissions. In order to satisfy this criterion, the "Baseline" scenario, as defined in Section 93, must be composed of all in-place regionally significant highway and transit facilities, services and activities, all ongoing travel demand management or transportation system management activities, and reflect the completion of all regionally significant projects, independent of funding source, which are currently under construction, undergoing right-of-way acquisition and protective buying, and have completed the NEPA

process. The "Baseline" scenario is represented by the Existing and No Action alternatives for this project.

The Build (Route 92) scenario must be composed of all projects implemented as components of the approved transportation plan, TIPs adopted under transportation plans, and all other regionally significant projects reasonably anticipated to be completed under the long range transportation plan, including those non-FHWA/FTA highway and transit projects that have clear funding sources and commitments leading toward their implementation and completion by the year of analysis.

To demonstrate whether a reduction in emissions would occur for the transportation plan, estimates of emissions predicted to result from travel on the transportation systems defined by the Baseline and Build scenarios must be performed to determine the difference in regional nonattainment pollutant or pollutant precursor emissions. The criterion of 93.119 is satisfied if, the estimates of regional emissions predicted for the Route 92 scenario are less than those emissions for the Existing and No Action scenarios.

In accordance with 93.122(b)(1), a network-based transportation demand model, relating travel demand and transportation system performance to land-use patterns, population demographics, employment, transportation infrastructure, and transportation policies (for long range planning assumptions), was used to estimate transportation impacts and travel-related parameters for use in the air quality emissions analysis of the Route 92 study area. The criterion in 93.118 would be satisfied if the regional emissions analysis demonstrates that emissions for each of the applicable pollutants or pollutant precursors are less than or equal to the motor vehicle emissions budget estimated for the horizon year of 2028.

2.3 NJDEP Ambient Air Quality Data

The most recent ambient air monitoring data for CO were obtained from NJDEP for a monitoring station located near the project area. According to EPA (http://www.epa.gov/air/data/index.html), the New Jersey Air Quality Control Region 043 (New York-New Jersey-Connecticut), including Middlesex County, is classified as "attainment" for CO. The monitoring location nearest to proposed Route 92 is at Georges Road, west of the US Route 130/US Route 1 intersection in North Brunswick. However, this location is not representative of the proposed Route 92 region because this monitoring station is located in an area that is more urban than the Route 92 study area. The NJDEP recommends that in the absence of a representative monitoring station, default concentrations can be used the microscale CO modeling analysis. The recommended one-hour concentrations are 5 parts per million (ppm) for an intersection located in a Central Business District; 3 ppm for a suburban area; and 1 ppm for a rural area. The recommended eight-hour CO concentrations are 3.5 parts per million (ppm) for an intersection located in a Central Business District; 2.1 ppm for a suburban area; and 0.7 ppm for a rural area. (NJDEP, *Air Quality Analysis for Intersections*, November 2001). The Route 92 study area is representative of a suburban area; therefore, 3 ppm and 2.1 ppm were used to represent existing one-hour and eight-hour background CO concentrations, respectively.

3.0 Data Requirements

This section outlines the data needed to conduct the emissions and air quality modeling analyses that were obtained from the 1994 DEIS and from the traffic modeling analysis.

3.1 Roadway Design Information

The Horizon Year No Action and Build roadway design data required for the air modeling analysis were:

- Length of each roadway segment;
- Widths of each lane; and
- Total pavement widths including paved shoulders and median strips.

3.2 Traffic Data

Existing and projected future years traffic data supplied by the traffic engineers was reviewed for all of the critical roadway intersections in the traffic network study area. The air quality study area is defined as a 6-mile proposed Route 92 corridor stretching from the US Route 1 to New Jersey Turnpike. **Figure 1** shows the air quality study area. The traffic engineers also conducted level-of-service analyses (LOS) for 17 intersections within the study area. Each intersection was reviewed and four worst-case intersections were selected for the CO "hotspot" analysis based on procedures outline in Section 4.

The traffic engineers provided the future vehicle running speeds for each roadway segment for the Horizon Year No Action and Build scenarios for Route 92.

4.0 Air Quality Impact Analysis Procedures

A regional emissions modeling and hot spot CO modeling analysis was performed, as required by FHWA and EPA. Guidelines provided by FHWA, NJDEP and EPA were used to perform the air modeling analysis. The air quality modeling was conducted based on EPA's *Guideline for Modeling Carbon Monoxide from Roadway Intersections, 1992*, and *NJDEP, Air Analysis for Intersections, November 2001* for four critical roadway intersections for the Horizon Year No Action and Build scenarios.

4.1 MOBILE6.2 Emission Factor Modeling Methodology

The requirements of 93.111 of the Final Conformity Rule, "Latest emissions model", are satisfied if the conformity determination is based upon the latest emission

Source: F.R. Harris, 1998

CDM

Figure 1
Air Quality Study Area

estimation model available. Pursuant to 93.111, the mobile source emission factors used for the air quality analyses were estimated using the EPA Mobile Source Emissions Factor Model, MOBILE6.2 (October, 2002), and subsequent EPA MOBILE6.2 documentation relevant to the project.

Analysis of mobile source emissions within the proposed Route 92 corridor requires a comparative analysis of the Existing, EPA Modified No Build, Route 1 Improvement Alternatives, and the Horizon Year No Action and Build scenarios. Emission factors used to quantify mobile source impacts and benefits of the alternatives were obtained using MOBILE6.2. This model was used to estimate the 2001 and 2028 No Action and Build speed-dependent mobile source emissions.

The emission rates of individual vehicles are influenced by factors such as ambient air temperature, engine temperature, operating mode, average speed, and maintenance. The average emission rate for a fleet of vehicles operating on a highway is further influenced by the composition of the fleet, vehicle type, and vehicle age. System-wide variables such as fleet turnover, and the effects of clean fuels programs, maintenance programs, and inspection programs, are reflected in the MOBILE6.2 emission factors.

The assumed system-wide variables are the same among alternatives analyzed for a specific year of interest (e.g., 2028).

Area-specific data used in determining MOBILE6.2 emission factors included:

- Vehicle Registration Rates;
- Vehicle Miles Traveled (VMT) mix for gasoline and diesel vehicle classes;
- Tier 1 Testing exhaust emission standards for light-duty vehicles (passenger cars and light-duty trucks);
- Reformulated Gasoline information for NO_x reduction benefits
- Inspection and Maintenance (I/M) programs for both centralized and de-centralized I/M programs, and
- Anti-Tampering Program (ATP).

Table 2 presents the MOBILE6.2 input setup for each model year provided by NJTPA. This MOBILE6.2 input setup for that year was used to represent Horizon Year (2028).

MOBILE6.2 produced emission factors for cold start idle emission conditions representative of the A.M. peak hour period and network-averaged vehicle speeds in miles per hour (mph). Carbon monoxide emissions were estimated using ambient January temperature of 31°F, while VOC and NO_x were estimated using ambient July temperature of 95°F. This because winter is the worst-case for CO concentrations and summer is the worst time for ozone (smog) formation from VOC and NO_x precursors.

NJDEP requires a two-step method be used to estimate the impact of the vehicle inspection program on emissions from highway mobile sources in New Jersey. These steps are:

- Estimate emissions from all vehicles as if they were inspected at a centralized test-only inspection facility, and
- Estimate emissions from all vehicles as if they were inspected at a decentralized inspection facility test-and-repair facility.

4.2 Regional Emissions Modeling Methodology

Two MOBILE6.2 models runs were run for each model year scenario. These model runs include:

- 2001 Existing Year for CO centralized and decentralized I/M program
- 2001 Existing Year for NO_x and VOC centralized and decentralized I/M program
- 2028 Existing Year for CO centralized and decentralized I/M program
- 2028 Existing Year for NO_x and VOC centralized and decentralized I/M program

The procedure to estimate regional mobile source emissions for the 2001 Existing, 2028 No Action, and 2028 Route 92 consisted of using the output from the Statewide Transportation Planning Model used to estimate vehicle miles traveled (VMT) and average travel speed for the entire network. Regional emissions were calculated based on the VMT, average travel speed and emission factor dependent emissions contribution of the network. The composite results of the regional emissions inventory were then converted to tons of pollutant per hour from the entire network. The methodology used to estimate the emissions totals are consistent with that used in the 1994 DEIS. The approach is summarized in the following steps:

- Determine vehicle-miles traveled for the roadway network for each model year scenario;
- Determine average transportation network speed for each model year scenario;
- List emissions factors for each pollutant in a cross-referenced table based on scenario;
- Convert MOBILE6.2 emissions factors from grams/vehicle-mile to tons/vehicle-mile; and
- Calculate tons-per-hour emission rate for each link by multiplying the tons per vehicle-mile emission factor by the VMT per hour for the entire transportation network.

Registration Distribution by Age	New Jersey specific registration distribution
Refueling Emission Factors	Stage 2
Anti-tampering program (ATP)	NJ Specified ATP, functional purge check of emission control system
Inspection and Maintenance Program Inputs	7 New Jersey Specified I/M programs
Scenario Descriptive Input	
Calendar Year of Evaluation	2001, and 2028 (No-build & Build)
Evaluation Month	1 (CO Modeling), 7 (NOx & VOC Modeling)
Max/Min Temperature	31.0 31.0 (CO Modeling)
Absolute Humidity	64.4
Fuel Reid Vapor Pressure (RVP)	9.0
Fuel Program	2 N (Reformulated Gasoline for North Region)
VMT Fractions	DEP Specified
Average Speed	Provided by Traffic Engineers; specific to each alternative/case/location being modeled

Source: North Jersey Transportation Planning Authority, SIP MOBILE6 Input Files, 2003
New Jersey Department of Environmental Protection, Air Quality Analysis For Intersections, November 2001.

Table 2
MOBILE6.2 Model Input Parameters

4.3 CAL3QHC Modeling Methodology

4.3.1 Intersection Selection

Local CO "hot spot" (microscale) modeling was conducted based on procedures outlined by EPA (USEPA, *Guideline for Modeling Carbon Monoxide from Roadway Intersections*, EPA-454/R-92-005, 1992). These procedures were used to calculate worst-case one-hour CO concentrations. Horizon Year No Action and Build projected traffic data were reviewed to identify intersections and/or congested areas at which CO concentrations could be potentially adverse (with and without the project). The selection of the worst-case intersections is based on the level-of-service (LOS) of an intersection. The LOS is a measure of the operating conditions of an intersection based on the combined traffic volume, signal timing and related congestion and delay. The LOS delay is rated on a scale from A to F, with a LOS A describing intersection operations with very low delays (i.e., less than 5 seconds per vehicle) and a LOS F describing intersection operations with delays in excess of 60 seconds per vehicle. This condition is considered over saturation, which is when traffic volumes exceed the capacity of the intersection.

The methodology used to determine critical intersections is based on those intersections at LOS D, E or F or those that have changed to LOS D, E or F because of increased traffic volumes or construction related to a new project. For this project, the method used to select critical intersections for CO hot spot modeling was to rank the 17 intersections by LOS and delay times and model the top four intersections based on the worst LOS.

The traffic engineers conducted a LOS analysis for 17 intersections within the traffic network study area. **Table 3** presents a comparison of the LOS for the No Action and Build scenarios for each intersection. Of these 17 intersections, ten of them had LOS F. These ten intersections were then ranked by the delay time from highest to lowest. The four worst-case intersections ranked in order of delay time are listed below.

	No Action		Build	
Intersection	**Level-of Service**	**Delay Time (s)**	**Level-of Service**	**Delay Time (s)**
Dey Rd./CR535	F	1195	F	1768
Rt. 32 (Forsgate Dr.)/CR535	F	269.0	F	620.4
George Rd./Kingston Ln.	D	37.5	C	22.1
Cozzens Ln./Rt. 1	F	289.6	F	233.2
New Road/Rt. 1	F	172.2	F	159.6
Rt. 1/Ridge Rd.	F	N/A	F	N/A
CR522/Rt. 1	F	230.1	F	N/A
Sandhill Rd./Rt. 1	F	191.4	F	153.7
Rt. 27/Raymond Rd.	F	170.3	F	115.3
Rt. 27/Rt. 522	E	77.3	D	53.6
Rt. 522/Kingston Ln.	F	742.5	F	749.2
Rt. 535/Plainsboro	E	67.2	D	50.0
Scudder's Mill Rd./Dey Rd.	F	N/A	F	N/A
Scudder's Mill/Schalk's Crossing	F	206.2	F	158.5
US 130/Dey Rd.	F	1794	F	1664
US 130/Friendship Rd.	F	329.7	F	178.5
Herrod Ave./Rt. 32	N/A	N/A	N/A	N/A

Table 3
Level-of-Service Intersection Analysis
Horizon Year No Action and Build Scenarios

- Dey Road/CR 535
- US 130/Dey Road
- Route 522/Kingston Lane
- Route 32 (Forsgate Drive)/CR 535

These four intersections were evaluated in the microscale CO modeling analysis.

4.3.2 Input Parameters

The CAL3QHC model was used to calculate one-hour CO concentrations at receptors located near each intersection. The following input parameters were used in CAL3QHC:

MOBILE6.2 Modeling Results

- CO emission factors for each model year

Screening Meteorological Variables

- Temperature: 31°F (average January temperature for New Jersey)
- Surface roughness: (cm/s) (See **Table 4**)
- Atmospheric mixing height: 1,000 m
- Wind direction: every 5° of wind direction from 0° to 360°
- Wind speed: 1.0 m/s
- Atmospheric stability class (use Auer method to determine if an area within three kilometers is more than 50 percent urban or rural); stability class D and E for urban and rural areas, respectively. A stability class E was selected because of the more rural character of the surrounding land use.

Site Variables

- Roadway segment width (m or ft)
- Roadway segment centerline coordinates (x, y, z) (m or ft)
- Receptor coordinates (x, y, z) (m or ft)

Traffic Variables

- Traffic volume for each roadway segment (vehicles/hr)
- Travel speed for each roadway segment (mph)
- Emissions source height was set at 0.0 m

As discussed in Section 3.0, site and traffic variables were obtained from the 1994 DEIS and results from traffic modeling analysis.

4.3.3 Selecting Receptor Locations

Receptor locations selected for estimating maximum CO concentrations near a roadway segment were based on guidance provided by EPA (USEPA, *Guideline for Modeling Carbon Monoxide from Roadway Intersections,* EPA-454/R-92-006, 1992) and NJDEP (*NJDEP, Air Quality Analysis For Intersections, November 2001*). According to this guidance, the following are appropriate receptor locations:

- All sidewalks to which the general public has access on a more-or-less continuous basis.

Type of Surface	z_o (cm)
Smooth desert	0.03
Grass (5-6 cm)	0.75
Grass (4 cm)	0.14
Alfalfa (15.2 cm)	2.72
Grass (60-70 cm)	11.40
Wheat (60 cm)	22.00
Corn (220 cm)	74.00
Citrus orchard	198.00
Fir forest	283.00
City land-use	
Single family residential	108.00
Apartment residential	370.00
Office	175.00
Central business district	321.00
Park	127.00

Source: U.S. EPA, Guideline for Modeling Carbon Monoxide from Roadway Intersections, EPA-454/R-92-005, 1992

Table 4
Surface Roughness Lengths (Z_o) for Various Land Uses

- Vacant lots near an intersection, where the general public would have continuous access in the immediate vicinity.
- Portions of a nearby parking lot to which pedestrians have continuous access.
- In the vicinity of parking lot entrances and exits, provided a nearby area contains a public sidewalk, residences, or structures to which the general public is likely to have continuous access.
- On the property lines of all residences, hospitals, rest homes, schools, playgrounds, and the entrances and air intakes to all other buildings.
- At least four receptors should be modeled for each intersection.

One receptor location was selected for each leg of the intersection and both sides of the roadway for a total of four receptors for each intersection. The receptors were placed at least three meters from the edge of each roadway and at a height of 1.8 meters per the guidance in the *NJDEP, Air Quality Analysis For Intersections, November 2001.*

4.3.4 Vehicle CO Emissions Estimates

CO emissions were calculated by intersection roadway link for vehicle speeds provided the results of the traffic intersection analysis. Vehicle speed estimates were provided for both the Horizon Year No Action and Build scenarios. The MOBILE6.2 model is limited to vehicle speeds of 2.5 to 65 mph. The pollutant emissions for each roadway segment is equal to the MOBILE6.2 emission factor for that roadway segment multiplied by the vehicle miles traveled (VMT). VMT is estimated based on the hourly traffic volumes multiplied by the length of the roadway segment. For the microscale analysis, CO emissions were estimated by multiplying the total peak one-hour volume and length of a roadway segment used in CAL3QHC. MOBILE6.2 emission factors (in grams per vehicle-mile) were directly inputted into CAL3QHC. The CO emissions were used for the microscale air modeling analysis to estimate Horizon Year ambient CO concentrations. The MOBILE6.2 input file used for this microscale modeling analysis was provided by NJTPA and is presented in **Table 2.**

4.4 Existing and Horizon Year Background CO Impacts

CO impacts for the Existing Year were based on a one- and eight-hour CO background concentration of 3 ppm and 2.1 ppm, respectively (See Section 2.3). The Horizon Year No Action and Build background CO concentrations were estimated using EPA's methodology for calculating future background CO concentrations. The "present" concentrations were multiplied by the ratio of the future MOBILE6.2 CO emission factor to the present CO emission factor, and by the ratio of future traffic volume to present traffic volume, for each modeled location (*USEPA, Guideline for Modeling Carbon Monoxide from Roadway Intersections, EPA-454/R-92-005, November 1992*). **Table 5** presents the background concentrations for 2001 and 2028 No Action and Build scenarios.

Year	One Hour Second Highest (ppm)	Eight Hour Second Highest (ppm)
2001	3.0	2.1
2028 No Action	2.0	1.4
2028 Build	1.9	1.3

Table 5
Existing and Horizon Year Background CO Concentrations

5.0 Air Quality Impact Analyses Results

5.1 Regional Emissions Modeling

Regional emissions modeling were performed for the Existing Year (2001) and Horizon Year (2028). The Horizon Year contained the following scenarios: No Action, EPA Modified No-Build, Route 92, Route 1 Six-Lane Widening, and Route 1 Widening with Signal Removal. Two additional scenarios, 2-Lane Route 92 and Route 92 w/o Perrine Road Intersection, were added for a sub-alternative analysis discussed in **Section 5.1.3**. This modeling was conducted with the following goals:

- Estimate the potential regional CO, NO_x, and VOC emissions;
- Determine whether or not the Route 92 project meets EPA transportation conformity requirements.

The estimation of the potential regional CO, NO_x, and VOC emissions was based on predicted vehicle miles traveled (VMT) along with average speeds in the study area. This data combined with emission factor data from EPA's Mobile Source Emissions Factor Model, MOBILE6.2, was used to generate a tons-per-hour emission rate for each model scenario.

The traffic engineer, using the Statewide Transportation Planning Model, supplied the VMT and average speed data. These data for each scenario are presented in **Table 6**. Emission factor data were estimated for each scenario for CO, NO_x, and VOCs using MOBILE6.2. The MOBILE6.2 inputs for each scenario model run are presented in Section 4.1, **Table 2**. **Table 7** contains the emissions factors for the Route 92 Traffic Study Region.

The resultant VOC, CO, and NO_x pollutant loadings for the 2001 and 2028 build/No Action scenarios were calculated using the VMT values from **Table 6** and the emissions factors from **Table 7**. This calculation is performed by multiplying the VMT for a specific scenario by the emissions factor for each pollutant and scenario. The results of these calculations are displayed in **Table 8**.

Year	Scenario	VMT	Avg. Speed (mph)
2001	Existing	864,883	22.6
2001	2-Lane Route 92	844,285	24.7
2028	No Action	1,163,744	17.7
2028	EPA Modified No-Build	1,165,285	19.4
2028	Route 1 Six-Lane Widening	1,158,159	18.8
2028	Route 1 Widening with Signal Removal	1,162,800	20.0
2028	2-Lane Route 92	1,153,238	20.4
2028	Route 92 w/o Perrine Road Intersection	1,153,686	21.0
2028	Route 92	1,152,027	21.1

Table 6
VMTs and Average Speeds in the Traffic Study Area

Year	Scenario	VOC (g/mile)	CO (g/mile)	NO_x (g/mile)
2001	Existing	1.24	23.83	1.93
2001	2-Lane Route 92	1.21	23.67	1.91
2028	No Action	0.30	11.59	0.17
2028	EPA Modified No-Build	0.29	11.50	0.17
2028	Route 1 Six-Lane Widening	0.29	11.53	0.17
2028	Route 1 Widening with Signal Removal	0.29	11.48	0.17
2028	2-Lane Route 92	0.28	11.46	0.17
2028	Route 92 w/o Perrine Road Intersection	0.28	11.43	0.17
2028	Route 92	0.28	11.43	0.17

Table 7
Final Emission Factors

Year	Scenario	VOC (tons)	CO (tons)	NO_X (tons)
2001	Existing	1.17	22.39	1.81
2001	2-Lane Route 92	1.14	22.24	1.80
2028	No Action	0.38	14.71	0.22
2028	EPA Modified No-Build	0.37	14.60	0.22
2028	Route 1 Six-Lane Widening	0.37	14.66	0.22
2028	Route 1 Widening with Signal Removal	0.36	14.59	0.22
2028	2-Lane Route 92	0.36	14.57	0.22
2028	Route 92 w/o Perrine Road Intersection	0.35	14.54	0.22
2028	Route 92	0.35	14.51	0.22

Table 8
Total VOC, CO, NO_x Loadings

5.1.1 Comparison of Build / No Action Alternatives

The emissions loading data in **Table 8** reveals that all 2028 scenarios produce a reduction of VOC, CO, and NO_x loadings when compared to the Existing Year scenario of 2001. Route 92 produces a 70% VOC reduction compared to the 67% by the No Action scenario. Additionally, the largest reductions of CO emissions (35%) occur with the Route 92 preferred alternative. All of the 2028 alternatives produce an 88% reduction of NO_x loadings.

It is important to note that all 2028 scenarios show a reduction of emission rates for CO, VOC and NO_x. However, Route 92 displays the largest emission rate reduction for CO and VOC. It is clear from this analysis that the Route 92 scenario produces emissions of VOC, CO, and NO_x that are all less than the (2028 No Action) scenario. Based on the above information, the Route 92 scenario meets EPA's conformity regulations.

A comparison of the regional emissions modeling analysis between the two Route 1 widening scenarios is presented below.

5.1.2 Comparison of Route 1 Signalized and Unsignalized Alternatives

There are two scenarios for Route 1: six lanes with signalization and six lanes with signal removal. The first scenario involves widening the road to six lanes and keeping existing

signalization. The second removes five traffic signals and replaces them with overpasses and ramps in addition to widening the road.

Both of these scenarios produce an 88% decrease in NO_x. However, the latter produces nearly a 1% greater reduction of CO and VOC loading. From an air quality standpoint, removing signals, which increases network speeds, makes the Route 1 Widening with Signal Removal the next best alternative after Route 92.

As discussed in Section 1, "hotspot" analyses were not performed for either Route 1 widening scenario. Both alternatives, when compared to No Action, provide higher network speeds and lower vehicle miles, which would result in reduced congestion. It is expected that these conditions would reduce CO emissions, eliminating the need for this analysis.

5.1.3 Screening-level Analysis of Three Sub-Alternatives

An air quality screening-level regional emissions modeling analysis was conducted to assess the air quality impacts of three sub-alternatives:

- A two-lane design for proposed Route 92 (one lane in each direction);
- A four-lane design for the proposed Route 92 (preferred alternative); and,
- A four-lane proposed Route 92, without the Perrine Road interchange.

The emissions loading data in **Table 8** show a reduction of CO, VOC and NO_x from all 2028 alternatives when compared to the Existing Alternative. Each 2028 alternative produces similar NO_x and VOC emission loadings. However, the four-lane Route 92 Preferred Alternative produces the smallest loadings for CO when compared to the 2028 No-Build Alternative. The Preferred Alternative results in a 7.9% reduction in VOC emissions and nearly a 1.4% reduction in CO emissions compared to the No-Build alternative. The Route 92 without Perrine Road alternative also results in 7.9% reduction in VOC emissions but only a 1.2 % reduction in CO emissions compared to the No-Build alternative, and the two-lane Route 92 alternative results in a 5.2% reduction in VOC emissions and less than a 1% reduction in CO emissions compared to the No-Build alternative.

5.2 CAL3QHC Modeling

A CO "hot-spot" analysis was performed for the Horizon Year (2028) No Action and Build scenarios for the four worst-case intersections within the Route 92 traffic network area. The input parameters used in these analyses can be found in Section 4.3.2. A surface roughness coefficient of 108 cm was used to represent the surrounding land use. In addition, the Route 92 study area was determined to be more rural than urban; therefore, stability class E was used to represent atmospheric conditions in the area.

CAL3QHC predicted worst-case one-hour average CO concentrations for the Horizon Year No Action and Route 92 scenarios. The results were added to ambient CO levels and compared with the NAAQS. The one-hour analysis was multiplied by a persistence factor

to determine the eight-hour result. A persistence factor of 0.7 is recommended as a conservative conversion from a 1-hour average concentration to an 8-hour average concentration (USEPA, *Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised*, EPA-454/R-92-019, October 1992).

Table 9 presents the results of the CO microscale analysis for the Horizon Year No Action and Build for the four worst-case intersections. The maximum one-hour CO concentrations ranged from 3.4 ppm at the Kingston Lane/Route 522 intersection to 7.1 ppm at the Route 32/CR 535 intersection for the No Action alternative. The Route 92 alternative produced lesser one-hour CO concentrations at all four intersections with maximum concentrations ranging from 3.0 ppm at the Kingston Lane/Route 522 intersection to 5.1 ppm at the US 130 / Dey Road intersection. The one-hour CO concentrations for each alternative were less than the one-hour NAAQS of 35 ppm.

Maximum eight-hour CO concentrations ranged from 2.4 ppm at the Kingston Lane/Route 522 intersection to 5.0 ppm at the Route 32/CR 535 intersection for the No Action alternative. Smaller maximum eight-hour CO concentrations were produced by the Route 92 alternative, ranging from 2.1 ppm at the Kingston Lane/Route 522 intersection to 3.6 ppm at the US 130 / Dey Road intersection for the Route 92 alternative. Both alternatives resulted in eight-hour CO concentrations that were below the NAAQS of 9 ppm.

CAL3QHC output files for each intersection are provided following Section 7.

Intersections	One-Hour Average 2028		Eight-Hour Average 2028		NAAQS	
	No Action	Build	No Action	Build	1 hour	8 hour
Dey Road and CR 535	4.2	3.9	2.9	2.7	35	9
US 130 and Dey Road	5.4	5.1	3.8	3.6	35	9
Kingston Lane /Route 522	3.4	3.0	2.4	2.1	35	9
Route 32 and CR 535	7.1	4.7	5.0	3.3	35	9

Table 9
CAL3QHC Predicted Maximum CO Concentrations, in ppm

5.3 Construction Fugitive Dust Impacts

Construction fugitive dust impacts are discussed qualitatively, because they are generally considered temporary. Construction phases, duration, and dust generation potential is based on information provided by the NJTA. Some of the measures that may be used to mitigate the impacts of fugitive dust include:

- Water or chemical dust suppressant spraying on exposed areas;

- Covering trucks hauling dust generating materials to and from the site;
- Washing wheels and underbodies of construction vehicles prior to departure from the site;
- Reducing vehicle flow over non-paved areas;
- Routinely cleaning paved areas to lessen the amount of dust available to be re-suspended.

6.0 Conclusions and Recommendations

The air quality modeling analyses were conducted based on conformity determination criteria presented in Section 2 and CO microscale modeling methodology described in Section 4. The results of the regional emissions modeling analysis found that regional network emissions for Route 92 are projected to be less than the 2001 Existing emissions. Therefore, Route 92 has demonstrated to meet the conformity criterion of 93.119. In addition the results of CO microscale modeling analysis found that the Route 92 alternative would improve CO ambient concentrations when compared to the No Action alternative in Horizon Year 2028.

7.0 References

NJDEP, *Air Quality Analysis For Intersections*, November 2001.

USEPA, *Guideline on Air Quality Models (Revised), U.S. EPA-450/2-78-027R*, July 2001.

USEPA, *User's Guide to CAL3QHC Version 2.0, A Modeling Methodology for Predicting Pollutant Concentrations Near Roadway Intersections, U.S. EPA-454/12-92-006*, December 1992.

USEPA, *Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised*, EPA-454/R-92-019, October 1992.

USEPA, *Guideline for Modeling Carbon Monoxide from Roadway Intersections, U.S. EPA-454/R-92-005*, November 1992.

MOBILE6.2 INPUT/OUTPUT

2001 - Base Case		
Pollutant	Totals (g/mile)	Total Tons
CO	23.83	22.39
NOx	1.93	1.81
VOC	1.24	1.17
	VMT=	852,279

2001 - 2-Lane Route 92		
Pollutant	Totals (g/mile)	Total Tons
CO	23.67	22.24
NOx	1.91	1.80
VOC	1.21	1.14
	VMT=	844,285

2028 - No Build		
Pollutant	Totals (g/mile)	Total Tons
CO	11.59	14.71
NOx	0.17	0.22
VOC	0.30	0.38
	VMT=	1,163,744

2028 - EPA No Build		
Pollutant	Totals (g/mile)	Total Tons
CO	11.50	14.60
NOx	0.17	0.22
VOC	0.29	0.37
	VMT=	1,165,285

2028- Route 92		
Pollutant	Totals (g/mile)	Total Tons
CO	11.43	14.51
NOx	0.17	0.22
VOC	0.28	0.35
	VMT=	1,152,027

2028 - 6-Lane Route 92		
Pollutant	Totals (g/mile)	Total Tons
CO	11.53	14.66
NOx	0.17	0.22
VOC	0.29	0.37
	VMT=	1,158,159

2028 - Rt. 1 with Signals Removed		
Pollutant	Totals (g/mile)	Total Tons
CO	11.48	14.59
NOx	0.17	0.22
VOC	0.29	0.36
	VMT=	1,162,800

2028 - 2-Lane Route 92		
Pollutant	Totals (g/mile)	Total Tons
CO	11.46	14.57
NOx	0.17	0.22
VOC	0.28	0.36
	VMT=	1,153,238

2028 - Route 92 w/o Perrine Rd Int.		
Pollutant	Totals (g/mile)	Total Tons
CO	11.43	14.54
NOx	0.17	0.22
VOC	0.28	0.35
	VMT=	1,153,686

Comparison to the base case Pollutant Changes			
Alternative	**CO**	**NOx**	**VOC**
2001 - 2-Lane Route 92	-0.66%	-0.78%	-2.65%
2028- No Build	-34.28%	-87.86%	-67.27%
2028- Route 92	-35.17%	-87.86%	-69.77%
2028 - 2-Lane Route 92	-34.94%	-87.85%	-69.30%
2028 - Route 92 w/o Perrine Rd Int.	-35.06%	-87.85%	-69.62%
	-0.90%	0.00%	-2.50%

Comparision to Preferred Alternative - 2028 Route 92 Pollutant changes			
Alternative	**CO**	**NOx**	**VOC**
2028 - No Build	1.382%	0.000%	8.273%
2028 - 2-Lane Route 92	0.359%	0.105%	1.545%
2028 - Route 92 w/o Perrine Rd Int.	0.179%	0.144%	0.504%

Note: Positive values indicate percentage increase in pollutant loading

```
MOBILE6 INPUT FILE :
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REPORT FILE        :  01HC-NOx.out
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WITH FIELDNAMES    :
EMISSIONS TABLE    :  01HC-NOx.TB1
POLLUTANTS         :  HC NOX
AGGREGATED OUTPUT  :
RUN DATA           :

REG DISTRIBUTION   : NJ_REG.D
STAGE II REFUELING :
89 1 85. 70.
ANTI-TAMP PROGRAM  :
85 75 50 22222 22222222 2 12 098. 12211112
I/M EFFECTIVENES   : 0.94 0.94 0.94
I/M PROGRAM        : 1 1974 2050 2 TRC IDLE
I/M MODEL YEARS    : 1 1941 1980
I/M VEHICLES       : 1 22222 22222222 2
I/M STRINGENCY     : 1 30.0
I/M COMPLIANCE     : 1 98.0
I/M WAIVER RATES   : 1 0.0 0.0
I/M PROGRAM        : 2 2004 2050 2 TRC OBD I/M
I/M MODEL YEARS    : 2 1996 2050
I/M VEHICLES       : 2 22222 11111111 1
I/M STRINGENCY     : 2 30.0
I/M COMPLIANCE     : 2 98.0
I/M WAIVER RATES   : 2 0.0 3.0
I/M GRACE PERIOD   : 2 4
I/M PROGRAM        : 3 2000 2050 2 TRC ASM 5015 PHASE-IN
I/M MODEL YEARS    : 3 1981 1995
I/M VEHICLES       : 3 22222 11111111 1
I/M STRINGENCY     : 3 30.0
I/M COMPLIANCE     : 3 98.0
I/M WAIVER RATES   : 3 0.0 3.0
I/M PROGRAM        : 4 2000 2050 2 TRC IDLE
I/M MODEL YEARS    : 4 1981 2050
I/M VEHICLES       : 4 11111 22222222 2
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I/M COMPLIANCE     : 4 98.0
I/M WAIVER RATES   : 4 0.0 0.0
I/M GRACE PERIOD   : 4 4
I/M PROGRAM        : 5 1998 2050 2 TRC GC
I/M MODEL YEARS    : 5 1970 2050
I/M VEHICLES       : 5 11111 22222222 2
I/M COMPLIANCE     : 5 98.0
I/M WAIVER RATES   : 5 0.0 0.0
I/M GRACE PERIOD   : 5 4
I/M PROGRAM        : 6 1998 2050 2 TRC GC
I/M MODEL YEARS    : 6 1970 1995
I/M VEHICLES       : 6 22222 11111111 1
I/M COMPLIANCE     : 6 98.0
I/M WAIVER RATES   : 6 0.0 0.0
I/M PROGRAM        : 7 2004 2050 2 TRC EVAP OBD & GC
I/M MODEL YEARS    : 7 1996 2050
I/M VEHICLES       : 7 22222 11111111 1
I/M COMPLIANCE     : 7 98.0
I/M WAIVER RATES   : 7 0.0 0.0
I/M GRACE PERIOD   : 7 4
EXPAND EVAPORATIVE :
EXPAND EXHAUST     :


SCENARIO RECORD    : 2001 Summer - Base Case

CALENDAR YEAR      : 2001
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
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                     .001141 .004313 .005124 .005636 .020081 .000994 .000458 .015000
AVERAGE SPEED      : 22.6 FREEWAY


SCENARIO RECORD    : 2001 Summer - 2-lane Route 92

CALENDAR YEAR      : 2001
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
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EVALUATION MONTH   : 7
VMT FRACTIONS      :
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                     .001141 .004313 .005124 .005636 .020081 .000994 .000458 .015000
AVERAGE SPEED      : 24.7 FREEWAY
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DATABASE OUTPUT    :
WITH FIELDNAMES    :
EMISSIONS TABLE    :  01CO.TB1
POLLUTANTS         :  CO
AGGREGATED OUTPUT  :
RUN DATA           :

REG DISTRIBUTION   : NJ_REG.D
STAGE II REFUELING :
89 1 85. 70.
ANTI-TAMP PROGRAM  :
85 75 50 22222 22222222 2 12 098. 12211112
I/M EFFECTIVENES   : 0.94 0.94 0.94
I/M PROGRAM        : 1 1974 2050 2 TRC IDLE
I/M MODEL YEARS    : 1 1941 1980
I/M VEHICLES       : 1 22222 22222222 2
I/M STRINGENCY     : 1 30.0
I/M COMPLIANCE     : 1 98.0
I/M WAIVER RATES   : 1 0.0 0.0
I/M PROGRAM        : 2 2004 2050 2 TRC OBD I/M
I/M MODEL YEARS    : 2 1996 2050
I/M VEHICLES       : 2 22222 11111111 1
I/M STRINGENCY     : 2 30.0
I/M COMPLIANCE     : 2 98.0
I/M WAIVER RATES   : 2 0.0 3.0
I/M GRACE PERIOD   : 2 4
I/M PROGRAM        : 3 2000 2050 2 TRC ASM 5015 PHASE-IN
I/M MODEL YEARS    : 3 1981 1995
I/M VEHICLES       : 3 22222 11111111 1
I/M STRINGENCY     : 3 30.0
I/M COMPLIANCE     : 3 98.0
I/M WAIVER RATES   : 3 0.0 3.0
I/M PROGRAM        : 4 2000 2050 2 TRC IDLE
I/M MODEL YEARS    : 4 1981 2050
I/M VEHICLES       : 4 11111 22222222 2
I/M STRINGENCY     : 4 30.0
I/M COMPLIANCE     : 4 98.0
I/M WAIVER RATES   : 4 0.0 0.0
I/M GRACE PERIOD   : 4 4
I/M PROGRAM        : 5 1998 2050 2 TRC GC
I/M MODEL YEARS    : 5 1970 2050
I/M VEHICLES       : 5 11111 22222222 2
I/M COMPLIANCE     : 5 98.0
I/M WAIVER RATES   : 5 0.0 0.0
I/M GRACE PERIOD   : 5 4
I/M PROGRAM        : 6 1998 2050 2 TRC GC
I/M MODEL YEARS    : 6 1970 1995
I/M VEHICLES       : 6 22222 11111111 1
I/M COMPLIANCE     : 6 98.0
I/M WAIVER RATES   : 6 0.0 0.0
I/M PROGRAM        : 7 2004 2050 2 TRC EVAP OBD & GC
I/M MODEL YEARS    : 7 1996 2050
I/M VEHICLES       : 7 22222 11111111 1
I/M COMPLIANCE     : 7 98.0
I/M WAIVER RATES   : 7 0.0 0.0
I/M GRACE PERIOD   : 7 4
EXPAND EVAPORATIVE :
EXPAND EXHAUST     :


SCENARIO RECORD    : 2001 Winter - Base Case

CALENDAR YEAR      : 2001
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
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                     .001141 .004313 .005124 .005636 .020081 .000994 .000458 .015000
AVERAGE SPEED      : 22.6 FREEWAY


SCENARIO RECORD    : 2001 Winter - 2-lane Route 92

CALENDAR YEAR      : 2001
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
```

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EVALUATION MONTH   : 1
VMT FRACTIONS      :
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                     .001141 .004313 .005124 .005636 .020081 .000994 .000458 .015000
AVERAGE SPEED      : 24.7 FREEWAY
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DATABASE OUTPUT    :
WITH FIELDNAMES    :
EMISSIONS TABLE    :  28SUMB.TB1
POLLUTANTS         :  HC NOX
AGGREGATED OUTPUT  :
RUN DATA           :

REG DISTRIBUTION   : NJ_REG.D
STAGE II REFUELING :
89 1 85. 70.
ANTI-TAMP PROGRAM  :
85 75 50 22222 22222222 2 12 098. 12211112
I/M EFFECTIVENES   : 0.94 0.94 0.94
I/M PROGRAM        : 1 1974 2050 2 TRC IDLE
I/M MODEL YEARS    : 1 1941 1980
I/M VEHICLES       : 1 22222 22222222 2
I/M STRINGENCY     : 1 30.0
I/M COMPLIANCE     : 1 98.0
I/M WAIVER RATES   : 1 0.0 0.0
I/M PROGRAM        : 2 2004 2050 2 TRC OBD I/M
I/M MODEL YEARS    : 2 1996 2050
I/M VEHICLES       : 2 22222 11111111 1
I/M STRINGENCY     : 2 30.0
I/M COMPLIANCE     : 2 98.0
I/M WAIVER RATES   : 2 0.0 3.0
I/M GRACE PERIOD   : 2 4
I/M PROGRAM        : 3 2000 2050 2 TRC ASM 5015 PHASE-IN
I/M MODEL YEARS    : 3 1981 1995
I/M VEHICLES       : 3 22222 11111111 1
I/M STRINGENCY     : 3 30.0
I/M COMPLIANCE     : 3 98.0
I/M WAIVER RATES   : 3 0.0 3.0
I/M PROGRAM        : 4 2000 2050 2 TRC IDLE
I/M MODEL YEARS    : 4 1981 2050
I/M VEHICLES       : 4 11111 22222222 2
I/M STRINGENCY     : 4 30.0
I/M COMPLIANCE     : 4 98.0
I/M WAIVER RATES   : 4 0.0 0.0
I/M GRACE PERIOD   : 4 4
I/M PROGRAM        : 5 1998 2050 2 TRC GC
I/M MODEL YEARS    : 5 1970 2050
I/M VEHICLES       : 5 11111 22222222 2
I/M COMPLIANCE     : 5 98.0
I/M WAIVER RATES   : 5 0.0 0.0
I/M GRACE PERIOD   : 5 4
I/M PROGRAM        : 6 1998 2050 2 TRC GC
I/M MODEL YEARS    : 6 1970 1995
I/M VEHICLES       : 6 22222 11111111 1
I/M COMPLIANCE     : 6 98.0
I/M WAIVER RATES   : 6 0.0 0.0
I/M PROGRAM        : 7 2004 2050 2 TRC EVAP OBD & GC
I/M MODEL YEARS    : 7 1996 2050
I/M VEHICLES       : 7 22222 11111111 1
I/M COMPLIANCE     : 7 98.0
I/M WAIVER RATES   : 7 0.0 0.0
I/M GRACE PERIOD   : 7 4
EXPAND EVAPORATIVE :
EXPAND EXHAUST     :


SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
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AVERAGE SPEED      : 2.7 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
```

```
VMT FRACTIONS      :
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                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 5.0 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
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                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 5.6 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 6.9 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 8.3 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 11.2 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 11.8 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
```

```
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 14.3 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 15.4 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 16.9 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 18.6 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 21.2 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 21.5 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
```

```
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 23.8 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 26.3 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 28.6 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 29.6 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 30.1 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 30.4 FREEWAY
```



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SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
```

```
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 31.8 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 36.2 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 36.8 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 37.1 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 39.3 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 47.6 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build
```

```
CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 47.7 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 52.3 FREEWAY

SCENARIO RECORD    : 2028 Summer - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 53.0 FREEWAY
```

```
MOBILE6 INPUT FILE :
* Winter I/M (2028) for New Jersey - No Build
REPORT FILE        :  28WIN-NB.out
DATABASE OUTPUT    :
WITH FIELDNAMES    :
EMISSIONS TABLE    :  28WIN-NB.TB1
POLLUTANTS         :  CO
AGGREGATED OUTPUT  :
RUN DATA           :

REG DISTRIBUTION   : NJ_REG.D
STAGE II REFUELING :
89 1 85. 70.
ANTI-TAMP PROGRAM  :
85 75 50 22222 22222222 2 12 098. 12211112
I/M EFFECTIVENES   : 0.94 0.94 0.94
I/M PROGRAM        : 1 1974 2050 2 TRC IDLE
I/M MODEL YEARS    : 1 1941 1980
I/M VEHICLES       : 1 22222 22222222 2
I/M STRINGENCY     : 1 30.0
I/M COMPLIANCE     : 1 98.0
I/M WAIVER RATES   : 1 0.0 0.0
I/M PROGRAM        : 2 2004 2050 2 TRC OBD I/M
I/M MODEL YEARS    : 2 1996 2050
I/M VEHICLES       : 2 22222 11111111 1
I/M STRINGENCY     : 2 30.0
I/M COMPLIANCE     : 2 98.0
I/M WAIVER RATES   : 2 0.0 3.0
I/M GRACE PERIOD   : 2 4
I/M PROGRAM        : 3 2000 2050 2 TRC ASM 5015 PHASE-IN
I/M MODEL YEARS    : 3 1981 1995
I/M VEHICLES       : 3 22222 11111111 1
I/M STRINGENCY     : 3 30.0
I/M COMPLIANCE     : 3 98.0
I/M WAIVER RATES   : 3 0.0 3.0
I/M PROGRAM        : 4 2000 2050 2 TRC IDLE
I/M MODEL YEARS    : 4 1981 2050
I/M VEHICLES       : 4 11111 22222222 2
I/M STRINGENCY     : 4 30.0
I/M COMPLIANCE     : 4 98.0
I/M WAIVER RATES   : 4 0.0 0.0
I/M GRACE PERIOD   : 4 4
I/M PROGRAM        : 5 1998 2050 2 TRC GC
I/M MODEL YEARS    : 5 1970 2050
I/M VEHICLES       : 5 11111 22222222 2
I/M COMPLIANCE     : 5 98.0
I/M WAIVER RATES   : 5 0.0 0.0
I/M GRACE PERIOD   : 5 4
I/M PROGRAM        : 6 1998 2050 2 TRC GC
I/M MODEL YEARS    : 6 1970 1995
I/M VEHICLES       : 6 22222 11111111 1
I/M COMPLIANCE     : 6 98.0
I/M WAIVER RATES   : 6 0.0 0.0
I/M PROGRAM        : 7 2004 2050 2 TRC EVAP OBD & GC
I/M MODEL YEARS    : 7 1996 2050
I/M VEHICLES       : 7 22222 11111111 1
I/M COMPLIANCE     : 7 98.0
I/M WAIVER RATES   : 7 0.0 0.0
I/M GRACE PERIOD   : 7 4
EXPAND EVAPORATIVE :
EXPAND EXHAUST     :


SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 2.7 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
```

```
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 3.5 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 4.2 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 5.0 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 5.3 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 7.2 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 7.7 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
```

```
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 11.5 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 13.7 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 15.9 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 18.5 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 19.0 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 19.4 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
```

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FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 19.7 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 21.3 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 22.9 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 24.0 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 26.5 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 28.4 FREEWAY
```



```
SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
```

```
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 30.4 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 34.9 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 35.2 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 37.2 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 38.2 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 38.6 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build
```

```
CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 39.1 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 48.4 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 49.0 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 49.1 FREEWAY
```

```
MOBILE6 INPUT FILE :
* Summer I/M (2028) for New Jersey
REPORT FILE        :  28HC-NOx.out
DATABASE OUTPUT    :
WITH FIELDNAMES    :
EMISSIONS TABLE    :  28HC-NOx.TB1
POLLUTANTS         :  HC NOX
AGGREGATED OUTPUT  :
RUN DATA           :

REG DISTRIBUTION   : NJ_REG.D
STAGE II REFUELING :
89 1 85. 70.
ANTI-TAMP PROGRAM  :
85 75 50 22222 22222222 2 12 098. 12211112
I/M EFFECTIVENES   : 0.94 0.94 0.94
I/M PROGRAM        : 1 1974 2050 2 TRC IDLE
I/M MODEL YEARS    : 1 1941 1980
I/M VEHICLES       : 1 22222 22222222 2
I/M STRINGENCY     : 1 30.0
I/M COMPLIANCE     : 1 98.0
I/M WAIVER RATES   : 1 0.0 0.0
I/M PROGRAM        : 2 2004 2050 2 TRC OBD I/M
I/M MODEL YEARS    : 2 1996 2050
I/M VEHICLES       : 2 22222 11111111 1
I/M STRINGENCY     : 2 30.0
I/M COMPLIANCE     : 2 98.0
I/M WAIVER RATES   : 2 0.0 3.0
I/M GRACE PERIOD   : 2 4
I/M PROGRAM        : 3 2000 2050 2 TRC ASM 5015 PHASE-IN
I/M MODEL YEARS    : 3 1981 1995
I/M VEHICLES       : 3 22222 11111111 1
I/M STRINGENCY     : 3 30.0
I/M COMPLIANCE     : 3 98.0
I/M WAIVER RATES   : 3 0.0 3.0
I/M PROGRAM        : 4 2000 2050 2 TRC IDLE
I/M MODEL YEARS    : 4 1981 2050
I/M VEHICLES       : 4 11111 22222222 2
I/M STRINGENCY     : 4 30.0
I/M COMPLIANCE     : 4 98.0
I/M WAIVER RATES   : 4 0.0 0.0
I/M GRACE PERIOD   : 4 4
I/M PROGRAM        : 5 1998 2050 2 TRC GC
I/M MODEL YEARS    : 5 1970 2050
I/M VEHICLES       : 5 11111 22222222 2
I/M COMPLIANCE     : 5 98.0
I/M WAIVER RATES   : 5 0.0 0.0
I/M GRACE PERIOD   : 5 4
I/M PROGRAM        : 6 1998 2050 2 TRC GC
I/M MODEL YEARS    : 6 1970 1995
I/M VEHICLES       : 6 22222 11111111 1
I/M COMPLIANCE     : 6 98.0
I/M WAIVER RATES   : 6 0.0 0.0
I/M PROGRAM        : 7 2004 2050 2 TRC EVAP OBD & GC
I/M MODEL YEARS    : 7 1996 2050
I/M VEHICLES       : 7 22222 11111111 1
I/M COMPLIANCE     : 7 98.0
I/M WAIVER RATES   : 7 0.0 0.0
I/M GRACE PERIOD   : 7 4
EXPAND EVAPORATIVE :
EXPAND EXHAUST     :


SCENARIO RECORD    : 2028 Summer - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 17.7 FREEWAY

SCENARIO RECORD    : 2028 Summer - EPA No-Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
```

```
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 19.4 FREEWAY

SCENARIO RECORD    : 2028 Summer - Route 92

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 21.1 FREEWAY

SCENARIO RECORD    : 2028 Summer - 6-Lane Route 1

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 18.8 FREEWAY

SCENARIO RECORD    : 2028 Summer - Route 1 with Signals Removed

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 20.0 FREEWAY

SCENARIO RECORD    : 2028 Summer - 2-Lane Route 92

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 20.4 FREEWAY

SCENARIO RECORD    : 2028 Summer - Route 92 without Perrine Rd. Intersection

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  70.9  94.1
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 21.0 FREEWAY
```

```
MOBILE6 INPUT FILE :
* Winter I/M (2028) for New Jersey - Build
REPORT FILE        :  28WINB.out
DATABASE OUTPUT    :
WITH FIELDNAMES    :
EMISSIONS TABLE    :  28WINB.TB1
POLLUTANTS         :  CO
AGGREGATED OUTPUT  :
RUN DATA           :

REG DISTRIBUTION   : NJ_REG.D
STAGE II REFUELING :
89 1 85. 70.
ANTI-TAMP PROGRAM  :
85 75 50 22222 22222222 2 12 098. 12211112
I/M EFFECTIVENES   : 0.94 0.94 0.94
I/M PROGRAM        : 1 1974 2050 2 TRC IDLE
I/M MODEL YEARS    : 1 1941 1980
I/M VEHICLES       : 1 22222 22222222 2
I/M STRINGENCY     : 1 30.0
I/M COMPLIANCE     : 1 98.0
I/M WAIVER RATES   : 1 0.0 0.0
I/M PROGRAM        : 2 2004 2050 2 TRC OBD I/M
I/M MODEL YEARS    : 2 1996 2050
I/M VEHICLES       : 2 22222 11111111 1
I/M STRINGENCY     : 2 30.0
I/M COMPLIANCE     : 2 98.0
I/M WAIVER RATES   : 2 0.0 3.0
I/M GRACE PERIOD   : 2 4
I/M PROGRAM        : 3 2000 2050 2 TRC ASM 5015 PHASE-IN
I/M MODEL YEARS    : 3 1981 1995
I/M VEHICLES       : 3 22222 11111111 1
I/M STRINGENCY     : 3 30.0
I/M COMPLIANCE     : 3 98.0
I/M WAIVER RATES   : 3 0.0 3.0
I/M PROGRAM        : 4 2000 2050 2 TRC IDLE
I/M MODEL YEARS    : 4 1981 2050
I/M VEHICLES       : 4 11111 22222222 2
I/M STRINGENCY     : 4 30.0
I/M COMPLIANCE     : 4 98.0
I/M WAIVER RATES   : 4 0.0 0.0
I/M GRACE PERIOD   : 4 4
I/M PROGRAM        : 5 1998 2050 2 TRC GC
I/M MODEL YEARS    : 5 1970 2050
I/M VEHICLES       : 5 11111 22222222 2
I/M COMPLIANCE     : 5 98.0
I/M WAIVER RATES   : 5 0.0 0.0
I/M GRACE PERIOD   : 5 4
I/M PROGRAM        : 6 1998 2050 2 TRC GC
I/M MODEL YEARS    : 6 1970 1995
I/M VEHICLES       : 6 22222 11111111 1
I/M COMPLIANCE     : 6 98.0
I/M WAIVER RATES   : 6 0.0 0.0
I/M PROGRAM        : 7 2004 2050 2 TRC EVAP OBD & GC
I/M MODEL YEARS    : 7 1996 2050
I/M VEHICLES       : 7 22222 11111111 1
I/M COMPLIANCE     : 7 98.0
I/M WAIVER RATES   : 7 0.0 0.0
I/M GRACE PERIOD   : 7 4
EXPAND EVAPORATIVE :
EXPAND EXHAUST     :


SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 2.7 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
```

```
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 5.0 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 5.6 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 6.9 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 8.3 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 11.2 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 11.8 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
```

```
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 14.3 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 15.4 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 16.9 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 18.6 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 21.2 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 21.5 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
```

```
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 23.8 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 26.3 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 28.6 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 29.6 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 30.1 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 30.4 FREEWAY
```



```
SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
```

```
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 31.8 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 36.2 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 36.8 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 37.1 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 39.3 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 47.6 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build
```

```
CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 47.7 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 52.3 FREEWAY

SCENARIO RECORD    : 2028 Winter - Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 53.0 FREEWAY
```

```
MOBILE6 INPUT FILE :
* Winter I/M (2028) for New Jersey - No Build
REPORT FILE        :  28WIN-NB.out
DATABASE OUTPUT    :
WITH FIELDNAMES    :
EMISSIONS TABLE    :  28WIN-NB.TB1
POLLUTANTS         :  CO
AGGREGATED OUTPUT  :
RUN DATA           :

REG DISTRIBUTION   : NJ_REG.D
STAGE II REFUELING :
89 1 85. 70.
ANTI-TAMP PROGRAM  :
85 75 50 22222 22222222 2 12 098. 12211112
I/M EFFECTIVENES   : 0.94 0.94 0.94
I/M PROGRAM        : 1 1974 2050 2 TRC IDLE
I/M MODEL YEARS    : 1 1941 1980
I/M VEHICLES       : 1 22222 22222222 2
I/M STRINGENCY     : 1 30.0
I/M COMPLIANCE     : 1 98.0
I/M WAIVER RATES   : 1 0.0 0.0
I/M PROGRAM        : 2 2004 2050 2 TRC OBD I/M
I/M MODEL YEARS    : 2 1996 2050
I/M VEHICLES       : 2 22222 11111111 1
I/M STRINGENCY     : 2 30.0
I/M COMPLIANCE     : 2 98.0
I/M WAIVER RATES   : 2 0.0 3.0
I/M GRACE PERIOD   : 2 4
I/M PROGRAM        : 3 2000 2050 2 TRC ASM 5015 PHASE-IN
I/M MODEL YEARS    : 3 1981 1995
I/M VEHICLES       : 3 22222 11111111 1
I/M STRINGENCY     : 3 30.0
I/M COMPLIANCE     : 3 98.0
I/M WAIVER RATES   : 3 0.0 3.0
I/M PROGRAM        : 4 2000 2050 2 TRC IDLE
I/M MODEL YEARS    : 4 1981 2050
I/M VEHICLES       : 4 11111 22222222 2
I/M STRINGENCY     : 4 30.0
I/M COMPLIANCE     : 4 98.0
I/M WAIVER RATES   : 4 0.0 0.0
I/M GRACE PERIOD   : 4 4
I/M PROGRAM        : 5 1998 2050 2 TRC GC
I/M MODEL YEARS    : 5 1970 2050
I/M VEHICLES       : 5 11111 22222222 2
I/M COMPLIANCE     : 5 98.0
I/M WAIVER RATES   : 5 0.0 0.0
I/M GRACE PERIOD   : 5 4
I/M PROGRAM        : 6 1998 2050 2 TRC GC
I/M MODEL YEARS    : 6 1970 1995
I/M VEHICLES       : 6 22222 11111111 1
I/M COMPLIANCE     : 6 98.0
I/M WAIVER RATES   : 6 0.0 0.0
I/M PROGRAM        : 7 2004 2050 2 TRC EVAP OBD & GC
I/M MODEL YEARS    : 7 1996 2050
I/M VEHICLES       : 7 22222 11111111 1
I/M COMPLIANCE     : 7 98.0
I/M WAIVER RATES   : 7 0.0 0.0
I/M GRACE PERIOD   : 7 4
EXPAND EVAPORATIVE :
EXPAND EXHAUST     :


SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 2.7 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
```

```
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 3.5 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 4.2 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 5.0 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 5.3 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 7.2 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 7.7 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
```

```
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 11.5 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 13.7 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 15.9 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 18.5 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 19.0 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 19.4 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
```

```
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 19.7 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 21.3 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 22.9 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 24.0 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 26.5 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 28.4 FREEWAY
```



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SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
```

```
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 30.4 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 34.9 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 35.2 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 37.2 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 38.2 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 38.6 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build
```

```
CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 39.1 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 48.4 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 49.0 FREEWAY

SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 7
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 49.1 FREEWAY
```

```
MOBILE6 INPUT FILE :
* Winter I/M (2028) for New Jersey
REPORT FILE        :  28CO.out
DATABASE OUTPUT    :
WITH FIELDNAMES    :
EMISSIONS TABLE    :  28CO.TB1
POLLUTANTS         :  CO
AGGREGATED OUTPUT  :
RUN DATA           :

REG DISTRIBUTION   : NJ_REG.D
STAGE II REFUELING :
89 1 85. 70.
ANTI-TAMP PROGRAM  :
85 75 50 22222 22222222 2 12 098. 12211112
I/M EFFECTIVENES   : 0.94 0.94 0.94
I/M PROGRAM        : 1 1974 2050 2 TRC IDLE
I/M MODEL YEARS    : 1 1941 1980
I/M VEHICLES       : 1 22222 22222222 2
I/M STRINGENCY     : 1 30.0
I/M COMPLIANCE     : 1 98.0
I/M WAIVER RATES   : 1 0.0 0.0
I/M PROGRAM        : 2 2004 2050 2 TRC OBD I/M
I/M MODEL YEARS    : 2 1996 2050
I/M VEHICLES       : 2 22222 11111111 1
I/M STRINGENCY     : 2 30.0
I/M COMPLIANCE     : 2 98.0
I/M WAIVER RATES   : 2 0.0 3.0
I/M GRACE PERIOD   : 2 4
I/M PROGRAM        : 3 2000 2050 2 TRC ASM 5015 PHASE-IN
I/M MODEL YEARS    : 3 1981 1995
I/M VEHICLES       : 3 22222 11111111 1
I/M STRINGENCY     : 3 30.0
I/M COMPLIANCE     : 3 98.0
I/M WAIVER RATES   : 3 0.0 3.0
I/M PROGRAM        : 4 2000 2050 2 TRC IDLE
I/M MODEL YEARS    : 4 1981 2050
I/M VEHICLES       : 4 11111 22222222 2
I/M STRINGENCY     : 4 30.0
I/M COMPLIANCE     : 4 98.0
I/M WAIVER RATES   : 4 0.0 0.0
I/M GRACE PERIOD   : 4 4
I/M PROGRAM        : 5 1998 2050 2 TRC GC
I/M MODEL YEARS    : 5 1970 2050
I/M VEHICLES       : 5 11111 22222222 2
I/M COMPLIANCE     : 5 98.0
I/M WAIVER RATES   : 5 0.0 0.0
I/M GRACE PERIOD   : 5 4
I/M PROGRAM        : 6 1998 2050 2 TRC GC
I/M MODEL YEARS    : 6 1970 1995
I/M VEHICLES       : 6 22222 11111111 1
I/M COMPLIANCE     : 6 98.0
I/M WAIVER RATES   : 6 0.0 0.0
I/M PROGRAM        : 7 2004 2050 2 TRC EVAP OBD & GC
I/M MODEL YEARS    : 7 1996 2050
I/M VEHICLES       : 7 22222 11111111 1
I/M COMPLIANCE     : 7 98.0
I/M WAIVER RATES   : 7 0.0 0.0
I/M GRACE PERIOD   : 7 4
EXPAND EVAPORATIVE :
EXPAND EXHAUST     :


SCENARIO RECORD    : 2028 Winter - No Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 7
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 17.7 FREEWAY

SCENARIO RECORD    : 2028 Winter - EPA No-Build

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
```

```
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 19.4 FREEWAY

SCENARIO RECORD    : 2028 Winter - Route 92

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 21.1 FREEWAY

SCENARIO RECORD    : 2028 Winter - 6-Lane Route 1

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 18.8 FREEWAY

SCENARIO RECORD    : 2028 Winter - Route 1 with Signals Removed

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 20.0 FREEWAY

SCENARIO RECORD    : 2028 Winter - 2-Lane Route 92

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 20.4 FREEWAY

SCENARIO RECORD    : 2028 Winter - Route 92 without Perrine Rd. Intersection

CALENDAR YEAR      : 2028
EVALUATION MONTH   : 1
MIN/MAX TEMPERATURE:  31.0  31.0
ABSOLUTE HUMIDITY  :  64.4
FUEL RVP           : 9.0
FUEL PROGRAM       : 2 N
SEASON             : 1
EVALUATION MONTH   : 1
VMT FRACTIONS      :
                     .667000 .042503 .141495 .050005 .022995 .019618 .001934 .001623
                     .001214 .004386 .005173 .005612 .019996 .000988 .000458 .015000
AVERAGE SPEED      : 21.0 FREEWAY
```

```
************************************************************************
* MOBILE6.2.01 (31-Oct-2002)                                           *
* Input file: 01HC-NOX.DAT (file 1, run 1).                            *
************************************************************************

* Reading Registration Distributions from the following external
* data file: NJ_REG.D
  M601 Comment:
               User has enabled STAGE II REFUELING.


* Reading ASM I/M Test Credits from ASMDATA.D

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2001 Summer - Base Case
* File 1, Run 1, Scenario 1.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 22.6
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
*** I/M credits for Tech1&2 vehicles were read from the following external
    data file: TECH12.D
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

                    Calendar Year:  2001
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.9 (F)
              Maximum Temperature:  94.1 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:  149. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.6657	0.1840	0.0720		0.0180	0.0013	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	1.302	0.937	1.357	1.055	1.440	0.868	0.756	0.771	3.05	1.243
Composite NOX :	1.157	1.081	1.341	1.154	4.418	1.555	1.271	17.712	1.13	1.927
Exhaust emissions (g/mi):										
VOC Start:	0.299	0.238	0.374	0.276		0.307	0.187		0.635	
VOC Running:	0.299	0.295	0.440	0.336		0.561	0.570		1.641	
VOC Total Exhaust:	0.599	0.533	0.813	0.612	0.683	0.868	0.756	0.771	2.28	0.637
NOx Start:	0.230	0.203	0.246	0.215		0.085	0.040		0.490	
NOx Running:	0.927	0.878	1.096	0.939		1.471	1.231		0.644	
NOx Total Exhaust:	1.157	1.081	1.341	1.154	4.418	1.555	1.271	17.712	1.13	1.927
Non-Exhaust Emissions (g/mi):										
Hot Soak Loss:	0.169	0.080	0.113	0.089	0.145	0.000	0.000	0.000	0.125	0.140
Diurnal Loss:	0.031	0.016	0.025	0.018	0.030	0.000	0.000	0.000	0.022	0.026
Resting Loss:	0.147	0.073	0.112	0.084	0.138	0.000	0.000	0.000	0.627	0.131

Running Loss:	0.322	0.186	0.230	0.198	0.300	0.000	0.000	0.000	0.000	0.271
Crankcase Loss:	0.009	0.009	0.010	0.009	0.012	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.026	0.040	0.054	0.044	0.132	0.000	0.000	0.000	0.000	0.031
Total Non-Exhaust:	0.703	0.403	0.544	0.440	0.757	0.000	0.000	0.000	0.774	0.606

```
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2001 Summer - 2-lane Route 92
* File 1, Run 1, Scenario 2.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 24.7
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b

                   Calendar Year:  2001
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:  149. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.6657	0.1840	0.0720		0.0180	0.0013	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	1.269	0.916	1.326	1.032	1.338	0.831	0.718	0.720	2.95	1.210
Composite NOX :	1.154	1.083	1.343	1.156	4.489	1.511	1.234	17.374	1.16	1.912
Exhaust emissions (g/mi):										
VOC Start:	0.299	0.238	0.374	0.276		0.307	0.187		0.635	
VOC Running:	0.293	0.290	0.427	0.328		0.523	0.532		1.544	
VOC Total Exhaust:	0.592	0.528	0.801	0.605	0.605	0.831	0.718	0.720	2.18	0.625
NOx Start:	0.230	0.203	0.246	0.215		0.085	0.040		0.490	
NOx Running:	0.924	0.880	1.097	0.941		1.426	1.194		0.668	
NOx Total Exhaust:	1.154	1.083	1.343	1.156	4.489	1.511	1.234	17.374	1.16	1.912
Non-Exhaust Emissions (g/mi):										
Hot Soak Loss:	0.169	0.080	0.113	0.089	0.145	0.000	0.000	0.000	0.125	0.140
Diurnal Loss:	0.031	0.016	0.025	0.018	0.030	0.000	0.000	0.000	0.022	0.026
Resting Loss:	0.147	0.073	0.112	0.084	0.138	0.000	0.000	0.000	0.627	0.131
Running Loss:	0.296	0.171	0.212	0.182	0.276	0.000	0.000	0.000	0.000	0.249
Crankcase Loss:	0.009	0.009	0.010	0.009	0.012	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.026	0.040	0.054	0.044	0.132	0.000	0.000	0.000	0.000	0.031
Total Non-Exhaust:	0.677	0.389	0.525	0.424	0.733	0.000	0.000	0.000	0.774	0.585

```
*************************************************************************
* MOBILE6.2.01 (31-Oct-2002)                                            *
* Input file: 01CO.DAT (file 1, run 1).                                 *
*************************************************************************

* Reading Registration Distributions from the following external
* data file: NJ_REG.D
  M601 Comment:
               User has enabled STAGE II REFUELING.


* Reading ASM I/M Test Credits from ASMDATA.D

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2001 Winter - Base Case
* File 1, Run 1, Scenario 1.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 22.6
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
*** I/M credits for Tech1&2 vehicles were read from the following external
    data file: TECH12.D
  M 48 Warning:
              there are no sales for vehicle class HDGV8b

                    Calendar Year:  2001
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  31.0 (F)
              Maximum Temperature:  31.0 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:  149. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6656    0.1840    0.0720              0.0180    0.0014    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     24.80     24.61     28.91     25.82     14.95     1.904     1.320     4.160     17.53    23.831
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:     13.75     13.19     15.07     13.72               0.824     0.414                5.886
         CO Running:     11.06     11.42     13.84     12.10               1.080     0.906               11.643
   CO Total Exhaust:     24.80     24.61     28.91     25.82     14.95     1.904     1.320     4.160     17.53    23.831
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2001 Winter - 2-lane Route 92
* File 1, Run 1, Scenario 2.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
```

```
             User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 24.7
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
            there are no sales for vehicle class HDGV8b

                  Calendar Year:  2001
                          Month:  Jan.
                       Altitude:  Low
            Minimum Temperature:  31.0 (F)
            Maximum Temperature:  31.0 (F)
              Absolute Humidity:   64. grains/lb
            Fuel Sulfur Content:  149. ppm

            Exhaust I/M Program:  Yes
               Evap I/M Program:  Yes
                    ATP Program:  Yes
               Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.6656	0.1840	0.0720		0.0180	0.0014	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite CO :	24.69	24.50	28.76	25.70	13.57	1.807	1.238	3.788	16.52	23.674
Exhaust emissions (g/mi):										
CO Start:	13.75	13.19	15.07	13.72		0.824	0.414		5.886	
CO Running:	10.95	11.31	13.69	11.98		0.984	0.824		10.635	
CO Total Exhaust:	24.69	24.50	28.76	25.70	13.57	1.807	1.238	3.788	16.52	23.674

```
*************************************************************************
* MOBILE6.2.01 (31-Oct-2002)                                            *
* Input file: 28SUMB.DAT (file 1, run 1).                               *
*************************************************************************

* Reading Registration Distributions from the following external
* data file: NJ_REG.D
  M601 Comment:
               User has enabled STAGE II REFUELING.


* Reading ASM I/M Test Credits from ASMDATA.D

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 1.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M514 Warning:
            The combined freeway and ramp average speed entered
           cannot be less than  2.7 miles per hour.
           The average speed will be reset to this value.
  M582 Warning:
           The user supplied freeway average speed of  2.7
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
*** I/M credits for Tech1&2 vehicles were read from the following external
    data file: TECH12.D
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  -----------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      1.717     1.324     1.712     1.433     1.796    0.113     0.234     0.693      9.86     1.722
     Composite NOX :      0.322     0.327     0.509     0.378     0.131    0.044     0.186     0.785      1.17     0.365
  -----------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.190     0.256     0.360     0.285               0.098     0.209                8.570
  VOC Total Exhaust:     0.229     0.303     0.422     0.336     0.399     0.113     0.234     0.693      9.20     0.414

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.303     0.303     0.470     0.350               0.043     0.183                0.676
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  NOx Total Exhaust:     0.322     0.327     0.509     0.378     0.131     0.044     0.186     0.785      1.17     0.365
  ---------------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     1.413     0.965     1.211     1.034     1.291     0.000     0.000     0.000     0.000     1.229
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     1.489     1.021     1.289     1.091     1.397     0.000     0.000     0.000     0.659     1.308
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 2.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of  5.0
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.707     0.601     0.781     0.652     0.860     0.102     0.211     0.617      6.91     0.784
     Composite NOX :      0.273     0.289     0.450     0.334     0.134     0.040     0.170     0.714      1.11     0.318
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.125     0.166     0.232     0.184               0.087     0.186                5.615
  VOC Total Exhaust:     0.164     0.212     0.294     0.235     0.324     0.102     0.211     0.617      6.25     0.296

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.254     0.265     0.411     0.306               0.040     0.167                0.618
  NOx Total Exhaust:     0.273     0.289     0.450     0.334     0.134     0.040     0.170     0.714      1.11     0.318
  ---------------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.466     0.333     0.409     0.354     0.429     0.000     0.000     0.000     0.000     0.409
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     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.542     0.389     0.487     0.414     0.535     0.000     0.000     0.000     0.659     0.488
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* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 3.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of  5.6
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ----------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.601     0.522     0.680     0.567     0.757     0.100     0.206     0.601      6.47     0.682
     Composite NOX :      0.261     0.279     0.434     0.323     0.134     0.040     0.166     0.699      1.10     0.306
  ----------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.115     0.152     0.213     0.169               0.085     0.181                5.175
  VOC Total Exhaust:     0.154     0.198     0.275     0.220     0.309     0.100     0.206     0.601      5.81     0.278

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.242     0.255     0.395     0.294               0.039     0.163                0.609
  NOx Total Exhaust:     0.261     0.279     0.434     0.323     0.134     0.040     0.166     0.699      1.10     0.306
  ----------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.370     0.268     0.327     0.285     0.341     0.000     0.000     0.000     0.000     0.326
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.446     0.324     0.405     0.345     0.448     0.000     0.000     0.000     0.659     0.404
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* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
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* File 1, Run 1, Scenario 4.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of  6.9
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.6664	0.1840	0.0719		0.0180	0.0006	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.495	0.436	0.568	0.473	0.640	0.093	0.192	0.554	5.58	0.570
Composite NOX :	0.226	0.246	0.386	0.286	0.137	0.037	0.156	0.657	1.08	0.271
Exhaust emissions (g/mi):										
VOC Start:	0.039	0.047	0.063	0.051		0.015	0.025		0.635	
VOC Running:	0.095	0.124	0.174	0.138		0.078	0.167		4.288	
VOC Total Exhaust:	0.134	0.171	0.237	0.189	0.270	0.093	0.192	0.554	4.92	0.240
NOx Start:	0.019	0.024	0.039	0.029		0.001	0.003		0.490	
NOx Running:	0.207	0.222	0.347	0.257		0.036	0.154		0.590	
NOx Total Exhaust:	0.226	0.246	0.386	0.286	0.137	0.037	0.156	0.657	1.08	0.271
Non-Exhaust Emissions (g/mi):										
Hot Soak Loss:	0.040	0.022	0.034	0.026	0.028	0.000	0.000	0.000	0.142	0.036
Diurnal Loss:	0.004	0.003	0.004	0.003	0.006	0.000	0.000	0.000	0.010	0.004
Resting Loss:	0.015	0.009	0.014	0.010	0.015	0.000	0.000	0.000	0.506	0.020
Running Loss:	0.285	0.209	0.253	0.221	0.263	0.000	0.000	0.000	0.000	0.252
Crankcase Loss:	0.008	0.009	0.009	0.009	0.011	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.009	0.013	0.017	0.014	0.047	0.000	0.000	0.000	0.000	0.011
Total Non-Exhaust:	0.362	0.265	0.331	0.282	0.370	0.000	0.000	0.000	0.659	0.330

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* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 5.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
```

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          The user supplied freeway average speed of  8.3
          will be used for all hours of the day. 100% of VMT
          has been assigned to a fixed combination of freeways
          and freeway ramps for all hours of the day and all
           vehicle types.
  M 48 Warning:
            there are no sales for vehicle class HDGV8b
  M 48 Warning:
            there are no sales for vehicle class LDDT12

                 Calendar Year:  2028
                         Month:  July
                      Altitude:  Low
            Minimum Temperature:  70.9 (F)
            Maximum Temperature:  94.1 (F)
              Absolute Humidity:   64. grains/lb
            Fuel Sulfur Content:   30. ppm

            Exhaust I/M Program:  Yes
               Evap I/M Program:  Yes
                    ATP Program:  Yes
               Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.6664	0.1840	0.0719		0.0180	0.0006	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.419	0.372	0.486	0.404	0.554	0.089	0.182	0.520	4.94	0.489
Composite NOX :	0.201	0.223	0.351	0.259	0.138	0.036	0.149	0.626	1.07	0.246
Exhaust emissions (g/mi):										
VOC Start:	0.039	0.047	0.063	0.051		0.015	0.025		0.635	
VOC Running:	0.080	0.104	0.146	0.116		0.074	0.157		3.643	
VOC Total Exhaust:	0.119	0.151	0.209	0.167	0.241	0.089	0.182	0.520	4.28	0.213
NOx Start:	0.019	0.024	0.039	0.029		0.001	0.003		0.490	
NOx Running:	0.182	0.198	0.312	0.230		0.035	0.146		0.576	
NOx Total Exhaust:	0.201	0.223	0.351	0.259	0.138	0.036	0.149	0.626	1.07	0.246
Non-Exhaust Emissions (g/mi):										
Hot Soak Loss:	0.040	0.022	0.034	0.026	0.028	0.000	0.000	0.000	0.142	0.036
Diurnal Loss:	0.004	0.003	0.004	0.003	0.006	0.000	0.000	0.000	0.010	0.004
Resting Loss:	0.015	0.009	0.014	0.010	0.015	0.000	0.000	0.000	0.506	0.020
Running Loss:	0.224	0.166	0.199	0.175	0.207	0.000	0.000	0.000	0.000	0.198
Crankcase Loss:	0.008	0.009	0.009	0.009	0.011	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.009	0.013	0.017	0.014	0.047	0.000	0.000	0.000	0.000	0.011
Total Non-Exhaust:	0.300	0.222	0.278	0.236	0.313	0.000	0.000	0.000	0.659	0.276

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* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 6.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
          The user supplied freeway average speed of 11.2
          will be used for all hours of the day. 100% of VMT
          has been assigned to a fixed combination of freeways
          and freeway ramps for all hours of the day and all
           vehicle types.
  M 48 Warning:
            there are no sales for vehicle class HDGV8b
```

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  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
                GVWR:                <6000     >6000     (All)
                          ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.325     0.294     0.385     0.319     0.445    0.081     0.166     0.469      4.11     0.388
     Composite NOX :      0.166     0.191     0.303     0.222     0.141    0.033     0.139     0.581      1.05     0.211
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.060     0.078     0.110     0.087               0.066     0.141                2.818
  VOC Total Exhaust:     0.099     0.124     0.172     0.138     0.199     0.081     0.166     0.469      3.45     0.177

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.148     0.166     0.264     0.194               0.032     0.136                0.563
  NOx Total Exhaust:     0.166     0.191     0.303     0.222     0.141     0.033     0.139     0.581      1.05     0.211
  ---------------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.150     0.114     0.135     0.120     0.139     0.000     0.000     0.000     0.000     0.133
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.226     0.169     0.213     0.181     0.246     0.000     0.000     0.000     0.659     0.211
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 7.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 11.8
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
```

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              Maximum Temperature:  94.1 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.315     0.284     0.373     0.309     0.429    0.079     0.162     0.455      3.99     0.376
     Composite NOX :      0.160     0.184     0.293     0.215     0.142    0.032     0.136     0.569      1.05     0.205
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.057     0.073     0.104     0.082               0.064     0.137                2.696
  VOC Total Exhaust:     0.096     0.120     0.166     0.133     0.190     0.079     0.162     0.455      3.33     0.171

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.141     0.160     0.254     0.186               0.031     0.133                0.564
  NOx Total Exhaust:     0.160     0.184     0.293     0.215     0.142     0.032     0.136     0.569      1.05     0.205
  ---------------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.143     0.108     0.128     0.114     0.133     0.000     0.000     0.000     0.000     0.127
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.219     0.164     0.206     0.175     0.239     0.000     0.000     0.000     0.659     0.205
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 8.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
                User has supplied post-1999 sulfur levels.
  M615 Comment:
                User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 14.3
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                    Calendar Year:  2028
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.9 (F)
              Maximum Temperature:  94.1 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
```

```
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:               <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.281     0.252     0.331     0.274     0.376    0.073     0.149     0.410      3.59     0.336
     Composite NOX :      0.139     0.164     0.263     0.192     0.145    0.030     0.127     0.531      1.06     0.183
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.046     0.059     0.084     0.066               0.058     0.124                2.296
  VOC Total Exhaust:     0.085     0.106     0.147     0.117     0.158     0.073     0.149     0.410      2.93     0.152

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.120     0.139     0.224     0.163               0.029     0.124                0.570
  NOx Total Exhaust:     0.139     0.164     0.263     0.192     0.145     0.030     0.127     0.531      1.06     0.183
  ---------------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.120     0.090     0.106     0.094     0.111     0.000     0.000     0.000     0.000     0.106
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.196     0.146     0.184     0.156     0.218     0.000     0.000     0.000     0.659     0.184
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 9.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 15.4
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:               <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
```

```
 Composite Emission Factors (g/mi):
     Composite VOC :      0.270     0.241     0.317     0.262     0.358     0.071     0.144     0.395      3.46     0.322
     Composite NOX :      0.132     0.157     0.253     0.184     0.146     0.030     0.124     0.518      1.06     0.176
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.042     0.055     0.078     0.061               0.056     0.119                2.161
  VOC Total Exhaust:     0.082     0.101     0.140     0.112     0.148     0.071     0.144     0.395      2.80     0.145

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.113     0.133     0.214     0.155               0.029     0.121                0.572
  NOx Total Exhaust:     0.132     0.157     0.253     0.184     0.146     0.030     0.124     0.518      1.06     0.176
  ---------------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.112     0.084     0.099     0.088     0.104     0.000     0.000     0.000     0.000     0.099
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.188     0.139     0.177     0.149     0.211     0.000     0.000     0.000     0.659     0.177
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 10.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 16.9
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                    Calendar Year:  2028
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.9 (F)
              Maximum Temperature:  94.1 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.258     0.230     0.304     0.251     0.334     0.068     0.137     0.372      3.31     0.308
     Composite NOX :      0.130     0.156     0.251     0.183     0.148     0.029     0.120     0.499      1.08     0.173
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.041     0.053     0.074     0.059               0.053     0.112                2.015
```

```
  VOC Total Exhaust:     0.080     0.099     0.137     0.110     0.133     0.068     0.137     0.372      2.65     0.140

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.111     0.132     0.212     0.154               0.028     0.117                0.586
  NOx Total Exhaust:     0.130     0.156     0.251     0.183     0.148     0.029     0.120     0.499      1.08     0.173
  ---------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.102     0.075     0.089     0.079     0.095     0.000     0.000     0.000     0.000     0.090
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.178     0.131     0.167     0.140     0.201     0.000     0.000     0.000     0.659     0.168
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 11.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 18.6
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.247     0.220     0.292     0.240     0.310     0.064     0.130     0.348      3.17     0.294
     Composite NOX :      0.129     0.157     0.252     0.184     0.150     0.028     0.115     0.481      1.09     0.173
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.040     0.051     0.073     0.057               0.049     0.105                1.880
  VOC Total Exhaust:     0.079     0.098     0.135     0.108     0.119     0.064     0.130     0.348      2.52     0.135

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.111     0.132     0.213     0.155               0.027     0.112                0.602
  NOx Total Exhaust:     0.129     0.157     0.252     0.184     0.150     0.028     0.115     0.481      1.09     0.173
  ---------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
```

Hot Soak Loss:	0.040	0.022	0.034	0.026	0.028	0.000	0.000	0.000	0.142	0.036
Diurnal Loss:	0.004	0.003	0.004	0.003	0.006	0.000	0.000	0.000	0.010	0.004
Resting Loss:	0.015	0.009	0.014	0.010	0.015	0.000	0.000	0.000	0.506	0.020
Running Loss:	0.092	0.066	0.079	0.070	0.085	0.000	0.000	0.000	0.000	0.080
Crankcase Loss:	0.008	0.009	0.009	0.009	0.011	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.009	0.013	0.017	0.014	0.047	0.000	0.000	0.000	0.000	0.011
Total Non-Exhaust:	0.168	0.122	0.157	0.131	0.192	0.000	0.000	0.000	0.659	0.159

```
* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 12.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 21.2
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.6664	0.1840	0.0719		0.0180	0.0006	0.0011	0.0430	0.0150	1.0000

Composite Emission Factors (g/mi):										
Composite VOC :	0.233	0.208	0.278	0.228	0.282	0.060	0.121	0.318	3.01	0.278
Composite NOX :	0.129	0.158	0.253	0.185	0.153	0.026	0.110	0.458	1.12	0.173
Exhaust emissions (g/mi):										
VOC Start:	0.039	0.047	0.063	0.051		0.015	0.025		0.635	
VOC Running:	0.039	0.050	0.070	0.056		0.045	0.096		1.715	
VOC Total Exhaust:	0.078	0.096	0.133	0.107	0.101	0.060	0.121	0.318	2.35	0.130
NOx Start:	0.019	0.024	0.039	0.029		0.001	0.003		0.490	
NOx Running:	0.110	0.134	0.214	0.156		0.025	0.107		0.626	
NOx Total Exhaust:	0.129	0.158	0.253	0.185	0.153	0.026	0.110	0.458	1.12	0.173
Non-Exhaust Emissions (g/mi):										
Hot Soak Loss:	0.040	0.022	0.034	0.026	0.028	0.000	0.000	0.000	0.142	0.036
Diurnal Loss:	0.004	0.003	0.004	0.003	0.006	0.000	0.000	0.000	0.010	0.004
Resting Loss:	0.015	0.009	0.014	0.010	0.015	0.000	0.000	0.000	0.506	0.020
Running Loss:	0.080	0.056	0.067	0.059	0.074	0.000	0.000	0.000	0.000	0.070
Crankcase Loss:	0.008	0.009	0.009	0.009	0.011	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.009	0.013	0.017	0.014	0.047	0.000	0.000	0.000	0.000	0.011
Total Non-Exhaust:	0.156	0.112	0.145	0.120	0.180	0.000	0.000	0.000	0.659	0.148

```
  ------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 13.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 21.5
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:     0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :       0.232     0.207     0.277     0.227     0.279    0.059     0.120     0.315      2.99     0.276
     Composite NOX :       0.129     0.158     0.254     0.185     0.153    0.026     0.109     0.456      1.12     0.172
  ------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:      0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.038     0.050     0.070     0.055               0.045     0.095                1.698
  VOC Total Exhaust:     0.078     0.096     0.133     0.106     0.099     0.059     0.120     0.315      2.33     0.129

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.110     0.134     0.214     0.156               0.025     0.106                0.630
  NOx Total Exhaust:     0.129     0.158     0.254     0.185     0.153     0.026     0.109     0.456      1.12     0.172
  ------------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.079     0.055     0.066     0.058     0.073     0.000     0.000     0.000     0.000     0.069
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.155     0.111     0.144     0.120     0.180     0.000     0.000     0.000     0.659     0.147
  ------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 14.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
```

User has supplied post-1999 sulfur levels.
M615 Comment:
User supplied VMT mix.
M582 Warning:
The user supplied freeway average speed of 23.8
will be used for all hours of the day. 100% of VMT
has been assigned to a fixed combination of freeways
and freeway ramps for all hours of the day and all
vehicle types.
M 48 Warning:
there are no sales for vehicle class HDGV8b
M 48 Warning:
there are no sales for vehicle class LDDT12

Calendar Year: 2028
Month: July
Altitude: Low
Minimum Temperature: 70.9 (F)
Maximum Temperature: 94.1 (F)
Absolute Humidity: 64. grains/lb
Fuel Sulfur Content: 30. ppm

Exhaust I/M Program: Yes
Evap I/M Program: Yes
ATP Program: Yes
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.6664	0.1840	0.0719		0.0180	0.0006	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.224	0.201	0.269	0.221	0.260	0.056	0.112	0.290	2.88	0.266
Composite NOX :	0.128	0.159	0.254	0.186	0.156	0.025	0.106	0.439	1.15	0.172
Exhaust emissions (g/mi):										
VOC Start:	0.039	0.047	0.063	0.051		0.015	0.025		0.635	
VOC Running:	0.038	0.049	0.068	0.054		0.041	0.087		1.584	
VOC Total Exhaust:	0.077	0.095	0.131	0.105	0.087	0.056	0.112	0.290	2.22	0.126
NOx Start:	0.019	0.024	0.039	0.029		0.001	0.003		0.490	
NOx Running:	0.109	0.134	0.215	0.157		0.024	0.103		0.658	
NOx Total Exhaust:	0.128	0.159	0.254	0.186	0.156	0.025	0.106	0.439	1.15	0.172
Non-Exhaust Emissions (g/mi):										
Hot Soak Loss:	0.040	0.022	0.034	0.026	0.028	0.000	0.000	0.000	0.142	0.036
Diurnal Loss:	0.004	0.003	0.004	0.003	0.006	0.000	0.000	0.000	0.010	0.004
Resting Loss:	0.015	0.009	0.014	0.010	0.015	0.000	0.000	0.000	0.506	0.020
Running Loss:	0.072	0.050	0.060	0.053	0.067	0.000	0.000	0.000	0.000	0.062
Crankcase Loss:	0.008	0.009	0.009	0.009	0.011	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.009	0.013	0.017	0.014	0.047	0.000	0.000	0.000	0.000	0.011
Total Non-Exhaust:	0.148	0.106	0.138	0.115	0.173	0.000	0.000	0.000	0.659	0.141

* #
* 2028 Summer - Build
* File 1, Run 1, Scenario 15.
* #
M616 Comment:
User has supplied post-1999 sulfur levels.
M615 Comment:
User supplied VMT mix.
M582 Warning:
The user supplied freeway average speed of 26.3
will be used for all hours of the day. 100% of VMT
has been assigned to a fixed combination of freeways

```
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                  Calendar Year:  2028
                          Month:  July
                       Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.6664	0.1840	0.0719		0.0180	0.0006	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.217	0.196	0.263	0.215	0.242	0.053	0.106	0.268	2.77	0.257
Composite NOX :	0.127	0.159	0.255	0.186	0.159	0.024	0.102	0.426	1.18	0.171
Exhaust emissions (g/mi):										
VOC Start:	0.039	0.047	0.063	0.051		0.015	0.025		0.635	
VOC Running:	0.037	0.048	0.067	0.053		0.038	0.081		1.478	
VOC Total Exhaust:	0.076	0.094	0.129	0.104	0.075	0.053	0.106	0.268	2.11	0.122
NOx Start:	0.019	0.024	0.039	0.029		0.001	0.003		0.490	
NOx Running:	0.109	0.135	0.216	0.158		0.024	0.100		0.686	
NOx Total Exhaust:	0.127	0.159	0.255	0.186	0.159	0.024	0.102	0.426	1.18	0.171
Non-Exhaust Emissions (g/mi):										
Hot Soak Loss:	0.040	0.022	0.034	0.026	0.028	0.000	0.000	0.000	0.142	0.036
Diurnal Loss:	0.004	0.003	0.004	0.003	0.006	0.000	0.000	0.000	0.010	0.004
Resting Loss:	0.015	0.009	0.014	0.010	0.015	0.000	0.000	0.000	0.506	0.020
Running Loss:	0.065	0.046	0.055	0.048	0.061	0.000	0.000	0.000	0.000	0.057
Crankcase Loss:	0.008	0.009	0.009	0.009	0.011	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.009	0.013	0.017	0.014	0.047	0.000	0.000	0.000	0.000	0.011
Total Non-Exhaust:	0.141	0.102	0.133	0.110	0.167	0.000	0.000	0.000	0.659	0.135

```
* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 16.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
              User has supplied post-1999 sulfur levels.
  M615 Comment:
              User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 28.6
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12
```

```
                 Calendar Year:  2028
                         Month:  July
                      Altitude:  Low
          Minimum Temperature:  70.9 (F)
          Maximum Temperature:  94.1 (F)
            Absolute Humidity:   64. grains/lb
          Fuel Sulfur Content:   30. ppm

          Exhaust I/M Program:  Yes
             Evap I/M Program:  Yes
                  ATP Program:  Yes
             Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.6664	0.1840	0.0719		0.0180	0.0006	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.211	0.192	0.257	0.210	0.229	0.050	0.100	0.250	2.68	0.250
Composite NOX :	0.127	0.160	0.255	0.186	0.162	0.024	0.100	0.417	1.20	0.171
Exhaust emissions (g/mi):										
VOC Start:	0.039	0.047	0.063	0.051		0.015	0.025		0.635	
VOC Running:	0.036	0.047	0.066	0.053		0.035	0.075		1.390	
VOC Total Exhaust:	0.076	0.094	0.128	0.104	0.067	0.050	0.100	0.250	2.03	0.119
NOx Start:	0.019	0.024	0.039	0.029		0.001	0.003		0.490	
NOx Running:	0.108	0.135	0.216	0.158		0.023	0.098		0.712	
NOx Total Exhaust:	0.127	0.160	0.255	0.186	0.162	0.024	0.100	0.417	1.20	0.171
Non-Exhaust Emissions (g/mi):										
Hot Soak Loss:	0.040	0.022	0.034	0.026	0.028	0.000	0.000	0.000	0.142	0.036
Diurnal Loss:	0.004	0.003	0.004	0.003	0.006	0.000	0.000	0.000	0.010	0.004
Resting Loss:	0.015	0.009	0.014	0.010	0.015	0.000	0.000	0.000	0.506	0.020
Running Loss:	0.060	0.042	0.050	0.044	0.056	0.000	0.000	0.000	0.000	0.052
Crankcase Loss:	0.008	0.009	0.009	0.009	0.011	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.009	0.013	0.017	0.014	0.047	0.000	0.000	0.000	0.000	0.011
Total Non-Exhaust:	0.136	0.098	0.129	0.106	0.162	0.000	0.000	0.000	0.659	0.131

```
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 17.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 29.6
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                 Calendar Year:  2028
                         Month:  July
                      Altitude:  Low
          Minimum Temperature:  70.9 (F)
          Maximum Temperature:  94.1 (F)
            Absolute Humidity:   64. grains/lb
          Fuel Sulfur Content:   30. ppm
```

```
             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite VOC :      0.209     0.190     0.255     0.208     0.224    0.049     0.098     0.243      2.65     0.247
    Composite NOX :      0.126     0.160     0.255     0.187     0.164    0.024     0.100     0.414      1.21     0.171
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.036     0.047     0.065     0.052               0.034     0.073                1.356
  VOC Total Exhaust:     0.075     0.094     0.128     0.103     0.064     0.049     0.098     0.243      1.99     0.118

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.108     0.135     0.216     0.158               0.023     0.097                0.723
  NOx Total Exhaust:     0.126     0.160     0.255     0.187     0.164     0.024     0.100     0.414      1.21     0.171
  ---------------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.058     0.041     0.049     0.043     0.054     0.000     0.000     0.000     0.000     0.050
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.134     0.096     0.127     0.104     0.160     0.000     0.000     0.000     0.659     0.129
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 18.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 30.1
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
```

```
              GVWR:               <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.208     0.189     0.254     0.207     0.221    0.049     0.097     0.239      2.63     0.246
     Composite NOX :      0.126     0.160     0.255     0.187     0.164    0.024     0.099     0.412      1.22     0.171
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.036     0.047     0.065     0.052               0.034     0.072                1.340
  VOC Total Exhaust:     0.075     0.093     0.128     0.103     0.062     0.049     0.097     0.239      1.98     0.118

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.107     0.135     0.216     0.158               0.023     0.096                0.727
  NOx Total Exhaust:     0.126     0.160     0.255     0.187     0.164     0.024     0.099     0.412      1.22     0.171
  ---------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.057     0.040     0.048     0.042     0.053     0.000     0.000     0.000     0.000     0.050
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.133     0.096     0.126     0.104     0.159     0.000     0.000     0.000     0.659     0.128
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 19.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 30.4
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:               <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.207     0.189     0.253     0.207     0.220    0.049     0.096     0.237      2.62     0.245
     Composite NOX :      0.126     0.160     0.255     0.187     0.164    0.024     0.099     0.412      1.22     0.171
```

```
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.036     0.047     0.065     0.052               0.034     0.072                1.330
  VOC Total Exhaust:     0.075     0.093     0.128     0.103     0.061     0.049     0.096     0.237      1.97     0.117

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.107     0.135     0.216     0.158               0.023     0.096                0.730
  NOx Total Exhaust:     0.126     0.160     0.255     0.187     0.164     0.024     0.099     0.412      1.22     0.171
  ---------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.056     0.040     0.047     0.042     0.052     0.000     0.000     0.000     0.000     0.049
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.132     0.095     0.126     0.103     0.159     0.000     0.000     0.000     0.659     0.127
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 20.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 31.8
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
            there are no sales for vehicle class HDGV8b
  M 48 Warning:
            there are no sales for vehicle class LDDT12

                 Calendar Year:  2028
                         Month:  July
                      Altitude:  Low
            Minimum Temperature:  70.9 (F)
            Maximum Temperature:  94.1 (F)
              Absolute Humidity:   64. grains/lb
            Fuel Sulfur Content:   30. ppm

            Exhaust I/M Program:  Yes
               Evap I/M Program:  Yes
                    ATP Program:  Yes
               Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
             GVWR:                <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.204     0.186     0.250     0.204     0.214     0.047     0.094     0.228      2.58     0.241
     Composite NOX :      0.125     0.160     0.255     0.186     0.167     0.024     0.099     0.410      1.23     0.170
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.036     0.047     0.064     0.052               0.032     0.069                1.285
  VOC Total Exhaust:     0.075     0.093     0.127     0.103     0.058     0.047     0.094     0.228      1.92     0.116

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
```

```
       NOx Running:     0.106     0.135     0.216     0.158               0.023     0.096               0.744
  NOx Total Exhaust:     0.125     0.160     0.255     0.186     0.167     0.024     0.099     0.410      1.23     0.170
  ---------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.053     0.038     0.045     0.040     0.050     0.000     0.000     0.000     0.000     0.047
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.129     0.093     0.123     0.101     0.156     0.000     0.000     0.000     0.659     0.125
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 21.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 36.2
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:               <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite VOC :      0.196     0.181     0.243     0.198     0.197    0.044     0.087     0.205      2.46     0.231
    Composite NOX :      0.124     0.160     0.255     0.187     0.172    0.024     0.099     0.411      1.27     0.170
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025               0.635
      VOC   Running:     0.036     0.046     0.063     0.051               0.029     0.062               1.167
  VOC Total Exhaust:     0.075     0.093     0.126     0.102     0.048     0.044     0.087     0.205      1.80     0.113

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003               0.490
       NOx Running:     0.105     0.136     0.216     0.158               0.023     0.096               0.778
  NOx Total Exhaust:     0.124     0.160     0.255     0.187     0.172     0.024     0.099     0.411      1.27     0.170
  ---------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
```

```
      Running Loss:     0.046     0.032     0.039     0.034     0.042     0.000     0.000     0.000     0.000     0.040
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.122     0.088     0.117     0.095     0.149     0.000     0.000     0.000     0.659     0.118
  ----------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 22.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 36.8
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ----------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.195     0.180     0.242     0.198     0.195     0.044     0.086     0.202      2.45     0.230
     Composite NOX :      0.124     0.160     0.256     0.187     0.173     0.024     0.099     0.413      1.27     0.171
  ----------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.036     0.047     0.063     0.051               0.029     0.061                1.154
  VOC Total Exhaust:     0.075     0.093     0.126     0.102     0.047     0.044     0.086     0.202      1.79     0.113

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.105     0.136     0.217     0.159               0.023     0.096                0.782
  NOx Total Exhaust:     0.124     0.160     0.256     0.187     0.173     0.024     0.099     0.413      1.27     0.171
  ----------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.045     0.031     0.038     0.033     0.041     0.000     0.000     0.000     0.000     0.039
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.121     0.087     0.116     0.095     0.148     0.000     0.000     0.000     0.659     0.117
  ----------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
```

```
* 2028 Summer - Build
* File 1, Run 1, Scenario 23.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 37.1
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
              Minimum Temperature:  70.9 (F)
              Maximum Temperature:  94.1 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.6664	0.1840	0.0719		0.0180	0.0006	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.195	0.180	0.241	0.197	0.194	0.043	0.085	0.200	2.44	0.229
Composite NOX :	0.124	0.161	0.256	0.187	0.174	0.024	0.099	0.413	1.27	0.171
Exhaust emissions (g/mi):										
VOC Start:	0.039	0.047	0.063	0.051		0.015	0.025		0.635	
VOC Running:	0.036	0.047	0.063	0.051		0.028	0.060		1.148	
VOC Total Exhaust:	0.075	0.093	0.126	0.102	0.047	0.043	0.085	0.200	1.78	0.112
NOx Start:	0.019	0.024	0.039	0.029		0.001	0.003		0.490	
NOx Running:	0.105	0.136	0.217	0.159		0.023	0.097		0.784	
NOx Total Exhaust:	0.124	0.161	0.256	0.187	0.174	0.024	0.099	0.413	1.27	0.171
Non-Exhaust Emissions (g/mi):										
Hot Soak Loss:	0.040	0.022	0.034	0.026	0.028	0.000	0.000	0.000	0.142	0.036
Diurnal Loss:	0.004	0.003	0.004	0.003	0.006	0.000	0.000	0.000	0.010	0.004
Resting Loss:	0.015	0.009	0.014	0.010	0.015	0.000	0.000	0.000	0.506	0.020
Running Loss:	0.044	0.031	0.037	0.033	0.041	0.000	0.000	0.000	0.000	0.038
Crankcase Loss:	0.008	0.009	0.009	0.009	0.011	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.009	0.013	0.017	0.014	0.047	0.000	0.000	0.000	0.000	0.011
Total Non-Exhaust:	0.120	0.087	0.116	0.094	0.147	0.000	0.000	0.000	0.659	0.117

```
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 24.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
```

```
  M582 Warning:
            The user supplied freeway average speed of 39.3
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                    Calendar Year:  2028
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.9 (F)
              Maximum Temperature:  94.1 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:               <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.192     0.178     0.239     0.195     0.188    0.042     0.083     0.191      2.40     0.226
     Composite NOX :      0.124     0.162     0.258     0.189     0.176    0.024     0.101     0.418      1.29     0.172
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.036     0.047     0.064     0.052               0.027     0.058                1.104
  VOC Total Exhaust:     0.075     0.094     0.126     0.103     0.043     0.042     0.083     0.191      1.74     0.112

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.106     0.137     0.219     0.160               0.023     0.098                0.796
  NOx Total Exhaust:     0.124     0.162     0.258     0.189     0.176     0.024     0.101     0.418      1.29     0.172
  ---------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.041     0.029     0.035     0.030     0.038     0.000     0.000     0.000     0.000     0.036
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.117     0.084     0.113     0.092     0.144     0.000     0.000     0.000     0.659     0.114
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 25.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 47.6
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
```

```
            there are no sales for vehicle class HDGV8b
  M 48 Warning:
            there are no sales for vehicle class LDDT12

                  Calendar Year:  2028
                          Month:  July
                       Altitude:  Low
            Minimum Temperature:  70.9 (F)
            Maximum Temperature:  94.1 (F)
              Absolute Humidity:   64. grains/lb
            Fuel Sulfur Content:   30. ppm

            Exhaust I/M Program:  Yes
               Evap I/M Program:  Yes
                    ATP Program:  Yes
               Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite VOC :      0.182     0.172     0.231     0.189     0.169    0.039     0.075     0.167      2.32     0.215
    Composite NOX :      0.127     0.169     0.267     0.196     0.188    0.027     0.115     0.479      1.36     0.180
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.037     0.050     0.065     0.054               0.024     0.050                1.029
  VOC Total Exhaust:     0.077     0.096     0.127     0.105     0.036     0.039     0.075     0.167      1.66     0.111

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.108     0.144     0.228     0.168               0.026     0.112                0.874
  NOx Total Exhaust:     0.127     0.169     0.267     0.196     0.188     0.027     0.115     0.479      1.36     0.180
  ---------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.029     0.020     0.025     0.022     0.027     0.000     0.000     0.000     0.000     0.026
    Crankcase Loss:      0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
    Refueling Loss:      0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.105     0.076     0.103     0.083     0.133     0.000     0.000     0.000     0.659     0.104
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 26.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
             User has supplied post-1999 sulfur levels.
  M615 Comment:
             User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 47.7
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
            there are no sales for vehicle class HDGV8b
  M 48 Warning:
            there are no sales for vehicle class LDDT12

                  Calendar Year:  2028
                          Month:  July
                       Altitude:  Low
```

```
              Minimum Temperature:  70.9 (F)
              Maximum Temperature:  94.1 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.182     0.172     0.231     0.188     0.169     0.039     0.075     0.167      2.32     0.215
     Composite NOX :      0.127     0.169     0.267     0.197     0.188     0.027     0.115     0.480      1.37     0.180
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.037     0.050     0.065     0.054               0.024     0.050                1.029
  VOC Total Exhaust:     0.077     0.096     0.128     0.105     0.036     0.039     0.075     0.167      1.66     0.111

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.109     0.145     0.228     0.168               0.027     0.112                0.876
  NOx Total Exhaust:     0.127     0.169     0.267     0.197     0.188     0.027     0.115     0.480      1.37     0.180
  ---------------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.029     0.020     0.025     0.022     0.027     0.000     0.000     0.000     0.000     0.026
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.105     0.076     0.103     0.083     0.133     0.000     0.000     0.000     0.659     0.104
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 27.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 52.3
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                    Calendar Year:  2028
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.9 (F)
              Maximum Temperature:  94.1 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
```

```
                    ATP Program:  Yes
              Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
             GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
 ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite VOC :      0.178     0.170     0.228     0.186     0.163    0.038     0.073     0.160      2.32     0.211
    Composite NOX :      0.129     0.173     0.273     0.201     0.195    0.031     0.130     0.546      1.49     0.187
 ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.038     0.051     0.066     0.055               0.023     0.048                1.026
  VOC Total Exhaust:     0.077     0.097     0.128     0.106     0.034     0.038     0.073     0.160      1.66     0.111

         NOx Start:      0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.110     0.149     0.234     0.173               0.030     0.128                1.004
  NOx Total Exhaust:     0.129     0.173     0.273     0.201     0.195     0.031     0.130     0.546      1.49     0.187
 ---------------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.025     0.017     0.021     0.018     0.023     0.000     0.000     0.000     0.000     0.022
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.101     0.073     0.099     0.080     0.129     0.000     0.000     0.000     0.659     0.100
 ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Build
* File 1, Run 1, Scenario 28.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 53.0
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                  Calendar Year:  2028
                          Month:  July
                       Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```



```
      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
             GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
```

Composite Emission Factors (g/mi):										
Composite VOC :	0.178	0.170	0.227	0.186	0.163	0.037	0.073	0.159	2.36	0.211
Composite NOX :	0.129	0.174	0.274	0.202	0.196	0.032	0.134	0.561	1.52	0.188
Exhaust emissions (g/mi):										
VOC Start:	0.039	0.047	0.063	0.051		0.015	0.025		0.635	
VOC Running:	0.038	0.051	0.066	0.055		0.023	0.048		1.069	
VOC Total Exhaust:	0.078	0.098	0.128	0.106	0.034	0.037	0.073	0.159	1.70	0.112
NOx Start:	0.019	0.024	0.039	0.029		0.001	0.003		0.490	
NOx Running:	0.111	0.149	0.235	0.173		0.031	0.131		1.025	
NOx Total Exhaust:	0.129	0.174	0.274	0.202	0.196	0.032	0.134	0.561	1.52	0.188
Non-Exhaust Emissions (g/mi):										
Hot Soak Loss:	0.040	0.022	0.034	0.026	0.028	0.000	0.000	0.000	0.142	0.036
Diurnal Loss:	0.004	0.003	0.004	0.003	0.006	0.000	0.000	0.000	0.010	0.004
Resting Loss:	0.015	0.009	0.014	0.010	0.015	0.000	0.000	0.000	0.506	0.020
Running Loss:	0.024	0.017	0.021	0.018	0.022	0.000	0.000	0.000	0.000	0.021
Crankcase Loss:	0.008	0.009	0.009	0.009	0.011	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.009	0.013	0.017	0.014	0.047	0.000	0.000	0.000	0.000	0.011
Total Non-Exhaust:	0.100	0.072	0.099	0.079	0.129	0.000	0.000	0.000	0.659	0.099

```
*************************************************************************
* MOBILE6.2.01 (31-Oct-2002)                                            *
* Input file: 28SUM-NB.DAT (file 1, run 1).                             *
*************************************************************************

* Reading Registration Distributions from the following external
* data file: NJ_REG.D
  M601 Comment:
               User has enabled STAGE II REFUELING.


* Reading ASM I/M Test Credits from ASMDATA.D

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 1.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M514 Warning:
            The combined freeway and ramp average speed entered
           cannot be less than  2.7 miles per hour.
           The average speed will be reset to this value.
  M582 Warning:
           The user supplied freeway average speed of  2.7
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
*** I/M credits for Tech1&2 vehicles were read from the following external
    data file: TECH12.D
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.6664	0.1840	0.0719		0.0180	0.0006	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	1.717	1.324	1.712	1.433	1.796	0.113	0.234	0.693	9.86	1.722
Composite NOX :	0.322	0.327	0.509	0.378	0.131	0.044	0.186	0.785	1.17	0.365
Exhaust emissions (g/mi):										
VOC Start:	0.039	0.047	0.063	0.051		0.015	0.025		0.635	
VOC Running:	0.190	0.256	0.360	0.285		0.098	0.209		8.570	
VOC Total Exhaust:	0.229	0.303	0.422	0.336	0.399	0.113	0.234	0.693	9.20	0.414
NOx Start:	0.019	0.024	0.039	0.029		0.001	0.003		0.490	
NOx Running:	0.303	0.303	0.470	0.350		0.043	0.183		0.676	

```
  NOx Total Exhaust:     0.322     0.327     0.509     0.378     0.131     0.044     0.186     0.785      1.17     0.365
  ---------------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     1.413     0.965     1.211     1.034     1.291     0.000     0.000     0.000     0.000     1.229
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     1.489     1.021     1.289     1.091     1.397     0.000     0.000     0.000     0.659     1.308
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 2.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of  3.5
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      1.216     0.965     1.250     1.045     1.332     0.108     0.222     0.656      8.40     1.256
     Composite NOX :      0.298     0.308     0.480     0.357     0.132     0.042     0.178     0.750      1.14     0.342
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.158     0.211     0.296     0.235               0.093     0.198                7.104
  VOC Total Exhaust:     0.197     0.258     0.359     0.286     0.362     0.108     0.222     0.656      7.74     0.355

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.279     0.284     0.441     0.328               0.041     0.175                0.648
  NOx Total Exhaust:     0.298     0.308     0.480     0.357     0.132     0.042     0.178     0.750      1.14     0.342
  ---------------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.943     0.652     0.813     0.697     0.863     0.000     0.000     0.000     0.000     0.823
```

```
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     1.019     0.707     0.891     0.755     0.970     0.000     0.000     0.000     0.659     0.901
  ----------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 3.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of  4.2
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ----------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.933     0.763     0.989     0.827     1.069     0.105     0.216     0.634      7.57     0.994
     Composite NOX :      0.284     0.298     0.463     0.344     0.133     0.041     0.173     0.730      1.12     0.328
  ----------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.139     0.186     0.260     0.207               0.090     0.191                6.277
  VOC Total Exhaust:     0.179     0.232     0.323     0.258     0.341     0.105     0.216     0.634      6.91     0.322

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.265     0.273     0.424     0.316               0.040     0.171                0.631
  NOx Total Exhaust:     0.284     0.298     0.463     0.344     0.133     0.041     0.173     0.730      1.12     0.328
  ----------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.678     0.475     0.588     0.507     0.622     0.000     0.000     0.000     0.000     0.593
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.754     0.530     0.667     0.566     0.728     0.000     0.000     0.000     0.659     0.671
  ----------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
```

```
* File 1, Run 1, Scenario 4.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of  5.0
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.6664	0.1840	0.0719		0.0180	0.0006	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.707	0.601	0.781	0.652	0.860	0.102	0.211	0.617	6.91	0.784
Composite NOX :	0.273	0.289	0.450	0.334	0.134	0.040	0.170	0.714	1.11	0.318
Exhaust emissions (g/mi):										
VOC Start:	0.039	0.047	0.063	0.051		0.015	0.025		0.635	
VOC Running:	0.125	0.166	0.232	0.184		0.087	0.186		5.615	
VOC Total Exhaust:	0.164	0.212	0.294	0.235	0.324	0.102	0.211	0.617	6.25	0.296
NOx Start:	0.019	0.024	0.039	0.029		0.001	0.003		0.490	
NOx Running:	0.254	0.265	0.411	0.306		0.040	0.167		0.618	
NOx Total Exhaust:	0.273	0.289	0.450	0.334	0.134	0.040	0.170	0.714	1.11	0.318
Non-Exhaust Emissions (g/mi):										
Hot Soak Loss:	0.040	0.022	0.034	0.026	0.028	0.000	0.000	0.000	0.142	0.036
Diurnal Loss:	0.004	0.003	0.004	0.003	0.006	0.000	0.000	0.000	0.010	0.004
Resting Loss:	0.015	0.009	0.014	0.010	0.015	0.000	0.000	0.000	0.506	0.020
Running Loss:	0.466	0.333	0.409	0.354	0.429	0.000	0.000	0.000	0.000	0.409
Crankcase Loss:	0.008	0.009	0.009	0.009	0.011	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.009	0.013	0.017	0.014	0.047	0.000	0.000	0.000	0.000	0.011
Total Non-Exhaust:	0.542	0.389	0.487	0.414	0.535	0.000	0.000	0.000	0.659	0.488

```
* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 5.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
```

```
          The user supplied freeway average speed of  5.3
          will be used for all hours of the day. 100% of VMT
          has been assigned to a fixed combination of freeways
          and freeway ramps for all hours of the day and all
           vehicle types.
  M 48 Warning:
            there are no sales for vehicle class HDGV8b
  M 48 Warning:
            there are no sales for vehicle class LDDT12

                 Calendar Year:  2028
                         Month:  July
                      Altitude:  Low
            Minimum Temperature:  70.9 (F)
            Maximum Temperature:  94.1 (F)
              Absolute Humidity:   64. grains/lb
            Fuel Sulfur Content:   30. ppm

            Exhaust I/M Program:  Yes
               Evap I/M Program:  Yes
                    ATP Program:  Yes
               Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.6664	0.1840	0.0719		0.0180	0.0006	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.639	0.553	0.719	0.599	0.797	0.102	0.209	0.612	6.71	0.721
Composite NOX :	0.270	0.287	0.446	0.332	0.134	0.040	0.169	0.710	1.11	0.314
Exhaust emissions (g/mi):										
VOC Start:	0.039	0.047	0.063	0.051		0.015	0.025		0.635	
VOC Running:	0.121	0.159	0.223	0.177		0.087	0.185		5.419	
VOC Total Exhaust:	0.160	0.206	0.286	0.228	0.320	0.102	0.209	0.612	6.05	0.288
NOx Start:	0.019	0.024	0.039	0.029		0.001	0.003		0.490	
NOx Running:	0.251	0.262	0.407	0.303		0.039	0.166		0.615	
NOx Total Exhaust:	0.270	0.287	0.446	0.332	0.134	0.040	0.169	0.710	1.11	0.314
Non-Exhaust Emissions (g/mi):										
Hot Soak Loss:	0.040	0.022	0.034	0.026	0.028	0.000	0.000	0.000	0.142	0.036
Diurnal Loss:	0.004	0.003	0.004	0.003	0.006	0.000	0.000	0.000	0.010	0.004
Resting Loss:	0.015	0.009	0.014	0.010	0.015	0.000	0.000	0.000	0.506	0.020
Running Loss:	0.403	0.291	0.355	0.309	0.371	0.000	0.000	0.000	0.000	0.355
Crankcase Loss:	0.008	0.009	0.009	0.009	0.011	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.009	0.013	0.017	0.014	0.047	0.000	0.000	0.000	0.000	0.011
Total Non-Exhaust:	0.480	0.347	0.433	0.369	0.478	0.000	0.000	0.000	0.659	0.433

```
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 6.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
          The user supplied freeway average speed of  7.2
          will be used for all hours of the day. 100% of VMT
          has been assigned to a fixed combination of freeways
          and freeway ramps for all hours of the day and all
           vehicle types.
  M 48 Warning:
            there are no sales for vehicle class HDGV8b
```

```
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
                GVWR:                <6000     >6000     (All)
                          ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.476     0.420     0.548     0.456     0.619     0.092     0.189     0.545      5.42     0.550
     Composite NOX :      0.220     0.241     0.377     0.279     0.137     0.037     0.155     0.649      1.08     0.265
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.091     0.119     0.167     0.133               0.077     0.164                4.129
  VOC Total Exhaust:     0.130     0.166     0.230     0.184     0.263     0.092     0.189     0.545      4.76     0.234

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.201     0.216     0.338     0.250               0.036     0.152                0.586
  NOx Total Exhaust:     0.220     0.241     0.377     0.279     0.137     0.037     0.155     0.649      1.08     0.265
  ---------------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.270     0.198     0.240     0.210     0.250     0.000     0.000     0.000     0.000     0.238
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.346     0.254     0.318     0.271     0.356     0.000     0.000     0.000     0.659     0.317
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 7.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of  7.7
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
```

```
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.448     0.397     0.518     0.431     0.587    0.090     0.186     0.533      5.19     0.520
     Composite NOX :      0.211     0.232     0.364     0.269     0.138    0.036     0.152     0.638      1.07     0.255
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.085     0.112     0.157     0.124               0.075     0.161                3.891
  VOC Total Exhaust:     0.125     0.158     0.219     0.175     0.252     0.090     0.186     0.533      4.53     0.224

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.192     0.208     0.325     0.241               0.035     0.149                0.581
  NOx Total Exhaust:     0.211     0.232     0.364     0.269     0.138     0.036     0.152     0.638      1.07     0.255
  ---------------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.247     0.183     0.220     0.193     0.229     0.000     0.000     0.000     0.000     0.218
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.323     0.238     0.298     0.254     0.335     0.000     0.000     0.000     0.659     0.297
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 8.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 11.5
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
```

```
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:               <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.320     0.289     0.379     0.314     0.437    0.080     0.164     0.462      4.05     0.382
     Composite NOX :      0.163     0.187     0.298     0.219     0.141    0.033     0.137     0.575      1.05     0.208
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.058     0.076     0.107     0.084               0.065     0.139                2.755
  VOC Total Exhaust:     0.098     0.122     0.169     0.135     0.195     0.080     0.164     0.462      3.39     0.174

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.144     0.163     0.259     0.190               0.032     0.134                0.563
  NOx Total Exhaust:     0.163     0.187     0.298     0.219     0.141     0.033     0.137     0.575      1.05     0.208
  ---------------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.146     0.111     0.131     0.117     0.136     0.000     0.000     0.000     0.000     0.130
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.222     0.167     0.209     0.178     0.242     0.000     0.000     0.000     0.659     0.208
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 9.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 13.7
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:               <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
```

```
 Composite Emission Factors (g/mi):
     Composite VOC :      0.288     0.258     0.340     0.281     0.387    0.074     0.151     0.420      3.67     0.344
     Composite NOX :      0.143     0.168     0.269     0.197     0.144    0.031     0.129     0.539      1.06     0.187
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.048     0.062     0.088     0.070               0.059     0.126                2.379
  VOC Total Exhaust:     0.087     0.109     0.151     0.121     0.165     0.074     0.151     0.420      3.01     0.156

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.124     0.144     0.230     0.168               0.030     0.126                0.569
  NOx Total Exhaust:     0.143     0.168     0.269     0.197     0.144     0.031     0.129     0.539      1.06     0.187
  ---------------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.124     0.094     0.111     0.098     0.116     0.000     0.000     0.000     0.000     0.110
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.200     0.149     0.189     0.160     0.222     0.000     0.000     0.000     0.659     0.189
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 10.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 15.9
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                    Calendar Year:  2028
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.9 (F)
              Maximum Temperature:  94.1 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.265     0.236     0.312     0.258     0.350    0.070     0.142     0.388      3.40     0.317
     Composite NOX :      0.130     0.155     0.250     0.182     0.146    0.029     0.123     0.512      1.07     0.174
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.041     0.053     0.076     0.060               0.055     0.117                2.108
```

```
  VOC Total Exhaust:     0.081     0.100     0.138     0.111     0.143     0.070     0.142     0.388      2.74     0.143

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.111     0.131     0.211     0.153               0.028     0.120                0.575
  NOx Total Exhaust:     0.130     0.155     0.250     0.182     0.146     0.029     0.123     0.512      1.07     0.174
  ---------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.109     0.081     0.096     0.085     0.101     0.000     0.000     0.000     0.000     0.096
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.185     0.137     0.174     0.146     0.208     0.000     0.000     0.000     0.659     0.174
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 11.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 18.5
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.247     0.220     0.293     0.241     0.312     0.064     0.130     0.349      3.18     0.295
     Composite NOX :      0.129     0.157     0.252     0.184     0.150     0.028     0.115     0.482      1.09     0.173
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.040     0.051     0.073     0.057               0.049     0.105                1.887
  VOC Total Exhaust:     0.079     0.098     0.135     0.108     0.120     0.064     0.130     0.349      2.52     0.136

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.111     0.132     0.213     0.155               0.027     0.113                0.601
  NOx Total Exhaust:     0.129     0.157     0.252     0.184     0.150     0.028     0.115     0.482      1.09     0.173
  ---------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
```

Hot Soak Loss:	0.040	0.022	0.034	0.026	0.028	0.000	0.000	0.000	0.142	0.036
Diurnal Loss:	0.004	0.003	0.004	0.003	0.006	0.000	0.000	0.000	0.010	0.004
Resting Loss:	0.015	0.009	0.014	0.010	0.015	0.000	0.000	0.000	0.506	0.020
Running Loss:	0.092	0.067	0.079	0.070	0.086	0.000	0.000	0.000	0.000	0.081
Crankcase Loss:	0.008	0.009	0.009	0.009	0.011	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.009	0.013	0.017	0.014	0.047	0.000	0.000	0.000	0.000	0.011
Total Non-Exhaust:	0.168	0.122	0.157	0.131	0.192	0.000	0.000	0.000	0.659	0.159

```
* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 12.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 19.0
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.6664	0.1840	0.0719		0.0180	0.0006	0.0011	0.0430	0.0150	1.0000

Composite Emission Factors (g/mi):

Composite VOC :	0.244	0.218	0.289	0.238	0.305	0.064	0.128	0.343	3.15	0.291
Composite NOX :	0.129	0.157	0.252	0.184	0.150	0.027	0.114	0.477	1.10	0.173

Exhaust emissions (g/mi):

VOC Start:	0.039	0.047	0.063	0.051		0.015	0.025		0.635	
VOC Running:	0.040	0.051	0.072	0.057		0.049	0.103		1.852	
VOC Total Exhaust:	0.079	0.098	0.135	0.108	0.116	0.064	0.128	0.343	2.49	0.134
NOx Start:	0.019	0.024	0.039	0.029		0.001	0.003		0.490	
NOx Running:	0.111	0.133	0.213	0.155		0.026	0.111		0.606	
NOx Total Exhaust:	0.129	0.157	0.252	0.184	0.150	0.027	0.114	0.477	1.10	0.173

Non-Exhaust Emissions (g/mi):

Hot Soak Loss:	0.040	0.022	0.034	0.026	0.028	0.000	0.000	0.000	0.142	0.036
Diurnal Loss:	0.004	0.003	0.004	0.003	0.006	0.000	0.000	0.000	0.010	0.004
Resting Loss:	0.015	0.009	0.014	0.010	0.015	0.000	0.000	0.000	0.506	0.020
Running Loss:	0.089	0.064	0.077	0.068	0.083	0.000	0.000	0.000	0.000	0.078
Crankcase Loss:	0.008	0.009	0.009	0.009	0.011	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.009	0.013	0.017	0.014	0.047	0.000	0.000	0.000	0.000	0.011
Total Non-Exhaust:	0.165	0.120	0.155	0.129	0.190	0.000	0.000	0.000	0.659	0.157

```
  ------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 13.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 19.4
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:               <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:     0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :       0.242     0.216     0.287     0.236     0.301    0.063     0.127     0.338      3.12     0.289
     Composite NOX :       0.129     0.157     0.253     0.184     0.151    0.027     0.113     0.473      1.10     0.173
  ------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:      0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.039     0.051     0.072     0.057               0.048     0.102                1.825
  VOC Total Exhaust:     0.079     0.097     0.134     0.108     0.113     0.063     0.127     0.338      2.46     0.134

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.110     0.133     0.213     0.155               0.026     0.111                0.609
  NOx Total Exhaust:     0.129     0.157     0.253     0.184     0.151     0.027     0.113     0.473      1.10     0.173
  ------------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.087     0.062     0.075     0.066     0.081     0.000     0.000     0.000     0.000     0.077
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.163     0.118     0.153     0.127     0.188     0.000     0.000     0.000     0.659     0.155
  ------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 14.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
```

```
              User has supplied post-1999 sulfur levels.
  M615 Comment:
              User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 19.7
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.6664	0.1840	0.0719		0.0180	0.0006	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.240	0.214	0.285	0.234	0.297	0.062	0.126	0.335	3.10	0.287
Composite NOX :	0.129	0.157	0.253	0.184	0.151	0.027	0.113	0.471	1.10	0.173
Exhaust emissions (g/mi):										
VOC Start:	0.039	0.047	0.063	0.051		0.015	0.025		0.635	
VOC Running:	0.039	0.051	0.071	0.057		0.047	0.101		1.805	
VOC Total Exhaust:	0.078	0.097	0.134	0.108	0.111	0.062	0.126	0.335	2.44	0.133
NOx Start:	0.019	0.024	0.039	0.029		0.001	0.003		0.490	
NOx Running:	0.110	0.133	0.214	0.156		0.026	0.110		0.611	
NOx Total Exhaust:	0.129	0.157	0.253	0.184	0.151	0.027	0.113	0.471	1.10	0.173
Non-Exhaust Emissions (g/mi):										
Hot Soak Loss:	0.040	0.022	0.034	0.026	0.028	0.000	0.000	0.000	0.142	0.036
Diurnal Loss:	0.004	0.003	0.004	0.003	0.006	0.000	0.000	0.000	0.010	0.004
Resting Loss:	0.015	0.009	0.014	0.010	0.015	0.000	0.000	0.000	0.506	0.020
Running Loss:	0.086	0.061	0.073	0.064	0.080	0.000	0.000	0.000	0.000	0.075
Crankcase Loss:	0.008	0.009	0.009	0.009	0.011	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.009	0.013	0.017	0.014	0.047	0.000	0.000	0.000	0.000	0.011
Total Non-Exhaust:	0.162	0.117	0.151	0.126	0.186	0.000	0.000	0.000	0.659	0.154

```
* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 15.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
              User has supplied post-1999 sulfur levels.
  M615 Comment:
              User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 21.3
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
```

```
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                  Calendar Year:  2028
                          Month:  July
                       Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.6664	0.1840	0.0719		0.0180	0.0006	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.233	0.208	0.278	0.227	0.281	0.060	0.120	0.317	3.00	0.277
Composite NOX :	0.129	0.158	0.253	0.185	0.153	0.026	0.110	0.457	1.12	0.172
Exhaust emissions (g/mi):										
VOC Start:	0.039	0.047	0.063	0.051		0.015	0.025		0.635	
VOC Running:	0.039	0.050	0.070	0.056		0.045	0.095		1.710	
VOC Total Exhaust:	0.078	0.096	0.133	0.107	0.100	0.060	0.120	0.317	2.34	0.130
NOx Start:	0.019	0.024	0.039	0.029		0.001	0.003		0.490	
NOx Running:	0.110	0.134	0.214	0.156		0.025	0.107		0.627	
NOx Total Exhaust:	0.129	0.158	0.253	0.185	0.153	0.026	0.110	0.457	1.12	0.172
Non-Exhaust Emissions (g/mi):										
Hot Soak Loss:	0.040	0.022	0.034	0.026	0.028	0.000	0.000	0.000	0.142	0.036
Diurnal Loss:	0.004	0.003	0.004	0.003	0.006	0.000	0.000	0.000	0.010	0.004
Resting Loss:	0.015	0.009	0.014	0.010	0.015	0.000	0.000	0.000	0.506	0.020
Running Loss:	0.079	0.056	0.067	0.059	0.074	0.000	0.000	0.000	0.000	0.069
Crankcase Loss:	0.008	0.009	0.009	0.009	0.011	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.009	0.013	0.017	0.014	0.047	0.000	0.000	0.000	0.000	0.011
Total Non-Exhaust:	0.155	0.111	0.145	0.120	0.180	0.000	0.000	0.000	0.659	0.148

```
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 16.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
              User has supplied post-1999 sulfur levels.
  M615 Comment:
              User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 22.9
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12
```

```
                 Calendar Year:  2028
                         Month:  July
                      Altitude:  Low
          Minimum Temperature:  70.9 (F)
          Maximum Temperature:  94.1 (F)
            Absolute Humidity:   64. grains/lb
          Fuel Sulfur Content:   30. ppm

          Exhaust I/M Program:  Yes
             Evap I/M Program:  Yes
                  ATP Program:  Yes
             Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.6664	0.1840	0.0719		0.0180	0.0006	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.227	0.204	0.272	0.223	0.267	0.057	0.115	0.299	2.92	0.270
Composite NOX :	0.128	0.158	0.254	0.185	0.155	0.026	0.107	0.445	1.14	0.172
Exhaust emissions (g/mi):										
VOC Start:	0.039	0.047	0.063	0.051		0.015	0.025		0.635	
VOC Running:	0.038	0.049	0.069	0.055		0.042	0.090		1.626	
VOC Total Exhaust:	0.077	0.096	0.131	0.106	0.091	0.057	0.115	0.299	2.26	0.127
NOx Start:	0.019	0.024	0.039	0.029		0.001	0.003		0.490	
NOx Running:	0.110	0.134	0.215	0.157		0.025	0.104		0.648	
NOx Total Exhaust:	0.128	0.158	0.254	0.185	0.155	0.026	0.107	0.445	1.14	0.172
Non-Exhaust Emissions (g/mi):										
Hot Soak Loss:	0.040	0.022	0.034	0.026	0.028	0.000	0.000	0.000	0.142	0.036
Diurnal Loss:	0.004	0.003	0.004	0.003	0.006	0.000	0.000	0.000	0.010	0.004
Resting Loss:	0.015	0.009	0.014	0.010	0.015	0.000	0.000	0.000	0.506	0.020
Running Loss:	0.074	0.052	0.062	0.055	0.069	0.000	0.000	0.000	0.000	0.065
Crankcase Loss:	0.008	0.009	0.009	0.009	0.011	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.009	0.013	0.017	0.014	0.047	0.000	0.000	0.000	0.000	0.011
Total Non-Exhaust:	0.150	0.108	0.141	0.116	0.175	0.000	0.000	0.000	0.659	0.143

```
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 17.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 24.0
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                 Calendar Year:  2028
                         Month:  July
                      Altitude:  Low
          Minimum Temperature:  70.9 (F)
          Maximum Temperature:  94.1 (F)
            Absolute Humidity:   64. grains/lb
          Fuel Sulfur Content:   30. ppm
```

```
             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite VOC :      0.224     0.201     0.269     0.220     0.258    0.056     0.112     0.288      2.87     0.266
    Composite NOX :      0.128     0.159     0.254     0.186     0.157    0.025     0.105     0.438      1.15     0.172
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.038     0.049     0.068     0.054               0.041     0.087                1.575
  VOC Total Exhaust:     0.077     0.095     0.131     0.105     0.086     0.056     0.112     0.288      2.21     0.125

         NOx Start:      0.019     0.024     0.039     0.029               0.001     0.003                0.490
       NOx Running:      0.109     0.134     0.215     0.157               0.024     0.102                0.660
  NOx Total Exhaust:     0.128     0.159     0.254     0.186     0.157     0.025     0.105     0.438      1.15     0.172
  ---------------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.071     0.050     0.060     0.053     0.066     0.000     0.000     0.000     0.000     0.062
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.147     0.106     0.138     0.114     0.172     0.000     0.000     0.000     0.659     0.140
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 18.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 26.5
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
```

```
              GVWR:               <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.217     0.196     0.262     0.214     0.241    0.053     0.105     0.266      2.76     0.257
     Composite NOX :      0.127     0.159     0.255     0.186     0.160    0.024     0.102     0.425      1.18     0.171
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.037     0.048     0.067     0.053               0.038     0.080                1.470
  VOC Total Exhaust:     0.076     0.094     0.129     0.104     0.075     0.053     0.105     0.266      2.11     0.122

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.109     0.135     0.216     0.158               0.024     0.099                0.688
  NOx Total Exhaust:     0.127     0.159     0.255     0.186     0.160     0.024     0.102     0.425      1.18     0.171
  ---------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.065     0.046     0.054     0.048     0.060     0.000     0.000     0.000     0.000     0.056
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.141     0.101     0.133     0.109     0.167     0.000     0.000     0.000     0.659     0.135
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 19.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 28.4
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:               <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.212     0.192     0.257     0.210     0.230    0.051     0.101     0.251      2.69     0.250
     Composite NOX :      0.127     0.159     0.255     0.186     0.162    0.024     0.101     0.418      1.20     0.171
```

```
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.036     0.047     0.066     0.053               0.036     0.076                1.397
  VOC Total Exhaust:     0.076     0.094     0.129     0.104     0.068     0.051     0.101     0.251      2.03     0.120

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.108     0.135     0.216     0.158               0.023     0.098                0.710
  NOx Total Exhaust:     0.127     0.159     0.255     0.186     0.162     0.024     0.101     0.418      1.20     0.171
  ---------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.060     0.042     0.051     0.045     0.056     0.000     0.000     0.000     0.000     0.053
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.136     0.098     0.129     0.106     0.162     0.000     0.000     0.000     0.659     0.131
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 20.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 30.4
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
            there are no sales for vehicle class HDGV8b
  M 48 Warning:
            there are no sales for vehicle class LDDT12

                 Calendar Year:  2028
                         Month:  July
                      Altitude:  Low
            Minimum Temperature:  70.9 (F)
            Maximum Temperature:  94.1 (F)
              Absolute Humidity:   64. grains/lb
            Fuel Sulfur Content:   30. ppm

            Exhaust I/M Program:  Yes
               Evap I/M Program:  Yes
                    ATP Program:  Yes
               Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.207     0.189     0.253     0.207     0.220     0.049     0.096     0.237      2.62     0.245
     Composite NOX :      0.126     0.160     0.255     0.187     0.164     0.024     0.099     0.412      1.22     0.171
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.036     0.047     0.065     0.052               0.034     0.072                1.330
  VOC Total Exhaust:     0.075     0.093     0.128     0.103     0.061     0.049     0.096     0.237      1.97     0.117

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
```

```
       NOx Running:     0.107     0.135     0.216     0.158               0.023     0.096                0.730
  NOx Total Exhaust:     0.126     0.160     0.255     0.187     0.164     0.024     0.099     0.412      1.22     0.171
  ---------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.056     0.040     0.047     0.042     0.052     0.000     0.000     0.000     0.000     0.049
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.132     0.095     0.126     0.103     0.159     0.000     0.000     0.000     0.659     0.127
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 21.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 34.9
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:               <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite VOC :      0.198     0.182     0.244     0.200     0.201     0.045     0.088     0.211      2.49     0.233
    Composite NOX :      0.124     0.159     0.254     0.186     0.170     0.024     0.098     0.408      1.26     0.170
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.035     0.046     0.063     0.051               0.030     0.064                1.198
  VOC Total Exhaust:     0.074     0.093     0.126     0.102     0.051     0.045     0.088     0.211      1.83     0.113

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
       NOx Running:     0.105     0.135     0.215     0.157               0.023     0.095                0.770
  NOx Total Exhaust:     0.124     0.159     0.254     0.186     0.170     0.024     0.098     0.408      1.26     0.170
  ---------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
```

```
      Running Loss:     0.048     0.034     0.040     0.036     0.044     0.000     0.000     0.000     0.000     0.042
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.124     0.089     0.119     0.097     0.151     0.000     0.000     0.000     0.659     0.120
  -----------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 22.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 35.2
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  -----------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.198     0.182     0.244     0.199     0.200     0.045     0.088     0.209      2.48     0.233
     Composite NOX :      0.124     0.159     0.255     0.186     0.171     0.024     0.098     0.409      1.26     0.170
  -----------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.035     0.046     0.063     0.051               0.030     0.063                1.190
  VOC Total Exhaust:     0.075     0.093     0.126     0.102     0.050     0.045     0.088     0.209      1.83     0.113

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.105     0.135     0.215     0.158               0.023     0.096                0.772
  NOx Total Exhaust:     0.124     0.159     0.255     0.186     0.171     0.024     0.098     0.409      1.26     0.170
  -----------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.047     0.033     0.040     0.035     0.044     0.000     0.000     0.000     0.000     0.041
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.123     0.089     0.118     0.097     0.150     0.000     0.000     0.000     0.659     0.120
  -----------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
```

```
* 2028 Summer - No Build
* File 1, Run 1, Scenario 23.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 37.2
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
              Minimum Temperature:  70.9 (F)
              Maximum Temperature:  94.1 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.6664	0.1840	0.0719		0.0180	0.0006	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.195	0.180	0.241	0.197	0.194	0.043	0.085	0.200	2.44	0.229
Composite NOX :	0.124	0.161	0.256	0.187	0.174	0.024	0.099	0.413	1.27	0.171
Exhaust emissions (g/mi):										
VOC Start:	0.039	0.047	0.063	0.051		0.015	0.025		0.635	
VOC Running:	0.036	0.047	0.063	0.051		0.028	0.060		1.146	
VOC Total Exhaust:	0.075	0.093	0.126	0.102	0.047	0.043	0.085	0.200	1.78	0.112
NOx Start:	0.019	0.024	0.039	0.029		0.001	0.003		0.490	
NOx Running:	0.105	0.136	0.217	0.159		0.023	0.097		0.785	
NOx Total Exhaust:	0.124	0.161	0.256	0.187	0.174	0.024	0.099	0.413	1.27	0.171
Non-Exhaust Emissions (g/mi):										
Hot Soak Loss:	0.040	0.022	0.034	0.026	0.028	0.000	0.000	0.000	0.142	0.036
Diurnal Loss:	0.004	0.003	0.004	0.003	0.006	0.000	0.000	0.000	0.010	0.004
Resting Loss:	0.015	0.009	0.014	0.010	0.015	0.000	0.000	0.000	0.506	0.020
Running Loss:	0.044	0.031	0.037	0.033	0.041	0.000	0.000	0.000	0.000	0.038
Crankcase Loss:	0.008	0.009	0.009	0.009	0.011	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.009	0.013	0.017	0.014	0.047	0.000	0.000	0.000	0.000	0.011
Total Non-Exhaust:	0.120	0.087	0.115	0.094	0.147	0.000	0.000	0.000	0.659	0.117

```
* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 24.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
```

```
  M582 Warning:
            The user supplied freeway average speed of 38.2
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                    Calendar Year:  2028
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.9 (F)
              Maximum Temperature:  94.1 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:               <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.193     0.179     0.240     0.196     0.191    0.043     0.084     0.196      2.42     0.227
     Composite NOX :      0.124     0.161     0.257     0.188     0.175    0.024     0.100     0.416      1.28     0.171
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.036     0.047     0.064     0.052               0.028     0.059                1.125
  VOC Total Exhaust:     0.075     0.093     0.126     0.103     0.045     0.043     0.084     0.196      1.76     0.112

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.105     0.137     0.218     0.160               0.023     0.097                0.790
  NOx Total Exhaust:     0.124     0.161     0.257     0.188     0.175     0.024     0.100     0.416      1.28     0.171
  ---------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.042     0.030     0.036     0.031     0.039     0.000     0.000     0.000     0.000     0.037
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.118     0.085     0.114     0.093     0.146     0.000     0.000     0.000     0.659     0.115
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 25.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 38.6
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
```

```
            there are no sales for vehicle class HDGV8b
  M 48 Warning:
            there are no sales for vehicle class LDDT12

                  Calendar Year:  2028
                          Month:  July
                       Altitude:  Low
            Minimum Temperature:  70.9 (F)
            Maximum Temperature:  94.1 (F)
              Absolute Humidity:   64. grains/lb
            Fuel Sulfur Content:   30. ppm

            Exhaust I/M Program:  Yes
               Evap I/M Program:  Yes
                    ATP Program:  Yes
               Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite VOC :      0.193     0.179     0.240     0.196     0.190    0.042     0.083     0.194      2.41     0.227
    Composite NOX :      0.124     0.161     0.257     0.188     0.175    0.024     0.100     0.416      1.28     0.171
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.036     0.047     0.064     0.052               0.027     0.058                1.117
  VOC Total Exhaust:     0.075     0.094     0.126     0.103     0.044     0.042     0.083     0.194      1.75     0.112

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.106     0.137     0.218     0.160               0.023     0.097                0.793
  NOx Total Exhaust:     0.124     0.161     0.257     0.188     0.175     0.024     0.100     0.416      1.28     0.171
  ---------------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.042     0.029     0.035     0.031     0.039     0.000     0.000     0.000     0.000     0.036
    Crankcase Loss:      0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
    Refueling Loss:      0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.118     0.085     0.114     0.092     0.145     0.000     0.000     0.000     0.659     0.115
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 26.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
             User has supplied post-1999 sulfur levels.
  M615 Comment:
             User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 39.1
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
            there are no sales for vehicle class HDGV8b
  M 48 Warning:
            there are no sales for vehicle class LDDT12

                  Calendar Year:  2028
                          Month:  July
                       Altitude:  Low
```

```
              Minimum Temperature:  70.9 (F)
              Maximum Temperature:  94.1 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.192     0.178     0.239     0.195     0.188     0.042     0.083     0.192      2.40     0.226
     Composite NOX :      0.124     0.162     0.258     0.189     0.176     0.024     0.100     0.417      1.29     0.172
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.036     0.047     0.064     0.052               0.027     0.058                1.107
  VOC Total Exhaust:     0.075     0.094     0.126     0.103     0.044     0.042     0.083     0.192      1.74     0.112

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.106     0.137     0.219     0.160               0.023     0.098                0.795
  NOx Total Exhaust:     0.124     0.162     0.258     0.189     0.176     0.024     0.100     0.417      1.29     0.172
  ---------------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.041     0.029     0.035     0.030     0.038     0.000     0.000     0.000     0.000     0.036
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.117     0.084     0.113     0.092     0.144     0.000     0.000     0.000     0.659     0.114
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 27.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 48.4
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                    Calendar Year:  2028
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.9 (F)
              Maximum Temperature:  94.1 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
```

```
                    ATP Program:  Yes
              Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
             GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
 ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite VOC :      0.181     0.172     0.230     0.188     0.168    0.038     0.075     0.165      2.32     0.214
    Composite NOX :      0.127     0.170     0.268     0.197     0.189    0.028     0.117     0.487      1.38     0.181
 ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051              0.015     0.025                0.635
      VOC   Running:     0.038     0.050     0.065     0.054              0.023     0.050                1.026
  VOC Total Exhaust:     0.077     0.096     0.128     0.105     0.035    0.038     0.075     0.165      1.66     0.111

         NOx Start:      0.019     0.024     0.039     0.029              0.001     0.003                0.490
        NOx Running:     0.109     0.145     0.229     0.169              0.027     0.114                0.888
  NOx Total Exhaust:     0.127     0.170     0.268     0.197     0.189    0.028     0.117     0.487      1.38     0.181
 ---------------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028    0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006    0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015    0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.029     0.020     0.024     0.021     0.026    0.000     0.000     0.000     0.000     0.025
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011    0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047    0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.105     0.075     0.102     0.082     0.133    0.000     0.000     0.000     0.659     0.103
 ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 28.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 49.0
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
            there are no sales for vehicle class HDGV8b
  M 48 Warning:
            there are no sales for vehicle class LDDT12

                  Calendar Year:  2028
                          Month:  July
                       Altitude:  Low
            Minimum Temperature:  70.9 (F)
            Maximum Temperature:  94.1 (F)
              Absolute Humidity:   64. grains/lb
            Fuel Sulfur Content:   30. ppm

            Exhaust I/M Program:  Yes
               Evap I/M Program:  Yes
                    ATP Program:  Yes
               Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
             GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
```

```
 ---------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.181     0.171     0.230     0.188     0.167    0.038     0.074     0.165      2.32     0.214
     Composite NOX :      0.128     0.170     0.269     0.198     0.190    0.028     0.119     0.496      1.40     0.182
 ---------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.038     0.050     0.065     0.054               0.023     0.050                1.026
  VOC Total Exhaust:     0.077     0.096     0.128     0.105     0.035     0.038     0.074     0.165      1.66     0.111

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.109     0.146     0.230     0.169               0.027     0.116                0.907
  NOx Total Exhaust:     0.128     0.170     0.269     0.198     0.190     0.028     0.119     0.496      1.40     0.182
 ---------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.028     0.019     0.024     0.020     0.026     0.000     0.000     0.000     0.000     0.024
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.104     0.075     0.102     0.082     0.132     0.000     0.000     0.000     0.659     0.103
 ---------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 29.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 49.1
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:               <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
 ---------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.181     0.171     0.230     0.188     0.167    0.038     0.074     0.164      2.32     0.213
     Composite NOX :      0.128     0.170     0.269     0.198     0.190    0.028     0.119     0.498      1.40     0.182
 ---------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
```

VOC Running:	0.038	0.050	0.065	0.054		0.023	0.050		1.026	
VOC Total Exhaust:	0.077	0.097	0.128	0.105	0.035	0.038	0.074	0.164	1.66	0.111
NOx Start:	0.019	0.024	0.039	0.029		0.001	0.003		0.490	
NOx Running:	0.109	0.146	0.230	0.169		0.028	0.116		0.910	
NOx Total Exhaust:	0.128	0.170	0.269	0.198	0.190	0.028	0.119	0.498	1.40	0.182

Non-Exhaust Emissions (g/mi):

Hot Soak Loss:	0.040	0.022	0.034	0.026	0.028	0.000	0.000	0.000	0.142	0.036
Diurnal Loss:	0.004	0.003	0.004	0.003	0.006	0.000	0.000	0.000	0.010	0.004
Resting Loss:	0.015	0.009	0.014	0.010	0.015	0.000	0.000	0.000	0.506	0.020
Running Loss:	0.028	0.019	0.024	0.020	0.026	0.000	0.000	0.000	0.000	0.024
Crankcase Loss:	0.008	0.009	0.009	0.009	0.011	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.009	0.013	0.017	0.014	0.047	0.000	0.000	0.000	0.000	0.011
Total Non-Exhaust:	0.104	0.075	0.102	0.082	0.132	0.000	0.000	0.000	0.659	0.103

```
*************************************************************************
* MOBILE6.2.01 (31-Oct-2002)                                            *
* Input file: 28HC-NOX.DAT (file 1, run 1).                             *
*************************************************************************

* Reading Registration Distributions from the following external
* data file: NJ_REG.D
  M601 Comment:
               User has enabled STAGE II REFUELING.


* Reading ASM I/M Test Credits from ASMDATA.D

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - No Build
* File 1, Run 1, Scenario 1.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 17.7
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
*** I/M credits for Tech1&2 vehicles were read from the following external
    data file: TECH12.D
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                  Calendar Year:  2028
                          Month:  July
                       Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.6664	0.1840	0.0719		0.0180	0.0006	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.252	0.225	0.298	0.245	0.322	0.066	0.133	0.360	3.24	0.301
Composite NOX :	0.129	0.156	0.251	0.183	0.149	0.028	0.117	0.490	1.08	0.173
Exhaust emissions (g/mi):										
VOC Start:	0.039	0.047	0.063	0.051		0.015	0.025		0.635	
VOC Running:	0.040	0.052	0.074	0.058		0.051	0.109		1.948	
VOC Total Exhaust:	0.079	0.098	0.136	0.109	0.126	0.066	0.133	0.360	2.58	0.138
NOx Start:	0.019	0.024	0.039	0.029		0.001	0.003		0.490	
NOx Running:	0.111	0.132	0.212	0.155		0.027	0.115		0.594	
NOx Total Exhaust:	0.129	0.156	0.251	0.183	0.149	0.028	0.117	0.490	1.08	0.173
Non-Exhaust Emissions (g/mi):										
Hot Soak Loss:	0.040	0.022	0.034	0.026	0.028	0.000	0.000	0.000	0.142	0.036

Diurnal Loss:	0.004	0.003	0.004	0.003	0.006	0.000	0.000	0.000	0.010	0.004
Resting Loss:	0.015	0.009	0.014	0.010	0.015	0.000	0.000	0.000	0.506	0.020
Running Loss:	0.097	0.070	0.084	0.074	0.090	0.000	0.000	0.000	0.000	0.085
Crankcase Loss:	0.008	0.009	0.009	0.009	0.011	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.009	0.013	0.017	0.014	0.047	0.000	0.000	0.000	0.000	0.011
Total Non-Exhaust:	0.173	0.126	0.162	0.136	0.196	0.000	0.000	0.000	0.659	0.163

```
* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - EPA No-Build
* File 1, Run 1, Scenario 2.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 19.4
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.6664	0.1840	0.0719		0.0180	0.0006	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.242	0.216	0.287	0.236	0.301	0.063	0.127	0.338	3.12	0.289
Composite NOX :	0.129	0.157	0.253	0.184	0.151	0.027	0.113	0.473	1.10	0.173
Exhaust emissions (g/mi):										
VOC Start:	0.039	0.047	0.063	0.051		0.015	0.025		0.635	
VOC Running:	0.039	0.051	0.072	0.057		0.048	0.102		1.825	
VOC Total Exhaust:	0.079	0.097	0.134	0.108	0.113	0.063	0.127	0.338	2.46	0.134
NOx Start:	0.019	0.024	0.039	0.029		0.001	0.003		0.490	
NOx Running:	0.110	0.133	0.213	0.155		0.026	0.111		0.609	
NOx Total Exhaust:	0.129	0.157	0.253	0.184	0.151	0.027	0.113	0.473	1.10	0.173
Non-Exhaust Emissions (g/mi):										
Hot Soak Loss:	0.040	0.022	0.034	0.026	0.028	0.000	0.000	0.000	0.142	0.036
Diurnal Loss:	0.004	0.003	0.004	0.003	0.006	0.000	0.000	0.000	0.010	0.004
Resting Loss:	0.015	0.009	0.014	0.010	0.015	0.000	0.000	0.000	0.506	0.020
Running Loss:	0.087	0.062	0.075	0.066	0.081	0.000	0.000	0.000	0.000	0.077
Crankcase Loss:	0.008	0.009	0.009	0.009	0.011	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.009	0.013	0.017	0.014	0.047	0.000	0.000	0.000	0.000	0.011
Total Non-Exhaust:	0.163	0.118	0.153	0.127	0.188	0.000	0.000	0.000	0.659	0.155

```
* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Route 92
* File 1, Run 1, Scenario 3.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 21.1
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                    Calendar Year:  2028
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.9 (F)
              Maximum Temperature:  94.1 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.6664	0.1840	0.0719		0.0180	0.0006	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.234	0.208	0.278	0.228	0.283	0.060	0.121	0.319	3.02	0.278
Composite NOX :	0.129	0.158	0.253	0.185	0.153	0.026	0.110	0.459	1.11	0.173
Exhaust emissions (g/mi):										
VOC Start:	0.039	0.047	0.063	0.051		0.015	0.025		0.635	
VOC Running:	0.039	0.050	0.070	0.056		0.045	0.096		1.721	
VOC Total Exhaust:	0.078	0.096	0.133	0.107	0.102	0.060	0.121	0.319	2.36	0.130
NOx Start:	0.019	0.024	0.039	0.029		0.001	0.003		0.490	
NOx Running:	0.110	0.134	0.214	0.156		0.025	0.107		0.624	
NOx Total Exhaust:	0.129	0.158	0.253	0.185	0.153	0.026	0.110	0.459	1.11	0.173
Non-Exhaust Emissions (g/mi):										
Hot Soak Loss:	0.040	0.022	0.034	0.026	0.028	0.000	0.000	0.000	0.142	0.036
Diurnal Loss:	0.004	0.003	0.004	0.003	0.006	0.000	0.000	0.000	0.010	0.004
Resting Loss:	0.015	0.009	0.014	0.010	0.015	0.000	0.000	0.000	0.506	0.020
Running Loss:	0.080	0.056	0.067	0.059	0.074	0.000	0.000	0.000	0.000	0.070
Crankcase Loss:	0.008	0.009	0.009	0.009	0.011	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.009	0.013	0.017	0.014	0.047	0.000	0.000	0.000	0.000	0.011
Total Non-Exhaust:	0.156	0.112	0.145	0.121	0.181	0.000	0.000	0.000	0.659	0.148

```
* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - 6-Lane Route 1
* File 1, Run 1, Scenario 4.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
```

```
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 18.8
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                    Calendar Year:  2028
                            Month:  July
                         Altitude:  Low
              Minimum Temperature:  70.9 (F)
              Maximum Temperature:  94.1 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.6664	0.1840	0.0719		0.0180	0.0006	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.245	0.219	0.291	0.239	0.308	0.064	0.129	0.346	3.16	0.293
Composite NOX :	0.129	0.157	0.252	0.184	0.150	0.027	0.115	0.479	1.09	0.173
Exhaust emissions (g/mi):										
VOC Start:	0.039	0.047	0.063	0.051		0.015	0.025		0.635	
VOC Running:	0.040	0.051	0.072	0.057		0.049	0.104		1.866	
VOC Total Exhaust:	0.079	0.098	0.135	0.108	0.117	0.064	0.129	0.346	2.50	0.135
NOx Start:	0.019	0.024	0.039	0.029		0.001	0.003		0.490	
NOx Running:	0.111	0.133	0.213	0.155		0.026	0.112		0.604	
NOx Total Exhaust:	0.129	0.157	0.252	0.184	0.150	0.027	0.115	0.479	1.09	0.173
Non-Exhaust Emissions (g/mi):										
Hot Soak Loss:	0.040	0.022	0.034	0.026	0.028	0.000	0.000	0.000	0.142	0.036
Diurnal Loss:	0.004	0.003	0.004	0.003	0.006	0.000	0.000	0.000	0.010	0.004
Resting Loss:	0.015	0.009	0.014	0.010	0.015	0.000	0.000	0.000	0.506	0.020
Running Loss:	0.091	0.065	0.078	0.069	0.084	0.000	0.000	0.000	0.000	0.079
Crankcase Loss:	0.008	0.009	0.009	0.009	0.011	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.009	0.013	0.017	0.014	0.047	0.000	0.000	0.000	0.000	0.011
Total Non-Exhaust:	0.167	0.121	0.156	0.130	0.191	0.000	0.000	0.000	0.659	0.158

```
* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Route 1 with Signals Removed
* File 1, Run 1, Scenario 5.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 20.0
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
```

```
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  July
                        Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite VOC :      0.239     0.213     0.284     0.233     0.294    0.062     0.125     0.332      3.08     0.285
     Composite NOX :      0.129     0.157     0.253     0.184     0.152    0.027     0.112     0.468      1.10     0.173
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
        VOC   Start:     0.039     0.047     0.063     0.051               0.015     0.025                0.635
      VOC   Running:     0.039     0.051     0.071     0.056               0.047     0.100                1.787
  VOC Total Exhaust:     0.078     0.097     0.134     0.107     0.109     0.062     0.125     0.332      2.42     0.132

          NOx Start:     0.019     0.024     0.039     0.029               0.001     0.003                0.490
        NOx Running:     0.110     0.133     0.214     0.156               0.026     0.109                0.614
  NOx Total Exhaust:     0.129     0.157     0.253     0.184     0.152     0.027     0.112     0.468      1.10     0.173
  ---------------------------------------------------------------------------------------------------------------------------
Non-Exhaust Emissions (g/mi):
      Hot Soak Loss:     0.040     0.022     0.034     0.026     0.028     0.000     0.000     0.000     0.142     0.036
       Diurnal Loss:     0.004     0.003     0.004     0.003     0.006     0.000     0.000     0.000     0.010     0.004
       Resting Loss:     0.015     0.009     0.014     0.010     0.015     0.000     0.000     0.000     0.506     0.020
       Running Loss:     0.085     0.060     0.072     0.063     0.079     0.000     0.000     0.000     0.000     0.074
     Crankcase Loss:     0.008     0.009     0.009     0.009     0.011     0.000     0.000     0.000     0.000     0.008
     Refueling Loss:     0.009     0.013     0.017     0.014     0.047     0.000     0.000     0.000     0.000     0.011
  Total Non-Exhaust:     0.161     0.116     0.150     0.125     0.185     0.000     0.000     0.000     0.659     0.152
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - 2-Lane Route 92
* File 1, Run 1, Scenario 6.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
              User has supplied post-1999 sulfur levels.
  M615 Comment:
              User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 20.4
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
```

```
                    Month:  July
                 Altitude:  Low
Minimum Temperature:  70.9 (F)
Maximum Temperature:  94.1 (F)
  Absolute Humidity:   64. grains/lb
Fuel Sulfur Content:   30. ppm

Exhaust I/M Program:  Yes
   Evap I/M Program:  Yes
        ATP Program:  Yes
   Reformulated Gas:  Yes
```

Vehicle Type: GVWR:	LDGV	LDGT12 <6000	LDGT34 >6000	LDGT (All)	HDGV	LDDV	LDDT	HDDV	MC	All Veh
VMT Distribution:	0.6664	0.1840	0.0719		0.0180	0.0006	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.237	0.211	0.281	0.231	0.290	0.061	0.124	0.327	3.06	0.282
Composite NOX :	0.129	0.158	0.253	0.184	0.152	0.027	0.111	0.465	1.11	0.173
Exhaust emissions (g/mi):										
VOC Start:	0.039	0.047	0.063	0.051		0.015	0.025		0.635	
VOC Running:	0.039	0.050	0.071	0.056		0.046	0.099		1.762	
VOC Total Exhaust:	0.078	0.097	0.133	0.107	0.106	0.061	0.124	0.327	2.40	0.132
NOx Start:	0.019	0.024	0.039	0.029		0.001	0.003		0.490	
NOx Running:	0.110	0.133	0.214	0.156		0.026	0.109		0.617	
NOx Total Exhaust:	0.129	0.158	0.253	0.184	0.152	0.027	0.111	0.465	1.11	0.173
Non-Exhaust Emissions (g/mi):										
Hot Soak Loss:	0.040	0.022	0.034	0.026	0.028	0.000	0.000	0.000	0.142	0.036
Diurnal Loss:	0.004	0.003	0.004	0.003	0.006	0.000	0.000	0.000	0.010	0.004
Resting Loss:	0.015	0.009	0.014	0.010	0.015	0.000	0.000	0.000	0.506	0.020
Running Loss:	0.083	0.058	0.070	0.062	0.077	0.000	0.000	0.000	0.000	0.072
Crankcase Loss:	0.008	0.009	0.009	0.009	0.011	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.009	0.013	0.017	0.014	0.047	0.000	0.000	0.000	0.000	0.011
Total Non-Exhaust:	0.159	0.114	0.148	0.123	0.183	0.000	0.000	0.000	0.659	0.151

```
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Summer - Route 92 without Perrine Rd. Intersection
* File 1, Run 1, Scenario 7.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 21.0
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                  Calendar Year:  2028
                          Month:  July
                       Altitude:  Low
             Minimum Temperature:  70.9 (F)
             Maximum Temperature:  94.1 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm
```

Exhaust I/M Program: Yes
Evap I/M Program: Yes
ATP Program: Yes
Reformulated Gas: Yes

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.6664	0.1840	0.0719		0.0180	0.0006	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.234	0.209	0.279	0.228	0.283	0.060	0.122	0.320	3.02	0.279
Composite NOX :	0.129	0.158	0.253	0.185	0.153	0.026	0.110	0.460	1.11	0.173
Exhaust emissions (g/mi):										
VOC Start:	0.039	0.047	0.063	0.051		0.015	0.025		0.635	
VOC Running:	0.039	0.050	0.070	0.056		0.045	0.097		1.727	
VOC Total Exhaust:	0.078	0.097	0.133	0.107	0.102	0.060	0.122	0.320	2.36	0.130
NOx Start:	0.019	0.024	0.039	0.029		0.001	0.003		0.490	
NOx Running:	0.110	0.133	0.214	0.156		0.025	0.107		0.623	
NOx Total Exhaust:	0.129	0.158	0.253	0.185	0.153	0.026	0.110	0.460	1.11	0.173
Non-Exhaust Emissions (g/mi):										
Hot Soak Loss:	0.040	0.022	0.034	0.026	0.028	0.000	0.000	0.000	0.142	0.036
Diurnal Loss:	0.004	0.003	0.004	0.003	0.006	0.000	0.000	0.000	0.010	0.004
Resting Loss:	0.015	0.009	0.014	0.010	0.015	0.000	0.000	0.000	0.506	0.020
Running Loss:	0.080	0.056	0.068	0.060	0.075	0.000	0.000	0.000	0.000	0.070
Crankcase Loss:	0.008	0.009	0.009	0.009	0.011	0.000	0.000	0.000	0.000	0.008
Refueling Loss:	0.009	0.013	0.017	0.014	0.047	0.000	0.000	0.000	0.000	0.011
Total Non-Exhaust:	0.156	0.112	0.146	0.121	0.181	0.000	0.000	0.000	0.659	0.148

```
*************************************************************************
* MOBILE6.2.01 (31-Oct-2002)                                            *
* Input file: 28WINB.DAT (file 1, run 1).                               *
*************************************************************************

* Reading Registration Distributions from the following external
* data file: NJ_REG.D
  M601 Comment:
               User has enabled STAGE II REFUELING.


* Reading ASM I/M Test Credits from ASMDATA.D

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 1.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M514 Warning:
            The combined freeway and ramp average speed entered
           cannot be less than  2.7 miles per hour.
           The average speed will be reset to this value.
  M582 Warning:
           The user supplied freeway average speed of  2.7
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
*** I/M credits for Tech1&2 vehicles were read from the following external
    data file: TECH12.D
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     23.57     21.98     27.17     23.44     34.42     1.969     1.371     0.905     96.38    23.812
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:     15.48     15.54     20.12     16.83               1.717     1.237               90.494
   CO Total Exhaust:     23.57     21.98     27.17     23.44     34.42     1.969     1.371     0.905     96.38    23.812
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
```

```
* 2028 Winter - Build
* File 1, Run 1, Scenario 2.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of  5.0
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                    Calendar Year:  2028
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  31.0 (F)
              Maximum Temperature:  31.0 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                          ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:     0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     17.31     15.90     19.26     16.85     28.11     1.682     1.164     0.753     61.12    17.305
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      9.22      9.46     12.22     10.23               1.430     1.030               55.237
   CO Total Exhaust:     17.31     15.90     19.26     16.85     28.11     1.682     1.164     0.753     61.12    17.305
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 3.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of  5.6
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                    Calendar Year:  2028
                            Month:  Jan.
```

```
                    Altitude:  Low
         Minimum Temperature:  31.0 (F)
         Maximum Temperature:  31.0 (F)
           Absolute Humidity:   64. grains/lb
         Fuel Sulfur Content:   30. ppm

         Exhaust I/M Program:  Yes
            Evap I/M Program:  Yes
                 ATP Program:  Yes
            Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
 -----------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite CO  :     16.51     15.12     18.25     16.00     26.84     1.623     1.122     0.722     56.03    16.453
 -----------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

          CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
        CO Running:      8.42      8.67     11.20      9.38               1.371     0.988               50.143
  CO Total Exhaust:     16.51     15.12     18.25     16.00     26.84     1.623     1.122     0.722     56.03    16.453
 -----------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 4.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of  6.9
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
            there are no sales for vehicle class HDGV8b
  M 48 Warning:
            there are no sales for vehicle class LDDT12

                 Calendar Year:  2028
                         Month:  Jan.
                    Altitude:  Low
         Minimum Temperature:  31.0 (F)
         Maximum Temperature:  31.0 (F)
           Absolute Humidity:   64. grains/lb
         Fuel Sulfur Content:   30. ppm

         Exhaust I/M Program:  Yes
            Evap I/M Program:  Yes
                 ATP Program:  Yes
            Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
 -----------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite CO  :     15.22     13.83     16.58     14.60     23.52     1.466     1.009     0.640     46.18    15.023
 -----------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
```

```
          CO Start:      8.09      6.44      7.05      6.61                0.252     0.134                5.886
        CO Running:      7.12      7.38      9.54      7.99                1.214     0.875               40.294
   CO Total Exhaust:     15.22     13.83     16.58     14.60     23.52     1.466     1.009     0.640     46.18    15.023
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 5.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of  8.3
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     14.28     12.89     15.37     13.59     21.11     1.352     0.927     0.580     39.02    13.985
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

          CO Start:      8.09      6.44      7.05      6.61                0.252     0.134                5.886
        CO Running:      6.19      6.45      8.33      6.98                1.100     0.793               33.138
   CO Total Exhaust:     14.28     12.89     15.37     13.59     21.11     1.352     0.927     0.580     39.02    13.985
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 6.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 11.2
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
```

```
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                    Calendar Year:  2028
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  31.0 (F)
              Maximum Temperature:  31.0 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     13.11     11.73     13.86     12.33     17.65     1.187     0.808     0.492     29.93    12.682
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      5.02      5.28      6.82      5.71               0.935     0.674               24.046
   CO Total Exhaust:     13.11     11.73     13.86     12.33     17.65     1.187     0.808     0.492     29.93    12.682
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 7.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 11.8
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                    Calendar Year:  2028
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  31.0 (F)
              Maximum Temperature:  31.0 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
```

```
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.97     11.58     13.67     12.17     16.85     1.147     0.779     0.472     28.64    12.510
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      4.88      5.13      6.63      5.55               0.896     0.645               22.754
   CO Total Exhaust:     12.97     11.58     13.67     12.17     16.85     1.147     0.779     0.472     28.64    12.510
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 8.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 14.3
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.50     11.09     13.05     11.64     14.26     1.019     0.687     0.404     24.42    11.950
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      4.41      4.65      6.00      5.03               0.768     0.553               18.538
   CO Total Exhaust:     12.50     11.09     13.05     11.64     14.26     1.019     0.687     0.404     24.42    11.950
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 9.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
```

```
              User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 15.4
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.34     10.93     12.84     11.46     13.39     0.976     0.656     0.382     23.00    11.760
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      4.25      4.48      5.79      4.85               0.724     0.522               17.116
   CO Total Exhaust:     12.34     10.93     12.84     11.46     13.39     0.976     0.656     0.382     23.00    11.760
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 10.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
              User has supplied post-1999 sulfur levels.
  M615 Comment:
              User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 16.9
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm
```

```
             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:               <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite CO  :     12.25     10.84     12.72     11.37     12.21     0.916     0.613     0.350     21.46    11.634
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      4.16      4.40      5.67      4.76               0.664     0.478               15.576
   CO Total Exhaust:     12.25     10.84     12.72     11.37     12.21     0.916     0.613     0.350     21.46    11.634
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 11.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 18.6
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:               <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite CO  :     12.20     10.79     12.64     11.31     11.06     0.856     0.570     0.319     20.05    11.540
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      4.11      4.34      5.60      4.70               0.605     0.436               14.159
   CO Total Exhaust:     12.20     10.79     12.64     11.31     11.06     0.856     0.570     0.319     20.05    11.540
  ---------------------------------------------------------------------------------------------------------------------------
```

```
* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 12.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 21.2
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type: GVWR:	LDGV	LDGT12 <6000	LDGT34 >6000	LDGT (All)	HDGV	LDDV	LDDT	HDDV	MC	All Veh
VMT Distribution:	0.6664	0.1840	0.0719		0.0180	0.0006	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite CO :	12.14	10.72	12.55	11.23	9.65	0.783	0.517	0.280	18.31	11.425
Exhaust emissions (g/mi):										
CO Start:	8.09	6.44	7.05	6.61		0.252	0.134		5.886	
CO Running:	4.05	4.28	5.50	4.62		0.532	0.383		12.425	
CO Total Exhaust:	12.14	10.72	12.55	11.23	9.65	0.783	0.517	0.280	18.31	11.425

```
* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 13.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 21.5
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
```

```
                    Month:  Jan.
                 Altitude:  Low
Minimum Temperature:  31.0 (F)
Maximum Temperature:  31.0 (F)
  Absolute Humidity:   64. grains/lb
Fuel Sulfur Content:   30. ppm

Exhaust I/M Program:  Yes
   Evap I/M Program:  Yes
        ATP Program:  Yes
   Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite CO  :     12.13     10.71     12.54     11.23      9.50     0.775     0.511     0.276     18.13    11.414
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

          CO Start:      8.09      6.44      7.05      6.61                0.252     0.134                5.886
        CO Running:      4.04      4.27      5.50      4.61                0.524     0.377               12.249
   CO Total Exhaust:     12.13     10.71     12.54     11.23      9.50     0.775     0.511     0.276     18.13    11.414
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 14.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 23.8
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                  Calendar Year:  2028
                    Month:  Jan.
                 Altitude:  Low
Minimum Temperature:  31.0 (F)
Maximum Temperature:  31.0 (F)
  Absolute Humidity:   64. grains/lb
Fuel Sulfur Content:   30. ppm

Exhaust I/M Program:  Yes
   Evap I/M Program:  Yes
        ATP Program:  Yes
   Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite CO  :     12.09     10.67     12.48     11.18      8.51     0.722     0.473     0.248     16.93    11.335
  ---------------------------------------------------------------------------------------------------------------------------
```

```
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61                0.252     0.134                 5.886
         CO Running:      4.00      4.22      5.43      4.56                0.471     0.339                11.045
   CO Total Exhaust:     12.09     10.67     12.48     11.18      8.51     0.722     0.473     0.248      16.93    11.335
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 15.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 26.3
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                  Calendar Year:  2028
                          Month:  Jan.
                       Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite CO  :     12.05     10.63     12.42     11.13      7.64     0.675     0.439     0.223     15.84    11.264
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61                0.252     0.134                 5.886
         CO Running:      3.96      4.18      5.38      4.52                0.424     0.305                 9.951
   CO Total Exhaust:     12.05     10.63     12.42     11.13      7.64     0.675     0.439     0.223     15.84    11.264
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 16.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 28.6
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
```

```
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.02     10.60     12.38     11.10      7.01     0.640     0.414     0.204     14.95    11.210
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61                0.252     0.134                5.886
         CO Running:      3.93      4.15      5.33      4.49                0.388     0.280                9.063
   CO Total Exhaust:     12.02     10.60     12.38     11.10      7.01     0.640     0.414     0.204     14.95    11.210
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 17.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
              User has supplied post-1999 sulfur levels.
  M615 Comment:
              User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 29.6
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
```

```
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.01     10.59     12.36     11.09      6.77     0.626     0.404     0.197     14.61    11.189
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61                0.252     0.134                5.886
         CO Running:      3.92      4.14      5.32      4.47                0.375     0.270                8.720
   CO Total Exhaust:     12.01     10.59     12.36     11.09      6.77     0.626     0.404     0.197     14.61    11.189
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 18.
* # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 30.1
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                    Calendar Year:  2028
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  31.0 (F)
              Maximum Temperature:  31.0 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.00     10.58     12.36     11.08      6.65     0.620     0.399     0.194     14.44    11.180
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61                0.252     0.134                5.886
         CO Running:      3.91      4.14      5.31      4.47                0.368     0.265                8.557
   CO Total Exhaust:     12.00     10.58     12.36     11.08      6.65     0.620     0.399     0.194     14.44    11.180
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 19.
* # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
```

```
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 30.4
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                     ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.00     10.58     12.35     11.08      6.59     0.616     0.397     0.192     14.35    11.176
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61                0.252     0.134                5.886
         CO Running:      3.91      4.14      5.31      4.47                0.364     0.262                8.461
   CO Total Exhaust:     12.00     10.58     12.35     11.08      6.59     0.616     0.397     0.192     14.35    11.176
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 20.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 31.8
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm
```

```
             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.02     10.60     12.38     11.10      6.34     0.601     0.386     0.184     13.91    11.183
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61                0.252     0.134                5.886
         CO Running:      3.93      4.16      5.34      4.49                0.349     0.252                8.024
   CO Total Exhaust:     12.02     10.60     12.38     11.10      6.34     0.601     0.386     0.184     13.91    11.183
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 21.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 36.2
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.14     10.74     12.56     11.25      5.72     0.563     0.359     0.164     12.78    11.275
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61                0.252     0.134                5.886
         CO Running:      4.05      4.30      5.51      4.64                0.311     0.224                6.894
   CO Total Exhaust:     12.14     10.74     12.56     11.25      5.72     0.563     0.359     0.164     12.78    11.275
  ---------------------------------------------------------------------------------------------------------------------------
```

```
* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 22.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
                User has supplied post-1999 sulfur levels.
  M615 Comment:
                User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 36.8
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                    Calendar Year:  2028
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  31.0 (F)
              Maximum Temperature:  31.0 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.18     10.79     12.61     11.30      5.67     0.559     0.356     0.162     12.65    11.310
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      4.09      4.34      5.56      4.69               0.308     0.222                6.768
   CO Total Exhaust:     12.18     10.79     12.61     11.30      5.67     0.559     0.356     0.162     12.65    11.310
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 23.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
                User has supplied post-1999 sulfur levels.
  M615 Comment:
                User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 37.1
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12
```

```
                Calendar Year:  2028
                        Month:  Jan.
                     Altitude:  Low
          Minimum Temperature:  31.0 (F)
          Maximum Temperature:  31.0 (F)
            Absolute Humidity:   64. grains/lb
          Fuel Sulfur Content:   30. ppm

          Exhaust I/M Program:  Yes
             Evap I/M Program:  Yes
                  ATP Program:  Yes
             Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:               <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
 ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite CO  :     12.20     10.81     12.64     11.32      5.64     0.557     0.355     0.161     12.59    11.328
 ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

          CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
        CO Running:      4.11      4.36      5.59      4.71               0.306     0.220                6.707
  CO Total Exhaust:     12.20     10.81     12.64     11.32      5.64     0.557     0.355     0.161     12.59    11.328
 ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 24.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 39.3
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                Calendar Year:  2028
                        Month:  Jan.
                     Altitude:  Low
          Minimum Temperature:  31.0 (F)
          Maximum Temperature:  31.0 (F)
            Absolute Humidity:   64. grains/lb
          Fuel Sulfur Content:   30. ppm

          Exhaust I/M Program:  Yes
             Evap I/M Program:  Yes
                  ATP Program:  Yes
             Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:               <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
 ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite CO  :     12.34     10.95     12.81     11.48      5.46     0.545     0.345     0.154     12.17    11.446
```

```
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61                0.252     0.134                 5.886
         CO Running:      4.24      4.51      5.77      4.86                0.293     0.211                 6.285
   CO Total Exhaust:     12.34     10.95     12.81     11.48      5.46      0.545     0.345     0.154      12.17    11.446
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 25.
* # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 47.6
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:               <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.89     11.56     13.55     12.12      5.47     0.528     0.333     0.146     11.35    11.964
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61                0.252     0.134                 5.886
         CO Running:      4.79      5.11      6.51      5.50                0.277     0.199                 5.467
   CO Total Exhaust:     12.89     11.56     13.55     12.12      5.47     0.528     0.333     0.146     11.35    11.964
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 26.
* # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 47.7
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
```

```
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite CO  :     12.89     11.56     13.56     12.12      5.47     0.528     0.333     0.146     11.35    11.970
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      4.80      5.12      6.51      5.51               0.277     0.199                5.462
   CO Total Exhaust:     12.89     11.56     13.56     12.12      5.47     0.528     0.333     0.146     11.35    11.970
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 27.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
              User has supplied post-1999 sulfur levels.
  M615 Comment:
              User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 52.3
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

```
      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
 ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite CO  :     13.20     11.90     13.98     12.49      5.93     0.537     0.340     0.150     11.32    12.279
 ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

          CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
        CO Running:      5.11      5.46      6.93      5.87               0.286     0.206                5.434
  CO Total Exhaust:     13.20     11.90     13.98     12.49      5.93     0.537     0.340     0.150     11.32    12.279
 ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Build
* File 1, Run 1, Scenario 28.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 53.0
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                  Calendar Year:  2028
                          Month:  Jan.
                       Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
 ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite CO  :     13.25     11.96     14.04     12.54      6.06     0.540     0.342     0.152     12.07    12.340
 ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

          CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
        CO Running:      5.16      5.51      7.00      5.93               0.289     0.208                6.182
  CO Total Exhaust:     13.25     11.96     14.04     12.54      6.06     0.540     0.342     0.152     12.07    12.340
 ---------------------------------------------------------------------------------------------------------------------------
```

```
*************************************************************************
* MOBILE6.2.01 (31-Oct-2002)                                            *
* Input file: 28WIN-NB.DAT (file 1, run 1).                             *
*************************************************************************

* Reading Registration Distributions from the following external
* data file: NJ_REG.D
  M601 Comment:
               User has enabled STAGE II REFUELING.


* Reading ASM I/M Test Credits from ASMDATA.D

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 1.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M514 Warning:
            The combined freeway and ramp average speed entered
           cannot be less than  2.7 miles per hour.
           The average speed will be reset to this value.
  M582 Warning:
           The user supplied freeway average speed of  2.7
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
*** I/M credits for Tech1&2 vehicles were read from the following external
    data file: TECH12.D
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     23.57     21.98     27.17     23.44     34.42     1.969     1.371     0.905     96.38    23.812
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:     15.48     15.54     20.12     16.83               1.717     1.237               90.494
   CO Total Exhaust:     23.57     21.98     27.17     23.44     34.42     1.969     1.371     0.905     96.38    23.812
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
```

```
* 2028 Winter - No Build
* File 1, Run 1, Scenario 2.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of  3.5
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                    Calendar Year:  2028
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  31.0 (F)
              Maximum Temperature:  31.0 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     20.47     18.97     23.25     20.17     31.29     1.826     1.269     0.830     78.89    20.584
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:     12.37     12.52     16.20     13.56               1.575     1.135               73.006
   CO Total Exhaust:     20.47     18.97     23.25     20.17     31.29     1.826     1.269     0.830     78.89    20.584
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 3.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of  4.2
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                    Calendar Year:  2028
                            Month:  Jan.
```

```
                    Altitude:  Low
         Minimum Temperature:  31.0 (F)
         Maximum Temperature:  31.0 (F)
           Absolute Humidity:   64. grains/lb
         Fuel Sulfur Content:   30. ppm

         Exhaust I/M Program:  Yes
            Evap I/M Program:  Yes
                 ATP Program:  Yes
            Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
 ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite CO  :     18.71     17.26     21.03     18.32     29.52     1.746     1.211     0.787     69.02    18.763
 ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

          CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
        CO Running:     10.62     10.82     13.99     11.71               1.494     1.077               63.134
  CO Total Exhaust:     18.71     17.26     21.03     18.32     29.52     1.746     1.211     0.787     69.02    18.763
 ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 4.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
 M616 Comment:
              User has supplied post-1999 sulfur levels.
 M615 Comment:
              User supplied VMT mix.
 M582 Warning:
          The user supplied freeway average speed of  5.0
          will be used for all hours of the day. 100% of VMT
          has been assigned to a fixed combination of freeways
          and freeway ramps for all hours of the day and all
           vehicle types.
 M 48 Warning:
            there are no sales for vehicle class HDGV8b
 M 48 Warning:
            there are no sales for vehicle class LDDT12

                 Calendar Year:  2028
                         Month:  Jan.
                    Altitude:  Low
         Minimum Temperature:  31.0 (F)
         Maximum Temperature:  31.0 (F)
           Absolute Humidity:   64. grains/lb
         Fuel Sulfur Content:   30. ppm

         Exhaust I/M Program:  Yes
            Evap I/M Program:  Yes
                 ATP Program:  Yes
            Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
 ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite CO  :     17.31     15.90     19.26     16.85     28.11     1.682     1.164     0.753     61.12    17.305
 ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):
```

```
          CO Start:      8.09      6.44      7.05      6.61                0.252     0.134                5.886
        CO Running:      9.22      9.46     12.22     10.23                1.430     1.030               55.237
  CO Total Exhaust:     17.31     15.90     19.26     16.85     28.11      1.682     1.164     0.753     61.12    17.305
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 5.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of  5.3
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:               <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     16.89     15.50     18.74     16.41     27.69     1.662     1.151     0.743     58.78    16.872
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

          CO Start:      8.09      6.44      7.05      6.61                0.252     0.134                5.886
        CO Running:      8.80      9.05     11.69      9.79                1.411     1.016               52.890
  CO Total Exhaust:     16.89     15.50     18.74     16.41     27.69      1.662     1.151     0.743     58.78    16.872
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 6.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of  7.2
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
```

```
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                    Calendar Year:  2028
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  31.0 (F)
              Maximum Temperature:  31.0 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:               <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     14.99     13.60     16.28     14.35     22.93     1.438     0.989     0.625     44.41    14.767
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      6.89      7.15      9.24      7.74               1.186     0.854               38.526
   CO Total Exhaust:     14.99     13.60     16.28     14.35     22.93     1.438     0.989     0.625     44.41    14.767
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 7.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of  7.7
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                    Calendar Year:  2028
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  31.0 (F)
              Maximum Temperature:  31.0 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:               <6000     >6000     (All)
```

```
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     14.64     13.25     15.84     13.98     22.03     1.396     0.958     0.603     41.77    14.384
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      6.55      6.81      8.79      7.36               1.144     0.824               35.886
   CO Total Exhaust:     14.64     13.25     15.84     13.98     22.03     1.396     0.958     0.603     41.77    14.384
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 8.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 11.5
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:               <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     13.04     11.65     13.77     12.24     17.24     1.166     0.793     0.482     29.27    12.594
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      4.95      5.20      6.72      5.63               0.915     0.659               23.383
   CO Total Exhaust:     13.04     11.65     13.77     12.24     17.24     1.166     0.793     0.482     29.27    12.594
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 9.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
```

```
              User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 13.7
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.59     11.19     13.18     11.75     14.80     1.046     0.706     0.418     25.30    12.065
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      4.50      4.75      6.13      5.14               0.794     0.572               19.409
   CO Total Exhaust:     12.59     11.19     13.18     11.75     14.80     1.046     0.706     0.418     25.30    12.065
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 10.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
              User has supplied post-1999 sulfur levels.
  M615 Comment:
              User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 15.9
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm
```

```
             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:               <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite CO  :     12.29     10.88     12.77     11.41     13.00     0.957     0.642     0.371     22.44    11.698
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      4.20      4.43      5.72      4.80               0.705     0.508               16.552
   CO Total Exhaust:     12.29     10.88     12.77     11.41     13.00     0.957     0.642     0.371     22.44    11.698
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 11.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 18.5
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:               <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite CO  :     12.20     10.79     12.65     11.31     11.12     0.860     0.572     0.320     20.12    11.545
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      4.11      4.35      5.60      4.70               0.608     0.438               14.235
   CO Total Exhaust:     12.20     10.79     12.65     11.31     11.12     0.860     0.572     0.320     20.12    11.545
  ---------------------------------------------------------------------------------------------------------------------------
```

```
* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 12.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 19.0
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

Vehicle Type: GVWR:	LDGV	LDGT12 <6000	LDGT34 >6000	LDGT (All)	HDGV	LDDV	LDDT	HDDV	MC	All Veh
VMT Distribution:	0.6664	0.1840	0.0719		0.0180	0.0006	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite CO :	12.19	10.78	12.63	11.30	10.82	0.844	0.561	0.312	19.75	11.520
Exhaust emissions (g/mi):										
CO Start:	8.09	6.44	7.05	6.61		0.252	0.134		5.886	
CO Running:	4.10	4.33	5.58	4.68		0.592	0.427		13.863	
CO Total Exhaust:	12.19	10.78	12.63	11.30	10.82	0.844	0.561	0.312	19.75	11.520

```
* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 13.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 19.4
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
```

```
                    Month:  Jan.
                 Altitude:  Low
     Minimum Temperature:  31.0 (F)
     Maximum Temperature:  31.0 (F)
       Absolute Humidity:   64. grains/lb
     Fuel Sulfur Content:   30. ppm

     Exhaust I/M Program:  Yes
        Evap I/M Program:  Yes
             ATP Program:  Yes
        Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
 ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite CO  :     12.18     10.76     12.61     11.28     10.59     0.832     0.552     0.306     19.46    11.501
 ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

          CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
        CO Running:      4.09      4.32      5.57      4.67               0.581     0.418               13.578
  CO Total Exhaust:     12.18     10.76     12.61     11.28     10.59     0.832     0.552     0.306     19.46    11.501
 ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 14.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
 M616 Comment:
              User has supplied post-1999 sulfur levels.
 M615 Comment:
              User supplied VMT mix.
 M582 Warning:
          The user supplied freeway average speed of 19.7
          will be used for all hours of the day. 100% of VMT
          has been assigned to a fixed combination of freeways
          and freeway ramps for all hours of the day and all
           vehicle types.
 M 48 Warning:
            there are no sales for vehicle class HDGV8b
 M 48 Warning:
            there are no sales for vehicle class LDDT12

                 Calendar Year:  2028
                    Month:  Jan.
                 Altitude:  Low
     Minimum Temperature:  31.0 (F)
     Maximum Temperature:  31.0 (F)
       Absolute Humidity:   64. grains/lb
     Fuel Sulfur Content:   30. ppm

     Exhaust I/M Program:  Yes
        Evap I/M Program:  Yes
             ATP Program:  Yes
        Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
 ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite CO  :     12.17     10.76     12.60     11.27     10.42     0.823     0.546     0.301     19.26    11.488
 ---------------------------------------------------------------------------------------------------------------------------
```

```
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61                0.252     0.134                 5.886
         CO Running:      4.08      4.31      5.56      4.66                0.572     0.412                13.373
   CO Total Exhaust:     12.17     10.76     12.60     11.27     10.42      0.823     0.546     0.301      19.26    11.488
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 15.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 21.3
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                    Calendar Year:  2028
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  31.0 (F)
              Maximum Temperature:  31.0 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.14     10.72     12.55     11.23      9.60     0.780     0.515     0.279     18.25    11.421
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61                0.252     0.134                 5.886
         CO Running:      4.04      4.27      5.50      4.62                0.529     0.381                12.366
   CO Total Exhaust:     12.14     10.72     12.55     11.23      9.60     0.780     0.515     0.279     18.25    11.421
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 16.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 22.9
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
```

```
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.10     10.69     12.50     11.20      8.87     0.742     0.487     0.258     17.37    11.364
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      4.01      4.24      5.46      4.58               0.490     0.353               11.487
   CO Total Exhaust:     12.10     10.69     12.50     11.20      8.87     0.742     0.487     0.258     17.37    11.364
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 17.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
              User has supplied post-1999 sulfur levels.
  M615 Comment:
              User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 24.0
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
```

```
              GVWR:                <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.08     10.67     12.47     11.17      8.43     0.718     0.470     0.246     16.84    11.328
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      3.99      4.22      5.43      4.56               0.466     0.336               10.952
   CO Total Exhaust:     12.08     10.67     12.47     11.17      8.43     0.718     0.470     0.246     16.84    11.328
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 18.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 26.5
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                    Calendar Year:  2028
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  31.0 (F)
              Maximum Temperature:  31.0 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.05     10.63     12.42     11.13      7.58     0.672     0.437     0.221     15.75    11.259
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      3.95      4.18      5.37      4.52               0.420     0.303                9.868
   CO Total Exhaust:     12.05     10.63     12.42     11.13      7.58     0.672     0.437     0.221     15.75    11.259
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 19.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
```

```
  M615 Comment:
                User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 28.4
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                    Calendar Year:  2028
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  31.0 (F)
              Maximum Temperature:  31.0 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                      ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.02     10.60     12.38     11.10      7.06     0.643     0.416     0.206     15.02    11.215
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61                0.252     0.134                5.886
         CO Running:      3.93      4.16      5.34      4.49                0.391     0.282                9.135
   CO Total Exhaust:     12.02     10.60     12.38     11.10      7.06     0.643     0.416     0.206     15.02    11.215
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 20.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
                User has supplied post-1999 sulfur levels.
  M615 Comment:
                User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 30.4
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                    Calendar Year:  2028
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  31.0 (F)
              Maximum Temperature:  31.0 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm
```

```
             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.00     10.58     12.35     11.08      6.59     0.616     0.397     0.192     14.35    11.176
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61                0.252     0.134                5.886
         CO Running:      3.91      4.14      5.31      4.47                0.364     0.262                8.461
   CO Total Exhaust:     12.00     10.58     12.35     11.08      6.59     0.616     0.397     0.192     14.35    11.176
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 21.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 34.9
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.06     10.65     12.44     11.15      5.85     0.572     0.365     0.169     13.07    11.198
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61                0.252     0.134                5.886
         CO Running:      3.96      4.20      5.39      4.54                0.320     0.231                7.182
   CO Total Exhaust:     12.06     10.65     12.44     11.15      5.85     0.572     0.365     0.169     13.07    11.198
  ---------------------------------------------------------------------------------------------------------------------------
```

```
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 22.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
                User has supplied post-1999 sulfur levels.
  M615 Comment:
                User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 35.2
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
               there are no sales for vehicle class HDGV8b
  M 48 Warning:
               there are no sales for vehicle class LDDT12

                     Calendar Year:  2028
                             Month:  Jan.
                          Altitude:  Low
               Minimum Temperature:  31.0 (F)
               Maximum Temperature:  31.0 (F)
                 Absolute Humidity:   64. grains/lb
               Fuel Sulfur Content:   30. ppm

               Exhaust I/M Program:  Yes
                  Evap I/M Program:  Yes
                       ATP Program:  Yes
                  Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.07     10.67     12.46     11.17      5.82     0.570     0.363     0.168     13.00    11.213
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61                0.252     0.134                5.886
         CO Running:      3.98      4.22      5.42      4.56                0.318     0.229                7.113
   CO Total Exhaust:     12.07     10.67     12.46     11.17      5.82     0.570     0.363     0.168     13.00    11.213
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 23.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
                User has supplied post-1999 sulfur levels.
  M615 Comment:
                User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 37.2
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
               there are no sales for vehicle class HDGV8b
  M 48 Warning:
               there are no sales for vehicle class LDDT12
```

```
                 Calendar Year:  2028
                         Month:  Jan.
                      Altitude:  Low
          Minimum Temperature:  31.0 (F)
          Maximum Temperature:  31.0 (F)
            Absolute Humidity:   64. grains/lb
          Fuel Sulfur Content:   30. ppm

          Exhaust I/M Program:  Yes
             Evap I/M Program:  Yes
                  ATP Program:  Yes
             Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
 ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite CO  :     12.21     10.81     12.64     11.33      5.63     0.557     0.354     0.161     12.57    11.333
 ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

          CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
        CO Running:      4.12      4.37      5.60      4.72               0.305     0.220                6.686
  CO Total Exhaust:     12.21     10.81     12.64     11.33      5.63     0.557     0.354     0.161     12.57    11.333
 ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 24.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 38.2
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                 Calendar Year:  2028
                         Month:  Jan.
                      Altitude:  Low
          Minimum Temperature:  31.0 (F)
          Maximum Temperature:  31.0 (F)
            Absolute Humidity:   64. grains/lb
          Fuel Sulfur Content:   30. ppm

          Exhaust I/M Program:  Yes
             Evap I/M Program:  Yes
                  ATP Program:  Yes
             Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
 ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite CO  :     12.27     10.88     12.73     11.40      5.55     0.551     0.350     0.158     12.38    11.389
```

```
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      4.18      4.44      5.68      4.79               0.299     0.216                6.490
   CO Total Exhaust:     12.27     10.88     12.73     11.40      5.55     0.551     0.350     0.158     12.38    11.389
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 25.
* # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 38.6
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:               <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.30     10.91     12.76     11.43      5.51     0.549     0.348     0.156     12.30    11.410
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      4.20      4.46      5.71      4.82               0.297     0.214                6.414
   CO Total Exhaust:     12.30     10.91     12.76     11.43      5.51     0.549     0.348     0.156     12.30    11.410
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 26.
* # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 39.1
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
```

```
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite CO  :     12.32     10.94     12.80     11.46      5.47     0.546     0.346     0.155     12.21    11.436
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      4.23      4.50      5.75      4.85               0.294     0.212                6.322
   CO Total Exhaust:     12.32     10.94     12.80     11.46      5.47     0.546     0.346     0.155     12.21    11.436
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 27.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
              User has supplied post-1999 sulfur levels.
  M615 Comment:
              User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 48.4
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes
```

```
       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.94     11.61     13.62     12.18      5.51     0.528     0.333     0.146     11.32    12.013
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      4.84      5.17      6.57      5.56               0.277     0.199                5.434
   CO Total Exhaust:     12.94     11.61     13.62     12.18      5.51     0.528     0.333     0.146     11.32    12.013
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 28.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 49.0
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                  Calendar Year:  2028
                          Month:  Jan.
                       Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.98     11.66     13.68     12.23      5.58     0.530     0.335     0.146     11.32    12.057
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      4.89      5.21      6.63      5.61               0.278     0.200                5.434
   CO Total Exhaust:     12.98     11.66     13.68     12.23      5.58     0.530     0.335     0.146     11.32    12.057
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 29.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
```

```
             User has supplied post-1999 sulfur levels.
  M615 Comment:
             User supplied VMT mix.
  M582 Warning:
          The user supplied freeway average speed of 49.1
          will be used for all hours of the day. 100% of VMT
          has been assigned to a fixed combination of freeways
          and freeway ramps for all hours of the day and all
           vehicle types.
  M 48 Warning:
            there are no sales for vehicle class HDGV8b
  M 48 Warning:
            there are no sales for vehicle class LDDT12

                 Calendar Year:  2028
                         Month:  Jan.
                      Altitude:  Low
            Minimum Temperature:  31.0 (F)
            Maximum Temperature:  31.0 (F)
              Absolute Humidity:   64. grains/lb
            Fuel Sulfur Content:   30. ppm

            Exhaust I/M Program:  Yes
               Evap I/M Program:  Yes
                    ATP Program:  Yes
               Reformulated Gas:  Yes
```

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.6664	0.1840	0.0719		0.0180	0.0006	0.0011	0.0430	0.0150	1.0000
Composite Emission Factors (g/mi):										
Composite CO :	12.99	11.67	13.69	12.23	5.59	0.530	0.335	0.147	11.32	12.064
Exhaust emissions (g/mi):										
CO Start:	8.09	6.44	7.05	6.61		0.252	0.134		5.886	
CO Running:	4.90	5.22	6.64	5.62		0.278	0.201		5.434	
CO Total Exhaust:	12.99	11.67	13.69	12.23	5.59	0.530	0.335	0.147	11.32	12.064

```
*************************************************************************
* MOBILE6.2.01 (31-Oct-2002)                                            *
* Input file: 28CO.DAT (file 1, run 1).                                 *
*************************************************************************

* Reading Registration Distributions from the following external
* data file: NJ_REG.D
  M601 Comment:
               User has enabled STAGE II REFUELING.


* Reading ASM I/M Test Credits from ASMDATA.D

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - No Build
* File 1, Run 1, Scenario 1.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 17.7
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
*** I/M credits for Tech1&2 vehicles were read from the following external
    data file: TECH12.D
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.23     10.81     12.68     11.34     11.64     0.886     0.592     0.334     20.76    11.587
  ---------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      4.14      4.37      5.64      4.73               0.635     0.457               14.876
   CO Total Exhaust:     12.23     10.81     12.68     11.34     11.64     0.886     0.592     0.334     20.76    11.587
  ---------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - EPA No-Build
* File 1, Run 1, Scenario 2.
* # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
```

```
              User has supplied post-1999 sulfur levels.
  M615 Comment:
              User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 19.4
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:               <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.18     10.76     12.61     11.28     10.59     0.832     0.552     0.306     19.46    11.501
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      4.09      4.32      5.57      4.67               0.581     0.418               13.578
   CO Total Exhaust:     12.18     10.76     12.61     11.28     10.59     0.832     0.552     0.306     19.46    11.501
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Route 92
* File 1, Run 1, Scenario 3.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
              User has supplied post-1999 sulfur levels.
  M615 Comment:
              User supplied VMT mix.
  M582 Warning:
           The user supplied freeway average speed of 21.1
           will be used for all hours of the day. 100% of VMT
           has been assigned to a fixed combination of freeways
           and freeway ramps for all hours of the day and all
            vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
```

```
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:               <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.14     10.72     12.55     11.24      9.70     0.786     0.519     0.281     18.37    11.429
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      4.05      4.28      5.51      4.62               0.534     0.385               12.485
   CO Total Exhaust:     12.14     10.72     12.55     11.24      9.70     0.786     0.519     0.281     18.37    11.429
  ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - 6-Lane Route 1
* File 1, Run 1, Scenario 4.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 18.8
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b
  M 48 Warning:
             there are no sales for vehicle class LDDT12

                   Calendar Year:  2028
                           Month:  Jan.
                        Altitude:  Low
             Minimum Temperature:  31.0 (F)
             Maximum Temperature:  31.0 (F)
               Absolute Humidity:   64. grains/lb
             Fuel Sulfur Content:   30. ppm

             Exhaust I/M Program:  Yes
                Evap I/M Program:  Yes
                     ATP Program:  Yes
                Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:               <6000     >6000     (All)
                         ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.20     10.78     12.63     11.30     10.94     0.850     0.565     0.315     19.90    11.530
  ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      4.10      4.34      5.59      4.69               0.599     0.431               14.009
   CO Total Exhaust:     12.20     10.78     12.63     11.30     10.94     0.850     0.565     0.315     19.90    11.530
```

```
  ------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Route 1 with Signals Removed
* File 1, Run 1, Scenario 5.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 20.0
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                    Calendar Year:  2028
                            Month:  Jan.
                         Altitude:  Low
              Minimum Temperature:  31.0 (F)
              Maximum Temperature:  31.0 (F)
                Absolute Humidity:   64. grains/lb
              Fuel Sulfur Content:   30. ppm

              Exhaust I/M Program:  Yes
                 Evap I/M Program:  Yes
                      ATP Program:  Yes
                 Reformulated Gas:  Yes

       Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
               GVWR:                <6000     >6000     (All)
                        ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
   VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
  ------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
     Composite CO  :     12.17     10.75     12.59     11.27     10.26     0.815     0.540     0.297     19.06    11.475
  ------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

           CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
         CO Running:      4.07      4.30      5.54      4.65               0.564     0.406               13.173
   CO Total Exhaust:     12.17     10.75     12.59     11.27     10.26     0.815     0.540     0.297     19.06    11.475
  ------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - 2-Lane Route 92
* File 1, Run 1, Scenario 6.
* # # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 20.4
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12
```

```
                 Calendar Year:  2028
                         Month:  Jan.
                      Altitude:  Low
          Minimum Temperature:  31.0 (F)
          Maximum Temperature:  31.0 (F)
            Absolute Humidity:   64. grains/lb
          Fuel Sulfur Content:   30. ppm

          Exhaust I/M Program:  Yes
             Evap I/M Program:  Yes
                  ATP Program:  Yes
             Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
 ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
    Composite CO  :     12.16     10.74     12.58     11.26     10.05     0.804     0.532     0.291     18.80    11.458
 ---------------------------------------------------------------------------------------------------------------------------
Exhaust emissions (g/mi):

          CO Start:      8.09      6.44      7.05      6.61               0.252     0.134                5.886
        CO Running:      4.06      4.30      5.53      4.64               0.553     0.398               12.916
  CO Total Exhaust:     12.16     10.74     12.58     11.26     10.05     0.804     0.532     0.291     18.80    11.458
 ---------------------------------------------------------------------------------------------------------------------------

* # # # # # # # # # # # # # # # # # # # # # # # # # # #
* 2028 Winter - Route 92 without Perrine Rd. Intersection
* File 1, Run 1, Scenario 7.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M616 Comment:
               User has supplied post-1999 sulfur levels.
  M615 Comment:
               User supplied VMT mix.
  M582 Warning:
            The user supplied freeway average speed of 21.0
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways
            and freeway ramps for all hours of the day and all
             vehicle types.
  M 48 Warning:
              there are no sales for vehicle class HDGV8b
  M 48 Warning:
              there are no sales for vehicle class LDDT12

                 Calendar Year:  2028
                         Month:  Jan.
                      Altitude:  Low
          Minimum Temperature:  31.0 (F)
          Maximum Temperature:  31.0 (F)
            Absolute Humidity:   64. grains/lb
          Fuel Sulfur Content:   30. ppm

          Exhaust I/M Program:  Yes
             Evap I/M Program:  Yes
                  ATP Program:  Yes
             Reformulated Gas:  Yes

      Vehicle Type:      LDGV    LDGT12    LDGT34      LDGT      HDGV      LDDV      LDDT      HDDV        MC   All Veh
              GVWR:                <6000     >6000     (All)
                       ------    ------    ------    ------    ------    ------    ------    ------    ------    ------
  VMT Distribution:    0.6664    0.1840    0.0719              0.0180    0.0006    0.0011    0.0430    0.0150    1.0000
 ---------------------------------------------------------------------------------------------------------------------------
 Composite Emission Factors (g/mi):
```

Composite CO :	12.14	10.73	12.56	11.24	9.75	0.788	0.521	0.283	18.43	11.433

Exhaust emissions (g/mi):

CO Start:	8.09	6.44	7.05	6.61		0.252	0.134		5.886	
CO Running:	4.05	4.28	5.51	4.63		0.537	0.387		12.545	
CO Total Exhaust:	12.14	10.73	12.56	11.24	9.75	0.788	0.521	0.283	18.43	11.433

CAL3QHC DIAGRAMS & INPUT/OUTPUT FILES

```
'Kingston Ln & Rt. 522' 60.00 108.000 0.00 0.00 4 1.0000 0 1
'Rcpt_1              '   19.00   14.00    1.80
'Rcpt_2              '   18.58  -13.54    1.80
'Rcpt_3              '  -14.04  -15.04    1.80
'Rcpt_4              '  -14.04   15.05    1.80
'Rt 92 Build' 20 1 0 'C'
    2
'N-LQ                ' 'AG'    2.00  -12.00   22.68  -32.68  0.00  4.00    1
       146   98    2.00  179   23.81 1626    2    3
    1
'N-FA                ' 'AG'  359.55 -365.55    6.00  -12.00 66.00 11.43  0.00 10.00
    2
'N-TQ                ' 'AG'    6.00  -12.00   13.62  -19.62  0.00  4.00    1
       146   98    2.00   66   23.81 1810    1    3
    2
'N-RQ                ' 'AG'   10.00  -12.00   13.54  -15.54  0.00  4.00    1
       146   98    2.00   10   23.81 1615    1    3
    1
'N-FD                ' 'AG'    6.00   12.00  359.55  365.55 931.00 11.41  0.00 10.00
    2
'S-LQ                ' 'AG'   -2.00   12.00    7.93   21.93  0.00  4.00    1
       146   98    2.00   86   23.81 1787    1    3
    1
'S-FA                ' 'AG'  347.55  365.55   -6.00   12.00 150.00 16.45  0.00 10.00
    2
'S-TQ                ' 'AG'   -6.00   12.00   11.32   29.32  0.00  4.00    1
       146   98    2.00  150   23.81 1764    1    3
    2
'S-RQ                ' 'AG'   -7.00   12.00    0.07   19.07  0.00  4.00    1
       146   98    2.00   81   23.81 1764    2    3
    1
'S-FD                ' 'AG'   -6.00  -12.00  347.55 -365.55 521.00 11.18  0.00 10.00
    2
'E-LQ                ' 'AG'  -12.00   -2.00 -512.00   -2.00  0.00  4.00    1
       146  134    2.00  847   23.81 1805    2    3
    1
'E-FA                ' 'AG' -500.00   -6.00    0.00   -6.00 296.00 15.02  0.00 10.00
    2
'E-TQ                ' 'AG'  -12.00   -6.00  -90.10   -6.00  0.00  4.00    1
       146  118    2.00  296   23.81 1900    1    3
    2
'E-RQ                ' 'AG'  -12.00  -10.00 -301.00  -10.00  0.00  4.00    1
       146  114    2.00  361   23.81 1553    1    3
    1
'E-FD                ' 'AG'    0.00   -6.00  500.00   -6.00 392.00  8.49  0.00 10.00
    2
'W-LQ                ' 'AG'   12.00    2.00   17.00    2.00  0.00  4.00    1
       146  134    2.00   10   23.81 1805    2    3
    1
'W-FA                ' 'AG'  500.00    6.00    0.00    6.00 123.00 11.18  0.00 10.00
    2
'W-TQ                ' 'AG'   12.00    6.00   35.37    6.00  0.00  4.00    1
       146  114    2.00  123   23.81 1827    1    3
    2
'W-RQ                ' 'AG'   12.00   10.00   17.00   10.00  0.00  4.00    1
       146  114    2.00   18   23.81 1615    1    3
    1
'W-FD                ' 'AG'    0.00    6.00 -500.00    6.00 383.00 11.45  0.00 10.00
 1.00   0.00 5 1000.00  1.90 'Y'   5   0  72
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'Dey Rd. & CR 535' 60.00 108.000 0.00 0.00 3 1.0000 0 0
'Rcpt_1              '  -10.00    7.00    1.80
'Rcpt_2              '  -10.00   -6.00    1.80
'Rcpt_3              '   10.00    0.00    1.80
'2028 Route 92' 11 1 0 'C'
    1
'N-FA                ' 'AG'    2.00 -500.00    2.00    0.00 1489.00 11.54  0.00
10.00
    2
'N-LQ                ' 'AG'    1.00   -2.00    1.00 -4467.81  0.00  4.00    1
       120  107    2.00   69   23.81 1814    2    3
    2
'N-TQ                ' 'AG'    3.00   -2.00    3.00 -4516.20  0.00  4.00    1
       120  107    2.00 1489   23.81 1814    1    3
    1
'N-FD                ' 'AG'    2.00    0.00    2.00  500.00 1699.00 11.63  0.00
10.00
    1
'S-FA                ' 'AG'   -2.00  500.00   -2.00    0.00 685.00 11.26  0.00 10.00
    2
'S-RQ                ' 'AG'   -3.00    2.00   -3.00 2476.00  0.00  4.00    1
       120   41    2.00  362   23.81 1888    1    3
    2
'S-TQ                ' 'AG'   -1.00    2.00   -1.00   48.81  0.00  4.00    1
       120   41    2.00  685   23.81 1888    1    3
    1
'S-FD                ' 'AG'   -2.00    0.00   -2.00 -500.00 861.00 11.19  0.00 10.00
    2
'E-RQ                ' 'AG'   -4.00   -1.00  -32.01   -1.00  0.00  4.00    1
       120   96    2.00  176   23.81 1605    2    3
    2
'E-LQ                ' 'AG'   -4.00    1.00  -37.43    1.00  0.00  4.00    1
       120   96    2.00  210   23.81 1605    2    3
    1
'W-FD                ' 'AG'   -4.00    3.00  -52.00    3.00 431.00 11.31  0.00 10.00
 1.00   0.00 5 1000.00  1.90 'Y'   5   0  72
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'Dey Rd. & Rt. 130' 60.00 108.000 0.00 0.00 4 1.0000 0 1
'NE                  '   18.00   16.00    1.80
'SE                  '   18.00  -16.00    1.80
'SW                  '  -18.00  -16.00    1.80
'NW                  '  -18.00   16.00    1.80
'2028 Route 92' 20 1 0 'C'
    2
'N-LQ                ' 'AG'    2.00  -12.00    2.00  -16.00  0.00  4.00    1
        90   80    2.00   21   23.81 1719    2    5
    1
'N-FA                ' 'AG'    8.00 -500.00    8.00    0.00 1737.00 11.76  0.00
14.00
    2
'N-RQ                ' 'AG'   10.00  -12.00   10.00  -16.00  0.00  4.00    1
        90   76    2.00    9   23.81 2935    1    5
    1
'N-FD                ' 'AG'    8.00    0.00    8.00  500.00 1955.00 11.97  0.00
14.00
    2
'S-LQ                ' 'AG'   -2.00   12.00   -2.00  530.07  0.00  4.00    1
        90   80    2.00  268   23.81 1752    2    5
    1
'S-FA                ' 'AG'   -8.00  500.00   -8.00    0.00 1685.00 15.02  0.00
14.00
    2
'S-RQ                ' 'AG'  -10.00   12.00  -10.00   29.35  0.00  4.00    1
        90   76    2.00  137   23.81 3155    1    5
    1
'S-FD                ' 'AG'   -8.00    0.00   -8.00 -500.00 1970.00 11.96  0.00
14.00
    2
'E-LQ                ' 'AG'  -12.00   -2.00  -35.12   -2.00  0.00  4.00    1
        90   79    2.00  125   23.81 1770    2    5
    1
'E-FA                ' 'AG' -500.00   -6.00    0.00   -6.00 128.00 11.28  0.00 10.00
    2
'E-RQ                ' 'AG'  -12.00  -10.00  -27.69  -10.00  0.00  4.00    1
        90   44    2.00  214   23.81 1615    1    5
    1
'E-FD                ' 'AG'    0.00   -6.00  500.00   -6.25 405.00 11.33  0.00 10.00
    2
'W-LQ                ' 'AG'   12.00    2.00   21.35    2.00  0.00  4.00    1
        90   79    2.00   71   23.81 1752    2    5
    1
'W-FA                ' 'AG'  500.00    6.00    0.00    6.00 31.00 12.51  0.00 10.00
    2
'W-RQ                ' 'AG'   12.00   10.00   18.82   10.00  0.00  4.00    1
        90   44    2.00   93   23.81 1524    1    5
    1
'W-FD                ' 'AG'    0.00    6.00 -500.00    6.00 189.00 11.45  0.00 10.00
    2
'N-TQ                ' 'AG'    7.00  -12.01    7.00 -512.01  0.00  8.00    2
        90   76    2.00 1737   23.81 2935    1    5
    2
'S-TQ                ' 'AG'   -7.00   12.00   -7.00  112.00  0.00  8.00    2
        90   76    2.00 1685   23.81 3155    1    5
    2
'E-TQ                ' 'AG'  -12.00   -5.00  -21.39   -5.00  0.00  4.00    1
        90   44    2.00  128   23.81 1881    1    5
    2
'W-TQ                ' 'AG'   12.00    5.00   17.00    5.00  0.00  4.00    1
        90   44    2.00   31   23.81 1900    1    5
 1.00   0.00 5 1000.00  1.90 'Y'   5   0  72
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'Rt. 32 Forsgate Dr. & CR 535' 60.00 108.000 0.00 0.00 4 1.0000 0 1
'Rcpt_1              '   14.00   22.00    1.80
'Rcpt_2              '   15.00  -22.00    1.80
'Rcpt_3              '  -18.00  -22.00    1.80
'Rcpt_4              '  -18.00   22.00    1.80
'2028 Route 92' 20 1 0 'C'
    2
'N-LQ                ' 'AG'    2.00  -16.00    2.00  -21.00  0.00  4.00    1
       135  121    2.00   10   23.81 1752    2    3
    1
'N-FA                ' 'AG'    6.00 -500.00    6.00    0.00 576.00 17.30  0.00 10.00
    2
'N-TQ                ' 'AG'    5.00  -16.00    5.00  -66.06  0.00  4.00    2
       135  102    2.00  573   23.81 1776    1    3
    2
'N-RQ                ' 'AG'   10.00  -16.00   10.00 -1046.43  0.00  4.00    1
       135  102    2.00  613   23.81 1495    1    3
    1
'N-FD                ' 'AG'    6.00    0.00    6.00  500.00 928.00 11.18  0.00 10.00
    2
'S-LQ                ' 'AG'   -2.00   16.00   -2.00 1220.01  0.00  4.00    1
       135  121    2.00  482   23.81 1805    1    3
    1
'S-FA                ' 'AG'   -8.00  500.00   -8.00    0.00 817.00 13.98  0.00 14.00
    2
'S-TQ                ' 'AG'   -7.00   16.00   -7.00   85.44  0.00  8.00    2
       135  102    2.00  817   23.81 3145    1    3
    2
'S-RQ                ' 'AG'  -10.00   16.00  -10.00   66.15  0.00  4.00    1
       135  102    2.00  295   23.81 3145    1    3
    1
'S-FD                ' 'AG'   -8.00    0.00   -8.00 -500.00 1655.00 11.21  0.00
14.00
    2
'E-LQ                ' 'AG'  -12.00   -2.00 -409.95   -2.00  0.00  4.00    1
       135  124    2.00  197   23.81 1656    2    3
    1
'E-FA                ' 'AG' -500.00  -10.00    0.00  -10.00 605.00 12.34  0.00 18.00
    2
'E-TQ                ' 'AG'  -12.00   -9.00  -33.51   -9.00  0.00 12.00    3
       135   64    2.00  605   23.81 4637    1    3
    2
'E-RQ                ' 'AG'  -12.00  -14.00  -22.99  -14.00  0.00  4.00    1
       135   64    2.00  103   23.81 4637    1    3
    1
'E-FD                ' 'AG'    0.00  -10.00  500.00  -10.00 1700.00 11.34  0.00
18.00
    2
'W-LQ                ' 'AG'   12.00    2.00 2179.18    2.00  0.00  4.00    1
       135  124    2.00  735   23.81 1770    2    3
    1
'W-FA                ' 'AG'  500.00   10.00    0.00   10.00 1348.00 11.95  0.00
18.00
    2
'W-TQ                ' 'AG'   12.00    9.00   59.93    9.00  0.00 12.00    3
       135   64    2.00 1348   23.81 5061    1    3
    2
'W-RQ                ' 'AG'   12.00   14.00   28.53   14.00  0.00  4.00    1
       135   64    2.00  155   23.81 5061    1    3
    1
'W-FD                ' 'AG'    0.00   10.00 -500.00   10.00 1653.00 12.28  0.00
18.00
 1.00   0.00 5 1000.00  1.90 'Y'   5   0  72
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'Kingston Ln & Rt. 522' 60.00 108.000 0.00 0.00 4 1.0000 0 1
'Rcpt_1              '   19.00   14.00    1.80
'Rcpt_2              '   18.58  -13.54    1.80
'Rcpt_3              '  -14.04  -15.04    1.80
'Rcpt_4              '  -14.04   15.05    1.80
'2028 No Build' 20 1 0 'C'
    2
'N-LQ                ' 'AG'    2.00  -12.00   24.17  -34.17  0.00  4.00    1
       146   98    2.00  192   23.81 1530    2    3
    1
'N-FA                ' 'AG'  359.55 -365.55    6.00  -12.00 134.00 11.70  0.00 10.00
    2
'N-TQ                ' 'AG'    6.00  -12.00   21.48  -27.48  0.00  4.00    1
       146   98    2.00  134   23.81 1712    1    3
    2
'N-RQ                ' 'AG'   10.00  -12.00   13.54  -15.54  0.00  4.00    1
       146   98    2.00   10   23.81 1615    1    3
    1
'N-FD                ' 'AG'    6.00   12.00  359.55  365.55 1057.00 11.52  0.00
10.00
    2
'S-LQ                ' 'AG'   -2.00   12.00   11.97   25.97  0.00  4.00    1
       146   98    2.00  121   23.81 1752    1    3
    1
'S-FA                ' 'AG'  347.55  365.55   -6.00   12.00 10.00 17.30  0.00 10.00
    2
'S-TQ                ' 'AG'   -6.00   12.00   -2.46   15.54  0.00  4.00    1
       146   98    2.00   10   23.81 1595    1    3
    2
'S-RQ                ' 'AG'   -7.00   12.00    3.51   22.51  0.00  4.00    1
       146   98    2.00   91   23.81 1595    2    3
    1
'S-FD                ' 'AG'   -6.00  -12.00  347.55 -365.55 538.00 11.21  0.00 10.00
    2
'E-LQ                ' 'AG'  -12.00   -2.00 -512.00   -2.00  0.00  4.00    1
       146  134    2.00  884   23.81 1805    2    3
    1
'E-FA                ' 'AG'  -50.00   -6.00    0.00   -6.00 507.00 20.58  0.00 10.00
    2
'E-TQ                ' 'AG'  -12.00   -6.00 -597.10   -6.00  0.00  4.00    1
       146  114    2.00  507   23.81 1863    1    3
    2
'E-RQ                ' 'AG'  -12.00  -10.00 -841.29  -10.00  0.00  4.00    1
       146  114    2.00  518   23.81 1509    1    3
    1
'E-FD                ' 'AG'    0.00   -6.00  500.00   -6.00 638.00 11.39  0.00 10.00
    2
'W-LQ                ' 'AG'   12.00    2.00   17.00    2.00  0.00  4.00    1
       146  134    2.00   10   23.81 1805    2    3
    1
'W-FA                ' 'AG'  500.00    6.00    0.00    6.00 150.00 11.18  0.00 10.00
    2
'W-TQ                ' 'AG'   12.00    6.00   40.50    6.00  0.00  4.00    1
       146  114    2.00  150   23.81 1727    1    3
    2
'W-RQ                ' 'AG'   12.00   10.00   19.41   10.00  0.00  4.00    1
       146  114    2.00   39   23.81 1553    1    3
    1
'W-FD                ' 'AG'    0.00    6.00 -500.00    6.00 433.00 11.44  0.00 10.00
 1.00   0.00 5 1000.00  2.00 'Y'   5   0  72
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'Dey Rd. & CR 535' 60.00 108.000 0.00 0.00 3 1.0000 0 0
'Rcpt_1              '  -10.00    6.00    1.80
'Rcpt_2              '  -10.00   -6.00    1.80
'Rcpt_3              '   10.00    0.00    1.80
'2028 No Build' 11 1 0 'C'
    1
'N-FA                ' 'AG'    2.00 -500.00    2.00    0.00 996.00 11.36  0.00 10.00
    2
'N-LQ                ' 'AG'    1.00   -2.00    1.00  -14.31  0.00  4.00    1
       120  107    2.00  262   23.81 1784    2    3
    2
'N-TQ                ' 'AG'    3.00   -2.00    3.00 -2894.26  0.00  4.00    1
       120  107    2.00  996   23.81 1784    1    3
    1
'N-FD                ' 'AG'    2.00    0.00    2.00  500.00 1186.00 11.33  0.00
10.00
    1
'S-FA                ' 'AG'   -2.00  500.00   -2.00    0.00 1197.00 11.49  0.00
10.00
    2
'S-RQ                ' 'AG'   -3.00    2.00   -3.00   20.72  0.00  4.00    1
       120   41    2.00  274   23.81 1856    1    3
    2
'S-TQ                ' 'AG'   -1.00    2.00   -1.00  247.00  0.00  4.00    1
       120   41    2.00 1197   23.81 1856    1    3
    1
'S-FD                ' 'AG'   -2.00    0.00   -2.00 -500.00 1362.00 11.42  0.00
10.00
    2
'E-RQ                ' 'AG'   -4.00   -1.00  -30.26   -1.00  0.00  4.00    1
       120   96    2.00  165   23.81 1658    2    3
    2
'E-LQ                ' 'AG'   -4.00    1.00  -34.24    1.00  0.00  4.00    1
       120   96    2.00  190   23.81 1658    2    3
    1
'W-FD                ' 'AG'   -4.00    3.00 -504.00    3.00 536.00 11.21  0.00 10.00
 1.00   0.00 5 1000.00  2.00 'Y'   5   0  72
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'Dey Rd. & Rt. 130' 60.00 108.000 0.00 0.00 4 1.0000 0 1
'NE                  '   18.00   15.00    1.80
'SE                  '   18.00  -14.00    1.80
'SW                  '  -18.00  -15.00    1.80
'NW                  '  -19.00   14.00    1.80
'2028 No Build' 20 1 0 'C'
    2
'N-LQ                ' 'AG'    2.00  -12.00    2.00  -16.00  0.00  4.00    1
        90   80    2.00   16   23.81 1719    2    3
    1
'N-FA                ' 'AG'    8.00 -500.00    8.00    0.00 1991.00 12.59  0.00
14.00
    2
'N-RQ                ' 'AG'   10.00  -12.00   10.00  -16.00  0.00  4.00    1
        90   76    2.00   10   23.81 3085    1    3
    1
'N-FD                ' 'AG'    8.00    0.00    8.00  500.00 2812.00 11.20  0.00
14.00
    2
'S-LQ                ' 'AG'   -2.00   12.00   -2.00  319.85  0.00  4.00    1
        90   80    2.00  200   23.81 1703    2    3
    1
'S-FA                ' 'AG'   -8.00  500.00   -8.00    0.00 1628.00 14.38  0.00
14.00
    2
'S-RQ                ' 'AG'  -14.00   12.00  -14.00   52.03  0.00  4.00    1
        90   76    2.00  171   23.81 1553    1    3
    1
'S-FD                ' 'AG'   -8.00    0.00   -8.00 -500.00 1828.00 12.01  0.00
14.00
    2
'E-LQ                ' 'AG'  -16.00   -2.00 -1723.90   -2.00  0.00  4.00    1
        90   79    2.00  654   23.81 1736    2    3
    1
'E-FA                ' 'AG' -500.00   -6.00    0.00   -6.00 199.00 23.81  0.00 10.00
    2
'E-RQ                ' 'AG'  -16.00  -10.00  -24.65  -10.00  0.00  4.00    1
        90   44    2.00  118   23.81 1599    1    3
    1
'E-FD                ' 'AG'    0.00   -6.00  500.00   -6.00 409.00 11.33  0.00 10.00
    2
'W-LQ                ' 'AG'   12.00    2.00   22.80    2.00  0.00  4.00    1
        90   79    2.00   82   23.81 1787    2    3
    1
'W-FA                ' 'AG'  500.00    6.00    0.00    6.00 89.00 14.77  0.00 10.00
    2
'W-RQ                ' 'AG'   12.00   10.00   24.25   10.00  0.00  4.00    1
        90   44    2.00  167   23.81 1380    1    3
    1
'W-FD                ' 'AG'    0.00    6.00 -500.00    6.00 276.00 11.41  0.00 10.00
    2
'N-TQ                ' 'AG'    7.00  -12.00    7.00 -112.00  0.00  8.00    2
        90   76    2.00 1991   23.81 3085    1    3
    2
'S-TQ                ' 'AG'   -7.00   12.00   -7.00  112.00  0.00  8.00    2
        90   76    2.00 1628   23.81 3282    1    3
    2
'E-TQ                ' 'AG'  -16.00   -5.00  -30.59   -5.00  0.00  4.00    1
        90   44    2.00  199   23.81 1863    1    3
    2
'W-TQ                ' 'AG'   12.00    5.00   18.53    5.00  0.00  4.00    1
        90   44    2.00   89   23.81 1827    1    3
 1.00   0.00 5 1000.00  2.00 'Y'   5   0  72
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'Rt. 32 Forsgate Dr. & CR 535' 60.00 108.000 0.00 0.00 4 1.0000 0 1
'Rcpt_1              '   14.00   22.00    1.80
'Rcpt_2              '   15.00  -22.00    1.80
'Rcpt_3              '  -18.00  -22.00    1.80
'Rcpt_4              '  -18.00   22.00    1.80
'2028 No Build' 19 1 0 'C'
    2
'N-LQ                ' 'AG'    2.00  -16.00    2.00  -21.65  0.00  4.00    1
       135  121    2.00   28   23.81 1556    2    3
    1
'N-FA                ' 'AG'    6.00 -500.00    6.00    0.00 383.00 16.87  0.00 10.00
    2
'N-TQ                ' 'AG'    5.00  -16.00    5.00  -48.56  0.00  4.00    2
       135  102    2.00  383   23.81 1776    1    3
    2
'N-RQ                ' 'AG'   10.00  -16.00   10.00  -47.51  0.00  4.00    1
       135  102    2.00  181   23.81 1196    1    3
    1
'N-FD                ' 'AG'    6.00    0.00    6.00  500.00 1039.00 11.26  0.00
10.00
    2
'S-LQ                ' 'AG'   -2.00   16.00   -2.00   37.73  0.00  4.00    1
       135  121    2.00   97   23.81 1612    2    3
    1
'S-FA                ' 'AG'   -8.00  500.00   -8.00    0.00 1351.00 18.76  0.00
14.00
    2
'S-TQ                ' 'AG'   -7.00   16.00   -7.00  144.65  0.00  8.00    2
       135  102    2.00 1351   23.81 3454    1    3
    2
'S-RQ                ' 'AG'  -10.00   16.00  -10.00   23.99  0.00  4.00    1
       135  102    2.00   47   23.81 3454    1    3
    1
'S-FD                ' 'AG'   -8.00    0.00   -8.00 -500.00 1497.00 11.50  0.00
14.00
    2
'E-LQ                ' 'AG'  -12.00   -2.00 -1188.00   -2.00  0.00  4.00    1
       135  124    2.00  427   23.81 1583    2    3
    1
'E-FA                ' 'AG' -500.00  -10.00    0.00  -10.00 904.00 11.54  0.00 18.00
    2
'E-TQ                ' 'AG'  -12.00   -9.00  -44.14   -9.00  0.00 12.00    3
       135   64    2.00  904   23.81 4284    1    3
    2
'E-RQ                ' 'AG'  -12.00  -14.00  -27.57  -14.00  0.00  4.00    1
       135   64    2.00  146   23.81 4284    1    3
    1
'E-FD                ' 'AG'    0.00  -10.00  500.00  -10.00 1182.00 12.12  0.00
18.00
    1
'W-FA                ' 'AG'  500.00   10.00    0.00   10.00 2516.00 23.81  0.00
18.00
    2
'W-TQ                ' 'AG'   12.00    9.00  101.46    9.00  0.00 12.00    3
       135   64    2.00 2516   23.81 4871    1    3
    2
'W-RQ                ' 'AG'   12.00   14.00   36.43   14.00  0.00  4.00    1
       135   64    2.00  229   23.81 4871    1    3
    1
'W-FD                ' 'AG'    0.00   10.00 -500.00   10.00 2591.00 12.06  0.00
18.00
 1.00   0.00 5 1000.00  2.00 'Y'   5   0  72
```

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: Kingston Ln & Rt. 522 RUN: Rt 92 Build

DATE : 7/30/ 3
TIME : 15:34:36

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = .0 CM/S VD = .0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 5 (E) ATIM = 60. MINUTES MIXH = 1000. M AMB = 1.9 PPM

LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	LENGTH (M)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (M)	W (M)	V/C	QUEUE (VEH)
1. N-LQ	2.0	-12.0	22.7	-32.7	29.	135.	AG	43.	100.0	.0	4.0	.37	4.9
2. N-FA	359.5	-365.5	6.0	-12.0	500.	315.	AG	66.	11.4	.0	10.0		
3. N-TQ	6.0	-12.0	13.6	-19.6	11.	135.	AG	43.	100.0	.0	4.0	.12	1.8
4. N-RQ	10.0	-12.0	11.2	-13.2	2.	135.	AG	43.	100.0	.0	4.0	.02	.3
5. N-FD	6.0	12.0	359.5	365.5	500.	45.	AG	931.	11.4	.0	10.0		
6. S-LQ	-2.0	12.0	7.9	21.9	14.	45.	AG	43.	100.0	.0	4.0	.16	2.3
7. S-FA	347.5	365.5	-6.0	12.0	500.	225.	AG	150.	16.5	.0	10.0		
8. S-TQ	-6.0	12.0	11.3	29.3	25.	45.	AG	43.	100.0	.0	4.0	.28	4.1
9. S-RQ	-7.0	12.0	2.4	21.4	13.	45.	AG	43.	100.0	.0	4.0	.15	2.2
10. S-FD	-6.0	-12.0	347.5	-365.5	500.	135.	AG	521.	11.2	.0	10.0		
11. E-LQ	-12.0	-2.0	-2542.1	-2.0	2530.	270.	AG	59.	100.0	.0	4.0	8.64	421.7
12. E-FA	-500.0	-6.0	.0	-6.0	500.	90.	AG	296.	15.0	.0	10.0		
13. E-TQ	-12.0	-6.0	-87.0	-6.0	75.	270.	AG	52.	100.0	.0	4.0	.95	12.5
14. E-RQ	-12.0	-10.0	-303.6	-10.0	292.	270.	AG	50.	100.0	.0	4.0	1.22	48.6
15. E-FD	.0	-6.0	500.0	-6.0	500.	90.	AG	392.	8.5	.0	10.0		
16. W-LQ	12.0	2.0	14.2	2.0	2.	90.	AG	59.	100.0	.0	4.0	.10	.4
17. W-FA	500.0	6.0	.0	6.0	500.	270.	AG	123.	11.2	.0	10.0		
18. W-TQ	12.0	6.0	35.4	6.0	23.	90.	AG	50.	100.0	.0	4.0	.35	3.9
19. W-RQ	12.0	10.0	15.4	10.0	3.	90.	AG	50.	100.0	.0	4.0	.06	.6
20. W-FD	.0	6.0	-500.0	6.0	500.	270.	AG	383.	11.4	.0	10.0		

JOB: Kingston Ln & Rt. 522 RUN: Rt 92 Build

DATE : 7/30/ 3
TIME : 15:34:36

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
1. N-LQ	146	98	2.0	179	1626	23.81	2	3
3. N-TQ	146	98	2.0	66	1810	23.81	1	3
4. N-RQ	146	98	2.0	10	1615	23.81	1	3
6. S-LQ	146	98	2.0	86	1787	23.81	1	3
8. S-TQ	146	98	2.0	150	1764	23.81	1	3
9. S-RQ	146	98	2.0	81	1764	23.81	2	3
11. E-LQ	146	134	2.0	847	1805	23.81	2	3
13. E-TQ	146	118	2.0	296	1900	23.81	1	3
14. E-RQ	146	114	2.0	361	1553	23.81	1	3
16. W-LQ	146	134	2.0	10	1805	23.81	2	3
18. W-TQ	146	114	2.0	123	1827	23.81	1	3
19. W-RQ	146	114	2.0	18	1615	23.81	1	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. Rcpt_1	19.0	14.0	1.8
2. Rcpt_2	18.6	-13.5	1.8
3. Rcpt_3	-14.0	-15.0	1.8
4. Rcpt_4	-14.0	15.1	1.8

JOB: Kingston Ln & Rt. 522 RUN: Rt 92 Build

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4
0.	2.4	2.3	2.4	1.9
5.	2.4	2.3	2.4	1.9
10.	2.4	2.3	2.3	1.9
15.	2.5	2.3	2.2	1.9
20.	2.5	2.3	2.3	1.9
25.	2.6	2.5	2.5	1.9
30.	2.6	2.5	2.4	1.9
35.	2.7	2.5	2.5	2.0
40.	2.6	2.2	2.6	2.1
45.	2.5	2.2	2.5	2.3
50.	2.2	2.1	2.3	2.4
55.	2.1	2.0	2.3	2.6
60.	2.0	2.0	2.2	2.5
65.	1.9	2.1	2.2	2.5
70.	1.9	2.1	2.1	2.5
75.	1.9	2.1	2.2	2.6
80.	1.9	2.1	2.2	2.6
85.	1.9	2.1	2.4	2.5
90.	2.1	2.1	2.3	2.7
95.	2.1	2.0	2.3	2.6
100.	2.1	2.0	2.2	2.7
105.	2.1	1.9	2.2	2.5
110.	2.2	1.9	2.3	2.4
115.	2.2	1.9	2.3	2.1
120.	2.2	1.9	2.2	2.1
125.	2.2	1.9	2.3	2.1
130.	2.2	2.0	2.2	2.2
135.	2.2	2.0	2.2	2.3
140.	2.2	2.1	2.1	2.2
145.	2.2	2.1	2.0	2.3
150.	2.2	2.1	1.9	2.4
155.	2.2	2.1	1.9	2.3
160.	2.2	2.1	1.9	2.2
165.	2.2	2.1	1.9	2.2
170.	2.2	2.2	1.9	2.2
175.	2.2	2.1	1.9	2.1
180.	2.2	2.1	1.9	2.2
185.	2.2	2.1	1.9	2.3
190.	2.2	2.1	1.9	2.4
195.	2.2	2.1	1.9	2.4
200.	2.2	2.1	1.9	2.4

205. * 2.2 2.1 1.9 2.4

JOB: Kingston Ln & Rt. 522 RUN: Rt 92 Build

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) REC1	REC2	REC3	REC4
210.	2.2	2.1	1.9	2.4
215.	2.3	2.1	1.9	2.4
220.	2.1	2.2	1.9	2.4
225.	2.2	2.2	1.9	2.4
230.	2.1	2.2	1.9	2.5
235.	2.2	2.2	1.9	2.5
240.	2.6	2.2	1.9	2.5
245.	2.6	2.2	1.9	2.5
250.	2.7	2.2	1.9	2.5
255.	2.8	2.2	1.9	2.6
260.	2.8	2.5	2.1	2.5
265.	2.8	2.6	2.2	2.5
270.	3.0	3.0	2.7	2.4
275.	2.7	3.0	2.8	2.1
280.	2.7	2.7	2.8	2.0
285.	2.6	2.7	2.9	1.9
290.	2.5	2.4	2.8	1.9
295.	2.5	2.3	2.8	1.9
300.	2.4	2.2	2.7	1.9
305.	2.4	2.1	2.6	1.9
310.	2.4	2.1	2.6	1.9
315.	2.4	2.1	2.5	1.9
320.	2.4	2.0	2.5	1.9
325.	2.4	2.0	2.5	1.9
330.	2.3	2.1	2.5	1.9
335.	2.3	2.1	2.4	1.9
340.	2.3	2.1	2.4	1.9
345.	2.3	2.1	2.4	1.9
350.	2.4	2.3	2.4	1.9
355.	2.4	2.3	2.4	1.9
360.	2.4	2.3	2.4	1.9
MAX	3.0	3.0	2.9	2.7
DEGR.	270	270	285	90

THE HIGHEST CONCENTRATION OF 3.00 PPM OCCURRED AT RECEPTOR REC1 .

JOB: Dey Rd. & CR 535 RUN: 2028 Route 92

DATE : 7/30/ 3
TIME : 15:36:26

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = .0 CM/S VD = .0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 5 (E) ATIM = 60. MINUTES MIXH = 1000. M AMB = 1.9 PPM

LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	LENGTH (M)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (M)	W (M)	V/C	QUEUE (VEH)
1. N-FA	2.0	-500.0	2.0	.0	500.	360.	AG	1489.	11.5	.0	10.0		
2. N-LQ	1.0	-2.0	1.0	-14.3	12.	180.	AG	57.	100.0	.0	4.0	.51	2.1
3. N-TQ	3.0	-2.0	3.0	-4516.4	4514.	180.	AG	57.	100.0	.0	4.0	****	752.4
4. N-FD	2.0	.0	2.0	500.0	500.	360.	AG	1699.	11.6	.0	10.0		
5. S-FA	-2.0	500.0	-2.0	.0	500.	180.	AG	685.	11.3	.0	10.0		
6. S-RQ	-3.0	2.0	-3.0	26.7	25.	360.	AG	22.	100.0	.0	4.0	.31	4.1
7. S-TQ	-1.0	2.0	-1.0	48.8	47.	360.	AG	22.	100.0	.0	4.0	.58	7.8
8. S-FD	-2.0	.0	-2.0	-500.0	500.	180.	AG	861.	11.2	.0	10.0		
9. E-RQ	-4.0	-1.0	-32.2	-1.0	28.	270.	AG	51.	100.0	.0	4.0	.66	4.7
10. E-LQ	-4.0	1.0	-38.0	1.0	34.	270.	AG	51.	100.0	.0	4.0	.79	5.7
11. W-FD	-4.0	3.0	-52.0	3.0	48.	270.	AG	431.	11.3	.0	10.0		

JOB: Dey Rd. & CR 535 RUN: 2028 Route 92

DATE : 7/30/ 3
TIME : 15:36:26

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. N-LQ	120	107	2.0	69	1814	23.81	2	3
3. N-TQ	120	107	2.0	1489	1814	23.81	1	3
6. S-RQ	120	41	2.0	362	1888	23.81	1	3
7. S-TQ	120	41	2.0	685	1888	23.81	1	3
9. E-RQ	120	96	2.0	176	1605	23.81	2	3
10. E-LQ	120	96	2.0	210	1605	23.81	2	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. Rcpt_1	-10.0	7.0	1.8
2. Rcpt_2	-10.0	-6.0	1.8
3. Rcpt_3	10.0	.0	1.8

JOB: Dey Rd. & CR 535 RUN: 2028 Route 92

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3
0.	2.9	3.2	3.1
5.	3.1	3.4	2.6
10.	3.3	3.6	2.3
15.	3.2	3.7	2.0
20.	3.2	3.6	1.9
25.	3.2	3.4	1.9
30.	3.1	3.4	1.9
35.	3.0	3.2	1.9
40.	3.0	3.0	1.9
45.	3.0	3.0	1.9
50.	2.9	2.8	1.9
55.	2.8	2.8	1.9
60.	2.7	2.8	1.9
65.	2.7	2.6	1.9
70.	2.7	2.8	1.9
75.	2.8	2.8	1.9
80.	2.8	2.9	1.9
85.	2.8	2.8	1.9
90.	2.8	2.8	1.9
95.	2.8	2.8	1.9
100.	2.8	2.8	1.9
105.	2.7	2.8	1.9
110.	2.7	2.8	1.9
115.	2.7	2.8	1.9
120.	2.8	2.9	1.9
125.	2.9	2.9	1.9
130.	3.0	2.9	1.9
135.	3.2	2.8	1.9
140.	3.3	2.9	1.9
145.	3.4	2.9	1.9
150.	3.5	3.0	1.9
155.	3.7	3.2	1.9
160.	3.6	3.3	1.9
165.	3.8	3.5	2.0
170.	3.9	3.5	2.3
175.	3.8	3.4	2.8
180.	3.6	3.1	3.3
185.	3.0	2.6	3.6
190.	2.5	2.1	3.6
195.	2.3	1.9	3.6
200.	2.3	1.9	3.4

205. * 2.3 1.9 3.2

JOB: Dey Rd. & CR 535 RUN: 2028 Route 92

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3
210.	2.3	1.9	3.2
215.	2.3	1.9	3.2
220.	2.3	1.9	3.1
225.	2.4	1.9	3.1
230.	2.4	1.9	3.0
235.	2.4	1.9	3.0
240.	2.5	1.9	2.9
245.	2.5	1.9	2.8
250.	2.5	1.9	2.9
255.	2.4	1.9	3.1
260.	2.3	1.9	3.0
265.	2.3	1.9	3.0
270.	2.2	1.9	3.1
275.	2.1	2.2	3.1
280.	2.1	2.2	3.0
285.	2.0	2.3	2.9
290.	2.0	2.4	2.8
295.	2.0	2.5	2.8
300.	1.9	2.5	2.7
305.	1.9	2.5	2.7
310.	1.9	2.5	2.8
315.	1.9	2.4	2.8
320.	1.9	2.4	2.9
325.	1.9	2.4	3.0
330.	1.9	2.3	3.2
335.	1.9	2.3	3.2
340.	1.9	2.2	3.3
345.	1.9	2.2	3.3
350.	2.2	2.5	3.5
355.	2.5	2.8	3.3
360.	2.9	3.2	3.1
MAX	3.9	3.7	3.6
DEGR.	170	15	185

THE HIGHEST CONCENTRATION OF 3.90 PPM OCCURRED AT RECEPTOR REC1 .

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: Dey Rd. & Rt. 130 RUN: 2028 Route 92

DATE : 7/30/ 3
TIME : 15:30:27

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = .0 CM/S VD = .0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 5 (E) ATIM = 60. MINUTES MIXH = 1000. M AMB = 1.9 PPM

LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	LENGTH (M)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (M)	W (M)	V/C	QUEUE (VEH)
1. N-LQ	2.0	-12.0	2.0	-14.8	3.	180.	AG	57.	100.0	.0	4.0	.18	.5
2. N-FA	8.0	-500.0	8.0	.0	500.	360.	AG	1737.	11.8	.0	14.0		
3. N-RQ	10.0	-12.0	10.0	-13.1	1.	180.	AG	54.	100.0	.0	4.0	.03	.2
4. N-FD	8.0	.0	8.0	500.0	500.	360.	AG	1955.	12.0	.0	14.0		
5. S-LQ	-2.0	12.0	-2.0	519.4	507.	360.	AG	57.	100.0	.0	4.0	2.31	84.6
6. S-FA	-8.0	500.0	-8.0	.0	500.	180.	AG	1685.	15.0	.0	14.0		
7. S-RQ	-10.0	12.0	-10.0	29.4	17.	360.	AG	54.	100.0	.0	4.0	.39	2.9
8. S-FD	-8.0	.0	-8.0	-500.0	500.	180.	AG	1970.	12.0	.0	14.0		
9. E-LQ	-12.0	-2.0	-31.1	-2.0	19.	270.	AG	56.	100.0	.0	4.0	.91	3.2
10. E-FA	-500.0	-6.0	.0	-6.0	500.	90.	AG	128.	11.3	.0	10.0		
11. E-RQ	-12.0	-10.0	-27.7	-10.0	16.	270.	AG	31.	100.0	.0	4.0	.28	2.6
12. E-FD	.0	-6.0	500.0	-6.3	500.	90.	AG	405.	11.3	.0	10.0		
13. W-LQ	12.0	2.0	21.3	2.0	9.	90.	AG	56.	100.0	.0	4.0	.52	1.6
14. W-FA	500.0	6.0	.0	6.0	500.	270.	AG	31.	12.5	.0	10.0		
15. W-RQ	12.0	10.0	18.8	10.0	7.	90.	AG	31.	100.0	.0	4.0	.13	1.1
16. W-FD	.0	6.0	-500.0	6.0	500.	270.	AG	189.	11.4	.0	10.0		
17. N-TQ	7.0	-12.0	7.0	-1796.6	1785.	180.	AG	108.	100.0	.0	8.0	2.66	297.4
18. S-TQ	-7.0	12.0	-7.0	1639.9	1628.	360.	AG	108.	100.0	.0	8.0	2.41	271.3
19. E-TQ	-12.0	-5.0	-21.4	-5.0	9.	270.	AG	31.	100.0	.0	4.0	.15	1.6
20. W-TQ	12.0	5.0	14.3	5.0	2.	90.	AG	31.	100.0	.0	4.0	.03	.4

JOB: Dey Rd. & Rt. 130 RUN: 2028 Route 92

DATE : 7/30/ 3
TIME : 15:30:27

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
1. N-LQ	90	80	2.0	21	1719	23.81	2	5
3. N-RQ	90	76	2.0	9	2935	23.81	1	5
5. S-LQ	90	80	2.0	268	1752	23.81	2	5
7. S-RQ	90	76	2.0	137	3155	23.81	1	5
9. E-LQ	90	79	2.0	125	1770	23.81	2	5
11. E-RQ	90	44	2.0	214	1615	23.81	1	5
13. W-LQ	90	79	2.0	71	1752	23.81	2	5
15. W-RQ	90	44	2.0	93	1524	23.81	1	5
17. N-TQ	90	76	2.0	1737	2935	23.81	1	5
18. S-TQ	90	76	2.0	1685	3155	23.81	1	5
19. E-TQ	90	44	2.0	128	1881	23.81	1	5
20. W-TQ	90	44	2.0	31	1900	23.81	1	5

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. NE	18.0	16.0	1.8
2. SE	18.0	-16.0	1.8
3. SW	-18.0	-16.0	1.8
4. NW	-18.0	16.0	1.8

JOB: Dey Rd. & Rt. 130 RUN: 2028 Route 92

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4
0.	3.6	3.8	4.2	3.9
5.	2.8	3.0	4.9	4.6
10.	2.3	2.4	5.1	4.8
15.	2.0	2.1	4.9	4.7
20.	1.9	2.0	4.3	4.3
25.	1.9	2.0	4.1	4.3
30.	1.9	2.0	3.7	4.1
35.	1.9	2.0	3.5	3.9
40.	1.9	2.0	3.3	3.8
45.	1.9	2.0	3.3	3.8
50.	1.9	2.1	3.1	3.6
55.	1.9	2.1	3.2	3.6
60.	1.9	2.1	3.1	3.6
65.	1.9	2.1	3.1	3.5
70.	1.9	2.1	3.0	3.5
75.	1.9	2.1	3.1	3.5
80.	1.9	2.1	3.2	3.5
85.	1.9	2.1	3.3	3.5
90.	2.0	2.1	3.3	3.5
95.	2.0	2.0	3.2	3.5
100.	2.0	1.9	3.2	3.5
105.	2.0	1.9	3.1	3.4
110.	2.0	1.9	3.2	3.4
115.	2.0	1.9	3.2	3.3
120.	2.0	1.9	3.2	3.4
125.	2.0	1.9	3.3	3.4
130.	2.0	1.9	3.3	3.3
135.	2.0	1.9	3.3	3.5
140.	2.0	1.9	3.4	3.4
145.	2.0	1.9	3.4	3.5
150.	2.0	1.9	3.6	3.8
155.	2.0	1.9	3.7	3.8
160.	2.0	1.9	3.9	4.0
165.	2.1	2.0	4.1	4.4
170.	2.6	2.4	4.2	4.4
175.	3.1	3.0	4.0	4.2
180.	3.9	3.6	3.4	3.6
185.	4.5	4.1	2.8	3.0
190.	4.5	4.3	2.3	2.5
195.	4.4	4.3	2.0	2.2
200.	4.1	3.9	1.9	2.1

205. * 4.0 3.8 1.9 2.1

JOB: Dey Rd. & Rt. 130 RUN: 2028 Route 92

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4
210.	3.6	3.7	1.9	2.1
215.	3.5	3.5	1.9	2.0
220.	3.3	3.4	1.9	2.0
225.	3.2	3.4	1.9	2.0
230.	3.1	3.3	1.9	2.0
235.	3.0	3.3	1.9	2.0
240.	3.1	3.2	1.9	2.0
245.	3.1	3.2	1.9	2.0
250.	3.1	3.2	1.9	2.0
255.	3.1	3.2	1.9	2.0
260.	3.1	3.2	1.9	2.0
265.	3.3	3.2	1.9	2.0
270.	3.3	3.2	2.0	2.0
275.	3.4	3.3	2.1	2.0
280.	3.3	3.3	2.1	1.9
285.	3.4	3.3	2.1	1.9
290.	3.4	3.4	2.1	1.9
295.	3.4	3.2	2.1	1.9
300.	3.4	3.2	2.2	1.9
305.	3.4	3.2	2.1	1.9
310.	3.5	3.1	2.0	1.9
315.	3.5	3.4	2.0	1.9
320.	3.6	3.4	2.1	1.9
325.	3.7	3.6	2.1	1.9
330.	3.8	3.9	2.1	1.9
335.	3.9	3.9	2.1	1.9
340.	4.2	4.2	2.1	1.9
345.	4.3	4.5	2.2	2.0
350.	4.4	4.6	2.6	2.4
355.	4.2	4.4	3.4	3.2
360.	3.6	3.8	4.2	3.9
MAX	4.5	4.6	5.1	4.8
DEGR.	185	350	10	10

THE HIGHEST CONCENTRATION OF 5.10 PPM OCCURRED AT RECEPTOR REC3 .

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: Rt. 32 Forsgate Dr. & CR 535 RUN: 2028 Route 92

DATE : 7/30/ 3
TIME : 15:32:45

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = .0 CM/S VD = .0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 5 (E) ATIM = 60. MINUTES MIXH = 1000. M AMB = 1.9 PPM

LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	LENGTH (M)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (M)	W (M)	V/C	QUEUE (VEH)
1. N-LQ	2.0	-16.0	2.0	-18.0	2.	180.	AG	57.	100.0	.0	4.0	.08	.3
2. N-FA	6.0	-500.0	6.0	.0	500.	360.	AG	576.	17.3	.0	10.0		
3. N-TQ	5.0	-16.0	5.0	-66.0	50.	180.	AG	97.	100.0	.0	4.0	.75	8.3
4. N-RQ	10.0	-16.0	10.0	-1046.9	1031.	180.	AG	48.	100.0	.0	4.0	1.91	171.8
5. N-FD	6.0	.0	6.0	500.0	500.	360.	AG	928.	11.2	.0	10.0		
6. S-LQ	-2.0	16.0	-2.0	1222.3	1206.	360.	AG	57.	100.0	.0	4.0	3.62	201.0
7. S-FA	-8.0	500.0	-8.0	.0	500.	180.	AG	817.	14.0	.0	14.0		
8. S-TQ	-7.0	16.0	-7.0	85.4	69.	360.	AG	97.	100.0	.0	8.0	.60	11.6
9. S-RQ	-10.0	16.0	-10.0	66.2	50.	360.	AG	48.	100.0	.0	4.0	.44	8.4
10. S-FD	-8.0	.0	-8.0	-500.0	500.	180.	AG	1655.	11.2	.0	14.0		
11. E-LQ	-12.0	-2.0	-412.7	-2.0	401.	270.	AG	59.	100.0	.0	4.0	2.32	66.8
12. E-FA	-500.0	-10.0	.0	-10.0	500.	90.	AG	605.	12.3	.0	18.0		
13. E-TQ	-12.0	-9.0	-33.4	-9.0	21.	270.	AG	91.	100.0	.0	12.0	.09	3.6
14. E-RQ	-12.0	-14.0	-23.0	-14.0	11.	270.	AG	30.	100.0	.0	4.0	.04	1.8
15. E-FD	.0	-10.0	500.0	-10.0	500.	90.	AG	1700.	11.3	.0	18.0		
16. W-LQ	12.0	2.0	2181.9	2.0	2170.	90.	AG	59.	100.0	.0	4.0	8.08	361.7
17. W-FA	500.0	10.0	.0	10.0	500.	270.	AG	1348.	11.9	.0	18.0		
18. W-TQ	12.0	9.0	59.9	9.0	48.	90.	AG	91.	100.0	.0	12.0	.18	8.0
19. W-RQ	12.0	14.0	28.5	14.0	17.	90.	AG	30.	100.0	.0	4.0	.06	2.8
20. W-FD	.0	10.0	-500.0	10.0	500.	270.	AG	1653.	12.3	.0	18.0		

JOB: Rt. 32 Forsgate Dr. & CR 535 RUN: 2028 Route 92

DATE : 7/30/ 3
TIME : 15:32:45

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
1. N-LQ	135	121	2.0	10	1752	23.81	2	3
3. N-TQ	135	102	2.0	573	1776	23.81	1	3
4. N-RQ	135	102	2.0	613	1495	23.81	1	3
6. S-LQ	135	121	2.0	482	1805	23.81	1	3
8. S-TQ	135	102	2.0	817	3145	23.81	1	3
9. S-RQ	135	102	2.0	295	3145	23.81	1	3
11. E-LQ	135	124	2.0	197	1656	23.81	2	3
13. E-TQ	135	64	2.0	605	4637	23.81	1	3
14. E-RQ	135	64	2.0	103	4637	23.81	1	3
16. W-LQ	135	124	2.0	735	1770	23.81	2	3
18. W-TQ	135	64	2.0	1348	5061	23.81	1	3
19. W-RQ	135	64	2.0	155	5061	23.81	1	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. Rcpt_1	14.0	22.0	1.8
2. Rcpt_2	15.0	-22.0	1.8
3. Rcpt_3	-18.0	-22.0	1.8
4. Rcpt_4	-18.0	22.0	1.8

JOB: Rt. 32 Forsgate Dr. & CR 535 RUN: 2028 Route 92

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4
0.	2.7	3.6	3.9	2.8
5.	2.4	3.4	4.3	3.2
10.	2.0	3.0	4.3	3.4
15.	2.0	2.9	4.1	3.5
20.	1.9	2.9	3.9	3.3
25.	1.9	2.9	3.7	3.1
30.	1.9	3.0	3.6	3.1
35.	1.9	3.0	3.5	3.0
40.	1.9	3.0	3.5	3.0
45.	1.9	3.0	3.4	3.0
50.	1.9	3.1	3.5	3.0
55.	1.9	3.1	3.7	2.9
60.	1.9	3.2	3.7	2.8
65.	1.9	3.3	3.8	2.8
70.	1.9	3.3	3.9	2.8
75.	2.0	3.5	4.2	2.9
80.	2.1	3.6	4.3	3.0
85.	2.5	3.4	4.1	3.4
90.	2.9	3.0	3.8	3.9
95.	3.5	2.6	3.5	4.4
100.	3.6	2.1	3.0	4.7
105.	3.7	2.0	2.9	4.6
110.	3.5	1.9	2.8	4.3
115.	3.4	1.9	2.8	4.0
120.	3.4	1.9	2.9	3.9
125.	3.4	1.9	2.9	3.8
130.	3.4	1.9	2.9	3.8
135.	3.3	1.9	2.9	3.4
140.	3.1	1.9	3.0	3.6
145.	3.1	1.9	3.0	3.6
150.	3.1	1.9	3.1	3.8
155.	3.0	1.9	3.2	3.7
160.	3.0	1.9	3.2	3.9
165.	3.0	1.9	3.4	3.9
170.	3.3	2.2	3.4	4.1
175.	3.7	2.6	3.2	4.1
180.	4.3	2.9	3.0	3.8
185.	4.2	3.3	2.5	3.4
190.	4.2	3.5	2.1	2.9
195.	4.0	3.5	2.0	2.8
200.	3.6	3.3	1.9	2.7

205. * 3.6 3.3 1.9 2.8

JOB: Rt. 32 Forsgate Dr. & CR 535 RUN: 2028 Route 92

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4
210.	3.5	3.3	1.9	2.8
215.	3.5	3.1	1.9	2.7
220.	3.5	3.1	1.9	2.7
225.	3.4	3.0	1.9	2.8
230.	3.5	3.0	1.9	2.8
235.	3.6	2.9	1.9	2.9
240.	3.5	2.9	1.9	3.0
245.	3.5	2.9	1.9	3.1
250.	3.8	2.9	1.9	3.2
255.	3.9	2.9	1.9	3.3
260.	4.0	2.9	2.0	3.4
265.	3.9	3.1	2.2	3.3
270.	3.8	3.5	2.6	2.9
275.	3.3	3.9	2.8	2.4
280.	3.0	4.0	2.9	2.1
285.	2.9	4.0	2.9	2.0
290.	2.8	4.1	2.9	1.9
295.	2.8	4.0	2.9	1.9
300.	2.8	3.8	2.8	1.9
305.	2.8	3.9	2.8	1.9
310.	2.9	3.7	2.9	1.9
315.	3.0	3.5	2.8	1.9
320.	3.0	3.5	2.8	1.9
325.	3.0	3.7	2.7	1.9
330.	2.9	3.4	2.7	1.9
335.	3.0	3.8	2.8	1.9
340.	2.9	3.9	2.8	1.9
345.	3.2	4.0	2.8	2.0
350.	3.2	3.9	2.9	2.0
355.	3.0	4.0	3.4	2.4
360.	2.7	3.6	3.9	2.8
MAX	4.3	4.1	4.3	4.7
DEGR.	180	290	5	100

THE HIGHEST CONCENTRATION OF 4.70 PPM OCCURRED AT RECEPTOR REC4 .

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: Kingston Ln & Rt. 522 RUN: 2028 No Build

DATE : 7/30/ 3
TIME : 15:35:27

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = .0 CM/S VD = .0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 5 (E) ATIM = 60. MINUTES MIXH = 1000. M AMB = 2.0 PPM

LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	LENGTH (M)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (M)	W (M)	V/C	QUEUE (VEH)
1. N-LQ	2.0	-12.0	24.2	-34.2	31.	135.	AG	43.	100.0	.0	4.0	.42	5.2
2. N-FA	359.5	-365.5	6.0	-12.0	500.	315.	AG	134.	11.7	.0	10.0		
3. N-TQ	6.0	-12.0	21.5	-27.5	22.	135.	AG	43.	100.0	.0	4.0	.26	3.6
4. N-RQ	10.0	-12.0	11.2	-13.2	2.	135.	AG	43.	100.0	.0	4.0	.02	.3
5. N-FD	6.0	12.0	359.5	365.5	500.	45.	AG	1057.	11.5	.0	10.0		
6. S-LQ	-2.0	12.0	12.0	26.0	20.	45.	AG	43.	100.0	.0	4.0	.23	3.3
7. S-FA	347.5	365.5	-6.0	12.0	500.	225.	AG	10.	17.3	.0	10.0		
8. S-TQ	-6.0	12.0	-4.8	13.2	2.	45.	AG	43.	100.0	.0	4.0	.02	.3
9. S-RQ	-7.0	12.0	3.5	22.5	15.	45.	AG	43.	100.0	.0	4.0	.19	2.5
10. S-FD	-6.0	-12.0	347.5	-365.5	500.	135.	AG	538.	11.2	.0	10.0		
11. E-LQ	-12.0	-2.0	-2665.4	-2.0	2653.	270.	AG	59.	100.0	.0	4.0	9.02	442.2
12. E-FA	-50.0	-6.0	.0	-6.0	50.	90.	AG	507.	20.6	.0	10.0		
13. E-TQ	-12.0	-6.0	-598.0	-6.0	586.	270.	AG	50.	100.0	.0	4.0	1.42	97.7
14. E-RQ	-12.0	-10.0	-842.5	-10.0	831.	270.	AG	50.	100.0	.0	4.0	1.79	138.4
15. E-FD	.0	-6.0	500.0	-6.0	500.	90.	AG	638.	11.4	.0	10.0		
16. W-LQ	12.0	2.0	14.2	2.0	2.	90.	AG	59.	100.0	.0	4.0	.10	.4
17. W-FA	500.0	6.0	.0	6.0	500.	270.	AG	150.	11.2	.0	10.0		
18. W-TQ	12.0	6.0	40.5	6.0	29.	90.	AG	50.	100.0	.0	4.0	.45	4.8
19. W-RQ	12.0	10.0	19.4	10.0	7.	90.	AG	50.	100.0	.0	4.0	.13	1.2
20. W-FD	.0	6.0	-500.0	6.0	500.	270.	AG	433.	11.4	.0	10.0		

JOB: Kingston Ln & Rt. 522 RUN: 2028 No Build

DATE : 7/30/ 3
TIME : 15:35:27

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
1. N-LQ	146	98	2.0	192	1530	23.81	2	3
3. N-TQ	146	98	2.0	134	1712	23.81	1	3
4. N-RQ	146	98	2.0	10	1615	23.81	1	3
6. S-LQ	146	98	2.0	121	1752	23.81	1	3
8. S-TQ	146	98	2.0	10	1595	23.81	1	3
9. S-RQ	146	98	2.0	91	1595	23.81	2	3
11. E-LQ	146	134	2.0	884	1805	23.81	2	3
13. E-TQ	146	114	2.0	507	1863	23.81	1	3
14. E-RQ	146	114	2.0	518	1509	23.81	1	3
16. W-LQ	146	134	2.0	10	1805	23.81	2	3
18. W-TQ	146	114	2.0	150	1727	23.81	1	3
19. W-RQ	146	114	2.0	39	1553	23.81	1	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. Rcpt_1	19.0	14.0	1.8
2. Rcpt_2	18.6	-13.5	1.8
3. Rcpt_3	-14.0	-15.0	1.8
4. Rcpt_4	-14.0	15.1	1.8

JOB: Kingston Ln & Rt. 522 RUN: 2028 No Build

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4
0.	2.4	2.5	2.7	2.0
5.	2.5	2.5	2.7	2.0
10.	2.5	2.5	2.6	2.0
15.	2.5	2.6	2.5	2.0
20.	2.6	2.6	2.6	2.0
25.	2.6	2.6	2.6	2.0
30.	2.7	2.6	2.7	2.0
35.	2.8	2.6	2.7	2.1
40.	2.7	2.7	2.8	2.2
45.	2.6	2.6	2.8	2.3
50.	2.4	2.4	2.8	2.4
55.	2.2	2.3	2.5	2.5
60.	2.1	2.3	2.6	2.4
65.	2.0	2.4	2.6	2.6
70.	2.0	2.4	2.5	2.6
75.	2.0	2.5	2.6	2.5
80.	2.0	2.6	2.6	2.5
85.	2.1	2.4	2.7	2.6
90.	2.2	2.4	2.7	2.6
95.	2.3	2.2	2.6	2.8
100.	2.3	2.1	2.5	2.7
105.	2.4	2.0	2.4	2.6
110.	2.4	2.0	2.4	2.6
115.	2.4	2.0	2.5	2.3
120.	2.4	2.0	2.4	2.3
125.	2.4	2.0	2.5	2.3
130.	2.4	2.1	2.5	2.3
135.	2.5	2.2	2.3	2.5
140.	2.4	2.3	2.2	2.7
145.	2.4	2.3	2.1	2.7
150.	2.4	2.3	2.0	2.6
155.	2.4	2.3	2.0	2.5
160.	2.3	2.3	2.0	2.4
165.	2.3	2.5	2.0	2.4
170.	2.4	2.5	2.0	2.4
175.	2.4	2.5	2.0	2.3
180.	2.4	2.4	2.0	2.4
185.	2.4	2.4	2.0	2.5
190.	2.4	2.4	2.0	2.6
195.	2.4	2.4	2.0	2.6
200.	2.4	2.3	2.0	2.6

205. * 2.5 2.3 2.0 2.6

JOB: Kingston Ln & Rt. 522 RUN: 2028 No Build

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4
210.	2.6	2.3	2.0	2.7
215.	2.7	2.3	2.0	2.7
220.	2.7	2.3	2.0	2.7
225.	2.6	2.3	2.0	2.7
230.	2.5	2.3	2.0	2.7
235.	2.5	2.3	2.0	2.7
240.	2.9	2.3	2.0	2.6
245.	2.8	2.3	2.0	2.6
250.	2.9	2.3	2.0	2.5
255.	2.9	2.3	2.0	2.7
260.	3.0	2.7	2.1	2.7
265.	3.0	2.9	2.4	2.7
270.	3.0	3.2	2.9	2.6
275.	2.7	3.4	2.9	2.2
280.	2.7	3.2	3.1	2.1
285.	2.6	3.1	3.2	2.0
290.	2.6	2.7	3.0	2.0
295.	2.4	2.6	3.1	2.0
300.	2.4	2.4	2.9	2.0
305.	2.5	2.5	2.9	2.0
310.	2.5	2.4	2.9	2.0
315.	2.5	2.4	2.8	2.0
320.	2.5	2.3	2.8	2.0
325.	2.4	2.2	2.8	2.0
330.	2.3	2.3	2.8	2.0
335.	2.4	2.3	2.7	2.0
340.	2.4	2.3	2.7	2.0
345.	2.4	2.4	2.7	2.0
350.	2.4	2.5	2.7	2.0
355.	2.4	2.5	2.7	2.0
360.	2.4	2.5	2.7	2.0
MAX	3.0	3.4	3.2	2.8
DEGR.	260	275	285	95

THE HIGHEST CONCENTRATION OF 3.40 PPM OCCURRED AT RECEPTOR REC2 .

JOB: Dey Rd. & CR 535 RUN: 2028 No Build

DATE : 7/30/ 3
TIME : 15:37:14

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = .0 CM/S VD = .0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 5 (E) ATIM = 60. MINUTES MIXH = 1000. M AMB = 2.0 PPM

LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	LENGTH (M)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (M)	W (M)	V/C	QUEUE (VEH)
1. N-FA	2.0	-500.0	2.0	.0	500.	360.	AG	996.	11.4	.0	10.0		
2. N-LQ	1.0	-2.0	1.0	-460.9	459.	180.	AG	57.	100.0	.0	4.0	1.97	76.5
3. N-TQ	3.0	-2.0	3.0	-2897.0	2895.	180.	AG	57.	100.0	.0	4.0	7.49	482.5
4. N-FD	2.0	.0	2.0	500.0	500.	360.	AG	1186.	11.3	.0	10.0		
5. S-FA	-2.0	500.0	-2.0	.0	500.	180.	AG	1197.	11.5	.0	10.0		
6. S-RQ	-3.0	2.0	-3.0	20.7	19.	360.	AG	22.	100.0	.0	4.0	.24	3.1
7. S-TQ	-1.0	2.0	-1.0	250.0	248.	360.	AG	22.	100.0	.0	4.0	1.03	41.3
8. S-FD	-2.0	.0	-2.0	-500.0	500.	180.	AG	1362.	11.4	.0	10.0		
9. E-RQ	-4.0	-1.0	-30.4	-1.0	26.	270.	AG	51.	100.0	.0	4.0	.60	4.4
10. E-LQ	-4.0	1.0	-34.4	1.0	30.	270.	AG	51.	100.0	.0	4.0	.69	5.1
11. W-FD	-4.0	3.0	-504.0	3.0	500.	270.	AG	536.	11.2	.0	10.0		

JOB: Dey Rd. & CR 535 RUN: 2028 No Build

DATE : 7/30/ 3
TIME : 15:37:14

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
2. N-LQ	120	107	2.0	262	1784	23.81	2	3
3. N-TQ	120	107	2.0	996	1784	23.81	1	3
6. S-RQ	120	41	2.0	274	1856	23.81	1	3
7. S-TQ	120	41	2.0	1197	1856	23.81	1	3
9. E-RQ	120	96	2.0	165	1658	23.81	2	3
10. E-LQ	120	96	2.0	190	1658	23.81	2	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. Rcpt_1	-10.0	6.0	1.8
2. Rcpt_2	-10.0	-6.0	1.8
3. Rcpt_3	10.0	.0	1.8

JOB: Dey Rd. & CR 535 RUN: 2028 No Build

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3
0.	3.1	3.6	3.0
5.	3.5	3.9	2.7
10.	3.5	3.9	2.3
15.	3.5	3.9	2.1
20.	3.3	3.7	2.0
25.	3.3	3.7	2.0
30.	3.1	3.5	2.0
35.	3.1	3.3	2.0
40.	3.1	3.3	2.0
45.	3.1	3.1	2.0
50.	3.1	3.0	2.0
55.	3.2	2.9	2.0
60.	3.0	2.9	2.0
65.	2.9	2.9	2.0
70.	2.9	2.9	2.0
75.	2.9	2.9	2.0
80.	2.9	2.8	2.0
85.	2.9	3.0	2.0
90.	2.9	3.0	2.0
95.	2.9	3.0	2.0
100.	2.8	2.9	2.0
105.	2.9	2.9	2.0
110.	3.0	3.0	2.0
115.	2.9	3.0	2.0
120.	3.1	3.0	2.0
125.	3.3	3.0	2.0
130.	3.3	3.0	2.0
135.	3.5	3.1	2.0
140.	3.4	3.1	2.0
145.	3.5	3.2	2.0
150.	3.6	3.4	2.0
155.	3.9	3.5	2.0
160.	3.9	3.6	2.0
165.	4.2	3.8	2.1
170.	4.2	3.8	2.4
175.	4.2	3.8	2.9
180.	3.9	3.5	3.5
185.	3.3	2.9	3.9
190.	2.7	2.3	3.9
195.	2.5	2.1	3.9
200.	2.4	2.0	3.6

205. * 2.5 2.0 3.5

JOB: Dey Rd. & CR 535 RUN: 2028 No Build

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3
210.	2.5	2.0	3.4
215.	2.5	2.0	3.4
220.	2.5	2.0	3.3
225.	2.5	2.0	3.1
230.	2.6	2.0	3.0
235.	2.6	2.0	3.0
240.	2.6	2.0	2.9
245.	2.7	2.0	2.9
250.	2.7	2.0	2.9
255.	2.8	2.0	3.1
260.	2.7	2.1	3.2
265.	2.7	2.2	3.1
270.	2.7	2.3	3.4
275.	2.5	2.4	3.2
280.	2.4	2.5	3.3
285.	2.2	2.5	2.9
290.	2.2	2.6	2.8
295.	2.1	2.6	2.8
300.	2.1	2.6	2.9
305.	2.1	2.6	2.8
310.	2.1	2.5	2.9
315.	2.0	2.5	2.9
320.	2.0	2.5	3.0
325.	2.0	2.5	3.0
330.	2.0	2.5	3.2
335.	2.0	2.5	3.2
340.	2.0	2.4	3.3
345.	2.1	2.5	3.5
350.	2.3	2.7	3.5
355.	2.7	3.1	3.5
360.	3.1	3.6	3.0
MAX	4.2	3.9	3.9
DEGR.	165	5	185

THE HIGHEST CONCENTRATION OF 4.20 PPM OCCURRED AT RECEPTOR REC1 .

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: Dey Rd. & Rt. 130 RUN: 2028 No Build

DATE : 7/30/ 3
TIME : 15:31:41

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = .0 CM/S VD = .0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 5 (E) ATIM = 60. MINUTES MIXH = 1000. M AMB = 2.0 PPM

LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	LENGTH (M)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (M)	W (M)	V/C	QUEUE (VEH)
1. N-LQ	2.0	-12.0	2.0	-14.1	2.	180.	AG	57.	100.0	.0	4.0	.14	.4
2. N-FA	8.0	-500.0	8.0	.0	500.	360.	AG	1991.	12.6	.0	14.0		
3. N-RQ	10.0	-12.0	10.0	-13.3	1.	180.	AG	54.	100.0	.0	4.0	.03	.2
4. N-FD	8.0	.0	8.0	500.0	500.	360.	AG	2812.	11.2	.0	14.0		
5. S-LQ	-2.0	12.0	-2.0	321.5	310.	360.	AG	57.	100.0	.0	4.0	1.77	51.6
6. S-FA	-8.0	500.0	-8.0	.0	500.	180.	AG	1628.	14.4	.0	14.0		
7. S-RQ	-14.0	12.0	-14.0	52.4	40.	360.	AG	54.	100.0	.0	4.0	.99	6.7
8. S-FD	-8.0	.0	-8.0	-500.0	500.	180.	AG	1828.	12.0	.0	14.0		
9. E-LQ	-16.0	-2.0	-1723.9	-2.0	1708.	270.	AG	56.	100.0	.0	4.0	4.84	284.7
10. E-FA	-500.0	-6.0	.0	-6.0	500.	90.	AG	199.	23.8	.0	10.0		
11. E-RQ	-16.0	-10.0	-24.7	-10.0	9.	270.	AG	31.	100.0	.0	4.0	.16	1.4
12. E-FD	.0	-6.0	500.0	-6.0	500.	90.	AG	409.	11.3	.0	10.0		
13. W-LQ	12.0	2.0	22.8	2.0	11.	90.	AG	56.	100.0	.0	4.0	.59	1.8
14. W-FA	500.0	6.0	.0	6.0	500.	270.	AG	89.	14.8	.0	10.0		
15. W-RQ	12.0	10.0	24.2	10.0	12.	90.	AG	31.	100.0	.0	4.0	.26	2.0
16. W-FD	.0	6.0	-500.0	6.0	500.	270.	AG	276.	11.4	.0	10.0		
17. N-TQ	7.0	-12.0	7.0	-2176.9	2165.	180.	AG	108.	100.0	.0	8.0	2.91	360.8
18. S-TQ	-7.0	12.0	-7.0	1528.5	1516.	360.	AG	108.	100.0	.0	8.0	2.24	252.7
19. E-TQ	-16.0	-5.0	-30.6	-5.0	15.	270.	AG	31.	100.0	.0	4.0	.23	2.4
20. W-TQ	12.0	5.0	18.5	5.0	7.	90.	AG	31.	100.0	.0	4.0	.10	1.1

JOB: Dey Rd. & Rt. 130 RUN: 2028 No Build

DATE : 7/30/ 3
TIME : 15:31:41

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
1. N-LQ	90	80	2.0	16	1719	23.81	2	3
3. N-RQ	90	76	2.0	10	3085	23.81	1	3
5. S-LQ	90	80	2.0	200	1703	23.81	2	3
7. S-RQ	90	76	2.0	171	1553	23.81	1	3
9. E-LQ	90	79	2.0	654	1736	23.81	2	3
11. E-RQ	90	44	2.0	118	1599	23.81	1	3
13. W-LQ	90	79	2.0	82	1787	23.81	2	3
15. W-RQ	90	44	2.0	167	1380	23.81	1	3
17. N-TQ	90	76	2.0	1991	3085	23.81	1	3
18. S-TQ	90	76	2.0	1628	3282	23.81	1	3
19. E-TQ	90	44	2.0	199	1863	23.81	1	3
20. W-TQ	90	44	2.0	89	1827	23.81	1	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. NE	18.0	15.0	1.8
2. SE	18.0	-14.0	1.8
3. SW	-18.0	-15.0	1.8
4. NW	-19.0	14.0	1.8

JOB: Dey Rd. & Rt. 130 RUN: 2028 No Build

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4
0.	4.1	4.2	4.6	4.0
5.	3.2	3.4	5.2	4.6
10.	2.5	2.7	5.4	5.0
15.	2.1	2.2	5.1	5.0
20.	2.1	2.1	4.4	4.6
25.	2.0	2.1	4.4	4.5
30.	2.0	2.1	4.0	4.2
35.	2.0	2.2	3.8	4.2
40.	2.0	2.2	3.7	4.0
45.	2.0	2.2	3.7	4.0
50.	2.0	2.2	3.4	3.9
55.	2.0	2.2	3.4	3.9
60.	2.0	2.2	3.3	3.8
65.	2.0	2.2	3.3	3.9
70.	2.0	2.2	3.3	3.8
75.	2.0	2.3	3.4	3.7
80.	2.0	2.3	3.3	3.5
85.	2.0	2.3	3.3	3.5
90.	2.2	2.2	3.3	3.7
95.	2.2	2.1	3.2	3.6
100.	2.2	2.1	3.3	3.5
105.	2.2	2.0	3.2	3.7
110.	2.2	2.0	3.3	3.5
115.	2.2	2.0	3.3	3.4
120.	2.2	2.0	3.3	3.3
125.	2.1	2.0	3.4	3.4
130.	2.2	2.0	3.4	3.5
135.	2.2	2.0	3.5	3.6
140.	2.2	2.0	3.5	3.6
145.	2.2	2.0	3.5	3.7
150.	2.2	2.0	3.7	3.9
155.	2.2	2.0	3.8	4.0
160.	2.3	2.0	4.1	4.1
165.	2.4	2.1	4.3	4.4
170.	2.8	2.5	4.3	4.4
175.	3.5	3.2	4.1	4.3
180.	4.3	3.9	3.7	3.8
185.	4.7	4.4	2.9	3.1
190.	5.0	4.6	2.4	2.6
195.	4.9	4.5	2.1	2.4
200.	4.5	4.3	2.0	2.3

205. * 4.3 4.1 2.0 2.3

JOB: Dey Rd. & Rt. 130 RUN: 2028 No Build

WIND ANGLE (DEGR)	* CONCENTRATION (PPM) REC1	REC2	REC3	REC4
210.	4.0	4.0	2.0	2.3
215.	3.9	3.8	2.0	2.3
220.	3.6	3.7	2.0	2.3
225.	3.8	3.6	2.0	2.3
230.	3.6	3.5	2.0	2.3
235.	3.5	3.5	2.0	2.3
240.	3.5	3.5	2.0	2.3
245.	3.6	3.4	2.0	2.3
250.	3.6	3.4	2.0	2.4
255.	3.6	3.4	2.0	2.5
260.	3.9	3.4	2.1	2.6
265.	3.9	3.5	2.2	2.5
270.	3.8	3.8	2.5	2.4
275.	3.7	3.8	2.5	2.2
280.	3.7	3.8	2.6	2.0
285.	3.7	3.7	2.5	2.0
290.	3.7	3.6	2.5	2.0
295.	3.7	3.6	2.4	2.0
300.	3.8	3.5	2.4	2.0
305.	3.8	3.5	2.5	2.0
310.	3.8	3.8	2.5	2.0
315.	3.9	3.6	2.6	2.0
320.	3.9	3.9	2.6	2.0
325.	4.0	4.1	2.5	2.0
330.	4.1	4.2	2.5	2.0
335.	4.4	4.3	2.5	2.0
340.	4.6	4.6	2.5	2.0
345.	4.9	5.1	2.6	2.1
350.	5.0	5.2	3.0	2.5
355.	4.8	5.0	3.8	3.1
360.	4.1	4.2	4.6	4.0
MAX	5.0	5.2	5.4	5.0
DEGR.	350	350	10	10

THE HIGHEST CONCENTRATION OF 5.40 PPM OCCURRED AT RECEPTOR REC3 .

CAL3QHC: LINE SOURCE DISPERSION MODEL - VERSION 2.0 Dated 95221 PAGE 1

JOB: Rt. 32 Forsgate Dr. & CR 535 RUN: 2028 No Build

DATE : 7/30/ 3
TIME : 15:33:45

The MODE flag has been set to C for calculating CO averages.

SITE & METEOROLOGICAL VARIABLES

VS = .0 CM/S VD = .0 CM/S Z0 = 108. CM
U = 1.0 M/S CLAS = 5 (E) ATIM = 60. MINUTES MIXH = 1000. M AMB = 2.0 PPM

LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (M) X1	Y1	X2	Y2	LENGTH (M)	BRG (DEG)	TYPE	VPH	EF (G/MI)	H (M)	W (M)	V/C	QUEUE (VEH)
1. N-LQ	2.0	-16.0	2.0	-21.6	6.	180.	AG	57.	100.0	.0	4.0	.24	.9
2. N-FA	6.0	-500.0	6.0	.0	500.	360.	AG	383.	16.9	.0	10.0		
3. N-TQ	5.0	-16.0	5.0	-48.5	32.	180.	AG	97.	100.0	.0	4.0	.50	5.4
4. N-RQ	10.0	-16.0	10.0	-47.6	32.	180.	AG	48.	100.0	.0	4.0	.71	5.3
5. N-FD	6.0	.0	6.0	500.0	500.	360.	AG	1039.	11.3	.0	10.0		
6. S-LQ	-2.0	16.0	-2.0	37.8	22.	360.	AG	57.	100.0	.0	4.0	.82	3.6
7. S-FA	-8.0	500.0	-8.0	.0	500.	180.	AG	1351.	18.8	.0	14.0		
8. S-TQ	-7.0	16.0	-7.0	144.7	129.	360.	AG	97.	100.0	.0	8.0	.91	21.4
9. S-RQ	-10.0	16.0	-10.0	24.0	8.	360.	AG	48.	100.0	.0	4.0	.06	1.3
10. S-FD	-8.0	.0	-8.0	-500.0	500.	180.	AG	1497.	11.5	.0	14.0		
11. E-LQ	-12.0	-2.0	-1188.3	-2.0	1176.	270.	AG	59.	100.0	.0	4.0	5.21	196.0
12. E-FA	-500.0	-10.0	.0	-10.0	500.	90.	AG	904.	11.5	.0	18.0		
13. E-TQ	-12.0	-9.0	-44.1	-9.0	32.	270.	AG	91.	100.0	.0	12.0	.14	5.4
14. E-RQ	-12.0	-14.0	-27.6	-14.0	16.	270.	AG	30.	100.0	.0	4.0	.07	2.6
15. E-FD	.0	-10.0	500.0	-10.0	500.	90.	AG	1182.	12.1	.0	18.0		
16. W-FA	500.0	10.0	.0	10.0	500.	270.	AG	2516.	23.8	.0	18.0		
17. W-TQ	12.0	9.0	101.4	9.0	89.	90.	AG	91.	100.0	.0	12.0	.35	14.9
18. W-RQ	12.0	14.0	36.4	14.0	24.	90.	AG	30.	100.0	.0	4.0	.09	4.1
19. W-FD	.0	10.0	-500.0	10.0	500.	270.	AG	2591.	12.1	.0	18.0		

JOB: Rt. 32 Forsgate Dr. & CR 535 RUN: 2028 No Build

DATE : 7/30/ 3
TIME : 15:33:45

ADDITIONAL QUEUE LINK PARAMETERS

LINK DESCRIPTION	CYCLE LENGTH (SEC)	RED TIME (SEC)	CLEARANCE LOST TIME (SEC)	APPROACH VOL (VPH)	SATURATION FLOW RATE (VPH)	IDLE EM FAC (gm/hr)	SIGNAL TYPE	ARRIVAL RATE
1. N-LQ	135	121	2.0	28	1556	23.81	2	3
3. N-TQ	135	102	2.0	383	1776	23.81	1	3
4. N-RQ	135	102	2.0	181	1196	23.81	1	3
6. S-LQ	135	121	2.0	97	1612	23.81	2	3
8. S-TQ	135	102	2.0	1351	3454	23.81	1	3
9. S-RQ	135	102	2.0	47	3454	23.81	1	3
11. E-LQ	135	124	2.0	427	1583	23.81	2	3
13. E-TQ	135	64	2.0	904	4284	23.81	1	3
14. E-RQ	135	64	2.0	146	4284	23.81	1	3
17. W-TQ	135	64	2.0	2516	4871	23.81	1	3
18. W-RQ	135	64	2.0	229	4871	23.81	1	3

RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (M) X	Y	Z
1. Rcpt_1	14.0	22.0	1.8
2. Rcpt_2	15.0	-22.0	1.8
3. Rcpt_3	-18.0	-22.0	1.8
4. Rcpt_4	-18.0	22.0	1.8

JOB: Rt. 32 Forsgate Dr. & CR 535 RUN: 2028 No Build

MODEL RESULTS

REMARKS : In search of the angle corresponding to the maximum concentration, only the first angle, of the angles with same maximum concentrations, is indicated as maximum.

WIND ANGLE RANGE: 0.-360.

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4
0.	3.0	4.6	4.7	3.5
5.	2.5	4.0	5.0	4.0
10.	2.3	3.7	5.1	4.1
15.	2.1	3.5	5.0	4.1
20.	2.0	3.5	4.6	4.0
25.	2.0	3.5	4.6	3.8
30.	2.0	3.5	4.4	3.7
35.	2.0	3.5	4.2	3.5
40.	2.0	3.7	4.3	3.4
45.	2.0	3.8	4.5	3.5
50.	2.0	3.9	4.4	3.4
55.	2.0	3.9	4.4	3.3
60.	2.0	4.1	4.6	3.3
65.	2.0	4.1	4.8	3.2
70.	2.1	4.3	5.0	3.3
75.	2.2	4.5	5.1	3.5
80.	2.7	4.3	5.1	4.0
85.	3.7	4.0	4.7	5.0
90.	4.8	3.4	4.1	6.0
95.	5.7	2.7	3.5	6.9
100.	6.0	2.3	3.1	7.1
105.	6.0	2.1	2.9	6.9
110.	5.6	2.0	2.8	6.3
115.	5.3	2.0	2.8	5.7
120.	5.1	2.0	2.8	5.4
125.	4.9	2.0	2.7	5.1
130.	4.8	2.0	2.8	4.9
135.	4.7	2.0	2.8	4.4
140.	4.5	2.0	2.8	4.4
145.	4.3	2.0	2.8	4.6
150.	4.2	2.0	2.8	4.4
155.	4.2	2.0	3.0	4.4
160.	4.1	2.0	3.1	4.3
165.	4.1	2.0	3.2	4.5
170.	4.3	2.2	3.2	4.4
175.	4.6	2.4	3.2	4.5
180.	5.0	2.7	2.8	4.2
185.	5.2	2.9	2.6	3.8
190.	5.1	3.1	2.2	3.4
195.	5.1	3.1	2.1	3.3
200.	5.0	3.1	2.0	3.2

205. * 4.7 3.2 2.0 3.3

JOB: Rt. 32 Forsgate Dr. & CR 535 RUN: 2028 No Build

WIND ANGLE (DEGR)	CONCENTRATION (PPM) REC1	REC2	REC3	REC4
210.	4.9	3.1	2.0	3.3
215.	4.6	3.0	2.0	3.4
220.	4.9	3.0	2.0	3.4
225.	4.9	3.0	2.0	3.4
230.	5.0	2.9	2.0	3.4
235.	4.9	2.8	2.0	3.5
240.	5.0	2.8	2.0	3.5
245.	5.0	2.8	2.0	3.7
250.	5.2	2.8	2.0	3.9
255.	5.3	2.8	2.0	4.1
260.	5.3	3.0	2.2	4.2
265.	5.1	3.4	2.6	4.0
270.	4.6	3.8	2.9	3.5
275.	4.1	4.4	3.4	3.0
280.	3.5	4.6	3.6	2.4
285.	3.2	4.6	3.7	2.1
290.	3.1	4.5	3.5	2.1
295.	3.2	4.1	3.5	2.0
300.	3.2	4.1	3.4	2.0
305.	3.2	4.1	3.3	2.0
310.	3.2	3.9	3.3	2.0
315.	3.3	3.8	3.3	2.0
320.	3.2	3.9	3.3	2.0
325.	3.3	4.2	3.2	2.0
330.	3.3	4.1	3.2	2.0
335.	3.5	4.4	3.2	2.0
340.	3.5	4.6	3.2	2.0
345.	3.7	4.8	3.3	2.1
350.	3.7	4.9	3.5	2.3
355.	3.5	4.9	4.1	2.9
360.	3.0	4.6	4.7	3.5
MAX	6.0	4.9	5.1	7.1
DEGR.	100	350	10	100

THE HIGHEST CONCENTRATION OF 7.10 PPM OCCURRED AT RECEPTOR REC4 .

Appendix C - Traffic Modeling and Analysis

Draft Environmental Impact Statement
For Route 92

Proposed by:

New Jersey Turnpike Authority

Prepared by:

Urbitran Associates, Inc.

Montville, New Jersey

August, 2003

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PART A: Description of Traffic Model

1. INTRODUCTION

A review of documentation and data from the prior Route 92 traffic studies identified a number of methodological issues suggesting that new traffic analyses should be performed as part of this EIS:

- The travel-demand model used in prior studies was a preliminary version of the Statewide Transportation Planning Model. The model has gone through a series of subsequent enhancements and updates;
- The most recent version of this model is a 22-county model that URS developed for the Penns Neck EIS. Compared with the version used for the prior Route 92 analyses, the current model has a number of features that make it more appropriate for use in analyzing Route 92, including:
    - Rather than performing a single, 24-hour traffic assignment, the new 22-county model performs a separate traffic assignment for peak and off-peak periods. This is critical for the analysis of tolled highways in metropolitan areas, which tend to have considerably different peaking patterns as compared with non-tolled highways of similar quality.
    - The new model also uses projected trip tables based on more recent economic projections.
- Signal retiming along US Route 1 has resulted in improved traffic flow along US Route 1 at the expense of the intersecting roads. The retiming may affect routings of some trips in this area, and has affected the performance of the intersections along US Route 1 (and possibly others);
- In addition, it is clear that potential additional improvements to US Route 1 in North and South Brunswick could potentially serve some of the trips that Route 92 is intended to serve. Therefore, a closer look at the future of US Route 1, and its impact on the need for Route 92, was warranted; and
- The prior studies did not consider the effects of the planned Penns Neck (formerly Millstone) Bypass. While Penns Neck is intended to address local traffic circulation, there was a concern that, when taken together with the new Hightstown Bypass, it may also provide another attractive east/west route, serving some of the trips that Route 92 is intended to serve, particularly during off-peak travel periods.

In addressing these issues, the current EIS was able to take advantage of the existence of several new models and databases that have been developed since the prior traffic analyses were performed:

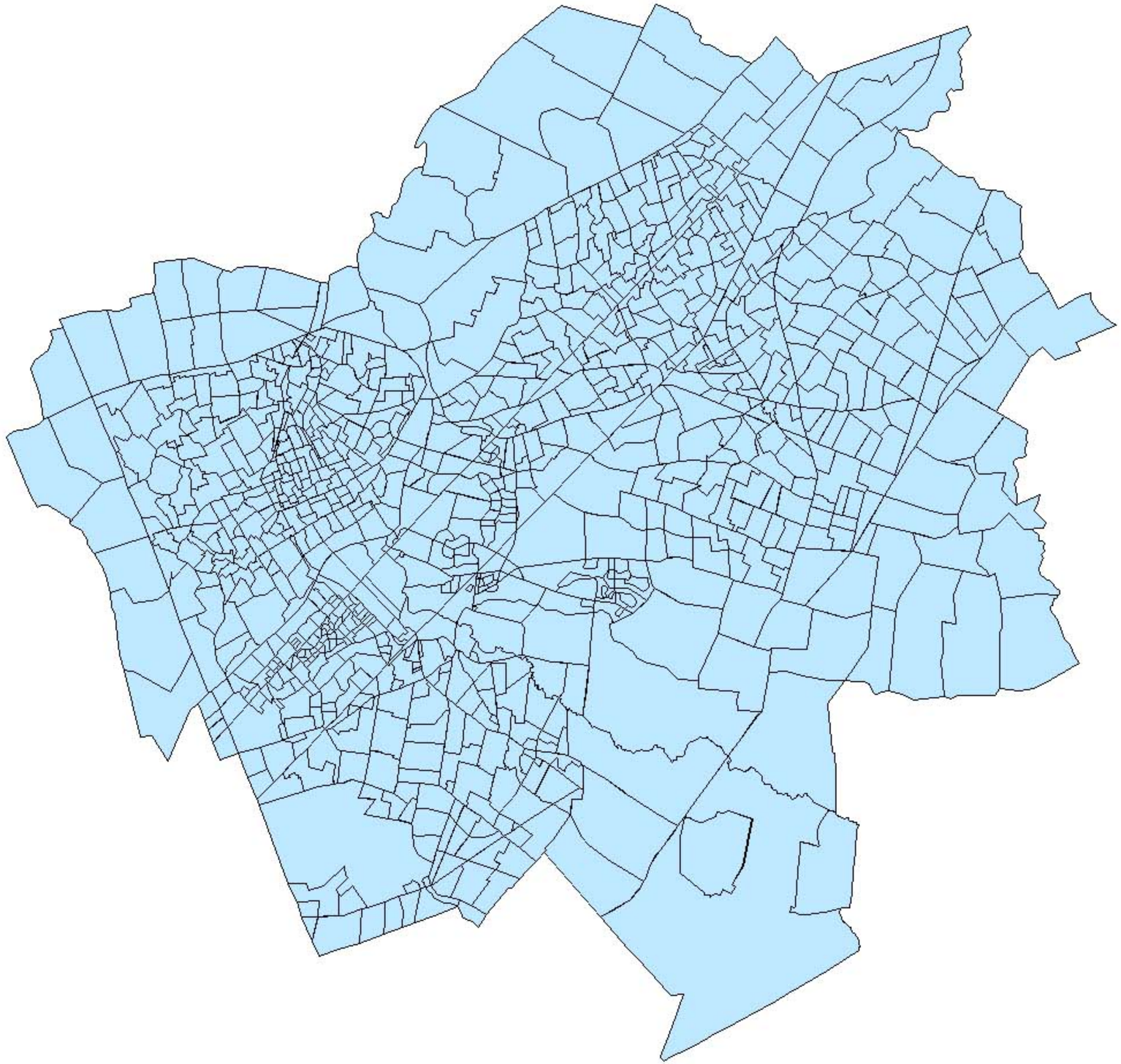
- A detailed "local model," recently developed for the Penns Neck EIS, has been found to perform excellently with respect to analyzing alternatives for this project;
- A detailed inventory of existing and planned land use in the area covered by this model (essentially the towns of West Windsor, Princeton Township, Princeton Borough, and Plainsboro);
- A similar detailed model for the South Brunswick area developed several years ago by Urbitran Associates; and

- A detailed inventory of existing and planned land use for South Brunswick.

Considering the issues and opportunities described above, it was decided to develop a new "Central Jersey" traffic model, which merges the Penns Neck and (updated) South Brunswick models in full detail, while adding East Windsor/Hightstown, and parts of North Brunswick and East Brunswick, such that this new model provides a detailed representation of the entire area from New Jersey Route 18 in the north to Mercer County Route 571 in the south, and from the New Jersey Turnpike and Middlesex County Route 535 on the east to New Jersey Route 27 on the west.

The remainder of Part A of this Appendix describes the specifics of this model, its relationship with the new 22-county model developed for the Penns Neck EIS, and its validation for year 2001 conditions.

Route 92 Traffic Model Zones



Urbitran Assoc. Inc.

2. LAND USE

2.1 Zone System

The new Central Jersey traffic model uses 985 traffic analysis zones to represent its area of coverage, as follows:

Town	Number of Zones
West Windsor	233 (with numbers in the range 1-500)
Princeton (town and borough)	238 (with numbers in the range 501-1000)
Plainsboro	110 (with numbers in the range 1001-1222)
South Brunswick (and vicinity)	323 (with numbers in the range 1225-1700)
Cranbury (and vicinity)	25 (with numbers in the range 1701-1743)
East Brunswick	16 (with numbers in the range 1745-1760)
North Brunswick (and vicinity)	32 (with numbers in the range 1765-1801)
East Windsor and Hightstown	8 (with numbers in the range 1806-1814)

In the five "core" municipalities (Princeton Town, Princeton Borough, West Windsor, Plainsboro, and South Brunswick), these zones are much smaller than the zones used in regional models. This permits more precise estimation of traffic flows within these municipalities. A map of the model zones is shown in an accompanying pullout sheet.

In addition, the base year (2001) model uses 53 "external stations" to represent entry and exit points to/from this area.

2.2 2001 Land Use

As will be discussed in Section 4 below, peak-hour vehicular origin-destination matrices for the Central Jersey area were prepared using a linked set of regional and local models. The regional 22-county model provides data relating to the orientation, mode choice, and route usage of long distance travel. The regional model essentially provides the context within which travel in the Central Jersey study area is conducted.

The local traffic model is nested within the regional model and uses the contextual data that it provides. The chief output of the local model is a set of detailed traffic assignments to the streets and highways of the study area. The local model also provides a comprehensive database of existing and future land use, which drives the estimation of trip making in the local area. Both the local and regional models use this land use database.

The land use and demographic inventories and forecasts are critical components of the travel modeling process because they provide the basis for computing travel activity. For each of the 985 traffic analysis zone, the land use is described in terms of 20 different land use categories. In practice, this level of detail means that in most commercial areas, a zone is equivalent to a specific building, and in residential areas a zone is equivalent to a small neighborhood or block.

The Central Jersey land use inventory and forecast builds upon 15 years of maintaining land use data for the Princetons (Town and Borough), West Windsor and South Brunswick. Land use inventories in all four communities were built up from property tax and census records in

the 1980's, and have been refined and maintained since that time. The Princeton and West Windsor traffic models were merged for the Penns Neck EIS, and Plainsboro was added. A new inventory for Plainsboro was developed as part of the Penns Neck Bypass work. South Brunswick data were updated in 1996 for NJDOT's US Route 1 Needs Assessment, and those data were added to the Penns Neck data to form this Central Jersey inventory.

The following procedures were used to update and validate the land use forecasts:

1. Special generators were identified from field inventories and knowledge of the area. Employers were contacted and employment totals estimated for each. These special generators and their traffic generation, population, and employment are shown in the table on the next page. The most significant special generator is Princeton University, which employs about 5,000 benefit-eligible persons and has about 4,550 undergraduate students and 1,500 graduate students.

2. Household size and employment densities were estimated for each of the land uses. For purposes of this analysis and validation of totals, consistent factors were applied across the study area.

3. Princeton Borough residential totals were reexamined and crosschecked against 2000 Census household totals. Commercial properties had been identified during an update in 1997. The database was reexamined and field checks made to identify new construction; it was found to be minimal within the Borough. Household totals were compared with Census totals and found to be consistent (3,465 inventoried households in 2001 vs. 3,326 households estimated by Census in 2000). Employment totals were compared to 1999 NJ Department of Labor estimates. Employment allocated to Princeton Borough by NJDOL was considerably higher than the inventory – 16,670 vs. 5,561 jobs. However, because the study area totals align, it was concluded that the NJDOL data contains significant problems in allocating employment among the Princeton zip code municipalities. Therefore, the totals built up from land use were assumed to have precedence.

4. Princeton Township residential properties were first established through a parcel-based property tax database analysis in 1986. As construction has since proceeded, the database has been updated. In this analysis, field inspections were made to validate the database. The estimated 2001 population is slightly higher than 2000 Census (16,947 vs. 16,027 persons). Households are slightly lower than Census (6,018 vs. 6,044 dwelling units). The employment is significantly lower than NJDOL estimates (5,854 vs. 8,264 jobs). Again, it was concluded that allocation problems among the Princeton zip codes are at the root of the employment discrepancy, and the land-use based totals were assumed to be more accurate.

5. The West Windsor Township land use database has been closely maintained and updated annually since 1988. Those data were reviewed, compared with known totals, field checked, and compared with Census for this study. The number of households estimated in 2001 is slightly higher than the Census total for 2000 (7,443 vs. 7,282 dwelling units). Population is slightly higher than Census (22,911 vs. 21,907 persons). Finally, employment developed from 2001 land use is higher than NJDOL estimates for 1999 (18,991 vs. 17,086 jobs). This difference is attributable in part to construction that occurred between 1999 and 2001.

6. Plainsboro Township data were newly developed for this study from developer inventories, field inventories, and Census block data. Of particular use was a development master plan traffic study, provided by Princeton Forrestal Center[1], which itemized each existing and future building lot within the project. Because the land use – based totals were assumed to be exceptionally accurate, based on the Princeton Forrestal report, it was assumed that the large discrepancy between land-use based employment and NJDOL estimates (27,266 vs. 13,999 jobs) was caused by allocation problems within the Princeton zip codes. The number of inventoried households was slightly higher than Census (9,438 vs. 8,742 dwelling units) and, similarly, the inventory estimate of population was slightly higher than Census (21,865 vs. 20,215 persons).

7. South Brunswick land use data were compiled from prior inventories and updated to be consistent with estimates for the Township compiled by the Penns Neck EIS study from regional data. Altogether the database indicates a population of 38,214 persons in 2001, and employment of 31,121 persons in the same year within South Brunswick Township.

The estimates of year 2001 population and employment for seven municipalities in the Central Jersey area are as follows:

MUNICIPALITY	POPULATION	EMPLOYMENT
	2001 Estimate	2001 Estimate
Cranbury Township	3,231	6,621
Monroe Township	28,513	7,974
Plainsboro Township	21,865	27,266
Princeton Borough	15,054	5,561
Princeton Township	16,947	5,854
South Brunswick Township	38,214	31,121
West Windsor Township	22,911	18,991
TOTAL	146,735	103,388

Source: Penns Neck Area EIS, Land Use Inventory and Forecast Study, Urbitran Associates, July, 2002.

[1] Third Updated Comprehensive Traffic Study, Princeton Forrestal Center and Kingston Area, Orth Rodgers Associates, Inc., December 1998. Adjustments to some totals were made based on current data provided by Princeton Forrestal Center.

3. HIGHWAY NETWORK

3.1 Link Characteristics

Year 2001 detailed highway network for the area described above was created by combining the highway networks for the Penns Neck local model and the South Brunswick model, removing duplicate links, and adding links for the main roads in East Windsor/Hightstown.

The resulting network link database is similar to the link data used in all highway network planning models, in that each link is associated with certain basic characteristics: two node numbers (one representing the node at each end of the link), a distance, a number of lanes (in each direction), and a facility type (which, together with the number of lanes, is used to determine the uncongested operating speed and the vehicle-carrying capacity of the link).

Facility type is an indication of the physical attributes of a roadway that affect free-flow speed and capacity. Such attributes include: lane width, median treatment, signal spacing, driveway spacing, shoulder treatment, and horizontal and vertical curvature. The facility types used in the detailed Central Jersey model, along with the attributes that define each type, are listed in the tables on the following pages.

The accompanying map shows the roadways included in this network, the facility types of these roadways, and the number of lanes by direction.

In addition, this network contains additional link data items for use in a special procedure developed by Urbitran Associates (and implemented successfully in the South Brunswick, Penns Neck, and other models) for improving the modeling of delays at intersections. Typically, an intersection is represented as a node having no time penalty associated with it. In reality, the presence of a traffic control device such as a stop sign or a signal introduces some measure of delay, even under free-flow conditions (i.e., with no traffic congestion). This can be important in traffic assignment, when a path using a freeway is being compared to a path using a signalized arterial, for example. Such delays increase greatly as the volume of traffic approaching an intersection during a certain time interval approaches or exceeds the capacity of the intersection approach.

Regional traffic models generally do not explicitly consider control devices. The usual reason given is that the influence of these devices is insignificant at the regional level, and the great effort needed to establish and maintain an inventory of such devices is not sufficiently worthwhile.

However, for detailed models of smaller areas, the explicit coding of control devices is both feasible and desirable. The Urbitran procedure uses theoretically derived capacity

CENTRAL JERSEY TRAFFIC MODEL FACILITY TYPES

FACILITY TYPE	FACTYPE VALUE	(Criteria listed in order of decreasing importance, from left to right.)							
		Function of Road	**Median**	**Turn Lanes**	**Shoulder**	**Lanes**	**Control Device**	**Curb Cuts**	**Parking**
Freeway	1	full control, limited access facility to serve regional traffic	always exists: raised guide rail, or grass	none	always greater than 6 feet	always has at least two lanes per direction; lanes at least 12 feet wide	none	none	none
Arterial Class 1	2	primarily serves regional traffic and provides access to abutting land use as a secondary function	usually has median, especially if no CTL exists	usually has a CTL; if no CTL exists, will have frequent LTL	usually shoulder is approx. 6 feet wide or greater	1-2 lanes per direction; lanes at least 12 feet wide	signals usually 0-3 per mile	few driveways	usually parking is not permitted
Arterial Class 2	3	primarily provides both land access and traffic circulation service within residential, commercial, & industrial areas	usually has median especially if no CTL exists	sometimes has CTL, if no CTL exists will have frequent LTL	usually greater than or equal to 6 feet	usually only 1 lane per direction lanes usually 12 ft wide	Signals usually 0-10 per mile	possibly many driveways	possibly parking is permitted
Collector Class 1	4	primarily provides both land access and traffic circulation service within residential, commercial, and industrial areas	usually has median especially if no CTL exists	sometimes has CTL, if no CTL exists will have frequent LTL	usually shoulder is less than 6 feet	usually only 1 lane per direction; usually lanes are 12 ft wide	Signals usually 0-10 per mile	possibly many driveways	usually parking is permitted during all hours
Collector Class 2	5 or 6	primarily provides both land access and traffic circulation service within residential, commercial, and industrial areas	rarely has a median	rarely has CTL, or frequent turn lanes	usually shoulder is less than 6 feet	usually only 1 lane per direction lane width varies	signals / stop signs usually 0-10 per mile	possibly many driveways	usually parking is permitted during all hours

CENTRAL JERSEY TRAFFIC MODEL FACILITY TYPES (cont.)

FACILITY TYPE	FACTYPE VALUE	(Criteria listed in order of decreasing importance, from left to right.)							
		Function of Road	**Median**	**Turn Lanes**	**Shoulder**	**Lanes**	**Control Device**	**Curb Cuts**	**Parking**
Local Street	8	serves strictly to provide access to residential or local business areas	rarely has a median	rarely has turn lanes	usually shoulder is less than 6 feet	usually only 1 lane per direction, usually about 12 ft wide	stop signs / signals usually 1-10 per mile	usually many driveways	usually parking is permitted during all hours
Centroid Connector	9	a link used to connect a zone centroid to roadway links, should represent local streets	none	none	none	always only 1 lane per direction; lane width assumed to be normal	none	none	none
Jughandle	10	lower level ramp with slower speeds, usually requiring a stop at the major facility	usually has raised median or guide rail	sometimes has LTL or RTL at the end of the ramp	varies	usually only 1 lane per direction, about 12 feet wide	signal / stop signs	none	none
Freeway Ramp	11	high level ramp providing adequate merge to major facility without a signal or stop sign	usually has raised median or guide rail	none	varies	usually only 1 lane per direction, usually 12 feet wide	usually does not require a stop by the vehicle	none	none

2001 Existing Condition

Highway Facility Types and Number of Lanes

US Army Corps of Engineers

Proposed Route 92

Environmental Impact Statement

and delay formulas to adjust the initial link free-flow speed and capacity, based on the link distance and the presence of a control device at its downstream ("B") node.

The procedure requires the addition of several link data fields, which are::

- CDEV – a link variable, if non-zero in either direction, indicates the presence and type of a control device at the end of the link headed in the relevant direction. The possible values of this variable are:

  1, for a stop sign

  2, for a yield sign

  3, for a traffic signal (major approach)

  4, for a traffic signal (minor approach)

- ADDLNS – a link variable indicating the number of turning lanes (for either right or left turns) that is added at the approach to the intersection at the end of the link.

- AMCYCLE/PMCYCLE – the (a.m. peak or p.m. peak) cycle length (in seconds) of a signal at the end of a link.

- AMGC/PMGC – the (a.m. peak or p.m. peak) green time-to-cycle length (G/C) percentage for the approach to a signalized intersection at the end of a link.

- ARRTYPE – the HCM "arrival type" (divided by 10), which denotes the level of signal progression.

The maps on the following pages display the nodes in the 2001 Central Jersey network where traffic signals, stop signs, and yield signs are coded via use of the CDEV variable.

If CDEV is non-zero, and no values are coded for the other variables, the model will insert default values for these variables, depending on the value of CDEV and the facility type of the link. The table on the following page shows specific cycle length and G/C values that were used for key intersections where specific information was available.

It should be noted that this procedure is not intended to replace HCM-type analysis for determination of intersection Level-Of-Service, but rather to improve the ability of traffic assignments to reflect the impacts of significant intersection improvements, such as signal retiming or adding turn lanes.

Finally, a TRUCK "flag" variable is used to identify links that cannot be used by trucks. In the base year (2001) network, this variable is used only for the purpose of assessing the proper tolls to autos and trucks using the sections of the New Jersey Turnpike within the modeled area.

2001 Existing Condition
Location of Stop and Yield Signs

US Army Corps of Engineers
Proposed Route 92
Environmental Impact Statement

Location of Stop and Yield Signs
⊗ Stop/Yield Sign

2001 Existing Condition
Location of Traffic Signals

US Army Corps of Engineers
Proposed Route 92
Environmental Impact Statement

Location of Traffic Signal
⊗ Traffic Signal

SIGNAL TIMING DATA

Intersection		AM			PM		
		Cycle Length (sec)	Green/Cycle (percent)		Cycle Length (sec)	Green/Cycle (percent)	
Major Road	Minor Road		Major	Minor		Major	Minor
Route 1	Nassau Park Blvd	240	78	8	120	51	17
Route 1	Meadow Rd	240	70	20	240	70	20
Route 1	Carnegie Center Blvd	240	75	10	120	52	20
Route 1	Washington Rd	240	64	29	120	67	20
Route 1	Fisher Place	240	80	14	120	60	28
Route 1	Harrison St	240	70	17	120	61	17
Route 1	Independence Way	240	75	7	120	55	17
Route 1	Ridge Rd	240	75	7	120	55	17
Route 1	Raymond Rd	240	80	14	120	60	28
Route 1	Rt 522 / Promenade Blvd	140	67	24	140	67	24
Route 1	New Rd	140	70	21	140	70	21
Route 1	Sand Hills Rd / Major Rd	135	70	16	135	70	16
Route 1	Cozzens Lane	140	59	33	140	59	33
Route 27	Rt 522 / Promenade Blvd	90	57	23	90	57	23
Scudders Mill Rd	Schalk's Crossing Rd	70	47	14	70	47	14
Scudders Mill Rd	Dey Rd	85	55	24	85	55	24
Rt 535	Plainsboro Rd	70	37	37	70	37	37
Rt 535	Dey Rd	120	69	17	120	69	17
Rt 535	Prospect Plains Rd	120	65	21	120	65	21
Rt 32	Rt 535	135	54	28	135	54	28
Rt 130	Friendship Rd	90	50	28	90	50	28
Rt 130	Park-n-Ride Lot	90	67	11	90	11	67
Rt 130	Dey Rd	120	56	23	120	56	23
Rt 522	Kingston Lane	100	41	27	100	41	27
George Rd	Kingston Lane	70	64	14	70	64	14

3.2 Link Speed and Capacity

The link attributes which most directly affect the routing of traffic are the link free-flow speed and capacity. The free-flow speed is that speed at which traffic can operate if unhindered by surrounding traffic. In the model, free-flow speed serves as the starting point for the first iteration of traffic assignment.

Capacity is the maximum volume of traffic that can pass through a link within a given time interval (usually one hour). In the model, capacity is used in the computation of link volume-to-capacity (V/C) ratios, which are in turn used to compute congested link speeds that are used in the next assignment iteration.

In the detailed Central Jersey model, as is most transportation planning models; link free-flow speeds and per-lane capacities are assigned by the model as a function of link facility type. This approach is an efficient and ensures consistency among links of the same type. The following tables show the link free-flow speeds and per-lane capacities used for links with no control device (CDEV = 0):

Facility Type	Free Flow Speed (mph)	Per-lane Hourly Capacity
1 (Freeway)	60	1750
2 (Arterial 1)	50	1575
3 (Arterial 2)	40	1300
4 (Collector 1)	40	900
5/6 (Collector 2)	20	500
8 (Local Street)	20	375
9 (Centroid Connector)	20	9999*
10 (Jughandle)	45	1400
11 (Freeway Ramp)	25	900

*Note: Capacity restraint is not performed on centroid connectors.

For links with a control device at the "B" node, the model adjusts the free-flow speed and per-lane capacity values using intersection delay and capacity calculations based on formulas in the Highway Capacity Manual.

3.3 Turn Prohibitions

In a detailed highway network, it is often necessary to specify turns that are not allowed at certain intersections. In our study area, there are many such prohibited turns, due to the use of "jug handles" for turning movements. This is particularly true along US Route 1, where there are no turns permitted at any of the signals. In order to prevent the model from allowing these turns and other illogical movements, 113 turn prohibitions were specified for the base year network.

3.4 Traffic Counts

A.M. and P.M. peak hour traffic counts for 2000-2002 were obtained from numerous sources, including:

- The NJDOT web site
- Counts taken by Urbitran for the Penns Neck EIS, this EIS, and various development impact studies
- Counts taken by various other firms for West Windsor Township and others.

This count information was coded into the network link database, and is displayed in an accompanying series of network plots.

4. TRIP TABLE GENERATION

Peak-hour vehicular origin-destination matrices for the Central Jersey area were prepared using a linked set of regional and local models. The regional 22-county model developed for the Penns Neck EIS was executed to create a set of "sub area" vehicle trip matrices for the area covered by the Central Jersey traffic model. Four vehicle trip matrices (auto home-based work trips, auto home-based non-work trips, auto non-home-based trips, and truck trips) were generated for each of two time periods: a 2-1/2 hour morning peak period, and a 3-hour evening peak period.

At the same time, standard ITE vehicle trip generation rates were applied to the detailed Central Jersey area land use inventory to estimate the number of vehicles entering and leaving each Central Jersey model zone during the a.m. and p.m. peak hours. This information was used to derive factors that were used to allocate the trips in the sub area matrices from the zones in the regional model to the much more detailed Central Jersey model zones. The resulting trip tables were then factored to ensure that the number of vehicles entering and leaving each zone agreed with the numbers obtained using the ITE rates, to convert from peak periods to peak hours, and to obtain the proper balance between internal and external trip-ends.

The trip tables resulting from this factoring process were then further modified through the "adaptable" traffic assignment procedure discussed in Section 5.2 below.

LOCAL AREA MODEL SPECIAL GENERATORS

ZONE	LOCATION	PARKING SPACES	Peak Hour Vehicle Trips AM In	AM Out	AM Total	PM In	PM Out	PM Total	Population	Employment
Public Parking Lots:										
703	Chambers St. Garage	300 spaces	144	36	180	63	147	210		
		0.6 trips/space/hr am, 0.7 trips/space/hr pm								
704	Spring St. Parking Lot	100 spaces	48	12	60	21	49	70		
		0.6 trips/space/hr am, 0.7 trips/space/hr pm								
601	Dinky RR Sta Parking Lot	100 spaces	40	0	40	0	40	40		
		0.4 trips/space/hr								
Princeton Junction Train Station:										
	Trips / space: In Out									
	AM 0.10 0.01									
	PM 0.02 0.15									
100	NJ Transit Daily	620 spaces	62	6	68	12	93	105		
102	NJ Transit Alexander Lots	1800 spaces	180	18	198	36	270	306		
103	WWPA Vaughn Drive	323 spaces	32	3	35	6	48	54		
120	WWPA Wallace (North)	270 spaces	27	3	30	5	41	46		
121	WWPA Wallace (South)	330 spaces	33	3	36	7	50	57		
	TOTAL	3343 spaces								
Institutions:										
709	Princeton Medical Center	1070 spaces	391	227	618	159	330	489		400
706	YMCA/YWCA		50	20	70	100	130	230		50
Colleges / Universities:										
Princeton University										
	Trips / space: In Out									
	AM 0.48 0.12	Source: Jacquemart study for Princeton U.								
	PM 0.10 0.44									
596	15, Jadwin	139 spaces	67	17	84	14	61	75		147
597	21	700 spaces	336	84	420	70	308	378		740
599	5,20,28A,1941 Hall	535 spaces	257	64	321	54	235	289		566
600	12,16,23,28,Boiler Hse,Garage	1540 spaces	739	185	924	154	678	832		628
601	22,29	64 spaces	31	8	39	6	28	34		68
608	19,24	279 spaces	134	33	167	28	123	151		139
610	7,Boat Hse	253 spaces	121	30	151	25	111	136		67
723	Main Campus, Borough									100
724	Main Campus, Borough									100
725	Main Campus, Borough									100
726	Main Campus, Borough									162
727	Main Campus, Borough									250
728	221,Nassau	11 spaces	5	1	6	1	5	6	550	250
729	1,1A,2,3,,25,25New,30	993 spaces	477	119	596	99	437	536	550	250
730	14,18,26,Infirmary,Dod,Brown,Booth,Pattor	19 spaces	9	2	11	2	8	10	600	300
731	10,10A	63 spaces	30	8	38	6	28	34	800	400
732	Dillon,Edwards,Witherspoon	55 spaces	26	7	33	6	24	30	850	350
734	106 Alexander	7 spaces	3	1	4	1	3	4		7
735	8,9,71 Univ Pl	50 spaces	24	6	30	5	22	27	300	53
737	Wyman	22 spaces	11	3	14	2	10	12		23
1019	Forrestal Campus & Plasma Lab		100	30	130	25	75	100		300
	Off-campus housing (20%)								900	
	Subtotal, Undergraduate Students								4,550	
	Graduate Students								1,500	
	TOTAL	4730							6,050	5,000
Princeton Theological Seminary										
	Most parking is for students; use 1/2 the Princeton U. trip rate									
	Trips / space: In Out									
	AM 0.24 0.06									
	PM 0.05 0.22									
736	North of Mercer St	125 spaces	30	8	38	6	28	34		75
740	South of Mercer St	438 spaces	105	26	131	22	96	118	590	125
	Off-campus housing (20%)								150	
	TOTAL								740	
Westminster Choir College										
	Trips / space: In Out									
	AM 0.48 0.12									
	PM 0.10 0.44									
717	Total Spaces	300 spaces	144	36	180	30	132	162	340	100
	Off-campus housing (20%)								90	
	TOTAL								430	
Mercer County College										
	Trips / space: In Out									
	AM 0.48 0.12									
	PM 0.10 0.44									
162	Total Spaces	2000 spaces	960	240	1200	200	880	1080		500
Municipal Facilites:										
109	West Windsor Municipal Complex		120	30	150	45	105	150		50
109	Mercer County Library		40	10	50	23	53	75		20
741	Princeton Borough Municipal Bldg		80	20	100	30	70	100		40
504	Princeton Twp Municipal Bldg		80	20	100	30	70	100		40
1098	Plainsboro Twp Municipal Bldg		240	60	300	90	210	300		100

5. TRAFFIC ASSIGNMENT

5.1 Capacity Restraint Algorithm

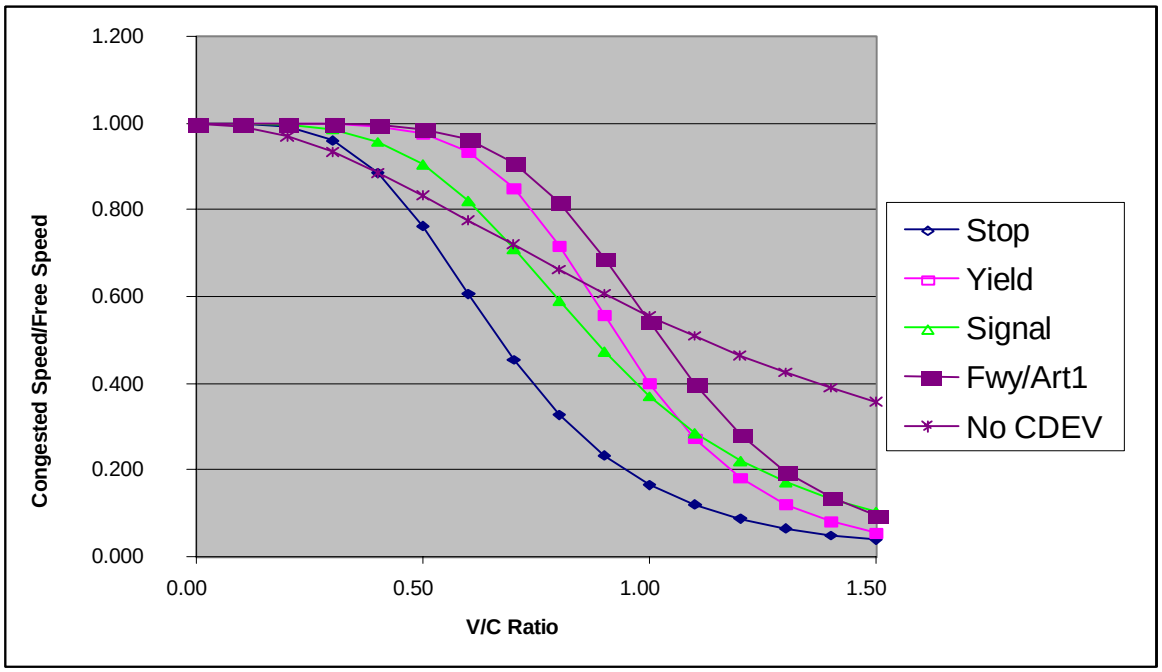
Various traffic assignment methods have been used in traffic models, including: equilibrium, incremental, iterative, stochastic, and combinations of these methods. For the Central Jersey traffic model, an iterative assignment process was used for both the A.M. and P.M. peak hour assignments. It was felt that in a highly congested area, with both tolled and non-tolled route options, an iterative assignment would yield the most stable and reliable results.

Each traffic assignment performs ten iterations of capacity restraint, starting with free-flow link speeds on the first iteration. Ten percent of the trips are assigned on each iteration. After each iteration, the volume assigned to each link is expanded to reflect a 100 percent assignment, and the resulting V/C ratios are computed for each link. Using the volume-delay curves (see below), the link speeds are updated for the next iteration of assignment.

Separate trip tables are used for autos and for trucks, and each is assigned to the appropriate paths. The auto and truck volumes are combined at the end of each iteration, to enable the proper capacity-restraint calculation to take place.

As mentioned above, link speeds are updated after each iteration using formulas known as "volume-delay curves", which describe the relationship between roadway operating speed and congestion level, as measured by a link's volume/capacity ratio. The original volume-delay curves, developed by the Bureau of Public Roads (now FHWA) in the 1960's, have been shown to be unsuitable for use in assigning traffic to highly congested networks. Various urban areas have had success with using variations of the original BPR formula, with different curves used for different facility types.

The volume-delay curves used for the Central Jersey traffic model are depicted in the graph below.



The volume-delay curves reduce speeds for most facilities more sharply than the BPR function as volume exceeds 90% of capacity. The exception is for local roadways with no control device. In a network model, one such link may represent 10 or 20 actual links that are not coded, but which still have capacity. Thus, it is appropriate to restrain these links less than other links. Carrying the same logic further, centroid connectors are not restrained at all.

The relationship between V/C ratio and speed is also quite different for freeways and expressways than for other roads, where stopped delay from signals (or other control devices) can be a significant component of congestion-induced speed reduction. Frequently during the assignment process, calculated constrained speeds for links with control devices can drop to extremely low values.

5.2 Adaptable Assignment

The gravity model, and all other destination choice models in current use, presumes that travelers' choice of destinations is a very rational, predictable phenomenon. As an overall theory, such models reflect some of the major influences on destination choice: destination choice is clearly influenced *in general terms* by the number of attractions available to satisfy their needs and how distant those attractions are from their home. However, there are additional factors that influence that choice, most of which cannot be practically measured or even known. Moreover, the list of factors and their relative influence changes daily. Travel behavior is composed of a somewhat predictable element and a completely random component, and a truly accurate model would have as many variables as there are people in the study area.

This reality notwithstanding, travel models are expected to replicate the actual traffic volumes that were counted for some base year on a number of roadways, to some specified degree of accuracy. Experience over many years suggests that models based on purely theoretical constructs, no matter how well crafted and sound, never achieve a level of base year assignment accuracy that public agencies deem satisfactory.

Some type of adjustment to the model is always required. The challenge is to adjust the model in ways that do not alter the basic travel relationships on which it is built. Doing so would render the model useless for forecasting. Many models suffer this fate, because of undue emphasis placed on calibration accuracy, to the exclusion of all other considerations.

In order to address this dilemma, Urbitran has developed a procedure to amend the basic O/D travel patterns just prior to assignment. This amendment consists of relatively minor modifications to the vehicle trip table on a cell-by-cell basis, such that the resulting assignment more closely matches the base year counted volumes. A proprietary procedure has been developed to accomplish this, called *adaptable assignment*. The result is a "delta" trip table, so called because it contains the *differences* between the pre-adjustment and post-adjustment trip tables. This "delta" table is added to model-estimated future-year trip table prior to assignment. Most of the entries in the delta table are small values, but their cumulative effect is to change the theoretical travel patterns to reflect the reality of the traffic counts.

Since the delta trip table can be thought of as a calibration adjustment, it is used to develop the model's forecasts as well. The delta trip table is added to the future modeled trip table, in the

same fashion as for calibration. This procedure has been used in a number of projects with positive results, and has been applied in the Central Jersey traffic model as well.

6. ASSIGNMENT VALIDATION

The following tables present statistics indicating the level of agreement between the base year peak-hour link traffic volumes assigned by the Central Jersey traffic model and the peak-hour traffic counts:

2001 A.M. PEAK HOUR VALIDATION STATISTICS

	Number of Links	Total of Traffic Counts	Total Assigned Volume	Assigned/ Counted Volume Ratio	Percent Root Mean Square Error	FHWA %RMSE Standard	Average Count
Facility Type:							
Freeway	8	36,541	37,079	1.01	3.6	--	4,567.6
Arterial 1	170	296,080	302,770	1.02	17.1	--	1,741.7
Arterial 2	209	142,694	155,641	1.09	34.7	--	682.8
Collector 1	120	54,751	59,371	1.08	32.8	--	456.3
Collector 2	231	65,195	67,675	1.04	55.5	--	282.2
Counted Volume Range:							
4000-9999	12	62,217	61,645	0.99	4.5	13-15	5,184.8
1000-3999	152	290,507	289,156	1.00	17.3	15-27	1,911.2
500 - 999	241	165,681	176,787	1.07	31.1	27-36	687.5
250 - 499	189	71,724	80,901	1.13	50.4	36-48	379.5

2001 P.M. PEAK HOUR VALIDATION STATISTICS

	Number of Links	Total of Traffic Counts	Total Assigned Volume	Assigned/ Counted Volume Ratio	Percent Root Mean Square Error	FHWA %RMSE Standard	Average Count
Facility Type:							
Freeway	8	39,045	37,323	0.96	7.8	--	4,880.6
Arterial 1	171	292,108	287,121	0.98	19.5	--	1,708.2
Arterial 2	212	148,242	155,959	1.05	40.2	--	699.3
Collector 1	122	55,881	58,345	1.04	24.8	--	458.0
Collector 2	231	66,408	74,038	1.11	91.3	--	287.5
Counted Volume Range:							
4000-9999	8	47,919	45,147	0.94	6.6	13-15	5,989.9
1000-3999	155	300,517	287,624	0.96	20.0	15-27	1,938.8
500 - 999	248	174,949	180,459	1.03	37.8	27-36	705.4
250 - 499	202	76,401	85,815	1.12	51.1	36-48	378.2

These tables show that, in total, the assigned traffic volumes are very close to the counts. The percent errors for individual links tend to increase as one moves from higher-type facilities to lower-type facilities and from higher-volume roadways to lower-volume roadways. The tables show the FHWA guidelines for Percent Root Mean Square Error for links within various

volume ranges (assuming that one-way peak-hour volume is about 10 percent of one-way 24-hour volume, or 5 percent of two-way 24-hour volume). As shown, the Central Jersey traffic model produces statistics that are in general agreement (and in some cases better) than the FHWA standards.

The overall coefficient of variation ("r-squared") between the assigned volumes and the counts is 0.966 for the A.M. peak hour and 0.946 for the P.M. peak hour. These are very high rates of correlation.

PART B: Future-Year Assumptions

1. FUTURE LAND USE

The study area has experienced rapid population and employment growth over the last two decades and there is good reason to anticipate that this growth will continue. One of the significant factors that will continue to propel this trend is the availability of vacant land with appropriate zoning and with planning approvals already in place. Most large (typically more than 20 acres) non-residential properties in the study area have some form of General Development Plan (GDP) approval, site plan approval, or are actively involved in obtaining the necessary approvals.

The growth potential for the study area was estimated primarily based on a property-by-property inventory of potential building yield. For Princeton Township, Princeton Borough, and West Windsor, such an inventory has been maintained on a continuing basis in recent years. Similar data were available from Plainsboro Township in the form of the Township's Master Plan and the Princeton Forrestal Center Master Plan (described in Part A). In South Brunswick, the basis for growth estimates was population and employment forecasts prepared by North Jersey Transportation Planning Authority and tabulated by the Penns Neck EIS study.

Future development is categorized into two growth types:

"Committed development" is that for which the developer is known, the property has an approval in place, or is actively pursuing approvals and they can be assumed to be forthcoming. As a starting point, for these properties it can be assumed that within a 20- to 30-year time frame, the project will be built.

"Uncommitted development" does not have approvals in place and often does not have a known, active developer. The municipality may be resisting development of the property, or plans for the property have not been determined. Development within the 20- to 30-year time frame is less defined but still probable.

No specific time frame is attached to the Committed and Uncommitted totals; instead they reflect known development conditions that could potentially occur. Committed development is likely to occur within an approximate 20-year time frame, because the developments that comprise it have approvals in place and are actively being marketed. The Uncommitted development could take longer – or it could happen more quickly because of development and marketing conditions. In either event, the combination of existing, Committed, and Uncommitted development represents close to a full-build land use condition. Underdeveloped properties and small vacant properties are likely not reflected in the databases and therefore are missing from what would otherwise be a full-build condition. In South Brunswick, specific property details were not defined, so all development was classified as "Uncommitted".

The following growth totals have been developed for the study area from the land use inventories.

Table 1

ANTICIPATED MUNICIPAL GROWTH POTENTIALS

	2001	Committed Growth	Uncommitted Growth	Total	Change
HOUSEHOLDS:					
Plainsboro Township	9,438	455	--	9,893	+5%
Princeton Borough	3,465	37	--	3,502	+1%
Princeton Township	6,018	83	5	6,106	+1%
South Brunswick Township	13,981		4,108	18,089	+29%
West Windsor Township	7,443	2,838	707	10,988	+48%
STUDY AREA TOTAL	40,345	3,413	4,820	48,578	+20%
POPULATION:					
Plainsboro Township	21,865	1,205	--	23,070	+6%
Princeton Borough	15,054	83	--	15,137	+1%
Princeton Township	16,947	186	10	17,143	+1%
South Brunswick Township	38,214		12,972	51,186	+34%
West Windsor Township	22,911	5,949	1,483	30,343	+32%
STUDY AREA TOTAL	114,991	7,423	14,465	136,879	+19%
EMPLOYMENT:					
Plainsboro Township	27,266	22,174	650	50,090	+84%
Princeton Borough	5,561	205	--	5,766	+4%
Princeton Township	5,854	1,180	649	7,683	+31%
South Brunswick Township	31,121		19,927	51,048	+64%
West Windsor Township	18,991	22,646	20,242	61,879	+226%
STUDY AREA TOTAL	88,793	46,205	41,648	176,468	+99%

Population and household growth in the five-town region may be relatively modest. Altogether, households could potentially increase by as much as 20 percent, with the highest growth concentrated in South Brunswick and West Windsor Townships. Potential population growth would be equivalent, about 19 percent.

By contrast, non-residential development has the potential to double the employment of the five-town region. The overall number of jobs could increase by about 99 percent, from 88,793 in 2001, to potentially 176,468 with both Committed and Uncommitted growth. About one half of the area's job growth could occur in West Windsor Township. There is sufficient zoned land available in the Township that employment is likely to more than triple there.

Growth Analysis

The above discussion describes the potential growth that could occur in the five-town local study area without reference to timing. For a transportation study for which the purpose is to evaluate transportation needs at a certain time, however, it is important to evaluate the rate at which this potential growth will actually occur. In the four-town portion of the study area that was analyzed by the Penns Neck EIS project (Plainsboro, Princeton Borough, Princeton Township, and West Windsor), projections by the regional planning agencies (North Jersey Transportation Planning Authority (NJTPA) and Delaware Valley Regional Planning Commission (DVRPC)) were replaced by the above land use analysis and a growth absorption analysis described below. In South Brunswick, the growth projections prepared by NJTPA were relied upon for population, household, and employment growth.

The following discussion relates to the four-town study area that was analyzed for the Penns Neck EIS:

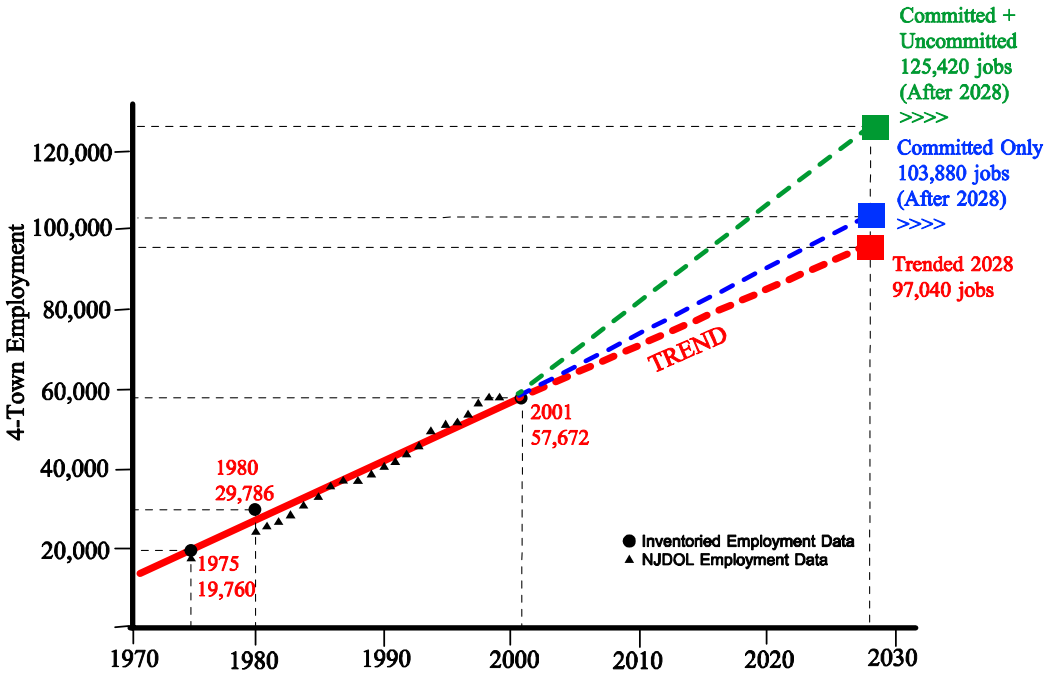
The pace of job growth in the US Route 1 corridor has historically been fast due to the influence of Princeton University and the "Princeton Zip Code" phenomenon. In 1975 there were 19,760 jobs in the four-town area[1], and that total grew quickly to 29,786 jobs by 1980[2]. As evidenced by NJDOL employment estimates in the two decades since 1980, employment in the four-municipality study area has grown steadily and consistently. Currently (2001), there are 57,672 jobs in the four-town area, a three-fold increase in the 26 years since 1975. This trend is illustrated below in Figure 1.

By extrapolating growth on a straight-line basis to the year 2028, it can be expected that there will be about 97,000 jobs in the study area, an increase of about 39,400 jobs or 68 percent from 2001. This trended-growth in jobs is similar to what would occur if the Committed development described above were to occur by 2028. The Committed growth total of 46,200 jobs is - an indication that there is ample developable land to support continuation of the historic trend.

By contrast, adding in the Uncommitted development would produce an additional 21,500 jobs in the area. Figure 1 shows that the combination of Committed and Uncommitted growth is substantially higher than would be achieved by the simple trend line.

[1] I-95 / I-695 Environmental Studies, Economic Impacts Technical Support Document, New Jersey Department of Transportation, 1978.

Figure 1
STUDY AREA JOB GROWTH
(Plainsboro, Princeton Borough, Princeton Township, West Windsor)



The experience in the US Route 1 corridor has been that development is affected by economic and market conditions, and that there have been lengthy periods of sluggishness offset by other periods of fast growth. It is reasonable to anticipate that on an overall basis, the next 27 years (2001 to 2028), will be similar to the past 26 years (1975 to 2001). Therefore it is suggested that the trended-growth level is a reasonable estimate of future employment growth in the four-town study area.

Because the composite of Committed and Uncommitted growth results in a spread of development across the entire four-town area, it is also suggested that the sum of Committed and Uncommitted growth be allocated to the trend total. This will result in some level of development on major sites that have been designated as Uncommitted (i.e. Wyeth / Cyanamid) and that would not show any development activity if Uncommitted growth were ignored. The following table shows the resulting job growth that will occur if Committed and Uncommitted development are allocated together to the trended total. Also indicated are employment levels for the intermediate years (2008 and 2018) assuming a straight-line interpolation

[2] Route 1 Corridor Transportation Study, Technical Report, New Jersey Department of Transportation, 1986.

Table 2
STUDY AREA JOB GROWTH
(Plainsboro, Princeton Borough, Princeton Township, West Windsor)

	2008	2018	2028
Portion of Development	15%	37%	58%
Committed Growth	6,962	16,907	26,852
Uncommitted Growth	3,246	7,882	12,518
Total Growth	10,207	24,789	39,370
Total Employment	67,879	82,461	97,042
Change from 2001	+18%	+43%	+68%

This allocation process estimates that about 58 percent of potential Committed and Uncommitted growth is likely to occur by 2028. For example, of the 7.6 million square feet of office remaining to be developed at Princeton Forestall Center, about 4.4 million would be complete by 2028 according to this formula. At Sarnoff, about 1.3 million of the 2.2 million total square feet would be complete by 2028. And at Wyeth (Cyanamid) about 2.6 million of the 4.4 million square foot total would be complete by 2028. Overall, it is estimated that employment will increase by about 68% from 2001 to 2028 in the four-town study area. The remaining 28,400 jobs identified by the Committed and Uncommitted growth, equivalent to an additional 49% growth, will occur sometime after 2028.

With respect to population and household growth, it is clear that the rate of job growth described above (68%) will far exceed the total Committed and Uncommitted population growth of 12% (see Table 1). Consequently, the available labor force within the four-town study area will be insufficient to supply even a part of the new job demand. Therefore, it is suggested that the pressures of high job growth and limited labor force will pressure the housing market within the study area. As a result, it is estimated that all the Committed and Uncommitted population and household development will occur by 2028.

The resulting estimated population and job growth for the four-town study area is summarized in Table 3. Over the 27-year forecast period, West Windsor will surpass Plainsboro as having the highest employment of the four towns. West Windsor employment is expected to increase from 18,991 jobs in 2001 to about 43,900 jobs in 2028, an increase of 131 percent. During the same period, Plainsboro's employment will increase from 27,266 to about 40,530 jobs, or 49 percent.

West Windsor will also gain the highest population growth, increasing from 22,911 to about 30,340 persons from 2001 to 2028. This is an increase of approximately 32 percent. Plainsboro, Princeton Township, and Princeton Borough will experience considerably less population growth; total population in those three towns is expected to increase from 53,866 to about 55,350 persons, an increase of approximately 3 percent.

Table 3
STUDY AREA POPULATION AND EMPLOYMENT GROWTH
(Plainsboro, Princeton Borough, Princeton Township, West Windsor)

	2001	2028
Households	26,364	30,489
Change from 2001		+16%
Population	76,777	85,693
Change from 2001		+12%
Employment	57,672	97,042
Change from 2001		+68%

In Table 4, the same household, population, and job growth is shown broken down by town. As was discussed above, South Brunswick totals were derived from NJTPA projections in a separate method.

Table 4
MUNICIPAL POPULATION AND EMPLOYMENT GROWTH

	2001	2028
HOUSEHOLDS:		
Plainsboro Township	9,438	9,893
Princeton Borough	3,465	3,502
Princeton Township	6,018	6,106
South Brunswick Township	13,981	18,089
West Windsor Township	7,443	10,988
STUDY AREA TOTAL	40,345	48,578
POPULATION:		
Plainsboro Township	21,865	23,070
Princeton Borough	15,054	15,137
Princeton Township	16,947	17,143
South Brunswick Township	38,214	51,186
West Windsor Township	22,911	30,343
STUDY AREA TOTAL	114,991	136,879
EMPLOYMENT:		
Plainsboro Township	27,266	40,530
Princeton Borough	5,561	5,680
Princeton Township	5,854	6,917
South Brunswick Township	31,121	51,048
West Windsor Township	18,991	43,915
STUDY AREA TOTAL	88,793	148,090

2. FUTURE (2028) NO-ACTION HIGHWAY NETWORK

Following the same procedure used for the Penns Neck EIS, only planned highway improvements with approved funding were included in the "No-Action" network. The funded improvements in the modeled area are as follows (note that some projects have already been implemented since 2001):

- Scudders Mill Road/Dey Road Intersection Improvements (Plainsboro) – Widen intersection approaches to provide additional turning lanes, as follows: Dedicated left, thru, and right turning lanes on Dey Road SB approach; Double left, double thru, and one right turning lane on Scudders Mill Road EB approach; Dedicated left, and thru-right lanes on Old Plainsboro Road approach; one lane thru and no auxiliary lanes on Dey Road NB approach.
- US Route 1/US-130/NJ-171 (Georges Road) Interchange (North Brunswick) – Added to network as per NJDOT plans.
- US-130/CR-539/685 Intersection (Cranbury) – Added signalization to replace existing traffic circle.
- US-130/Adams Lane Intersection (North Brunswick) – Added jughandles for turning movements from US-130.
- US-130/Renaissance Boulevard Intersection (North Brunswick) – Added Renaissance Boulevard west of US-130. Right-in, right-out access only from/to southbound US-130. No signal.
- CR-522 from Kingston Lane to US-130 (South Brunswick) – Added new CR-522 alignment as a four-lane, Type 2 Arterial. Signal coded at CR-522/Georges Road intersection. Tie into existing signal at US-130 and Fresh Ponds Road.
- CR-612 (Forsgate Drive)/Gatzmer Avenue/Perrineville Road Intersection (Jamesburg) – Added one left turn lane in each direction on CR-612.
- CR-610/Fresh Ponds Road Intersection (South Brunswick) – Added one left turn lane to each intersection approach.
- Penns Neck Bypass (West Windsor) – Added as a two-lane, Type 2 Arterial starting at CR-571 just west of the Northeast Corridor rail line and ending at CR-571 (Washington Road) just east of the Delaware and Raritan Canal, with an grade-separated interchange with US Route 1 at the location of the current (signalized) intersection with Harrison Street. The US Route 1/Washington Road intersection converted to right-in, right-out access from/to US Route 1 in both directions. US Route 1 (Signalized) /Fisher Road intersection removed. Added right-in/right-out access for Sarnoff property from/to northbound US Route 1.

PART C: Model Outputs

1.0 Highway Capacity Software 2000 Analysis of Intersection Levels of Service

Using HCS 2000 software, level of service and capacity analyses were conducted at several key locations, for both AM and PM peak periods, for each of the following four scenarios:

- 2001 Existing
- 2028 No build
- 2028 Build Route 92
- 2028 Widen Route 1 to 6 Lanes and Remove Signals

Traffic volumes for the 2001 Existing scenario were taken from turning movement counts gathered for model development. The corresponding model runs generated volumes for the future scenarios. Urbitran Associates inventoried signal timings and lane configurations for the intersections studied. The report from each HCS analysis follows.

1.1 2001 Existing – AM Peak Hour HCS Reports

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/16/02
Period: AM
Project ID: Rt 92 Model
E/W St: Cozzens Rd.

Inter.: Cozzens Ln. & Rt1
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Existing

N/S St: RT 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	0	3	0	0	3	0
LGConfig	L	TR		L	TR			T			TR	
Volume	275	414	39	523	330	408		2724			2838	343
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
RTOR Vol			0			0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left				
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
WB Left	A				SB	Left				
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	11.0	35.0					87.0			
Yellow	3.0	4.0					6.0			
All Red	0.0	2.0					2.0			

Cycle Length: 150.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	131	1787	2.34	0.07	693.8	F		
TR	433	1857	1.16	0.23	153.0	F	357.5	F
Westbound								
L	131	1787	4.44	0.07	1632	F		
TR	396	1699	2.07	0.23	548.0	F	997.9	F
Northbound								
T	2786	4803	1.09	0.58	77.3	E	77.3	E
Southbound								
TR	2855	4922	1.24	0.58	141.7	F	141.7	F

Intersection Delay = 276.2 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/17/02
Period: AM
Project ID: Rt 92 Model
E/W St: Sandhill Rd.

Inter.: Sandhill Rd. & Rt1
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Existing

N/S St: RT 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	0	2	0	0	2	0
LGConfig	L	T	R	L	T	R		T			T	
Volume	352	234	235	373	125	92		1338			1887	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru		P			Thru	P		
Right	P	P			Right			
Peds					Peds			
WB Left	A				SB Left			
Thru		P			Thru	P		
Right	P	P			Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	9.0	34.0			95.0			
Yellow	3.0	3.0			6.0			
All Red	3.0	2.0			2.0			

Cycle Length: 157.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	102	1787	3.83	0.06	1372	F		
T	407	1881	0.64	0.22	63.4	E	620.3	F
R	499	1599	0.52	0.31	48.3	D		
Westbound								
L	102	1787	4.06	0.06	1473	F		
T	403	1863	0.34	0.22	54.4	D	949.2	F
R	494	1583	0.21	0.31	40.7	D		
Northbound								
T	1933	3195	0.77	0.61	25.9	C	25.9	C
Southbound								
T	2100	3471	1.00	0.61	50.2	D	50.2	D

Intersection Delay = 258.5 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/17/02
Period: AM
Project ID: Rt 92 Model
E/W St: NEW RD.

Inter.: NEW RD. & RT 1
Area Type: All other areas
Jurisd: MIDDLESEX COUNTY
Year : 2001 Existing

N/S St: RT 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	0	2	0	0	2	0
LGConfig	L	T	R	L	T	R		T			T	
Volume	129	252	177	12	266	84		1175			2370	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
WB Left	A				SB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	7.0	23.0					90.0			
Yellow	3.0	4.0					6.0			
All Red	3.0	2.0					2.0			

Cycle Length: 140.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	89	1787	1.61	0.05	385.4	F		
T	309	1881	0.91	0.16	89.4	F	144.5	F
R	411	1599	0.48	0.26	48.0	D		
Westbound								
L	89	1787	0.15	0.05	64.4	E		
T	309	1881	0.96	0.16	99.6	F	85.2	F
R	407	1583	0.23	0.26	42.3	D		
Northbound								
T	2036	3167	0.64	0.64	16.8	B	16.8	B
Southbound								
T	2231	3471	1.18	0.64	111.1	F	111.1	F

Intersection Delay = 88.3 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/17/02
Period: AM
Project ID: Rt 92 Model
E/W St: RT 522 Promenade Rd.

Inter.: RT 522 Promenade Blvd. & Rt1
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Existing

N/S St: RT 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	0	2	0	0	2	0
LGConfig	L	T	R	L	T	R		T			T	
Volume	318	256	60	778	438	97		972			2181	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
WB Left	A				SB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	5.0	28.0					94.0			
Yellow	3.0	3.0					6.0			
All Red	2.0	2.0					2.0			

Cycle Length: 145.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	58	1671	6.09	0.03	2395	F		
T	363	1881	0.78	0.19	71.0	E	1233	F
R	415	1583	0.16	0.26	42.1	D		
Westbound								
L	62	1787	9.97	0.03	4137	F		
T	363	1881	1.34	0.19	229.7	F	2204	F
R	415	1583	0.26	0.26	43.9	D		
Northbound								
T	2035	3139	0.53	0.65	14.7	B	14.7	B
Southbound								
T	2250	3471	1.08	0.65	69.0	E	69.0	E

Intersection Delay = 687.3 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/17/02
Period: AM
Project ID: Rt 92 Model
E/W St: Ridge Rd.

Inter.: Rt1 & Ridge Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Existing

N/S St: Rt 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	1	0	2	0	0	2	0
LGConfig	L	TR		L	T	R		T			T	
Volume	376	399	53	187	390	95		1405			2519	
Lane Width	12.0	12.0		12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A	P			NB	Left				
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
WB Left	A	P			SB	Left				
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	6.0	21.0					55.0			
Yellow	3.0	4.0					6.0			
All Red	2.0	2.0					1.0			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	179	1752	2.34	0.32	649.6	F		
TR	388	1848	1.29	0.21	189.7	F	398.7	F
Westbound								
L	181	1770	1.15	0.32	144.4	F		
T	395	1881	1.10	0.21	113.3	F	111.0	F
R	326	1553	0.33	0.21	36.1	D		
Northbound								
T	1789	3252	0.87	0.55	25.7	C	25.7	C
Southbound								
T	1928	3505	1.45	0.55	228.8	F	228.8	F

Intersection Delay = 187.5 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/18/02
Period: AM
Project ID: Rt 92 Model
E/W St: Rt 522 (Promenade)

Inter.: Rt 27 & RT522 Promeade
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Existing

N/S St: Rt 27

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	1	1	1	1	1	1	1	1	1	1
LGConfig		LT	R	L	T	R	L	T	R	L	T	R
Volume	25	25	25	208	25	80	25	237	308	154	480	25
Lane Width		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	A			
Thru	P					Thru		P		
Right	P					Right	P	P		
Peds						Peds				
WB Left	P				SB	Left	A			
Thru	P					Thru		P		
Right	P					Right	P	P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	23.0						6.0	50.0		
Yellow	4.0						2.0	2.0		
All Red	1.0						1.0	1.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LT	243	952	0.23	0.26	28.7	C	28.1	C
R	236	923	0.12	0.26	26.7	C		
Westbound								
L	340	1329	0.68	0.26	40.6	D		
T	278	1086	0.10	0.26	26.3	C	36.2	D
R	409	1599	0.22	0.26	27.6	C		
Northbound								
L	69	1031	0.41	0.07	44.2	D		
T	1025	1845	0.26	0.56	11.0	B	10.8	B
R	962	1468	0.36	0.66	8.0	A		
Southbound								
L	119	1787	1.44	0.07	279.8	F		
T	1045	1881	0.51	0.56	14.2	B	75.9	E
R	605	923	0.05	0.66	5.7	A		

Intersection Delay = 43.0 (sec/veh) Intersection LOS = D

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/18/02
Period: AM
Project ID: Rt 92 Model
E/W St: Raymond

Inter.: RT27 & Raymond
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Existing

N/S St: RT 27

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	1	0	0	1	0	0	1	0
LGConfig					TR			TR			LT	
Volume				149	10		397	30		55	627	
Lane Width				12.0			12.0				12.0	
RTOR Vol					0			0				

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left					NB	Left				
Thru						Thru	P			
Right						Right	P			
Peds						Peds				
WB Left					SB	Left	P			
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green		15.0					39.0			
Yellow		2.0					2.0			
All Red		1.0					1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
TR	442	1767	0.40	0.25	21.4	C	21.4	C
Northbound								
TR	1128	1736	0.42	0.65	6.2	A	6.2	A
Southbound								
LT	1139	1753	0.67	0.65	9.6	A	9.6	A

Intersection Delay = 9.9 (sec/veh) Intersection LOS = A

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran Garmen
Date: 12/17/02
Period: AM
Project ID: Rt 92 Model
E/W St: Rt 27

Inter.: Rt 27 / Laurel Ave
Area Type: All other areas
Jurisd: Middlesex County, NJ
Year : 2001 Existing

N/S St: Laurel Ave

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	0	1	0	0	1	0
LGConfig	L	TR		L	TR			LTR			LTR	
Volume	10	536	105	150	657	10	236	206	23	10	196	74
Lane Width	12.0	11.0		12.0	9.0			11.0			10.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru	P					Thru	P			
Right	P					Right	P			
Peds						Peds				
WB Left	P				SB	Left	P			
Thru	P					Thru	P			
Right	P					Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	40.0						30.0			
Yellow	4.0						4.0			
All Red	1.0						1.0			

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	94	188	0.23	0.50	17.1	B		
TR	844	1688	1.49	0.50	246.0	F	242.0	F
Westbound								
L	94	188	2.96	0.50	928.9	F		
TR	829	1658	1.51	0.50	256.9	F	378.9	F
Northbound								
LTR	330	880	2.22	0.38	584.3	F	584.3	F
Southbound								
LTR	619	1650	0.76	0.38	30.3	C	30.3	C

Intersection Delay = 332.0 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/18/02
Period: AM
Project ID: Rt 92 Model
E/W St: Rt 522

Inter.: Rt 522 & Kingston Ln.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Existing

N/S St: Kingston Ln.

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	0	0	1	1	0	0	1	0
LGConfig		T	R				L	T			T	
Volume		92	1252				677	505			67	
Lane Width		12.0	12.0				12.0	12.0			12.0	
RTOR Vol			0									

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left					NB	Left	P			
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru	P			
Right						Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green		36.0					44.0			
Yellow		4.0					4.0			
All Red		1.0					1.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1430	3574	0.07	0.40	16.8	B	542.0	F
R	627	1568	2.22	0.40	580.5	F		
Westbound								
Northbound								
L	652	1333	1.15	0.49	108.7	F		
T	911	1863	0.62	0.49	19.9	B	70.8	E
Southbound								
T	920	1881	0.08	0.49	12.4	B	12.4	B

Intersection Delay = 313.6 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/16/02
Period: AM
Project ID: Rt 92 Model
E/W St: George Rd.

Inter.: George Rd. & Kingston Ln.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Exsting

N/S St: Kingston Ln.

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	0	0	0	1	1	0	0	1	1
LGConfig	L		R				L	T			T	R
Volume	222		82				258	598			93	52
Lane Width	12.0		12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru						Thru	P			
Right	P					Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru	P			
Right						Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	10.0						44.0			
Yellow	3.0						4.0			
All Red	2.0						2.0			

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	275	1787	0.90	0.15	60.4	E		
							52.0	D
R	239	1553	0.38	0.15	29.3	C		
Westbound								
Northbound								
L	871	1286	0.33	0.68	5.4	A		
T	1273	1881	0.52	0.68	6.8	A	6.4	A
Southbound								
T	1273	1881	0.08	0.68	3.7	A	3.7	A
R	1082	1599	0.05	0.68	3.6	A		

Intersection Delay = 16.7 (sec/veh) Intersection LOS = B

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/18/02
Period: AM
Project ID: Rt 92 Model
E/W St: Friendship Rd.

Inter.: US 130 & Friendship Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Existing

N/S St: US 130

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	1	1	0	1	2	0	0	2	0
LGConfig	L		R	L	T		L	T			TR	
Volume	225		92	588	128		73	1090			1305	42
Lane Width	12.0		12.0	12.0	12.0		12.0	12.0			12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru						Thru	P			
Right	P					Right				
Peds						Peds				
WB Left	P				SB	Left				
Thru	P					Thru	P			
Right	P					Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	13.0						74.0			
Yellow	4.0						5.0			
All Red	2.0						2.0			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	143	1103	1.75	0.13	407.4	F		
							303.5	F
R	206	1583	0.50	0.13	48.7	D		
Westbound								
L	223	1719	2.93	0.13	923.3	F		
T	242	1863	0.59	0.13	51.0	D	767.5	F
Northbound								
L	199	269	0.41	0.74	10.9	B		
T	2283	3085	0.53	0.74	6.5	A	6.7	A
Southbound								
TR	2583	3490	0.58	0.74	6.9	A	6.9	A

Intersection Delay = 187.0 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/18/02
Period: AM
Project ID: Rt 92 Model
E/W St: Rt32 Forsgate Dr

Inter.: RT 32 Forsgate Dr & CR 535
Area Type: All other areas
Jurisd: Middlesex Co, NJ
Year : 2001 Existing

N/S St: CR 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	3	0	0	3	0	1	1	1	1	2	0
LGConfig	L	TR			TR		L	T	R	L	TR	
Volume	332	732	99		1795	244	10	371	225	144	1124	80
Lane Width	12.0	12.0			12.0		12.0	12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left	A	P		
Thru		P				Thru		P		
Right		P				Right		P		
Peds						Peds				
WB Left					SB	Left	A	P		
Thru		P				Thru		P		
Right		P				Right		P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	8.0	65.0					10.0	28.0		
Yellow	3.0	6.0					4.0	5.0		
All Red	2.0	2.0					0.0	2.0		

Cycle Length: 135.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	127	1719	2.91	0.07	941.1	F		
TR	2113	4075	0.44	0.52	20.9	C	283.7	F
Westbound								
TR	2513	4846	0.90	0.52	35.2	D	35.2	D
Northbound								
L	180	1556	0.06	0.32	34.5	C		
T	421	1776	0.98	0.24	90.0	F	93.8	F
R	255	1077	0.98	0.24	102.8	F		
Southbound								
L	166	1388	0.96	0.32	98.4	F		
TR	808	3408	1.66	0.24	352.2	F	325.1	F

Intersection Delay = 173.9 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/16/02
Period: AM
Project ID: Rt 92 Model
E/W St: Dey Rd

Inter.: Dey Rd & CR 535
Area Type: All other areas
Jurisd: Middlesex County, NJ
Year : 2001 Exsiting

N/S St: CR 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	0	0	0	1	0	0	1	0
LGConfig		LR						LT			TR	
Volume	143		153				10	830			723	328
Lane Width		12.0						14.0			14.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left	A	P		
Thru						Thru	A	P		
Right	A					Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru		P		
Right						Right		P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	20.0						10.0	74.0		
Yellow	4.5						3.0	5.0		
All Red	2.0						0.0	1.5		

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LR	278	1668	1.18	0.17	163.1	F	163.1	F
Westbound								
Northbound								
LT	1326	1779	0.70	0.76	9.2	A	9.2	A
Southbound								
TR	1193	1836	0.98	0.65	41.5	D	41.5	D

Intersection Delay = 45.6 (sec/veh) Intersection LOS = D

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/18/02
Period: AM
Project ID: Rt 92 Model
E/W St: Dey Rd.

Inter.: US 130 & Dey Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Existing

N/S St: US 130

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	1	2	0	1	2	0
LGConfig	L	T	R	L	T	R	L	TR		L	TR	
Volume	184	176	321	103	34	191	471	1610	10	120	1197	90
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left	A			
Thru		P				Thru		P		
Right		P				Right		P		
Peds						Peds				
WB Left	A				SB	Left	A			
Thru		P				Thru		P		
Right		P				Right		P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	8.0	7.0					7.0	40.0		
Yellow	3.0	4.0					3.0	5.0		
All Red	0.0	1.0					0.0	1.0		

Cycle Length: 79.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	177	1752	1.15	0.10	150.1	F		
T	167	1881	1.17	0.09	160.0	F	429.8	F
R	142	1599	2.51	0.09	737.8	F		
Westbound								
L	181	1787	0.63	0.10	40.9	D		
T	165	1863	0.23	0.09	36.7	D	197.3	F
R	138	1553	1.54	0.09	310.2	F		
Northbound								
L	158	1787	3.31	0.09	1091	F		
TR	1523	3008	1.18	0.51	108.4	F	329.8	F
Southbound								
L	151	1703	0.88	0.09	76.3	E		
TR	1740	3437	0.82	0.51	21.0	C	25.7	C

Intersection Delay = 240.4 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/18/02
Period: AM
Project ID: Rt 92 Model
E/W St: Plainsboro Rd.

Inter.: Rt 535 & Plainsboro Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Existing

N/S St: Rt 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	0	0	0	1	1	0	0	1	1
LGConfig	L		R				L	T			TR	R
Volume	215		10				10	139			284	509
Lane Width	12.0		12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru						Thru	P			
Right	P					Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru	P			
Right						Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	26.0						26.0			
Yellow	4.0						4.0			
All Red	2.0						2.0			

Cycle Length: 64.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	698	1719	0.34	0.41	14.4	B		
							14.3	B
R	650	1599	0.02	0.41	11.4	B		
Westbound								
Northbound								
L	358	881	0.03	0.41	11.6	B		
T	715	1759	0.22	0.41	13.1	B	13.0	B
Southbound								
TR	750	1845	0.42	0.41	15.3	B	27.6	C
R	637	1568	0.89	0.41	34.5	C		

Intersection Delay = 23.2 (sec/veh) Intersection LOS = C

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/18/02
Period: AM
Project ID: Rt 92 Model
E/W St: Scudder's Mill Rd.

Inter.: Scudder's Mill Rd.& Schalk's
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Existing

N/S St: Schalk's Crossing

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	3	0	2	2	1	2	2	1	2	2	0
LGConfig	L	TR		L	T	R	L	T	R	L	TR	
Volume	85	331	29	10	1112	559	398	198	10	154	110	84
Lane Width	12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left	P			
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
WB Left	A				SB	Left		P		
Thru		P				Thru		P		
Right		P				Right		P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	6.0	33.0					10.0	10.0		
Yellow	4.0	4.0					4.0	4.0		
All Red	0.0	2.0					1.5	1.5		

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	130	1736	0.72	0.08	54.1	D		
TR	2069	5016	0.19	0.41	15.2	B	22.6	C
Westbound								
L	260	3467	0.04	0.08	34.4	C		
T	1474	3574	0.84	0.41	27.0	C	33.9	C
R	653	1583	0.95	0.41	47.8	D		
Northbound								
L	433	3467	1.02	0.13	83.6	F		
T	447	3574	0.49	0.13	36.5	D	67.4	E
R	200	1599	0.05	0.13	31.4	C		
Southbound								
L	425	3400	0.40	0.13	35.1	D		
TR	414	3314	0.52	0.13	37.4	D	36.3	D

Intersection Delay = 39.1 (sec/veh) Intersection LOS = D

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/18/02
Period: AM
Project ID: Rt 92 Model
E/W St: Scudder's Mill Rd.

Inter.: Scudder's Mill Rd.& Dey Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Existing

N/S St: Dey Rd.

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	0	1	0	0	1	1
LGConfig	L	TR		L	TR			LTR			LT	R
Volume	51	398	39	10	743	30	499	79	10	10	213	435
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	12.0
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A	P			NB	Left	P			
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
WB Left	A	P			SB	Left	P			
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	15.0	31.0					20.0			
Yellow	3.0	5.0					4.0			
All Red	0.0	1.0					1.0			

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	453	1719	0.13	0.61	8.2	A		
TR	1347	3477	0.36	0.39	18.2	B	17.1	B
Westbound								
L	625	1787	0.02	0.61	6.5	A		
TR	1377	3554	0.62	0.39	21.9	C	21.7	C
Northbound								
LTR	163	653	4.01	0.25	1397	F	1397	F
Southbound								
LT	463	1850	0.54	0.25	30.4	C	105.9	F
R	400	1599	1.21	0.25	144.7	F		

Intersection Delay = 364.1 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

1.2 2001 Existing – PM Peak Hour HCS Reports

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/16/02
Period: PM
Project ID: Rt 92 Model
E/W St: Cozzens Rd.

Inter.: Cozzens Ln. & Rt1
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Existing

N/S St: RT 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	0	3	0	0	3	0
LGConfig	L	TR		L	TR			T			TR	
Volume	98	615	17	134	156	526		2180			3764	854
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
RTOR Vol			0			0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left				
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
WB Left	A				SB	Left				
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	11.0	35.0					87.0			
Yellow	3.0	4.0					6.0			
All Red	0.0	2.0					2.0			

Cycle Length: 150.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	128	1752	0.85	0.07	107.8	F		
TR	433	1855	1.62	0.23	347.5	F	315.3	F
Westbound								
L	131	1787	1.14	0.07	189.8	F		
TR	368	1579	2.06	0.23	542.5	F	484.5	F
Northbound								
T	2865	4940	0.85	0.58	29.2	C	29.2	C
Southbound								
TR	2873	4953	1.79	0.58	386.6	F	386.6	F

Intersection Delay = 296.6 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/17/02
Period: PM
Project ID: Rt 92 Model
E/W St: Sandhill Rd.

Inter.: Sandhill Rd. & Rt1
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Existing

N/S St: RT 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	0	2	0	0	2	0
LGConfig	L	T	R	L	T	R		T			T	
Volume	112	211	257	33	357	34		1626			923	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
WB Left	A				SB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	9.0	34.0					95.0			
Yellow	3.0	3.0					6.0			
All Red	3.0	2.0					2.0			

Cycle Length: 157.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	102	1787	1.22	0.06	232.1	F		
T	407	1881	0.57	0.22	60.8	E	89.0	F
R	499	1599	0.57	0.31	50.0	D		
Westbound								
L	102	1787	0.36	0.06	73.4	E		
T	407	1881	0.98	0.22	100.0	F	92.9	F
R	494	1583	0.08	0.31	38.4	D		
Northbound								
T	2061	3406	0.88	0.61	31.7	C	31.7	C
Southbound								
T	2004	3312	0.51	0.61	18.7	B	18.7	B

Intersection Delay = 45.0 (sec/veh) Intersection LOS = D

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/17/02
Period: PM
Project ID: Rt 92 Model
E/W St: NEW RD.

Inter.: NEW RD. & RT 1
Area Type: All other areas
Jurisd: MIDDLESEX COUNTY
Year : 2001 Existing

N/S St: RT 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	0	2	0	0	2	0
LGConfig	L	T	R	L	T	R		T			T	
Volume	32	205	180	10	369	33		1989			915	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
WB Left	A				SB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	7.0	23.0					90.0			
Yellow	3.0	4.0					6.0			
All Red	3.0	2.0					2.0			

Cycle Length: 140.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	87	1736	0.41	0.05	67.7	E		
T	306	1863	0.75	0.16	70.9	E	60.9	E
R	411	1599	0.49	0.26	48.2	D		
Westbound								
L	89	1787	0.12	0.05	64.2	E		
T	309	1881	1.33	0.16	226.3	F	207.4	F
R	407	1583	0.09	0.26	40.0	D		
Northbound								
T	2210	3438	1.00	0.64	44.1	D	44.1	D
Southbound								
T	2129	3312	0.48	0.64	13.7	B	13.7	B

Intersection Delay = 56.6 (sec/veh) Intersection LOS = E

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/17/02
Period: PM
Project ID: Rt 92 Model
E/W St: RT 522 Promenade Rd.

Inter.: RT 522 Promenade Blvd. & Rt1
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Existing

N/S St: RT 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	0	2	0	0	2	0
LGConfig	L	T	R	L	T	R		T			T	
Volume	161	458	23	346	164	142		2097			879	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
WB Left	A				SB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	5.0	28.0					94.0			
Yellow	3.0	3.0					6.0			
All Red	2.0	2.0					2.0			

Cycle Length: 145.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	62	1787	2.89	0.03	961.5	F		
T	363	1881	1.40	0.19	255.4	F	424.6	F
R	419	1599	0.06	0.26	40.4	D		
Westbound								
L	59	1703	6.51	0.03	2584	F		
T	363	1881	0.50	0.19	57.1	E	1395	F
R	415	1583	0.38	0.26	46.5	D		
Northbound								
T	2229	3438	1.05	0.65	57.7	E	57.7	E
Southbound								
T	2147	3312	0.46	0.65	13.4	B	13.4	B

Intersection Delay = 307.9 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: PM
Project ID:
E/W St: Ridge Rd.

Inter.: Rt1 & Ridge Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build PM Peak Hour

N/S St: Rt 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	1	0	2	0	0	2	0
LGConfig	L	TR		L	T	R		T			T	
Volume	335	393	31	283	422	231		2023			849	
Lane Width	12.0	12.0		12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A	P			NB	Left				
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
WB Left	A	P			SB	Left				
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	6.0	21.0					55.0			
Yellow	3.0	4.0					6.0			
All Red	2.0	2.0					1.0			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	173	1687	2.15	0.32	568.2	F		
TR	383	1822	1.23	0.21	163.8	F	342.2	F
Westbound								
L	177	1736	1.77	0.32	401.9	F		
T	395	1881	1.19	0.21	146.5	F	200.4	F
R	336	1599	0.76	0.21	52.4	D		
Northbound								
T	1909	3471	1.18	0.55	108.2	F	108.2	F
Southbound								
T	1839	3343	0.51	0.55	15.1	B	15.1	B

Intersection Delay = 148.7 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/18/02
Period: PM
Project ID: Rt 92 Model
E/W St: RT 522 Promeade

Inter.: Rt 27 & Promeade Blvd (RT522)
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Existing

N/S St: Rt 27

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	1	1	1	1	1	1	1	1	1	1
LGConfig		LT	R	L	T	R	L	T	R	L	T	R
Volume	15	15	15	71	15	256	15	422	34	117	79	15
Lane Width		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	A			
Thru	P					Thru		P		
Right	P					Right	P	P		
Peds						Peds				
WB Left	P				SB	Left	A			
Thru	P					Thru		P		
Right	P					Right	P	P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	23.0						6.0	50.0		
Yellow	4.0						2.0	2.0		
All Red	1.0						1.0	1.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LT	273	1069	0.12	0.26	26.7	C	26.4	C
R	258	1009	0.07	0.26	25.9	C		
Westbound								
L	347	1356	0.23	0.26	28.0	C		
T	304	1188	0.06	0.26	25.7	C	36.6	D
R	409	1599	0.69	0.26	39.7	D		
Northbound								
L	75	1128	0.23	0.07	41.3	D		
T	1045	1881	0.45	0.56	13.2	B	13.6	B
R	1048	1599	0.04	0.66	5.5	A		
Southbound								
L	119	1787	1.09	0.07	151.5	F		
T	1035	1863	0.09	0.56	9.5	A	87.8	F
R	661	1009	0.03	0.66	5.5	A		

Intersection Delay = 36.1 (sec/veh) Intersection LOS = D

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/18/02
Period: PM
Project ID: Rt 92 Model
E/W St: Raymond

Inter.: RT27 & Raymond
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Existing

N/S St: RT 27

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	1	0	0	1	0	0	1	0
LGConfig					TR			TR			LT	
Volume				272	10		223	238		10	168	
Lane Width				12.0			12.0				12.0	
RTOR Vol					0			0				

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left					NB	Left				
Thru						Thru	P			
Right						Right	P			
Peds						Peds				
WB Left					SB	Left	P			
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green		15.0					39.0			
Yellow		2.0					2.0			
All Red		1.0					1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
TR	447	1787	0.70	0.25	29.3	C	29.3	C
Northbound								
TR	1088	1674	0.47	0.65	6.8	A	6.8	A
Southbound								
LT	1162	1788	0.17	0.65	4.5	A	4.5	A

Intersection Delay = 13.2 (sec/veh) Intersection LOS = B

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran Garmen
Date: 12/17/02
Period: PM
Project ID: Rt 92 Model
E/W St: Rt 27

Inter.: Rt 27 / Laurel Ave
Area Type: All other areas
Jurisd: Middlesex County, NJ
Year : 2001 Existing

N/S St: Laurel Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	0	1	0	0	1	0
LGConfig	L	TR		L	TR			LTR			LTR	
Volume	10	463	69	73	392	10	186	189	117	10	283	21
Lane Width	12.0	11.0		12.0	9.0			11.0			10.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru	P					Thru	P			
Right	P					Right	P			
Peds						Peds				
WB Left	P				SB	Left	P			
Thru	P					Thru	P			
Right	P					Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	40.0						30.0			
Yellow	4.0						4.0			
All Red	1.0						1.0			

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	144	288	0.15	0.50	13.1	B		
TR	853	1706	1.23	0.50	132.7	F	130.2	F
Westbound								
L	94	188	1.44	0.50	266.5	F		
TR	805	1610	0.94	0.50	38.4	D	73.0	E
Northbound								
LTR	360	961	2.81	0.38	847.7	F	847.7	F
Southbound								
LTR	631	1682	0.85	0.38	36.5	D	36.5	D

Intersection Delay = 308.4 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/18/02
Period: PM
Project ID: Rt 92 Model
E/W St: Rt 522

Inter.: Rt 522 & Kingston Ln.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Existing

N/S St: Kingston Ln.

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	0	0	0	1	1	0	0	1	0
LGConfig		T	R				L	T			T	
Volume		948	552				214	1045			159	
Lane Width		12.0	12.0				12.0	12.0			12.0	
RTOR Vol			0									

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left					NB	Left	P			
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
WB Left	A	P			SB	Left	P			
Thru	A	P				Thru	P			
Right	A	P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	8.0	27.0					41.0			
Yellow	4.0	4.0					4.0			
All Red	0.0	1.0					1.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1072	3574	0.98	0.30	54.8	D	103.8	F
R	466	1553	1.32	0.30	188.1	F		
Westbound								
Northbound								
L	466	1023	0.51	0.46	21.3	C		
T	825	1810	1.41	0.46	215.0	F	182.1	F
Southbound								
T	857	1881	0.21	0.46	15.3	B	15.3	B

Intersection Delay = 132.8 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/16/02
Period: PM
Project ID: Rt 92 Model
E/W St: George Rd.

Inter.: George Rd. & Kingston Ln.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Existing

N/S St: Kingston Ln.

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	0	0	0	1	1	0	0	1	1
LGConfig	L		R				L	T			T	R
Volume	68		165				191	141			115	47
Lane Width	12.0		12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru						Thru	P			
Right	P					Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru	P			
Right						Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	10.0						44.0			
Yellow	3.0						4.0			
All Red	2.0						2.0			

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	275	1787	0.28	0.15	26.8	C		
							39.4	D
R	246	1599	0.74	0.15	44.6	D		
Westbound								
Northbound								
L	835	1233	0.25	0.68	4.8	A		
T	1273	1881	0.12	0.68	3.9	A	4.4	A
Southbound								
T	1273	1881	0.10	0.68	3.8	A	3.7	A
R	1072	1583	0.05	0.68	3.6	A		

Intersection Delay = 15.5 (sec/veh) Intersection LOS = B

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/18/02
Period: PM
Project ID: Rt 92 Model
E/W St: Friendship Rd.

Inter.: US 130 & Friendship Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Existing

N/S St: US 130

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	0	1	1	0	0	1	1
LGConfig		LR		L	T		L	T			T	R
Volume	131		160	521	81		10	985			1316	43
Lane Width		12.0		12.0	12.0		12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru						Thru	P			
Right	P					Right				
Peds						Peds				
WB Left	P				SB	Left				
Thru	P					Thru	P			
Right						Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	13.0						74.0			
Yellow	4.0						5.0			
All Red	2.0						2.0			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LR	147	1129	2.20	0.13	606.9	F	606.9	F
Westbound								
L	217	1671	2.67	0.13	807.2	F		
T	240	1845	0.38	0.13	44.2	D	704.6	F
Northbound								
L	223	301	0.05	0.74	3.9	A		
T	1162	1570	0.94	0.74	26.8	C	26.6	C
Southbound								
T	1339	1810	1.09	0.74	66.6	E	64.6	E
R	1171	1583	0.04	0.74	3.6	A		

Intersection Delay = 220.3 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/18/02
Period: PM
Project ID: Rt 92 Model
E/W St: RT 32 Forsgate Dr

Inter.: RT 32 Forsgate Dr & CR 535
Area Type: All other areas
Jurisd: Middlesex Co, NJ
Year : 2001 Existing

N/S St: CR 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	3	0	0	3	0	1	1	1	1	2	0
LGConfig	L	TR			TR		L	T	R	L	TR	
Volume	271	1328	32		1330	67	16	400	294	283	821	142
Lane Width	12.0	13.0			12.0		12.0	12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left	A	P		
Thru		P				Thru		P		
Right		P				Right		P		
Peds						Peds				
WB Left					SB	Left	A	P		
Thru		P				Thru		P		
Right		P				Right		P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	8.0	65.0					10.0	28.0		
Yellow	3.0	6.0					4.0	5.0		
All Red	2.0	2.0					0.0	2.0		

Cycle Length: 135.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	120	1626	2.51	0.07	765.3	F		
TR	2614	5042	0.58	0.52	23.3	C	146.5	F
Westbound								
TR	2395	4618	0.65	0.52	24.9	C	24.9	C
Northbound								
L	187	1641	0.10	0.32	34.7	C		
T	421	1776	1.05	0.24	110.5	F	98.5	F
R	348	1468	0.94	0.24	85.7	F		
Southbound								
L	194	1719	1.62	0.32	340.0	F		
TR	805	3394	1.33	0.24	208.2	F	238.1	F

Intersection Delay = 128.5 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/16/02
Period: PM
Project ID: Rt 92 Model
E/W St: Dey Rd

Inter.: Dey Rd & CR 535
Area Type: All other areas
Jurisd: Middlesex County, NJ
Year : 2001 Existing

N/S St: CR 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	0	0	0	1	0	0	1	0
LGConfig		LR						LT			TR	
Volume	189		49				10	557			706	163
Lane Width		12.0						14.0			14.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left	A	P		
Thru						Thru	A	P		
Right	A					Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru		P		
Right						Right		P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	20.0						10.0	74.0		
Yellow	4.5						3.0	5.0		
All Red	2.0						0.0	1.5		

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LR	287	1721	0.92	0.17	82.1	F	82.1	F
Westbound								
Northbound								
LT	1383	1860	0.46	0.76	5.6	A	5.6	A
Southbound								
TR	1145	1762	0.84	0.65	23.9	C	23.9	C

Intersection Delay = 25.9 (sec/veh) Intersection LOS = C

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/18/02
Period: PM
Project ID: Rt 92 Model
E/W St: Dey Rd.

Inter.: US 130 & Dey Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Existing

N/S St: US 130

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	1	2	0	1	2	0
LGConfig	L	T	R	L	T	R	L	TR		L	TR	
Volume	330	59	206	87	10	67	15	1210	28	151	1092	157
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru		P			Thru		P		
Right		P			Right		P		
Peds					Peds				
WB Left	A				SB Left	A			
Thru		P			Thru		P		
Right		P			Right		P		
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	8.0	7.0				7.0	40.0		
Yellow	3.0	4.0				3.0	5.0		
All Red	0.0	1.0				0.0	1.0		

Cycle Length: 79.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	177	1752	2.07	0.10	537.5	F		
T	165	1863	0.40	0.09	41.1	D	420.3	F
R	142	1599	1.61	0.09	341.8	F		
Westbound								
L	181	1787	0.54	0.10	36.9	D		
T	167	1881	0.07	0.09	33.8	C	42.4	D
R	131	1482	0.56	0.09	51.0	D		
Northbound								
L	157	1770	0.11	0.09	33.4	C		
TR	1536	3034	0.90	0.51	26.1	C	26.2	C
Southbound								
L	152	1719	1.11	0.09	140.0	F		
TR	1688	3334	0.82	0.51	21.1	C	34.0	C

Intersection Delay = 99.0 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/18/02
Period: PM
Project ID: Rt 92 Model
E/W St: Plainsboro Rd.

Inter.: Rt 535 & Plainsboro Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Existing

N/S St: Rt 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	0	0	0	1	1	0	0	1	0
LGConfig	L		R				L	T			TR	
Volume	209		10				10	39			150	203
Lane Width	12.0		12.0				12.0	12.0			12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru						Thru	P			
Right	P					Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru	P			
Right						Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	26.0						26.0			
Yellow	4.0						4.0			
All Red	2.0						2.0			

Cycle Length: 64.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	726	1787	0.32	0.41	14.1	B		
							14.0	B
R	650	1599	0.02	0.41	11.4	B		
Westbound								
Northbound								
L	303	747	0.04	0.41	11.7	B		
T	750	1845	0.06	0.41	11.7	B	11.7	B
Southbound								
TR	677	1667	0.58	0.41	18.4	B	18.4	B

Intersection Delay = 16.3 (sec/veh) Intersection LOS = B

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/18/02
Period: PM
Project ID: Rt 92 Model
E/W St: Scudder's Mill Rd.

Inter.: Scudder's Mill Rd.& Schalk's
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Existing

N/S St: Schalk's Crossing

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	3	0	2	2	1	2	2	1	2	2	0
LGConfig	L	TR		L	T	R	L	T	R	L	TR	
Volume	78	1177	255	36	333	193	103	86	42	217	194	32
Lane Width	12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left	P			
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
WB Left	A				SB	Left		P		
Thru		P				Thru		P		
Right		P				Right		P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	6.0	33.0					10.0	10.0		
Yellow	4.0	4.0					4.0	4.0		
All Red	0.0	2.0					1.5	1.5		

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	131	1752	0.66	0.08	48.0	D		
TR	2062	4999	0.77	0.41	23.1	C	24.4	C
Westbound								
L	260	3467	0.15	0.08	34.9	C		
T	1474	3574	0.25	0.41	15.8	B	17.5	B
R	660	1599	0.32	0.41	17.2	B		
Northbound								
L	409	3273	0.28	0.13	33.4	C		
T	438	3505	0.22	0.13	32.6	C	33.3	C
R	200	1599	0.23	0.13	34.3	C		
Southbound								
L	433	3467	0.56	0.13	38.0	D		
TR	437	3493	0.58	0.13	38.5	D	38.2	D

Intersection Delay = 26.0 (sec/veh) Intersection LOS = C

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/18/02
Period: PM
Project ID: Rt 92 Model
E/W St: Scudder's Mill Rd.

Inter.: Scudder's Mill Rd.& Dey Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2001 Existing

N/S St: Dey Rd.

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	0	1	0	0	1	1
LGConfig	L	TR		L	TR			LTR			LT	R
Volume	644	534	258	10	203	100	10	323	10	10	33	356
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	12.0
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A	P			NB	Left	P			
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
WB Left	A	P			SB	Left	P			
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	15.0	31.0					20.0			
Yellow	3.0	5.0					4.0			
All Red	0.0	1.0					1.0			

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	696	1787	1.03	0.61	64.1	E		
TR	1317	3399	0.67	0.39	23.0	C	41.4	D
Westbound								
L	464	1787	0.02	0.61	7.9	A		
TR	1317	3398	0.26	0.39	17.1	B	16.8	B
Northbound								
LTR	463	1851	0.82	0.25	43.5	D	43.5	D
Southbound								
LT	418	1671	0.11	0.25	23.7	C	67.2	E
R	400	1599	0.99	0.25	72.5	E		

Intersection Delay = 42.8 (sec/veh) Intersection LOS = D

HCS2000: Signalized Intersections Release 4.1c

1.3 2028 No Build – AM Peak Hour HCS Reports

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/11/2002
Period: AM
Project ID:
E/W St: Cozzens Rd.

Inter.: Cozzens Ln. & Rt1
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build AM Peak Hour

N/S St: RT 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	0	3	0	0	3	0
LGConfig	L	TR		L	TR			T			TR	
Volume	206	517	15	451	351	340		2445			3632	410
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
RTOR Vol			0			0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left				
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
WB Left	A				SB	Left				
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	11.0	35.0					87.0			
Yellow	3.0	4.0					6.0			
All Red	0.0	2.0					2.0			

Cycle Length: 150.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	132	1805	1.73	0.07	429.7	F		
TR	441	1892	1.34	0.23	225.2	F	282.3	F
Westbound								
L	131	1787	3.82	0.07	1358	F		
TR	403	1725	1.91	0.23	474.3	F	823.5	F
Northbound								
T	2838	4893	0.96	0.58	39.3	D	39.3	D
Southbound								
TR	2854	4921	1.57	0.58	291.5	F	291.5	F

Intersection Delay = 289.6 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/11/2002
Period: AM
Project ID:
E/W St: Sandhill Rd.

Inter.: Sandhill Rd. & Rt1
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build AM Peak Hour

N/S St: RT 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	0	2	0	0	2	0
LGConfig	L	T	R	L	T	R		T			T	
Volume	143	265	262	293	193	231		1935			2658	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
WB Left	A				SB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	9.0	34.0					95.0			
Yellow	3.0	3.0					6.0			
All Red	3.0	2.0					2.0			

Cycle Length: 157.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	103	1805	1.54	0.06	361.0	F		
T	407	1881	0.72	0.22	67.7	E	123.6	F
R	499	1599	0.58	0.31	50.3	D		
Westbound								
L	100	1736	3.26	0.06	1116	F		
T	400	1845	0.54	0.22	59.6	E	488.2	F
R	494	1583	0.52	0.31	48.2	D		
Northbound								
T	2023	3343	1.06	0.61	70.1	E	70.1	E
Southbound								
T	2100	3471	1.41	0.61	216.7	F	216.7	F

Intersection Delay = 191.4 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/11/2002
Period: AM
Project ID:
E/W St: NEW RD.

Inter.: NEW RD. & RT 1
Area Type: All other areas
Jurisd: MIDDLESEX COUNTY
Year : 2028 No Build AM Peak Hour

N/S St: RT 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	0	2	0	0	2	0
LGConfig	L	T	R	L	T	R		T			T	
Volume	24	365	300	61	229	222		1760			3116	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru		P			Thru	P			
Right	P	P			Right				
Peds					Peds				
WB Left	A				SB Left				
Thru		P			Thru	P			
Right	P	P			Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	7.0	23.0				90.0			
Yellow	3.0	4.0				6.0			
All Red	3.0	2.0				2.0			

Cycle Length: 140.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	89	1787	0.30	0.05	66.1	E		
T	309	1881	1.31	0.16	221.0	F	147.5	F
R	411	1599	0.81	0.26	64.6	E		
Westbound								
L	89	1787	0.76	0.05	97.5	F		
T	306	1863	0.83	0.16	78.9	E	69.6	E
R	407	1583	0.61	0.26	52.4	D		
Northbound								
T	2149	3343	0.91	0.64	28.7	C	28.7	C
Southbound								
T	2231	3471	1.55	0.64	275.5	F	275.5	F

Intersection Delay = 172.2 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/11/2002
Period: AM
Project ID:
E/W St: RT 522 Promenade Rd.

Inter.: RT 522 Promenade Blvd. & Rt1
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build AM Peak Hour

N/S St: RT 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	0	2	0	0	2	0
LGConfig	L	T	R	L	T	R		T			T	
Volume	144	337	201	548	549	184		1801			2747	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
WB Left	A				SB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	5.0	28.0					94.0			
Yellow	3.0	3.0					6.0			
All Red	2.0	2.0					2.0			

Cycle Length: 145.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	62	1787	2.58	0.03	825.9	F		
T	367	1900	1.02	0.19	110.4	F	244.0	F
R	423	1615	0.53	0.26	50.5	D		
Westbound								
L	61	1770	9.98	0.03	4145	F		
T	363	1881	1.68	0.19	376.5	F	1942	F
R	415	1583	0.49	0.26	49.4	D		
Northbound								
T	2187	3374	0.91	0.65	29.5	C	29.5	C
Southbound								
T	2250	3471	1.36	0.65	188.9	F	188.9	F

Intersection Delay = 495.5 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: AM
Project ID:
E/W St: Ridge Rd.

Inter.: Rt1 & Ridge Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build AM Peak Hour

N/S St: Rt 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	1	0	2	0	0	2	0
LGConfig	L	TR		L	T	R		T			T	
Volume	407	331	339	227	459	132		2405			3250	
Lane Width	12.0	12.0		12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A	P			NB	Left				
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
WB Left	A	P			SB	Left				
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	6.0	21.0					55.0			
Yellow	3.0	4.0					6.0			
All Red	2.0	2.0					1.0			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	177	1736	2.55	0.32	747.1	F		
TR	365	1738	2.04	0.21	517.5	F	604.2	F
Westbound								
L	173	1687	1.46	0.32	266.3	F		
T	387	1845	1.32	0.21	199.7	F	192.2	F
R	323	1538	0.46	0.21	39.1	D		
Northbound								
T	1856	3374	1.44	0.55	223.5	F	223.5	F
Southbound								
T	1909	3471	1.89	0.55	425.7	F	425.7	F

Intersection Delay = 361.5 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

** Note the WB left turn volume entered as 548 (not 931); HCS would not accept a higher volume and still generate a delay for that lane.

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: AM
Project ID:
E/W St: Rt 522 Promeade

Inter.: Rt 27 & RT522 Promeade
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build AM Peak Hour

N/S St: Rt 27

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	1	1	1	1	1	1	1	1	1	1
LGConfig		LT	R	L	T	R	L	T	R	L	T	R
Volume	25	25	25	318	25	202	25	515	211	162	1061	25
Lane Width		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	A			
Thru	P					Thru		P		
Right	P					Right	P	P		
Peds						Peds				
WB Left	P				SB	Left	A			
Thru	P					Thru		P		
Right	P					Right	P	P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	23.0						6.0	50.0		
Yellow	4.0						2.0	2.0		
All Red	1.0						1.0	1.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LT	243	952	0.23	0.26	28.7	C	28.1	C
R	236	923	0.12	0.26	26.7	C		
Westbound								
L	346	1355	1.02	0.26	87.1	F		
T	486	1900	0.06	0.26	25.5	C	64.7	E
R	409	1599	0.55	0.26	34.2	C		
Northbound								
L	69	1031	0.41	0.07	44.2	D		
T	1015	1827	0.56	0.56	15.2	B	13.8	B
R	1028	1568	0.23	0.66	6.8	A		
Southbound								
L	120	1805	1.50	0.07	305.4	F		
T	1025	1845	1.15	0.56	99.1	F	124.0	F
R	605	923	0.05	0.66	5.7	A		

Intersection Delay = 77.3 (sec/veh) Intersection LOS = E

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: AM
Project ID:
E/W St: Raymond

Inter.: RT27 & Raymond
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build AM Peak Hour

N/S St: RT 27

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	1	0	0	1	0	0	1	0
LGConfig					TR			TR			LT	
Volume				345	10		474	154		140	1252	
Lane Width				12.0			12.0				12.0	
RTOR Vol					0			0				

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left					NB	Left				
Thru						Thru	P			
Right						Right	P			
Peds						Peds				
WB Left					SB	Left	P			
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green		15.0					39.0			
Yellow		2.0					2.0			
All Red		1.0					1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
TR	447	1789	0.88	0.25	43.0	D	43.0	D
Northbound								
TR	1156	1779	0.60	0.65	8.4	A	8.4	A
Southbound								
LT	980	1508	1.58	0.65	275.8	F	275.8	F

Intersection Delay = 170.3 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran Garmen
Date: 11/21/02
Period: AM Peak Hour
Project ID:
E/W St: Route 27

Inter.: Rt 27 / Laurel Ave
Area Type: All other areas
Jurisd: Middlesex County, NJ
Year : 2028 No Build

N/S St: Laurel Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	0	1	0	0	1	0
LGConfig	L	TR		L	TR			LTR			LTR	
Volume	10	618	204	109	1377	10	159	301	84	10	345	80
Lane Width	12.0	11.0		12.0	9.0			11.0			10.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru	P					Thru	P			
Right	P					Right	P			
Peds						Peds				
WB Left	P				SB	Left	P			
Thru	P					Thru	P			
Right	P					Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	40.0						30.0			
Yellow	4.0						4.0			
All Red	1.0						1.0			

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L				0.50				
TR	862	1723	1.85	0.50	406.6	F		
Westbound								
L	94	188	2.15	0.50	570.6	F		
TR	830	1659	3.15	0.50	989.3	F	959.3	F
Northbound								
LTR	295	786	3.40	0.38	1112	F	1112	F
Southbound								
LTR	622	1658	1.18	0.38	123.2	F	123.2	F

Intersection Delay = (sec/veh) Intersection LOS =

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: AM
Project ID:
E/W St: Rt 522

Inter.: Rt 522 & Kingston Ln.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build AM Peak Hour

N/S St: Kingston Ln.

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	1	1	0	1	1	0
LGConfig		T	R	L	TR		L	TR		L	T	
Volume		456	1110	10	1212	550	462	108	10	134	70	
Lane Width		12.0	12.0	12.0	12.0		12.0	12.0		12.0	12.0	
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left					NB	Left	P			
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
WB Left	A				SB	Left	P			
Thru	A	P				Thru	P			
Right	A	P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	8.0	27.0					41.0			
Yellow	4.0	4.0					4.0			
All Red	0.0	1.0					1.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1012	3374	0.50	0.30	27.7	C	559.6	F
R	466	1553	2.65	0.30	778.3	F		
Westbound								
L	160	1805	0.07	0.09	37.8	D		
TR	1443	3329	1.36	0.43	190.7	F	189.9	F
Northbound								
L	600	1316	0.86	0.46	36.3	D		
TR	783	1719	0.17	0.46	14.9	B	32.0	C
Southbound								
L	583	1279	0.26	0.46	16.2	B		
T	773	1696	0.10	0.46	14.2	B	15.5	B

Intersection Delay = 299.5 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: AM
Project ID:
E/W St: George Rd.

Inter.: George Rd. & Kingston Ln.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build AM Peak Hour

N/S St: Kingston Ln.

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	0	0	0	1	1	0	0	1	1
LGConfig	L		R				L	T			T	R
Volume	312		27				250	1010			310	96
Lane Width	12.0		12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru						Thru	P			
Right	P					Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru	P			
Right						Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	10.0						44.0			
Yellow	3.0						4.0			
All Red	2.0						2.0			

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	275	1787	1.26	0.15	171.2	F		
							159.5	F
R	246	1599	0.12	0.15	24.7	C		
Westbound								
Northbound								
L	679	1003	0.41	0.68	6.5	A		
T	1273	1881	0.88	0.68	17.4	B	15.2	B
Southbound								
T	1261	1863	0.27	0.68	4.7	A	4.5	A
R	1093	1615	0.10	0.68	3.8	A		

Intersection Delay = 37.5 (sec/veh) Intersection LOS = D

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: AM
Project ID:
E/W St: Friendship Rd.

Inter.: US 130 & Friendship Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build AM Peak Hour

N/S St: US 130

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	1	1	1	1	2	0	0	2	0
LGConfig	L		R	L	T	R	L	T			TR	
Volume	241		147	909	177	10	55	1797			1823	174
Lane Width	12.0		12.0	12.0	12.0	12.0	12.0	12.0			12.0	
RTOR Vol			0			0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru						Thru	P			
Right	P					Right				
Peds						Peds				
WB Left	P				SB	Left				
Thru	P					Thru	P			
Right	P					Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	13.0						74.0			
Yellow	4.0						5.0			
All Red	2.0						2.0			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	99	762	2.71	0.13	839.5	F		
							548.6	F
R	202	1553	0.81	0.13	70.4	E		
Westbound								
L	226	1736	4.47	0.13	1614	F		
T	242	1863	0.81	0.13	67.4	E	1350	F
R	210	1615	0.05	0.13	38.6	D		
Northbound								
L	75	102	0.81	0.74	69.2	E		
T	2207	2983	0.90	0.74	16.9	B	18.5	B
Southbound								
TR	2476	3346	0.90	0.74	15.6	B	15.6	B

Intersection Delay = 329.7 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/11/2002
Period: AM
Project ID:
E/W St: Rt32 Forsgate Dr

Inter.: RT 32 Forsgate Dr & CR 535
Area Type: All other areas
Jurisd: Middlesex Co, NJ
Year : 2002 Existing AM Peak Hour

N/S St: CR 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	3	0	0	3	0	1	1	1	1	2	0
LGConfig	L	TR			TR		L	T	R	L	TR	
Volume	427	904	146		2516	229	28	383	181	97	1351	47
Lane Width	12.0	12.0			12.0		12.0	12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left	A	P		
Thru		P				Thru		P		
Right		P				Right		P		
Peds						Peds				
WB Left					SB	Left	A	P		
Thru		P				Thru		P		
Right		P				Right		P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	8.0	65.0					10.0	28.0		
Yellow	3.0	6.0					4.0	5.0		
All Red	2.0	2.0					0.0	2.0		

Cycle Length: 135.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	117	1583	4.05	0.07	1455	F		
TR	2221	4284	0.52	0.52	22.4	C	436.7	F
Westbound								
TR	2526	4871	1.21	0.52	129.8	F	129.8	F
Northbound								
L	180	1556	0.17	0.32	35.1	D		
T	421	1776	1.01	0.24	98.4	F	84.1	F
R	283	1196	0.71	0.24	61.3	E		
Southbound								
L	184	1612	0.59	0.32	40.0	D		
TR	819	3454	1.90	0.24	459.4	F	432.1	F

Intersection Delay = 269.0 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/11/02
Period: AM
Project ID:
E/W St: Dey Rd

Inter.: Dey Rd & CR 535
Area Type: All other areas
Jurisd: Middlesex County, NJ
Year : 2028 No Build AM Peak Hour

N/S St: CR 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	0	0	0	1	0	0	1	0
LGConfig		LR						LT			TR	
Volume	190		165				262	996			1197	274
Lane Width		12.0						14.0			14.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left	A	P		
Thru						Thru	A	P		
Right	A					Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru		P		
Right						Right		P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	20.0						10.0	74.0		
Yellow	4.5						3.0	5.0		
All Red	2.0						0.0	1.5		

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LR	276	1658	1.43	0.17	262.1	F	262.1	F
Westbound								
Northbound								
LT	499	1784	2.80	0.76	830.8	F	830.8	F
Southbound								
TR	1206	1856	1.35	0.65	186.2	F	186.2	F

Intersection Delay = 458.0 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: AM
Project ID:
E/W St: Dey Rd.

Inter.: US 130 & Dey Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build AM Peak Hour

N/S St: US 130

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	1	2	0	1	2	0
LGConfig	L	T	R	L	T	R	L	TR		L	TR	
Volume	231	260	382	134	175	152	357	2361	12	112	1606	444
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru		P			Thru		P		
Right		P			Right		P		
Peds					Peds				
WB Left	A				SB Left	A			
Thru		P			Thru		P		
Right		P			Right		P		
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	8.0	7.0				7.0	40.0		
Yellow	3.0	4.0				3.0	5.0		
All Red	0.0	1.0				0.0	1.0		

Cycle Length: 79.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	174	1719	1.48	0.10	278.5	F		
T	163	1845	1.77	0.09	407.6	F	605.6	F
R	143	1615	2.97	0.09	938.9	F		
Westbound								
L	177	1752	0.84	0.10	63.8	E		
T	163	1845	1.19	0.09	166.8	F	178.8	F
R	114	1282	1.48	0.09	293.9	F		
Northbound								
L	157	1770	2.53	0.09	742.4	F		
TR	1523	3008	1.73	0.51	351.1	F	402.3	F
Southbound								
L	143	1612	0.87	0.09	74.8	E		
TR	1639	3237	1.39	0.51	198.5	F	192.1	F

Intersection Delay = 341.3 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: AM
Project ID:
E/W St: Plainsboro Rd.

Inter.: Rt 535 & Plainsboro Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build AM Peak Hour

N/S St: Rt 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	0	0	0	1	1	0	0	1	1
LGConfig	L		R				L	T			TR	R
Volume	67		10				10	711			685	544
Lane Width	12.0		12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru						Thru	P			
Right	P					Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru	P			
Right						Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	26.0						26.0			
Yellow	4.0						4.0			
All Red	2.0						2.0			

Cycle Length: 64.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	712	1752	0.10	0.41	12.1	B		
							12.0	B
R	656	1615	0.02	0.41	11.4	B		
Westbound								
Northbound								
L	126	311	0.09	0.41	13.1	B		
T	702	1727	1.13	0.41	93.0	F	91.9	F
Southbound								
TR	728	1792	1.05	0.41	64.8	E	56.1	E
R	631	1553	0.96	0.41	45.2	D		

Intersection Delay = 67.2 (sec/veh) Intersection LOS = E

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: AM
Project ID:
E/W St: Scudder's Mill Rd.

Inter.: Scudder's Mill Rd.& Schalk's
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build AM Peak Hour

N/S St: Schalk's Crossing

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	3	0	2	2	1	2	2	1	2	2	0
LGConfig	L	TR		L	T	R	L	T	R	L	TR	
Volume	89	206	21	12	1986	880	21	156	8	136	107	113
Lane Width	12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left	P			
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
WB Left	A				SB	Left		P		
Thru		P				Thru		P		
Right		P				Right		P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	6.0	33.0					10.0	10.0		
Yellow	4.0	4.0					4.0	4.0		
All Red	0.0	2.0					1.5	1.5		

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	131	1752	0.76	0.08	58.2	E		
TR	1966	4765	0.13	0.41	14.7	B	27.0	C
Westbound								
L	263	3502	0.05	0.08	34.4	C		
T	1460	3539	1.51	0.41	257.3	F	257.7	F
R	647	1568	1.51	0.41	261.7	F		
Northbound								
L	433	3467	0.05	0.13	31.1	C		
T	434	3471	0.40	0.13	35.0-	C	34.4	C
R	200	1599	0.05	0.13	31.2	C		
Southbound								
L	409	3273	0.37	0.13	34.7	C		
TR	410	3282	0.60	0.13	39.4	D	37.6	D

Intersection Delay = 206.2 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: AM
Project ID:
E/W St: Scudder's Mill Rd.

Inter.: Scudder's Mill Rd.& Dey Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build AM Peak Hour

N/S St: Dey Rd.

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	0	1	0	0	1	1
LGConfig	L	TR		L	TR			LTR			LT	R
Volume	84	194	72	10	1179	27	494	199	10	39	196	1204
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	12.0
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A	P			NB	Left	P			
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
WB Left	A	P			SB	Left	P			
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	15.0	31.0					20.0			
Yellow	3.0	5.0					4.0			
All Red	0.0	1.0					1.0			

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	387	1583	0.24	0.61	12.7	B		
TR	1284	3313	0.23	0.39	16.9	B	15.9	B
Westbound								
L	718	1805	0.02	0.61	6.3	A		
TR	1367	3529	0.98	0.39	44.3	D	44.0	D
Northbound								
LTR	166	664	4.70	0.25	1710	F	1710	F
Southbound								
LT	429	1715	0.61	0.25	32.8	C	918.8	F
R	400	1599	3.35	0.25	1091	F		

Intersection Delay = 696.8 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

TWO-WAY STOP CONTROL SUMMARY

Analyst: BB
Agency/Co.: Urbitran
Date Performed: 10/14/2002
Analysis Time Period: AM
Intersection: Herrod Ave. & Rt 32
Jurisdiction: Middlesex Co, NJ
Units: U. S. Customary
Analysis Year: 2028 Future AM Peak Conditions
Project ID:
East/West Street: RT 32
North/South Street: Herrod Ave.
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	168	1089	127	14	1543	124
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR	168	1089	127	14	1543	124
Percent Heavy Vehicles	4	--	--	4	--	--
Median Type	Undivided					
RT Channelized?						
Lanes	1	2	0	1	2	0
Configuration	L	T	TR	L	T	TR
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	118	12	298	90	102	216
Peak Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR	118	12	298	90	102	216
Percent Heavy Vehicles	9	8	8	12	7	19
Percent Grade (%)		0			0	
Median Storage						
Flared Approach: Exists?		No			No	
Storage						
RT Channelized?						
Lanes	0	1	0	0	2	0
Configuration		LTR		LT	TR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR		LT		TR
v (vph)	168	14		428		141		267
C(m) (vph)	373	558		0		0		24
v/c	0.45	0.03						11.13
95% queue length	2.26	0.08						33.38
Control Delay	22.3	11.6						
LOS	C	B		F		F		F
Approach Delay								
Approach LOS								

1.4 2028 No Build – PM Peak Hour HCS Reports

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/11/2002
Period: PM
Project ID:
E/W St: Cozzens Rd.

Inter.: Cozzens Ln. & Rt1
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build PM Peak Hour

N/S St: RT 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	0	3	0	0	3	0
LGConfig	L	TR		L	TR			T			TR	
Volume	124	494	57	138	174	462		3153			4207	836
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
RTOR Vol			0			0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru		P			Thru	P			
Right		P			Right				
Peds					Peds				
WB Left	A				SB Left				
Thru		P			Thru	P			
Right		P			Right	P			
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	11.0	35.0				87.0			
Yellow	3.0	4.0				6.0			
All Red	0.0	2.0				2.0			

Cycle Length: 150.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	130	1770	1.06	0.07	165.8	F		
TR	428	1836	1.43	0.23	264.1	F	246.0	F
Westbound								
L	131	1787	1.17	0.07	200.3	F		
TR	385	1652	1.83	0.23	442.7	F	399.5	F
Northbound								
T	2865	4940	1.22	0.58	135.0	F	135.0	F
Southbound								
TR	2862	4935	1.96	0.58	463.8	F	463.8	F

Intersection Delay = 335.9 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/11/2002
Period: PM
Project ID:
E/W St: Sandhill Rd.

Inter.: Sandhill Rd. & Rt1
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build PM Peak Hour

N/S St: RT 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	0	2	0	0	2	0
LGConfig	L	T	R	L	T	R		T			T	
Volume	36	248	188	96	403	71		2432			1736	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
WB Left	A				SB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	9.0	34.0					95.0			
Yellow	3.0	3.0					6.0			
All Red	3.0	2.0					2.0			

Cycle Length: 157.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	102	1787	0.39	0.06	73.8	E		
T	407	1881	0.68	0.22	65.3	E	58.0	E
R	494	1583	0.42	0.31	45.4	D		
Westbound								
L	97	1687	1.10	0.06	195.9	F		
T	407	1881	1.10	0.22	136.2	F	134.3	F
R	485	1553	0.16	0.31	39.9	D		
Northbound								
T	2080	3438	1.30	0.61	169.2	F	169.2	F
Southbound								
T	2042	3374	0.94	0.61	39.1	D	39.1	D

Intersection Delay = 112.0 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/11/2002
Period: PM
Project ID:
E/W St: NEW RD.

Inter.: NEW RD. & RT 1
Area Type: All other areas
Jurisd: MIDDLESEX COUNTY
Year : 2028 No Build PM Peak Hour

N/S St: RT 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	0	2	0	0	2	0
LGConfig	L	T	R	L	T	R		T			T	
Volume	15	314	160	18	452	55		2922			1681	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
WB Left	A				SB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	7.0	23.0					90.0			
Yellow	3.0	4.0					6.0			
All Red	3.0	2.0					2.0			

Cycle Length: 140.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	89	1770	0.19	0.05	64.8	E		
T	303	1845	1.15	0.16	157.8	F	118.5	F
R	415	1615	0.43	0.26	46.6	D		
Westbound								
L	87	1736	0.23	0.05	65.3	E		
T	309	1881	1.62	0.16	354.0	F	311.3	F
R	407	1583	0.15	0.26	41.0	D		
Northbound								
T	2231	3471	1.46	0.64	232.5	F	232.5	F
Southbound								
T	2169	3374	0.86	0.64	24.8	C	24.8	C

Intersection Delay = 167.8 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/11/2002
Period: PM
Project ID:
E/W St: RT 522 Promenade Rd.

Inter.: RT 522 Promenade Blvd. & Rt1
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build PM Peak Hour

N/S St: RT 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	0	2	0	0	2	0
LGConfig	L	T	R	L	T	R		T			T	
Volume	215	399	31	539	329	301		3059			1755	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru		P			Thru	P			
Right	P	P			Right				
Peds					Peds				
WB Left	A				SB Left				
Thru		P			Thru	P			
Right	P	P			Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	5.0	28.0				94.0			
Yellow	3.0	3.0				6.0			
All Red	2.0	2.0				2.0			

Cycle Length: 145.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	61	1770	3.92	0.03	1421	F		
T	363	1881	1.22	0.19	180.1	F	587.9	F
R	423	1615	0.08	0.26	40.7	D		
Westbound								
L	60	1736	9.98	0.03	4145	F		
T	360	1863	1.02	0.19	110.2	F	1959	F
R	415	1583	0.80	0.26	65.3	E		
Northbound								
T	2147	3312	1.58	0.65	290.2	F	290.2	F
Southbound								
T	2250	3471	0.87	0.65	25.3	C	25.3	C

Intersection Delay = 543.4 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

** Note the WB left turn volume entered as 539 (not 656); HCS would not accept a higher volume and still generate a delay for that lane.

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: PM
Project ID:
E/W St: Ridge Rd.

Inter.: Rt1 & Ridge Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build PM Peak Hour

N/S St: Rt 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	1	0	2	0	0	2	0
LGConfig	L	TR		L	T	R		T			T	
Volume	439	389	35	320	581	229		2688			1784	
Lane Width	12.0	12.0		12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A	P			NB	Left				
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
WB Left	A	P			SB	Left				
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	6.0	21.0					55.0			
Yellow	3.0	4.0					6.0			
All Red	2.0	2.0					1.0			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	170	1641	2.87	0.32	889.6	F		
TR	380	1809	1.24	0.21	167.8	F	535.1	F
Westbound								
L	173	1687	2.06	0.32	527.2	F		
T	391	1863	1.65	0.21	344.2	F	336.9	F
R	336	1599	0.76	0.21	51.7	D		
Northbound								
T	1909	3471	1.56	0.55	279.2	F	279.2	F
Southbound								
T	1856	3374	1.07	0.55	64.2	E	64.2	E

Intersection Delay = 264.1 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: PM
Project ID:
E/W St: RT 522 Promeade

Inter.: Rt 27 & Promeade Blvd (RT522)
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build PM Peak Hour

N/S St: Rt 27

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	1	1	1	1	1	1	1	1	1	1
LGConfig		LT	R	L	T	R	L	T	R	L	T	R
Volume	15	15	15	290	15	357	15	760	191	357	253	15
Lane Width		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	A			
Thru	P					Thru		P		
Right	P					Right	P	P		
Peds						Peds				
WB Left	P				SB	Left	A			
Thru	P					Thru		P		
Right	P					Right	P	P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	23.0						6.0	50.0		
Yellow	4.0						2.0	2.0		
All Red	1.0						1.0	1.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LT	273	1069	0.12	0.26	26.7	C	26.4	C
R	258	1009	0.07	0.26	25.9	C		
Westbound								
L	340	1330	0.95	0.26	70.0	E		
T	486	1900	0.03	0.26	25.3	C	70.7	E
R	405	1583	0.98	0.26	73.3	E		
Northbound								
L	75	1128	0.23	0.07	41.3	D		
T	1045	1881	0.81	0.56	22.8	C	19.9	B
R	1048	1599	0.20	0.66	6.6	A		
Southbound								
L	120	1805	3.31	0.07	1101	F		
T	1035	1863	0.27	0.56	11.1	B	634.0	F
R	661	1009	0.03	0.66	5.5	A		

Intersection Delay = 201.7 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: PM
Project ID:
E/W St: Raymond

Inter.: RT27 & Raymond
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build PM Peak Hour

N/S St: RT 27

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	1	0	0	1	0	0	1	0
LGConfig					TR			TR			LT	
Volume				331	10		514	371		31	502	
Lane Width				12.0			12.0				12.0	
RTOR Vol					0			0				

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left					NB	Left				
Thru						Thru	P			
Right						Right	P			
Peds						Peds				
WB Left					SB	Left	P			
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green		15.0					39.0			
Yellow		2.0					2.0			
All Red		1.0					1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
TR	473	1891	0.80	0.25	34.5	C	34.5	C
Northbound								
TR	1121	1725	0.88	0.65	18.3	B	18.3	B
Southbound								
LT	1106	1701	0.54	0.65	7.5	A	7.5	A

Intersection Delay = 18.1 (sec/veh) Intersection LOS = B

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran Garmen
Date: 11/21/02
Period: PM Peak Hour
Project ID:
E/W St: Route 27

Inter.: Rt 27 / Laurel Ave
Area Type: All other areas
Jurisd: Middlesex County, NJ
Year : 2028 No Build

N/S St: Laurel Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	0	1	0	0	1	0
LGConfig	L	TR		L	TR			LTR			LTR	
Volume	10	600	133	61	760	10	286	257	272	10	248	49
Lane Width	12.0	11.0		12.0	9.0			11.0			10.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru	P					Thru	P			
Right	P					Right	P			
Peds						Peds				
WB Left	P				SB	Left	P			
Thru	P					Thru	P			
Right	P					Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	40.0						30.0			
Yellow	4.0						4.0			
All Red	1.0						1.0			

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	94	188	0.23	0.50	17.1	B		
TR	866	1731	1.65	0.50	319.8	F	315.2	F
Westbound								
L	94	188	1.20	0.50	177.0	F		
TR	821	1642	1.76	0.50	368.7	F	354.8	F
Northbound								
LTR	385	1026	4.87	0.38	1771	F	1771	F
Southbound								
LTR	610	1627	0.85	0.38	37.2	D	37.2	D

Intersection Delay = 804.1 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: PM
Project ID:
E/W St: Rt 522

Inter.: Rt 522 & Kingston Ln.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No BuildPM Peak Hour

N/S St: Kingston Ln.

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	1	1	0	1	1	0
LGConfig		T	R	L	TR		L	TR		L	T	
Volume		1391	518	10	150	39	192	1018	10	121	126	
Lane Width		12.0	12.0	12.0	12.0		12.0	12.0		12.0	12.0	
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left					NB	Left	P			
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
WB Left	A	P			SB	Left	P			
Thru	A	P				Thru	P			
Right	A	P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	8.0	27.0					41.0			
Yellow	4.0	4.0					4.0			
All Red	0.0	1.0					1.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1062	3539	1.46	0.30	241.9	F	222.4	F
R	453	1509	1.27	0.30	170.1	F		
Westbound								
L	244	1805	0.05	0.43	18.7	B		
TR	1394	3217	0.15	0.43	15.5	B	15.7	B
Northbound								
L	490	1075	0.43	0.46	19.4	B		
TR	779	1711	1.47	0.46	241.2	F	206.4	F
Southbound								
L	82	180	1.63	0.46	358.2	F		
T	841	1845	0.17	0.46	14.9	B	182.8	F

Intersection Delay = 202.7 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: PM
Project ID:
E/W St: George Rd.

Inter.: George Rd. & Kingston Ln.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build PM Peak Hour

N/S St: Kingston Ln.

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	0	0	0	1	1	0	0	1	1
LGConfig	L		R				L	T			T	R
Volume	222		44				487	229			209	194
Lane Width	12.0		12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru						Thru	P			
Right	P					Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru	P			
Right						Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	10.0						44.0			
Yellow	3.0						4.0			
All Red	2.0						2.0			

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	270	1752	0.91	0.15	63.7	E		
							57.4	E
R	248	1615	0.20	0.15	25.8	C		
Westbound								
Northbound								
L	724	1070	0.75	0.68	13.8	B		
T	1180	1743	0.22	0.68	4.4	A	10.8	B
Southbound								
T	1273	1881	0.18	0.68	4.2	A	4.3	A
R	1072	1583	0.20	0.68	4.4	A		

Intersection Delay = 17.9 (sec/veh) Intersection LOS = B

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: PM
Project ID:
E/W St: Friendship Rd.

Inter.: US 130 & Friendship Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build PM Peak Hour

N/S St: US 130

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	1	1	1	0	0	1	1
LGConfig		LR		L	T	R	L	T			T	R
Volume	210		144	754	47	10	18	1742			1892	76
Lane Width		12.0		12.0	12.0	12.0	12.0	12.0			12.0	12.0
RTOR Vol			0			0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	P				NB Left	P			
Thru					Thru	P			
Right	P				Right				
Peds					Peds				
WB Left	P				SB Left				
Thru	P				Thru	P			
Right	P				Right	P			
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	13.0					74.0			
Yellow	4.0					5.0			
All Red	2.0					2.0			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LR	182	1401	2.16	0.13	583.0	F	583.0	F
Westbound								
L	215	1656	3.90	0.13	1358	F		
T	240	1845	0.22	0.13	41.0	D	1266	F
R	208	1599	0.05	0.13	38.6	D		
Northbound								
L	105	142	0.19	0.74	7.9	A		
T	1202	1624	1.61	0.74	291.7	F	288.8	F
Southbound								
T	1314	1776	1.60	0.74	286.5	F	275.6	F
R	1171	1583	0.07	0.74	3.7	A		

Intersection Delay = 466.8 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/11/2002
Period: PM
Project ID:
E/W St: RT 32 Forsgate Dr

Inter.: RT 32 Forsgate Dr & CR 535
Area Type: All other areas
Jurisd: Middlesex Co, NJ
Year : 2028 No Build PM Peak Hour

N/S St: CR 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	3	0	0	3	0	1	1	1	1	2	0
LGConfig	L	TR			TR		L	T	R	L	TR	
Volume	470	1635	106		1501	59	9	260	397	306	1024	130
Lane Width	12.0	13.0			12.0		12.0	12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left	A	P		
Thru		P				Thru		P		
Right		P				Right		P		
Peds						Peds				
WB Left					SB	Left	A	P		
Thru		P				Thru		P		
Right		P				Right		P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	8.0	65.0					10.0	28.0		
Yellow	3.0	6.0					4.0	5.0		
All Red	2.0	2.0					0.0	2.0		

Cycle Length: 135.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	120	1626	4.35	0.07	1589	F		
TR	2602	5019	0.74	0.52	27.4	C	359.3	F
Westbound								
TR	2400	4629	0.72	0.52	26.9	C	26.9	C
Northbound								
L	187	1641	0.05	0.32	34.5	C		
T	421	1776	0.69	0.24	55.7	E	137.0	F
R	348	1468	1.27	0.24	192.7	F		
Southbound								
L	236	1719	1.44	0.32	269.6	F		
TR	809	3413	1.58	0.24	320.5	F	309.8	F

Intersection Delay = 234.0 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/11/02
Period: PM
Project ID:
E/W St: Dey Rd

Inter.: Dey Rd & CR 535
Area Type: All other areas
Jurisd: Middlesex County, NJ
Year : 2028 No Build PM Peak Hour

N/S St: CR 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	0	0	0	1	0	0	1	0
LGConfig		LR						LT			TR	
Volume	222		163				93	921			1034	259
Lane Width		12.0						14.0			14.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left	A	P		
Thru						Thru	A	P		
Right	A					Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru		P		
Right						Right		P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	20.0						10.0	74.0		
Yellow	4.5						3.0	5.0		
All Red	2.0						0.0	1.5		

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LR	283	1700	1.51	0.17	298.0	F	298.0	F
Westbound								
Northbound								
LT	711	1835	1.58	0.76	283.9	F	283.9	F
Southbound								
TR	1169	1799	1.23	0.65	131.8	F	131.8	F

Intersection Delay = 212.9 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: PM
Project ID:
E/W St: Dey Rd.

Inter.: US 130 & Dey Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build PM Peak Hour

N/S St: US 130

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	1	2	0	1	2	0
LGConfig	L	T	R	L	T	R	L	TR		L	TR	
Volume	654	199	118	82	89	167	16	1991	10	200	1628	171
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru		P			Thru		P		
Right		P			Right		P		
Peds					Peds				
WB Left	A				SB Left	A			
Thru		P			Thru		P		
Right		P			Right		P		
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	8.0	7.0				7.0	40.0		
Yellow	3.0	4.0				3.0	5.0		
All Red	0.0	1.0				0.0	1.0		

Cycle Length: 79.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	176	1736	4.13	0.10	1457	F		
T	165	1863	1.34	0.09	223.7	F	1039	F
R	142	1599	0.92	0.09	92.9	F		
Westbound								
L	181	1787	0.50	0.10	35.8	D		
T	162	1827	0.61	0.09	50.7	D	174.9	F
R	122	1380	1.52	0.09	309.1	F		
Northbound								
L	152	1719	0.12	0.09	33.5	C		
TR	1562	3085	1.42	0.51	213.7	F	212.3	F
Southbound								
L	151	1703	1.47	0.09	279.9	F		
TR	1647	3252	1.21	0.51	121.5	F	137.4	F

Intersection Delay = 332.6 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: PM
Project ID:
E/W St: Plainsboro Rd.

Inter.: Rt 535 & Plainsboro Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build PM Peak Hour

N/S St: Rt 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	0	0	0	1	1	0	0	1	0
LGConfig	L		R				L	T			TR	
Volume	236		10				10	231			610	309
Lane Width	12.0		12.0				12.0	12.0			12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru						Thru	P			
Right	P					Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru	P			
Right						Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	26.0						26.0			
Yellow	4.0						4.0			
All Red	2.0						2.0			

Cycle Length: 64.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	712	1752	0.37	0.41	14.7	B		
							14.6	B
R	656	1615	0.02	0.41	11.4	B		
Westbound								
Northbound								
L	119	292	0.09	0.41	13.3	B		
T	722	1776	0.36	0.41	14.6	B	14.5	B
Southbound								
TR	685	1685	1.49	0.41	247.4	F	247.4	F

Intersection Delay = 166.8 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: PM
Project ID:
E/W St: Scudder's Mill Rd.

Inter.: Scudder's Mill Rd.& Schalk's
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build PM Peak Hour

N/S St: Schalk's Crossing

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	3	0	2	2	1	2	2	1	2	2	0
LGConfig	L	TR		L	T	R	L	T	R	L	TR	
Volume	205	2336	302	69	634	200	107	99	66	260	213	63
Lane Width	12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	P			
Thru		P			Thru	P			
Right		P			Right	P			
Peds					Peds				
WB Left	A				SB Left		P		
Thru		P			Thru		P		
Right		P			Right		P		
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	6.0	33.0				10.0	10.0		
Yellow	4.0	4.0				4.0	4.0		
All Red	0.0	2.0				1.5	1.5		

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	131	1752	1.74	0.08	399.9	F		
TR	2064	5004	1.42	0.41	215.6	F	228.9	F
Westbound								
L	263	3502	0.29	0.08	35.6	D		
T	1460	3539	0.48	0.41	18.4	B	19.5	B
R	653	1583	0.34	0.41	17.5	B		
Northbound								
L	429	3433	0.28	0.13	33.3	C		
T	442	3539	0.25	0.13	33.0	C	34.2	C
R	198	1583	0.37	0.13	37.3	D		
Southbound								
L	417	3335	0.69	0.13	42.7	D		
TR	426	3411	0.72	0.13	43.7	D	43.2	D

Intersection Delay = 153.9 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: PM
Project ID:
E/W St: Scudder's Mill Rd.

Inter.: Scudder's Mill Rd.& Dey Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build PM Peak Hour

N/S St: Dey Rd.

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	0	1	0	0	1	1
LGConfig	L	TR		L	TR			LTR			LT	R
Volume	1242	782	637	10	282	274	10	424	10	30	135	612
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	12.0
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A	P			NB	Left	P			
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
WB Left	A	P			SB	Left	P			
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	15.0	31.0					20.0			
Yellow	3.0	5.0					4.0			
All Red	0.0	1.0					1.0			

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Flow	Sat Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound									
L	553	1752		2.50	0.61	690.6	F		
TR	1292	3334		1.22	0.39	131.0	F	392.1	F
Westbound									
L	433	1805		0.03	0.61	11.7	B		
TR	1264	3261		0.49	0.39	19.9	B	19.7	B
Northbound									
LTR	465	1858		1.06	0.25	88.6	F	88.6	F
Southbound									
LT	339	1355		0.54	0.25	32.1	C	287.0	F
R	400	1599		1.70	0.25	355.6	F		

Intersection Delay = 296.1 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Unsignalized Intersections Release 4.1c

TWO-WAY STOP CONTROL SUMMARY

Analyst: BB
Agency/Co.: Urbitran
Date Performed: 10/14/2002
Analysis Time Period: PM
Intersection: Herrod Ave. & Rt 32
Jurisdiction: Middlesex Co, NJ
Units: U. S. Customary
Analysis Year: 2028 No Build PM Conditions
Project ID:
East/West Street: RT 32
North/South Street: Herrod Ave.
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	143	1666	45	18	768	56
Peak-Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR	143	1666	45	18	768	56
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type	Undivided					
RT Channelized?						
Lanes	1	2	0	1	2	0
Configuration	L	T	TR	L	T	TR
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	109	46	417	128	10	384
Peak Hour Factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Hourly Flow Rate, HFR	109	46	417	128	10	384
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Median Storage						
Flared Approach: Exists?		No			No	
Storage						
RT Channelized?						
Lanes	0	1	0	0	2	0
Configuration		LTR		LT	TR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR		LT		TR
v (vph)	143	18		572		133		389
C(m) (vph)	815	376		10		0		388
v/c	0.18	0.05		57.20				1.00
95% queue length	0.63	0.15		73.18				12.14
Control Delay	10.4	15.1						79.6
LOS	B	C		F		F		F
Approach Delay								
Approach LOS				F				

HCS2000: Unsignalized Intersections Release 4.1c

1.5 2028 Build Route 92– AM Peak Hour HCS Reports

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/11/2002
Period: AM
Project ID:
E/W St: Cozzens Rd.

Inter.: Cozzens Ln. & Rt1
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 with Rt92 AM Peak Hour

N/S St: RT 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	0	3	0	0	3	0
LGConfig	L	TR		L	TR			T			T	
Volume	204	567	15	339	441	281		2562			3698	
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left				
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
WB Left	A				SB	Left				
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	11.0	35.0					87.0			
Yellow	3.0	4.0					6.0			
All Red	0.0	2.0					2.0			

Cycle Length: 150.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	132	1805	1.72	0.07	423.2	F		
TR	425	1822	1.52	0.23	304.3	F	335.2	F
Westbound								
L	131	1787	2.88	0.07	935.1	F		
TR	409	1754	1.96	0.23	498.7	F	638.2	F
Northbound								
T	2838	4893	1.00	0.58	49.1	D	49.1	D
Southbound								
T	2893	4988	1.42	0.58	222.7	F	222.7	F

Intersection Delay = 233.2 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/11/2002
Period: AM
Project ID:
E/W St: Sandhill Rd.

Inter.: Sandhill Rd. & Rt1
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 with Rt 92 AM Peak Hour

N/S St: RT 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	0	2	0	0	2	0
LGConfig	L	T	R	L	T	R		T			T	
Volume	137	215	291	186	198	189		2045			2581	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	A				NB Left			
Thru		P			Thru	P		
Right	P	P			Right			
Peds					Peds			
WB Left	A				SB Left			
Thru		P			Thru	P		
Right	P	P			Right			
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	9.0	34.0			95.0			
Yellow	3.0	3.0			6.0			
All Red	3.0	2.0			2.0			

Cycle Length: 157.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	103	1805	1.48	0.06	332.9	F		
T	407	1881	0.59	0.22	61.3	E	115.3	F
R	499	1599	0.65	0.31	52.9	D		
Westbound								
L	101	1770	2.05	0.06	578.8	F		
T	400	1845	0.55	0.22	60.1	E	223.8	F
R	499	1599	0.42	0.31	45.4	D		
Northbound								
T	2042	3374	1.11	0.61	89.3	F	89.3	F
Southbound								
T	2100	3471	1.37	0.61	198.7	F	198.7	F

Intersection Delay = 153.7 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/11/2002
Period: AM
Project ID:
E/W St: NEW RD.

Inter.: NEW RD. & RT 1
Area Type: All other areas
Jurisd: MIDDLESEX COUNTY
Year : 2028 with RT92 AM Peak Hour

N/S St: RT 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	0	2	0	0	2	0
LGConfig	L	T	R	L	T	R		T			T	
Volume	26	418	262	60	258	152		1939			2947	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left				
Thru		P			Thru	P			
Right	P	P			Right				
Peds					Peds				
WB Left	A				SB Left				
Thru		P			Thru	P			
Right	P	P			Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	7.0	23.0				90.0			
Yellow	3.0	4.0				6.0			
All Red	3.0	2.0				2.0			

Cycle Length: 140.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	89	1787	0.33	0.05	66.4	E		
T	309	1881	1.50	0.16	300.5	F	201.3	F
R	415	1615	0.70	0.26	56.6	E		
Westbound								
L	89	1770	0.75	0.05	95.5	F		
T	306	1863	0.94	0.16	95.6	F	79.6	E
R	411	1599	0.41	0.26	46.2	D		
Northbound								
T	2149	3343	1.00	0.64	45.0	D	45.0	D
Southbound								
T	2231	3471	1.47	0.64	237.9	F	237.9	F

Intersection Delay = 159.6 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/11/2002
Period: AM
Project ID:
E/W St: RT 522 Promenade Rd.

Inter.: RT 522 Promenade Blvd. & Rt1
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 with Rt92 AM Peak Hour

N/S St: RT 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	0	2	0	0	2	0
LGConfig	L	T	R	L	T	R		T			T	
Volume	150	386	137	548	478	137		1976			2624	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
WB Left	A				SB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	5.0	28.0					94.0			
Yellow	3.0	3.0					6.0			
All Red	2.0	2.0					2.0			

Cycle Length: 145.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	60	1752	2.78	0.03	916.9	F		
T	363	1881	1.18	0.19	165.1	F	308.7	F
R	423	1615	0.36	0.26	46.0	D		
Westbound								
L	61	1770	9.98	0.03	4145	F		
T	363	1881	1.46	0.19	281.4	F	2074	F
R	411	1568	0.37	0.26	46.3	D		
Northbound								
T	2167	3343	1.01	0.65	48.2	D	48.2	D
Southbound								
T	2250	3471	1.30	0.65	162.1	F	162.1	F

Intersection Delay = 488.0 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

** Note the WB left turn volume entered as 548 (not 740); HCS would not accept a higher volume and still generate a delay for that lane.

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: AM
Project ID:
E/W St: Ridge Rd.

Inter.: Rt1 & Ridge Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 with RT92 AM Peak Hour

N/S St: Rt 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	1	0	3	0	0	3	0
LGConfig	L	TR		L	T	R		T			T	
Volume	390	485	137	57	501	233		2508			4832	
Lane Width	12.0	12.0		12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A	P			NB	Left				
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
WB Left	A	P			SB	Left				
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	6.0	22.0					75.0			
Yellow	3.0	4.0					6.0			
All Red	0.0	2.0					2.0			

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	148	1736	2.93	0.26	927.0	F		
TR	333	1819	2.08	0.18	543.0	F	690.9	F
Westbound								
L	144	1687	0.44	0.26	38.3	D		
T	338	1845	1.65	0.18	353.5	F	251.6	F
R	282	1538	0.92	0.18	84.3	F		
Northbound								
T	3030	4848	0.92	0.63	25.7	C	25.7	C
Southbound								
T	3118	4988	1.72	0.63	348.7	F	348.7	F

Intersection Delay = 289.6 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: AM
Project ID:
E/W St: Rt 522

Inter.: Rt 27 & 522
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 with RT92 AM Peak Hour

N/S St: Rt 27

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	1	1	1	1	1	1	1
LGConfig	L	TR		L	T	R	L	T	R	L	T	R
Volume	25	25	25	308	25	184	25	510	257	160	932	25
Lane Width	12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	A			
Thru	P					Thru		P		
Right	P					Right	P	P		
Peds						Peds				
WB Left	P				SB	Left	A			
Thru	P					Thru		P		
Right	P					Right	P	P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	23.0						6.0	50.0		
Yellow	4.0						2.0	2.0		
All Red	1.0						1.0	1.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	205	802	0.14	0.26	27.2	C		
TR	257	1004	0.22	0.26	28.4	C	28.0	C
Westbound								
L	346	1355	0.99	0.26	78.9	E		
T	278	1086	0.10	0.26	26.3	C	60.0	E
R	409	1599	0.50	0.26	32.9	C		
Northbound								
L	69	1031	0.41	0.07	44.2	D		
T	1045	1881	0.54	0.56	14.7	B	13.2	B
R	1059	1615	0.27	0.66	7.1	A		
Southbound								
L	120	1805	1.48	0.07	298.5	F		
T	1045	1881	0.99	0.56	45.6	D	81.0	F
R	605	923	0.05	0.66	5.7	A		

Intersection Delay = 53.6 (sec/veh) Intersection LOS = D

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: AM
Project ID:
E/W St: Raymond

Inter.: RT27 & Raymond
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build AM Peak Hour

N/S St: RT 27

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	1	0	0	1	0	0	1	0
LGConfig					TR			TR			LT	
Volume				290	50		504	136		132	1095	
Lane Width				12.0			12.0				12.0	
RTOR Vol					0			0				

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left					NB	Left				
Thru						Thru	P			
Right						Right	P			
Peds						Peds				
WB Left					SB	Left	P			
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green		15.0					39.0			
Yellow		2.0					2.0			
All Red		1.0					1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
TR	464	1856	0.81	0.25	35.7	D	35.7	D
Northbound								
TR	1169	1798	0.61	0.65	8.4	A	8.4	A
Southbound								
LT	980	1508	1.39	0.65	193.1	F	193.1	F

Intersection Delay = 115.3 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran Garmen
Date: 11/22/02
Period: AM Peak Hour
Project ID:
E/W St: Route 27

Inter.: Rt 27 / Laurel Ave
Area Type: All other areas
Jurisd: Middlesex County, NJ
Year : 2028 w/ Rt 92

N/S St: Laurel Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	0	1	0	0	1	0
LGConfig	L	TR		L	TR			LTR			LTR	
Volume	10	632	216	90	1062	17	204	267	75	10	271	122
Lane Width	12.0	11.0		12.0	9.0			11.0			10.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru	P					Thru	P			
Right	P					Right	P			
Peds						Peds				
WB Left	P				SB	Left	P			
Thru	P					Thru	P			
Right	P					Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	40.0						30.0			
Yellow	4.0						4.0			
All Red	1.0						1.0			

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L				0.50				
TR	861	1721	1.91	0.50	433.1	F		
Westbound								
L	94	188	1.78	0.50	408.8	F		
TR	821	1642	2.47	0.50	685.8	F	664.7	F
Northbound								
LTR	279	744	3.52	0.38	1169	F	1169	F
Southbound								
LTR	614	1637	1.10	0.38	90.9	F	90.9	F

Intersection Delay = (sec/veh) Intersection LOS =

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: AM
Project ID:
E/W St: Rt 522

Inter.: Rt 522 & Kingston Ln.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 with RT92 AM Peak Hour

N/S St: Kingston Ln.

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	1	1	0	1	1	0
LGConfig		T	R	L	TR		L	TR		L	T	
Volume		531	1085	50	923	301	416	139	50	114	101	
Lane Width		12.0	12.0	12.0	12.0		12.0	12.0		12.0	12.0	
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	P			
Thru		P			Thru	P			
Right		P			Right	P			
Peds					Peds				
WB Left	A	P			SB Left	P			
Thru	A	P			Thru	P			
Right	A	P			Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	8.0	27.0				41.0			
Yellow	4.0	4.0				4.0			
All Red	0.0	1.0				1.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1062	3539	0.56	0.30	28.6	C	507.9	F
R	470	1568	2.57	0.30	742.4	F		
Westbound								
L	322	1805	0.17	0.43	16.2	B		
TR	1488	3434	0.91	0.43	33.0	C	32.3	C
Northbound								
L	575	1263	0.80	0.46	32.4	C		
TR	785	1723	0.27	0.46	16.0	B	27.3	C
Southbound								
L	518	1136	0.25	0.46	16.1	B		
T	832	1827	0.13	0.46	14.5	B	15.4	B

Intersection Delay = 237.7 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: AM
Project ID:
E/W St: George Rd.

Inter.: George Rd. & Kingston Ln.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 with RT92 AM Peak Hour

N/S St: Kingston Ln.

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	0	0	0	1	1	0	0	1	1
LGConfig	L		R				L	T			T	R
Volume	256		39				200	974			313	105
Lane Width	12.0		12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru						Thru	P			
Right	P					Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru	P			
Right						Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	10.0						44.0			
Yellow	3.0						4.0			
All Red	2.0						2.0			

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	277	1798	1.03	0.15	88.2	F	80.0-	E
R	248	1615	0.17	0.15	25.4	C		
Westbound								
Northbound								
L	707	1044	0.31	0.68	5.5	A		
T	1266	1870	0.85	0.68	15.5	B	13.8	B
Southbound								
T	1281	1892	0.27	0.68	4.7	A	4.5	A
R	1093	1615	0.11	0.68	3.9	A		

Intersection Delay = 22.1 (sec/veh) Intersection LOS = C

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: AM
Project ID:
E/W St: Friendship Rd.

Inter.: US 130 & Friendship Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 with Rt92 AM Peak Hour

N/S St: US 130

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	0	0	2	0	0	2	0
LGConfig		LR		L	T			T			TR	
Volume	261		252	6	51			2455			1628	68
Lane Width		12.0		12.0	12.0			12.0			12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left				
Thru						Thru	P			
Right	P					Right				
Peds						Peds				
WB Left	P				SB	Left				
Thru	P					Thru	P			
Right						Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	13.0						74.0			
Yellow	4.0						5.0			
All Red	2.0						2.0			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LR	177	1363	3.22	0.13	1057	F	1057	F
Westbound								
L	223	1719	0.03	0.13	38.3	D		
T	245	1881	0.23	0.13	41.2	D	40.9	D
Northbound								
T	2245	3034	1.22	0.74	114.1	F	114.1	F
Southbound								
TR	2421	3272	0.78	0.74	10.5	B	10.5	B

Intersection Delay = 178.5 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 11/19/2002
Period: AM
Project ID:
E/W St: Rt 32 EB

Inter.: Rt 32 EB & CR 535
Area Type: All other areas
Jurisd: Middlesex Co, NJ
Year : 2028 with RT92 AM Peak Hour

N/S St: CR 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	0	0	0	2	1	1	2	0
LGConfig	L	TR						T	R	L	T	
Volume	197	605	103					586	613	482	1552	
Lane Width	12.0	12.0						12.0	12.0	12.0	12.0	
RTOR Vol			0						0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left				
Thru	P					Thru		P		
Right	P					Right		P		
Peds						Peds				
WB Left					SB	Left	A	P		
Thru						Thru	A	P		
Right						Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	28.0						15.0	63.0		
Yellow	4.0						3.0	4.0		
All Red	1.5						0.0	1.5		

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	414	1656	0.53	0.25	43.7	D		
TR	887	3227	0.89	0.28	54.4	D	52.0	D
Westbound								
Northbound								
T	1884	3374	0.35	0.56	15.0	B	22.7	C
R	835	1495	0.82	0.56	30.1	C		
Southbound								
L	584	1805	0.92	0.68	48.3	D		
T	2303	3252	0.75	0.71	12.1	B	20.7	C

Intersection Delay = 28.1 (sec/veh) Intersection LOS = C

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 11/19/2002
Period: AM
Project ID:
E/W St: Rt 32 WB

Inter.: Rt 32 WB & CR 535
Area Type: All other areas
Jurisd: Middlesex Co, NJ
Year : 2028 with RT92 AM Peak Hour

N/S St: CR 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	2	0	1	2	0	0	2	1
LGConfig				L	TR		L	T			T	R
Volume				735	1348	155	10	773			1299	295
Lane Width				12.0	12.0		12.0	12.0			12.0	12.0
RTOR Vol					0						0	

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left					NB	Left	A	P		
Thru						Thru	A	P		
Right						Right				
Peds						Peds				
WB Left		P			SB	Left				
Thru		P				Thru		P		
Right		P				Right		P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green		51.0					5.0	50.0		
Yellow		4.0					3.0	4.0		
All Red		1.5					0.0	1.5		

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	752	1770	1.09	0.43	93.3	F		
TR	1644	3523	1.02	0.47	58.2	E	69.7	E
Northbound								
L	149	1752	0.07	0.49	25.4	C		
T	1743	3374	0.49	0.52	18.9	B	19.0	B
Southbound								
T	1463	3252	0.99	0.45	53.1	D	48.7	D
R	623	1495	0.53	0.42	29.3	C		

Intersection Delay = 53.9 (sec/veh) Intersection LOS = D

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/11/02
Period: AM
Project ID:
E/W St: Dey Rd

Inter.: Dey Rd & CR 535
Area Type: All other areas
Jurisd: Middlesex County, NJ
Year : 2028 with RT92 AM Peak Hour

N/S St: CR 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	0	0	0	1	0	0	1	0
LGConfig		LR						LT			TR	
Volume	210		176				69	1489			685	362
Lane Width		12.0						14.0			14.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left	A	P		
Thru						Thru	A	P		
Right	A					Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru		P		
Right						Right		P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	20.0						10.0	74.0		
Yellow	4.5						3.0	5.0		
All Red	2.0						0.0	1.5		

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LR	268	1605	1.60	0.17	337.2	F	337.2	F
Westbound								
Northbound								
LT	919	1814	1.88	0.76	416.2	F	416.2	F
Southbound								
TR	1227	1888	0.95	0.65	35.0+	D	35.0+	D

Intersection Delay = 272.6 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: AM
Project ID:
E/W St: Dey Rd.

Inter.: US 130 & Dey Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 with RT92 AM Peak Hour

N/S St: US 130

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	1	2	0	1	2	0
LGConfig	L	T	R	L	T	R	L	TR		L	TR	
Volume	141	209	255	19	193	192	371	2052	35	184	1241	183
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru		P			Thru		P		
Right		P			Right		P		
Peds					Peds				
WB Left	A				SB Left	A			
Thru		P			Thru		P		
Right		P			Right		P		
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	8.0	7.0				7.0	40.0		
Yellow	3.0	4.0				3.0	5.0		
All Red	0.0	1.0				0.0	1.0		

Cycle Length: 79.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	177	1752	0.89	0.10	72.8	E		
T	168	1900	1.38	0.09	240.1	F	310.7	F
R	143	1615	1.98	0.09	500.7	F		
Westbound								
L	183	1805	0.11	0.10	32.6	C		
T	154	1743	1.39	0.09	246.1	F	263.4	F
R	140	1583	1.52	0.09	303.5	F		
Northbound								
L	154	1736	2.68	0.09	808.1	F		
TR	1511	2985	1.53	0.51	263.5	F	345.7	F
Southbound								
L	133	1504	1.53	0.09	310.3	F		
TR	1630	3219	0.97	0.51	35.2	D	66.7	E

Intersection Delay = 246.6 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: AM
Project ID:
E/W St: Plainsboro Rd.

Inter.: Rt 535 & Plainsboro Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 with Rt92 AM Peak Hour

N/S St: Rt 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	0	0	0	1	1	0	0	1	1
LGConfig	L		R				L	T			T	R
Volume	75		1				0	703			447	434
Lane Width	12.0		12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru						Thru	P			
Right	P					Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru	P			
Right						Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	26.0						26.0			
Yellow	4.0						4.0			
All Red	2.0						2.0			

Cycle Length: 64.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	719	1770	0.12	0.41	12.2	B		
							12.2	B
R	656	1615	0.00	0.41	11.3	B		
Westbound								
Northbound								
L	244	600	0.00	0.41	11.3	B		
T	702	1727	1.11	0.41	88.2	F	88.2	F
Southbound								
T	728	1792	0.68	0.41	20.7	C	22.8	C
R	631	1553	0.76	0.41	24.9	C		

Intersection Delay = 50.0 (sec/veh) Intersection LOS = D

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: AM
Project ID:
E/W St: Scudder's Mill Rd.

Inter.: Scudder's Mill Rd.& Dey Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 with RT92 AM Peak Hour

N/S St: Dey Rd.

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	0	1	0	0	1	1
LGConfig	L	TR		L	TR			LTR			LT	R
Volume	67	251	75	231	851	56	483	110	10	33	204	1049
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	12.0
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A	P			NB	Left	P			
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
WB Left	A	P			SB	Left	P			
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	15.0	31.0					20.0			
Yellow	3.0	5.0					4.0			
All Red	0.0	1.0					1.0			

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	429	1787	0.17	0.61	9.5	A		
TR	1303	3362	0.28	0.39	17.3	B	16.0	B
Westbound								
L	694	1805	0.37	0.61	7.6	A		
TR	1373	3543	0.73	0.39	24.5	C	21.1	C
Northbound								
LTR	156	623	4.29	0.25	1527	F	1527	F
Southbound								
LT	447	1789	0.59	0.25	32.0	C	738.6	F
R	400	1599	2.91	0.25	898.5	F		

Intersection Delay = 556.0 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

1.6 2028 Build Route 92– PM Peak Hour HCS Reports

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/11/2002
Period: PM
Project ID:
E/W St: Cozzens Rd.

Inter.: Cozzens Ln. & Rt1
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 with Rt92 PM Peak Hour

N/S St: RT 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	0	3	0	0	3	0
LGConfig	L	TR		L	TR			T			T	
Volume	130	478	65	131	171	442		2831			4163	
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left				
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
WB Left	A				SB	Left				
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	11.0	35.0					87.0			
Yellow	3.0	4.0					6.0			
All Red	0.0	2.0					2.0			

Cycle Length: 150.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	130	1770	1.11	0.07	180.3	F		
TR	424	1816	1.42	0.23	260.8	F	245.3	F
Westbound								
L	131	1787	1.11	0.07	182.2	F		
TR	387	1659	1.76	0.23	409.8	F	369.6	F
Northbound								
T	2893	4988	1.09	0.58	77.5	E	77.5	E
Southbound								
T	2921	5036	1.58	0.58	295.8	F	295.8	F

Intersection Delay = 224.8 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/11/2002
Period: AM
Project ID:
E/W St: Sandhill Rd.

Inter.: Sandhill Rd. & Rt1
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 with Rt 92 AM Peak Hour

N/S St: RT 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	0	2	0	0	2	0
LGConfig	L	T	R	L	T	R		T			T	
Volume	39	239	185	69	446	34		2077			1703	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
WB Left	A				SB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	9.0	34.0					95.0			
Yellow	3.0	3.0					6.0			
All Red	3.0	2.0					2.0			

Cycle Length: 157.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	102	1787	0.42	0.06	74.3	E		
T	407	1881	0.65	0.22	64.1	E	57.4	E
R	494	1583	0.42	0.31	45.3	D		
Westbound								
L	101	1770	0.76	0.06	101.4	F		
T	407	1881	1.22	0.22	180.3	F	161.5	F
R	499	1599	0.08	0.31	38.3	D		
Northbound								
T	2080	3438	1.11	0.61	87.9	F	87.9	F
Southbound								
T	2042	3374	0.93	0.61	36.6	D	36.6	D

Intersection Delay = 75.2 (sec/veh) Intersection LOS = E

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/11/2002
Period: PM
Project ID:
E/W St: NEW RD.

Inter.: NEW RD. & RT 1
Area Type: All other areas
Jurisd: MIDDLESEX COUNTY
Year : 2028 with RT92 PM Peak Hour

N/S St: RT 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	0	2	0	0	2	0
LGConfig	L	T	R	L	T	R		T			T	
Volume	18	292	172	17	462	40		2503			1603	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
WB Left	A				SB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	7.0	23.0					90.0			
Yellow	3.0	4.0					6.0			
All Red	3.0	2.0					2.0			

Cycle Length: 140.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	89	1770	0.22	0.05	65.2	E		
T	306	1863	1.06	0.16	126.3	F	95.9	F
R	415	1615	0.46	0.26	47.5	D		
Westbound								
L	87	1736	0.22	0.05	65.1	E		
T	309	1881	1.66	0.16	369.6	F	334.4	F
R	411	1599	0.11	0.26	40.2	D		
Northbound								
T	2231	3471	1.25	0.64	139.9	F	139.9	F
Southbound								
T	2169	3374	0.82	0.64	22.6	C	22.6	C

Intersection Delay = 118.6 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/11/2002
Period: PM
Project ID:
E/W St: Rt 522 Promenade Rd.

Inter.: RT 522 Promenade Blvd. & Rt1
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 with Rt92 PM Peak Hour

N/S St: RT 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	0	2	0	0	2	0
LGConfig	L	T	R	L	T	R		T			T	
Volume	158	421	45	548	312	292		2748			1750	
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
WB Left	A				SB	Left				
Thru		P				Thru	P			
Right	P	P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	5.0	28.0					94.0			
Yellow	3.0	3.0					6.0			
All Red	2.0	2.0					2.0			

Cycle Length: 145.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	62	1805	2.84	0.03	940.0	F		
T	367	1900	1.28	0.19	202.0	F	377.6	F
R	423	1615	0.12	0.26	41.3	D		
Westbound								
L	61	1770	9.98	0.03	4145	F		
T	363	1881	0.96	0.19	95.2	F	2013	F
R	419	1599	0.77	0.26	62.5	E		
Northbound								
T	2250	3471	1.36	0.65	189.1	F	189.1	F
Southbound								
T	2187	3374	0.89	0.65	27.1	C	27.1	C

Intersection Delay = 497.7 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

** Note the WB left turn volume entered as 548 (not 615); HCS would not accept a higher volume and still generate a delay for that lane.

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: PM
Project ID:
E/W St: Ridge Rd.

Inter.: Rt1 & Ridge Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 with RT92 PM Peak Hour

N/S St: Rt 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	1	0	3	0	0	3	0
LGConfig	L	TR		L	T	R		T			T	
Volume	437	396	32	383	469	213		3660			2073	
Lane Width	12.0	12.0		12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A	P			NB Left				
Thru		P			Thru	P			
Right		P			Right				
Peds					Peds				
WB Left	A	P			SB Left				
Thru		P			Thru	P			
Right		P			Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	6.0	22.0				75.0			
Yellow	3.0	4.0				6.0			
All Red	0.0	2.0				2.0			

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	148	1736	3.28	0.26	1087	F		
TR	341	1860	1.40	0.18	244.1	F	670.1	F
Westbound								
L	144	1687	2.96	0.26	942.1	F		
T	338	1845	1.54	0.18	307.0	F	488.5	F
R	282	1538	0.84	0.18	72.3	E		
Northbound								
T	3030	4848	1.34	0.63	178.8	F	178.8	F
Southbound								
T	3118	4988	0.74	0.63	17.3	B	17.3	B

Intersection Delay = 233.7 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: PM
Project ID:
E/W St: Rt 522

Inter.: Rt 27 & 522
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 with RT92 PM Peak Hour

N/S St: Rt 27

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	1	1	1	1	1	1	1
LGConfig	L	TR		L	T	R	L	T	R	L	T	R
Volume	15	15	15	241	15	341	15	737	197	168	267	15
Lane Width	12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	A			
Thru	P					Thru		P		
Right	P					Right	P	P		
Peds						Peds				
WB Left	P				SB	Left	A			
Thru	P					Thru		P		
Right	P					Right	P	P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	23.0						6.0	50.0		
Yellow	4.0						2.0	2.0		
All Red	1.0						1.0	1.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	220	859	0.08	0.26	26.1	C		
TR	272	1065	0.13	0.26	26.7	C	26.5	C
Westbound								
L	350	1369	0.77	0.26	45.8	D		
T	294	1152	0.06	0.26	25.7	C	55.6	E
R	405	1583	0.94	0.26	63.9	E		
Northbound								
L	73	1094	0.23	0.07	41.5	D		
T	1045	1881	0.78	0.56	21.6	C	18.8	B
R	1059	1615	0.21	0.66	6.6	A		
Southbound								
L	120	1805	1.56	0.07	329.8	F		
T	1035	1863	0.29	0.56	11.3	B	130.0	F
R	642	979	0.03	0.66	5.5	A		

Intersection Delay = 54.3 (sec/veh) Intersection LOS = D

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: PM
Project ID:
E/W St: Raymond

Inter.: RT27 & Raymond
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 No Build PM Peak Hour

N/S St: RT 27

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	1	0	0	1	0	0	1	0
LGConfig					TR			TR			LT	
Volume				440	106		490	250		106	373	
Lane Width				12.0			12.0				12.0	
RTOR Vol					0			0				

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left					NB	Left				
Thru						Thru	P			
Right						Right	P			
Peds						Peds				
WB Left					SB	Left	P			
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green		15.0					39.0			
Yellow		2.0					2.0			
All Red		1.0					1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
TR	461	1843	1.32	0.25	179.7	F	179.7	F
Northbound								
TR	1144	1760	0.72	0.65	10.8	B	10.8	B
Southbound								
LT	861	1325	0.62	0.65	9.5	A	9.5	A

Intersection Delay = 62.7 (sec/veh) Intersection LOS = E

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran Garmen
Date: 11/22/02
Period: PM Peak Hour
Project ID:
E/W St: Route 27

Inter.: Rt 27 / Laurel Ave
Area Type: All other areas
Jurisd: Middlesex County, NJ
Year : 2028 w/ Rt 92

N/S St: Laurel Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	0	1	0	0	1	0
LGConfig	L	TR		L	TR			LTR			LTR	
Volume	10	588	130	68	734	10	313	225	219	10	255	21
Lane Width	12.0	11.0		12.0	9.0			11.0			10.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru	P					Thru	P			
Right	P					Right	P			
Peds						Peds				
WB Left	P				SB	Left	P			
Thru	P					Thru	P			
Right	P					Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	40.0						30.0			
Yellow	4.0						4.0			
All Red	1.0						1.0			

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	94	188	0.23	0.50	17.1	B		
TR	865	1729	1.62	0.50	305.7	F	301.3	F
Westbound								
L	94	188	1.34	0.50	228.6	F		
TR	829	1658	1.69	0.50	334.6	F	325.9	F
Northbound								
LTR	371	988	4.46	0.38	1589	F	1589	F
Southbound								
LTR	615	1641	0.80	0.38	32.5	C	32.5	C

Intersection Delay = 701.6 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: PM
Project ID:
E/W St: Rt 522

Inter.: Rt 522 & Kingston Ln.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 with RT92 PM Peak Hour

N/S St: Kingston Ln.

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	1	1	0	1	1	0
LGConfig		T	R	L	TR		L	TR		L	T	
Volume		1143	361	10	123	18	179	913	10	86	150	
Lane Width		12.0	12.0	12.0	12.0		12.0	12.0		12.0	12.0	
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left					NB	Left	P			
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
WB Left	A	P			SB	Left	P			
Thru	A	P				Thru	P			
Right	A	P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	8.0	27.0					41.0			
Yellow	4.0	4.0					4.0			
All Red	0.0	1.0					1.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1083	3610	1.17	0.30	119.2	F	102.1	F
R	466	1553	0.86	0.30	48.1	D		
Westbound								
L	244	1805	0.05	0.43	18.7	B		
TR	1483	3422	0.11	0.43	15.2	B	15.4	B
Northbound								
L	508	1115	0.39	0.46	18.5	B		
TR	824	1808	1.24	0.46	144.5	F	124.0	F
Southbound								
L	84	184	1.14	0.46	166.4	F		
T	857	1881	0.19	0.46	15.1	B	70.4	E

Intersection Delay = 103.3 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: PM
Project ID:
E/W St: George Rd.

Inter.: George Rd. & Kingston Ln.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 with RT92 PM Peak Hour

N/S St: Kingston Ln.

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	0	0	0	1	1	0	0	1	1
LGConfig	L		R				L	T			T	R
Volume	160		58				159	459			169	181
Lane Width	12.0		12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru						Thru	P			
Right	P					Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru	P			
Right						Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	10.0						44.0			
Yellow	3.0						4.0			
All Red	2.0						2.0			

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	274	1780	0.65	0.15	37.2	D		
							34.4	C
R	248	1615	0.26	0.15	26.7	C		
Westbound								
Northbound								
L	787	1163	0.22	0.68	4.7	A		
T	1241	1833	0.41	0.68	5.7	A	5.4	A
Southbound								
T	1269	1874	0.15	0.68	4.0	A	4.1	A
R	1072	1583	0.19	0.68	4.3	A		

Intersection Delay = 10.4 (sec/veh) Intersection LOS = B

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: PM
Project ID:
E/W St: Friendship Rd.

Inter.: US 130 & Friendship Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 with Rt92 PM Peak Hour

N/S St: US 130

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	0	0	2	0	0	2	0
LGConfig		LR		L	T			T			TR	
Volume	155		366	6	27			2091			1945	54
Lane Width		12.0		12.0	12.0			12.0			12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left				
Thru						Thru	P			
Right	P					Right				
Peds						Peds				
WB Left	P				SB	Left				
Thru	P					Thru	P			
Right						Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	13.0						74.0			
Yellow	4.0						5.0			
All Red	2.0						2.0			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LR	182	1402	3.18	0.13	1039	F	1039	F
Westbound								
L	235	1805	0.03	0.13	38.2	D		
T	240	1845	0.13	0.13	39.5	D	39.3	D
Northbound								
T	2226	3008	1.04	0.74	44.6	D	44.6	D
Southbound								
TR	2381	3218	0.93	0.74	19.2	B	19.2	B

Intersection Delay = 145.2 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 11/19/2002
Period: PM
Project ID:
E/W St: Rt 32 EB

Inter.: Rt 32 EB & CR 535
Area Type: All other areas
Jurisd: Middlesex Co, NJ
Year : 2028 with RT92 AM Peak Hour

N/S St: CR 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	0	0	0	2	1	1	2	0
LGConfig	L	TR						T	R	L	T	
Volume	128	1199	31					714	693	693	1228	
Lane Width	12.0	12.0						12.0	12.0	12.0	12.0	
RTOR Vol			0						0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left				
Thru	P					Thru		P		
Right	P					Right		P		
Peds						Peds				
WB Left					SB	Left	A	P		
Thru						Thru	A	P		
Right						Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	28.0						15.0	61.0		
Yellow	4.0						3.0	4.0		
All Red	1.5						0.0	1.5		

Cycle Length: 118.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	421	1656	0.34	0.25	38.1	D		
TR	915	3273	1.49	0.28	270.1	F	248.3	F
Westbound								
Northbound								
T	1859	3374	0.43	0.55	16.3	B	29.7	C
R	824	1495	0.93	0.55	43.5	D		
Southbound								
L	517	1805	1.49	0.68	244.6	F		
T	2287	3252	0.60	0.70	9.2	A	94.1	F

Intersection Delay = 119.4 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 11/19/2002
Period: PM
Project ID:
E/W St: Rt 32 WB

Inter.: Rt 32 WB & CR 535
Area Type: All other areas
Jurisd: Middlesex Co, NJ
Year : 2028 with RT92 AM Peak Hour

N/S St: CR 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	2	0	1	2	0	0	2	1
LGConfig				L	TR		L	T			T	R
Volume				600	553	21	158	684			1321	158
Lane Width				12.0	12.0		12.0	12.0			12.0	12.0
RTOR Vol						0						0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left					NB	Left	A	P		
Thru						Thru	A	P		
Right						Right				
Peds						Peds				
WB Left		P			SB	Left				
Thru		P				Thru		P		
Right		P				Right		P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green		49.0					6.0	51.0		
Yellow		4.0					3.0	4.0		
All Red		1.5					0.0	1.5		

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
L	723	1770	0.92	0.41	52.8	D		
TR	1600	3556	0.40	0.45	22.9	C	38.2	D
Northbound								
L	164	1752	1.07	0.51	123.2	F		
T	1799	3374	0.42	0.53	16.9	B	36.9	D
Southbound								
T	1491	3252	0.98	0.46	52.0	D	49.0	D
R	635	1495	0.28	0.43	23.6	C		

Intersection Delay = 42.4 (sec/veh) Intersection LOS = D

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/11/02
Period: PM
Project ID:
E/W St: Dey Rd

Inter.: Dey Rd & CR 535
Area Type: All other areas
Jurisd: Middlesex County, NJ
Year : 2028 with RT92 PM Peak Hour

N/S St: CR 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	0	0	0	1	0	0	1	0
LGConfig		LR						LT			TR	
Volume	294		95				204	1058			906	442
Lane Width		12.0						14.0			14.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left	A	P		
Thru						Thru	A	P		
Right	A					Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru		P		
Right						Right		P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	20.0						10.0	74.0		
Yellow	4.5						3.0	5.0		
All Red	2.0						0.0	1.5		

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LR	273	1638	1.59	0.17	330.5	F	330.5	F
Westbound								
Northbound								
LT	620	1899	2.26	0.76	588.0	F	588.0	F
Southbound								
TR	1188	1827	1.26	0.65	145.3	F	145.3	F

Intersection Delay = 355.7 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: PM
Project ID:
E/W St: Dey Rd.

Inter.: US 130 & Dey Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 with RT92 PM Peak Hour

N/S St: US 130

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	1	2	0	1	2	0
LGConfig	L	T	R	L	T	R	L	TR		L	TR	
Volume	125	128	214	71	31	93	21	1737	9	268	1685	137
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru		P			Thru		P		
Right		P			Right		P		
Peds					Peds				
WB Left	A				SB Left	A			
Thru		P			Thru		P		
Right		P			Right		P		
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	8.0	7.0				7.0	40.0		
Yellow	3.0	4.0				3.0	5.0		
All Red	0.0	1.0				0.0	1.0		

Cycle Length: 79.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	179	1770	0.78	0.10	53.8	D		
T	167	1881	0.85	0.09	74.3	E	201.5	F
R	143	1615	1.66	0.09	363.7	F		
Westbound								
L	177	1752	0.45	0.10	35.2	D		
T	168	1900	0.20	0.09	36.1	D	51.0	D
R	135	1524	0.76	0.09	68.0	E		
Northbound								
L	152	1719	0.15	0.09	33.7	C		
TR	1486	2935	1.31	0.51	162.0	F	160.5	F
Southbound								
L	155	1752	1.92	0.09	474.1	F		
TR	1597	3155	1.27	0.51	144.9	F	187.2	F

Intersection Delay = 172.4 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: PM
Project ID:
E/W St: Plainsboro Rd.

Inter.: Rt 535 & Plainsboro Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 with Rt92 PM Peak Hour

N/S St: Rt 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	0	0	0	1	1	0	0	1	1
LGConfig	L		R				L	T			T	R
Volume	224		10				10	193			356	265
Lane Width	12.0		12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru						Thru	P			
Right	P					Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru	P			
Right						Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	26.0						26.0			
Yellow	4.0						4.0			
All Red	2.0						2.0			

Cycle Length: 64.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	719	1770	0.35	0.41	14.4	B		
							14.3	B
R	656	1615	0.02	0.41	11.4	B		
Westbound								
Northbound								
L	305	750	0.04	0.41	11.7	B		
T	728	1792	0.29	0.41	13.8	B	13.7	B
Southbound								
T	696	1712	0.57	0.41	18.0	B	17.4	B
R	619	1524	0.47	0.41	16.6	B		

Intersection Delay = 16.0 (sec/veh) Intersection LOS = B

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: PM
Project ID:
E/W St: Scudder's Mill Rd.

Inter.: Scudder's Mill Rd.& Schalk's Crossing
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 with RT92 PM Peak Hour

N/S St: Schalk's Crossing

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	3	0	2	2	1	2	2	1	2	2	0
LGConfig	L	TR		L	T	R	L	T	R	L	TR	
Volume	329	1831	285	82	638	133	119	103	64	65	173	214
Lane Width	12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	P			
Thru		P			Thru	P			
Right		P			Right	P			
Peds					Peds				
WB Left	A				SB Left		P		
Thru		P			Thru		P		
Right		P			Right		P		
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	6.0	33.0				10.0	10.0		
Yellow	4.0	4.0				4.0	4.0		
All Red	0.0	2.0				1.5	1.5		

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	130	1736	2.82	0.08	874.9	F		
TR	2076	5032	1.13	0.41	89.8	F	195.5	F
Westbound								
L	263	3502	0.35	0.08	35.9	D		
T	1474	3574	0.48	0.41	18.4	B	19.7	B
R	660	1599	0.22	0.41	16.0	B		
Northbound								
L	402	3213	0.33	0.13	34.1	C		
T	442	3539	0.26	0.13	33.1	C	34.3	C
R	202	1615	0.35	0.13	36.8	D		
Southbound								
L	433	3467	0.17	0.13	32.1	C		
TR	408	3260	1.05	0.13	94.5	F	85.5	F

Intersection Delay = 134.6 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

Analyst: BB
Agency: Urbitran
Date: 10/14/2002
Period: PM
Project ID:
E/W St: Scudder's Mill Rd.

Inter.: Scudder's Mill Rd.& Dey Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 with RT92 PM Peak Hour

N/S St: Dey Rd.

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	0	1	0	0	1	1
LGConfig	L	TR		L	TR			LTR			LT	R
Volume	799	697	655	10	331	178	37	339	10	30	108	523
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	12.0
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A	P			NB	Left	P			
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
WB Left	A	P			SB	Left	P			
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	15.0	31.0					20.0			
Yellow	3.0	5.0					4.0			
All Red	0.0	1.0					1.0			

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Flow	Sat Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound									
L	591	1805		1.50	0.61	264.0	F		
TR	1290	3330		1.16	0.39	107.3	F	165.5	F
Westbound									
L	433	1805		0.03	0.61	11.7	B		
TR	1309	3377		0.43	0.39	19.1	B	18.9	B
Northbound									
LTR	418	1673		1.03	0.25	80.9	F	80.9	F
Southbound									
LT	348	1390		0.44	0.25	29.3	C	196.7	F
R	404	1615		1.44	0.25	240.8	F		

Intersection Delay = 141.8 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

1.7 2028 Six-Lane Route 1 w/ Signals Removed - AM Peak Hour HCS Reports

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/04/02
Period: AM
Project ID:
E/W St: Ridge Rd.

Inter.: Rt1 & Ridge Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 NB Rt 1 No Signals

N/S St: Rt 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	1	0	3	0	0	3	0
LGConfig	L	TR		L	T	R		T			T	
Volume	621	371	139	186	490	123		2762			4883	
Lane Width	12.0	12.0		12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A	P			NB	Left				
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
WB Left	A	P			SB	Left				
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	6.0	21.0					55.0			
Yellow	3.0	4.0					6.0			
All Red	2.0	2.0					1.0			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	177	1736	3.90	0.32	1349	F		
TR	379	1804	1.49	0.21	275.1	F	865.3	F
Westbound								
L	171	1656	1.21	0.32	168.6	F		
T	384	1827	1.42	0.21	241.8	F	193.4	F
R	308	1468	0.44	0.21	39.0	D		
Northbound								
T	2642	4803	1.16	0.55	99.8	F	99.8	F
Southbound								
T	2743	4988	1.98	0.55	464.0	F	464.0	F

Intersection Delay = 383.7 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/08/02
Period: AM
Project ID: Rt 92 Model
E/W St: Rt 522 Promeade

Inter.: Rt 27 & RT522 Promeade
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 NB Rt 1 No Signals

N/S St: Rt 27

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	1	1	1	1	1	1	1	1	1	1
LGConfig		LT	R	L	T	R	L	T	R	L	T	R
Volume	25	25	25	129	25	304	25	348	212	161	881	25
Lane Width		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	A			
Thru	P					Thru		P		
Right	P					Right	P	P		
Peds						Peds				
WB Left	P				SB	Left	A			
Thru	P					Thru		P		
Right	P					Right	P	P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	23.0						6.0	50.0		
Yellow	4.0						2.0	2.0		
All Red	1.0						1.0	1.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LT	243	952	0.23	0.26	28.7	C	28.1	C
R	236	923	0.12	0.26	26.7	C		
Westbound								
L	343	1342	0.42	0.26	31.6	C		
T	278	1086	0.10	0.26	26.3	C	43.4	D
R	405	1583	0.83	0.26	49.7	D		
Northbound								
L	69	1031	0.41	0.07	44.2	D		
T	1035	1863	0.37	0.56	12.3	B	11.7	B
R	1028	1568	0.23	0.66	6.8	A		
Southbound								
L	119	1787	1.50	0.07	307.5	F		
T	1035	1863	0.95	0.56	36.4	D	76.6	E
R	605	923	0.05	0.66	5.7	A		

Intersection Delay = 50.5 (sec/veh) Intersection LOS = D

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/05/02
Period: AM
Project ID: Route 92 Model
E/W St: Raymond

Inter.: RT27 & Raymond
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 NB Rt 1 No Signals

N/S St: RT 27

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	0	0	0	1	0	0	1	0
LGConfig					LR			TR			LT	
Volume				393		10		431	185	98	916	
Lane Width					12.0			12.0			12.0	
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left					NB	Left				
Thru						Thru	P			
Right						Right	P			
Peds						Peds				
WB Left		P			SB	Left	P			
Thru						Thru	P			
Right		P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green		15.0					39.0			
Yellow		2.0					2.0			
All Red		1.0					1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
LR	451	1805	0.99	0.25	63.2	E	63.2	E
Northbound								
TR	1157	1780	0.59	0.65	8.2	A	8.2	A
Southbound								
LT	1072	1650	1.05	0.65	52.5	D	52.5	D

Intersection Delay = 41.2 (sec/veh) Intersection LOS = D

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran Garmen
Date: 12/05/02
Period: AM Peak Hour
Project ID: Route 92 Model
E/W St: Route 27

Inter.: Rt 27 / Laurel Ave
Area Type: All other areas
Jurisd: Middlesex County, NJ
Year : 2028 NB Rt 1 No Signals

N/S St: Laurel Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	0	1	0	0	1	0
LGConfig	L	TR		L	TR			LTR			LTR	
Volume	10	592	255	36	1186	10	120	312	95	10	225	144
Lane Width	12.0	11.0		12.0	9.0			11.0			10.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru	P					Thru	P			
Right	P					Right	P			
Peds						Peds				
WB Left	P				SB	Left	P			
Thru	P					Thru	P			
Right	P					Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	40.0						30.0			
Yellow	4.0						4.0			
All Red	1.0						1.0			

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L				0.50				
TR	861	1722	1.89	0.50	426.8	F		
Westbound								
L	94	188	0.71	0.50	52.5	D		
TR	822	1643	2.74	0.50	806.3	F	784.5	F
Northbound								
LTR	376	1002	2.68	0.38	786.6	F	786.6	F
Southbound								
LTR	598	1594	1.05	0.38	76.2	E	76.2	E

Intersection Delay = (sec/veh) Intersection LOS =

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/08/02
Period: AM
Project ID: Rt 92 Model
E/W St: Rt 522

Inter.: Rt 522 & Kingston Ln.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 NB Rt 1 No Signals

N/S St: Kingston Ln.

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	1	1	0	1	1	0
LGConfig		T	R	L	TR		L	TR		L	T	
Volume		621	1168	10	1103	445	536	132	10	155	71	
Lane Width		12.0	12.0	12.0	12.0		12.0	12.0		12.0	12.0	
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left					NB Left	P			
Thru		P			Thru	P			
Right		P			Right	P			
Peds					Peds				
WB Left	A				SB Left	P			
Thru	A	P			Thru	P			
Right	A	P			Right				
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	8.0	27.0				41.0			
Yellow	4.0	4.0				4.0			
All Red	0.0	1.0				1.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1022	3406	0.68	0.30	31.2	C	552.9	F
R	470	1568	2.76	0.30	830.2	F		
Westbound								
L	159	1787	0.07	0.09	37.8	D		
TR	1463	3377	1.18	0.43	112.1	F	111.6	F
Northbound								
L	587	1289	1.02	0.46	65.5	E		
TR	790	1734	0.20	0.46	15.2	B	55.0-	D
Southbound								
L	563	1236	0.31	0.46	16.9	B		
T	849	1863	0.09	0.46	14.1	B	16.0	B

Intersection Delay = 283.2 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/04/02
Period: AM
Project ID:
E/W St: George Rd.

Inter.: George Rd. & Kingston Ln.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 NB Rt 1 No Signals

N/S St: Kingston Ln.

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	0	0	0	1	1	0	0	1	1
LGConfig	L		R				L	T			T	R
Volume	212		126				327	852			115	80
Lane Width	12.0		12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru						Thru	P			
Right	P					Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru	P			
Right						Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	10.0						44.0			
Yellow	3.0						4.0			
All Red	2.0						2.0			

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	275	1787	0.86	0.15	54.4	D		
							47.1	D
R	246	1599	0.57	0.15	34.7	C		
Westbound								
Northbound								
L	843	1245	0.43	0.68	6.4	A		
T	1261	1863	0.75	0.68	11.1	B	9.8	A
Southbound								
T	1273	1881	0.10	0.68	3.8	A	3.8	A
R	1082	1599	0.08	0.68	3.7	A		

Intersection Delay = 16.5 (sec/veh) Intersection LOS = B

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/08/02
Period: AM
Project ID: Rt 92 Model
E/W St: Friendship Rd.

Inter.: US 130 & Friendship Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 NB Rt 1 No Signals

N/S St: US 130

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	1	1	0	1	2	0	0	2	0
LGConfig	L		R	L	T		L	T			TR	
Volume	233		110	898	161		62	1744			1621	109
Lane Width	12.0		12.0	12.0	12.0		12.0	12.0			12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru						Thru	P			
Right	P					Right				
Peds						Peds				
WB Left	P				SB	Left				
Thru	P					Thru	P			
Right						Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	13.0						74.0			
Yellow	4.0						5.0			
All Red	2.0						2.0			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	113	867	2.29	0.13	651.9	F		
							460.4	F
R	202	1553	0.60	0.13	53.8	D		
Westbound								
L	228	1752	4.38	0.13	1573	F		
T	242	1863	0.74	0.13	60.2	E	1343	F
Northbound								
L	101	136	0.68	0.74	38.3	D		
T	2190	2959	0.88	0.74	15.5	B	16.3	B
Southbound								
TR	2461	3325	0.78	0.74	10.6	B	10.6	B

Intersection Delay = 329.8 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/08/02
Period: AM
Project ID: Rt 92 Model
E/W St: Rt32 Forsgate Dr

Inter.: RT 32 Forsgate Dr & CR 535
Area Type: All other areas
Jurisd: Middlesex Co, NJ
Year : 2002 NB Rt 1 No Signals

N/S St: CR 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	3	0	0	3	0	1	1	1	1	2	0
LGConfig	L	TR			TR		L	T	R	L	TR	
Volume	436	875	157		2586	240	14	389	169	154	1334	67
Lane Width	12.0	12.0			12.0		12.0	12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left	A	P		
Thru		P				Thru		P		
Right		P				Right		P		
Peds						Peds				
WB Left					SB	Left	A	P		
Thru		P				Thru		P		
Right		P				Right		P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	8.0	65.0					10.0	28.0		
Yellow	3.0	6.0					4.0	5.0		
All Red	2.0	2.0					0.0	2.0		

Cycle Length: 135.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	118	1597	4.10	0.07	1478	F		
TR	2256	4350	0.51	0.52	22.1	C	454.4	F
Westbound								
TR	2590	4995	1.21	0.52	131.9	F	131.9	F
Northbound								
L	171	1444	0.09	0.32	34.7	C		
T	421	1776	1.03	0.24	102.2	F	87.7	F
R	279	1179	0.67	0.24	59.1	E		
Southbound								
L	183	1597	0.93	0.32	85.1	F		
TR	809	3415	1.92	0.24	471.6	F	433.3	F

Intersection Delay = 274.6 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/04/02
Period: AM
Project ID:
E/W St: Dey Rd

Inter.: Dey Rd & CR 535
Area Type: All other areas
Jurisd: Middlesex County, NJ
Year : 2028 NB Rt1 No Signals

N/S St: CR 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	0	0	0	1	0	0	1	0
LGConfig		LR						LT			TR	
Volume	212		145				338	939			1262	127
Lane Width		12.0						14.0			14.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left	A	P		
Thru						Thru	A	P		
Right	A					Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru		P		
Right						Right		P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	20.0						10.0	74.0		
Yellow	4.5						3.0	5.0		
All Red	2.0						0.0	1.5		

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LR	278	1668	1.43	0.17	262.2	F	262.2	F
Westbound								
Northbound								
LT	483	1768	2.94	0.76	892.2	F	892.2	F
Southbound								
TR	1214	1868	1.27	0.65	149.5	F	149.5	F

Intersection Delay = 476.6 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/08/02
Period: AM
Project ID:
E/W St: Dey Rd.

Inter.: US 130 & Dey Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 NB Rt 1 No Signals

N/S St: US 130

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	1	2	0	1	2	0
LGConfig	L	T	R	L	T	R	L	TR		L	TR	
Volume	255	246	302	7	136	251	512	2133	25	109	1431	295
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru		P			Thru		P		
Right		P			Right		P		
Peds					Peds				
WB Left	A				SB Left	A			
Thru		P			Thru		P		
Right		P			Right		P		
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	8.0	7.0				7.0	40.0		
Yellow	3.0	4.0				3.0	5.0		
All Red	0.0	1.0				0.0	1.0		

Cycle Length: 79.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	176	1736	1.61	0.10	333.9	F		
T	163	1845	1.67	0.09	365.0	F	470.8	F
R	142	1599	2.37	0.09	672.0	F		
Westbound								
L	138	1367	0.06	0.10	32.3	C		
T	159	1792	0.95	0.09	95.0	F	469.4	F
R	117	1324	2.38	0.09	684.5	F		
Northbound								
L	157	1770	3.62	0.09	1232	F		
TR	1524	3009	1.57	0.51	280.8	F	463.3	F
Southbound								
L	145	1641	0.83	0.09	67.8	E		
TR	1644	3247	1.17	0.51	101.5	F	99.5	F

Intersection Delay = 347.7 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/08/02
Period: AM
Project ID: Rt 92 Model
E/W St: Plainsboro Rd.

Inter.: Rt 535 & Plainsboro Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 NB Rt 1 No Signals

N/S St: Rt 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	0	0	0	1	1	0	0	1	1
LGConfig	L		R				L	T			TR	R
Volume	64		10				10	698			581	588
Lane Width	12.0		12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru						Thru	P			
Right	P					Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru	P			
Right						Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	26.0						26.0			
Yellow	4.0						4.0			
All Red	2.0						2.0			

Cycle Length: 64.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	719	1770	0.10	0.41	12.0	B		
							11.9	B
R	650	1599	0.02	0.41	11.4	B		
Westbound								
Northbound								
L	169	417	0.07	0.41	12.3	B		
T	702	1727	1.11	0.41	85.6	F	84.6	F
Southbound								
TR	722	1776	0.89	0.41	33.6	C	47.5	D
R	637	1568	1.03	0.41	61.2	E		

Intersection Delay = 59.6 (sec/veh) Intersection LOS = E

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/08/02
Period: AM
Project ID: Rt 92 Model
E/W St: Scudder's Mill Rd.

Inter.: Scudder's Mill Rd.& Schalk's
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 NB Rt 1 No Signals

N/S St: Schalk's Crossing

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	3	0	2	2	1	2	2	1	2	2	0
LGConfig	L	TR		L	T	R	L	T	R	L	TR	
Volume	121	267	23	6	1890	682	490	285	13	145	107	105
Lane Width	12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	P			
Thru		P			Thru	P			
Right		P			Right	P			
Peds					Peds				
WB Left	A				SB Left		P		
Thru		P			Thru		P		
Right		P			Right		P		
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	6.0	33.0				10.0	10.0		
Yellow	4.0	4.0				4.0	4.0		
All Red	0.0	2.0				1.5	1.5		

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	131	1752	1.02	0.08	121.8	F		
TR	2006	4862	0.16	0.41	15.0	B	46.3	D
Westbound								
L	260	3467	0.03	0.08	34.3	C		
T	1474	3574	1.42	0.41	218.6	F	192.3	F
R	641	1553	1.18	0.41	121.0	F		
Northbound								
L	433	3467	1.26	0.13	168.0	F		
T	426	3406	0.74	0.13	45.0	D	121.3	F
R	200	1599	0.07	0.13	31.6	C		
Southbound								
L	409	3273	0.39	0.13	35.0+	D		
TR	410	3276	0.58	0.13	38.8	D	37.3	D

Intersection Delay = 150.9 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/08/02
Period: AM
Project ID: Rt 92 Model
E/W St: Scudder's Mill Rd.

Inter.: Scudder's Mill Rd.& Dey Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 NB Rt 1 No Signals

N/S St: Dey Rd.

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	0	1	0	0	1	1
LGConfig	L	TR		L	TR			LTR			LT	R
Volume	87	232	105	10	1087	34	393	188	10	35	229	1098
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	12.0
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A	P			NB	Left	P			
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
WB Left	A	P			SB	Left	P			
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	15.0	31.0					20.0			
Yellow	3.0	5.0					4.0			
All Red	0.0	1.0					1.0			

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	389	1597	0.25	0.61	12.1	B		
TR	1287	3321	0.29	0.39	17.5	B	16.4	B
Westbound								
L	683	1787	0.02	0.61	6.3	A		
TR	1366	3524	0.91	0.39	34.0	C	33.7	C
Northbound								
LTR	145	580	4.53	0.25	1634	F	1634	F
Southbound								
LT	435	1740	0.67	0.25	35.1	D	791.4	F
R	396	1583	3.08	0.25	973.0	F		

Intersection Delay = 595.4 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

1.8 2028 Six-Lane Route 1 w/ Signals Removed - PM Peak Hour HCS Reports

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/04/02
Period: PM
Project ID:
E/W St: Ridge Rd.

Inter.: Rt1 & Ridge Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 NB Rt 1 No Signals

N/S St: Rt 1

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	1	0	3	0	0	3	0
LGConfig	L	TR		L	T	R		T			T	
Volume	667	311	12	300	508	367		3736			2272	
Lane Width	12.0	12.0		12.0	12.0	12.0		12.0			12.0	
RTOR Vol			0			0						

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A	P			NB	Left				
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
WB Left	A	P			SB	Left				
Thru		P				Thru	P			
Right		P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	6.0	21.0					55.0			
Yellow	3.0	4.0					6.0			
All Red	2.0	2.0					1.0			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	171	1656	4.33	0.32	1545	F		
TR	384	1827	0.93	0.21	70.9	E	1064	F
Westbound								
L	173	1687	1.92	0.32	472.1	F		
T	391	1863	1.44	0.21	252.6	F	283.0	F
R	329	1568	1.24	0.21	170.8	F		
Northbound								
T	2743	4988	1.51	0.55	255.4	F	255.4	F
Southbound								
T	2691	4893	0.94	0.55	28.8	C	28.8	C

Intersection Delay = 294.4 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/08/02
Period: PM
Project ID: Rt 92 Model
E/W St: RT 522 Promeade

Inter.: Rt 27 & Promeade Blvd (RT522)
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 NB Rt 1 No Signals

N/S St: Rt 27

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	1	1	1	1	1	1	1	1	1	1
LGConfig		LT	R	L	T	R	L	T	R	L	T	R
Volume	15	15	15	110	15	465	15	612	121	146	174	15
Lane Width		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	A			
Thru	P					Thru		P		
Right	P					Right	P	P		
Peds						Peds				
WB Left	P				SB	Left	A			
Thru	P					Thru		P		
Right	P					Right	P	P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	23.0						6.0	50.0		
Yellow	4.0						2.0	2.0		
All Red	1.0						1.0	1.0		

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LT	273	1069	0.12	0.26	26.7	C	26.4	C
R	258	1009	0.07	0.26	25.9	C		
Westbound								
L	347	1356	0.35	0.26	30.2	C		
T	304	1188	0.06	0.26	25.7	C	140.7	F
R	409	1599	1.26	0.26	170.6	F		
Northbound								
L	75	1128	0.23	0.07	41.3	D		
T	1045	1881	0.65	0.56	17.1	B	15.8	B
R	1048	1599	0.13	0.66	6.1	A		
Southbound								
L	119	1787	1.36	0.07	249.3	F		
T	1035	1863	0.19	0.56	10.3	B	114.2	F
R	661	1009	0.03	0.66	5.5	A		

Intersection Delay = 78.1 (sec/veh) Intersection LOS = E

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/05/02
Period: PM
Project ID: Route 92 Model
E/W St: Raymond

Inter.: RT27 & Raymond
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 NB Rt 1 No Signals

N/S St: RT 27

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	0	0	0	1	0	0	1	0
LGConfig					LR			TR			LT	
Volume				263		10		480	164	45	405	
Lane Width					12.0			12.0			12.0	
RTOR Vol						0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left					NB	Left				
Thru						Thru	P			
Right						Right	P			
Peds						Peds				
WB Left		P			SB	Left	P			
Thru						Thru	P			
Right		P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green		15.0					39.0			
Yellow		2.0					2.0			
All Red		1.0					1.0			

Cycle Length: 60.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
Westbound								
LR	450	1801	0.67	0.25	28.1	C	28.1	C
Northbound								
TR	1172	1803	0.61	0.65	8.5	A	8.5	A
Southbound								
LT	1076	1655	0.46	0.65	6.7	A	6.7	A

Intersection Delay = 11.8 (sec/veh) Intersection LOS = B

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran Garmen
Date: 12/05/02
Period: PM Peak Hour
Project ID: Route 92 Model
E/W St: Route 27

Inter.: Rt 27 / Laurel Ave
Area Type: All other areas
Jurisd: Middlesex County, NJ
Year : 2028 NB Rt 1 No Signals

N/S St: Laurel Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	0	1	1	0	0	1	0	0	1	0
LGConfig	L	TR		L	TR			LTR			LTR	
Volume	10	535	192	47	688	10	307	225	287	10	263	46
Lane Width	12.0	11.0		12.0	9.0			11.0			10.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru	P					Thru	P			
Right	P					Right	P			
Peds						Peds				
WB Left	P				SB	Left	P			
Thru	P					Thru	P			
Right	P					Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	40.0						30.0			
Yellow	4.0						4.0			
All Red	1.0						1.0			

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	94	188	0.23	0.50	17.1	B		
TR	860	1720	1.64	0.50	311.5	F	307.0	F
Westbound								
L	94	188	0.93	0.50	92.7	F		
TR	821	1642	1.60	0.50	294.9	F	282.3	F
Northbound								
LTR	368	982	5.21	0.38	1927	F	1927	F
Southbound								
LTR	612	1633	0.88	0.38	40.3	D	40.3	D

Intersection Delay = 861.3 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/08/02
Period: PM
Project ID: Rt 92 Model
E/W St: Rt 522

Inter.: Rt 522 & Kingston Ln.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 NB Rt 1 No Signals

N/S St: Kingston Ln.

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	1	1	0	1	1	0
LGConfig		T	R	L	TR		L	TR		L	T	
Volume		1253	474	10	135	38	186	1022	10	170	107	
Lane Width		12.0	12.0	12.0	12.0		12.0	12.0		12.0	12.0	
RTOR Vol			0			0			0			

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left					NB	Left	P			
Thru		P				Thru	P			
Right		P				Right	P			
Peds						Peds				
WB Left	A	P			SB	Left	P			
Thru	A	P				Thru	P			
Right	A	P				Right				
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	8.0	27.0					41.0			
Yellow	4.0	4.0					4.0			
All Red	0.0	1.0					1.0			

Cycle Length: 90.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
T	1072	3574	1.30	0.30	172.8	F	159.1	F
R	457	1524	1.15	0.30	122.8	F		
Westbound								
L	243	1787	0.05	0.43	18.7	B		
TR	1442	3328	0.13	0.43	15.4	B	15.6	B
Northbound								
L	487	1069	0.43	0.46	19.2	B		
TR	779	1711	1.47	0.46	244.1	F	209.7	F
Southbound								
L	81	178	2.33	0.46	661.2	F		
T	832	1827	0.14	0.46	14.6	B	411.4	F

Intersection Delay = 190.0 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/04/02
Period: PM
Project ID:
E/W St: George Rd.

Inter.: George Rd. & Kingston Ln.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 NB Rt 1 No Signals

N/S St: Kingston Ln.

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	0	0	0	1	1	0	0	1	1
LGConfig	L		R				L	T			T	R
Volume	152		53				317	368			281	263
Lane Width	12.0		12.0				12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru						Thru	P			
Right	P					Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru	P			
Right						Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	10.0						44.0			
Yellow	3.0						4.0			
All Red	2.0						2.0			

Cycle Length: 65.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	275	1787	0.61	0.15	35.6	D		
							33.2	C
R	246	1599	0.24	0.15	26.5	C		
Westbound								
Northbound								
L	692	1023	0.51	0.68	7.8	A		
T	1237	1827	0.33	0.68	5.1	A	6.4	A
Southbound								
T	1261	1863	0.25	0.68	4.5	A	4.7	A
R	1082	1599	0.27	0.68	4.8	A		

Intersection Delay = 9.6 (sec/veh) Intersection LOS = A

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/08/02
Period: PM
Project ID: Rt 92 Model
E/W St: Friendship Rd.

Inter.: US 130 & Friendship Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 NB Rt 1 No Signals

N/S St: US 130

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	1	1	0	1	1	0	0	1	1
LGConfig		LR		L	T		L	T			T	R
Volume	202		151	801	54		18	1492			1897	72
Lane Width		12.0		12.0	12.0		12.0	12.0			12.0	12.0
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru						Thru	P			
Right	P					Right				
Peds						Peds				
WB Left	P				SB	Left				
Thru	P					Thru	P			
Right						Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	13.0						74.0			
Yellow	4.0						5.0			
All Red	2.0						2.0			

Cycle Length: 100.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LR	177	1360	2.21	0.13	608.1	F	608.1	F
Westbound								
L	217	1671	4.10	0.13	1450	F		
T	242	1863	0.25	0.13	41.5	D	1361	F
Northbound								
L	104	141	0.19	0.74	8.0	A		
T	1162	1570	1.43	0.74	210.1	F	207.7	F
Southbound								
T	1290	1743	1.63	0.74	301.9	F	291.0	F
R	1171	1583	0.07	0.74	3.7	A		

Intersection Delay = 483.2 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/08/02
Period: PM
Project ID: Rt 92 Model
E/W St: RT 32 Forsgate Dr

Inter.: RT 32 Forsgate Dr & CR 535
Area Type: All other areas
Jurisd: Middlesex Co, NJ
Year : 2028 NB Rt 1 No Signals

N/S St: CR 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	3	0	0	3	0	1	1	1	1	2	0
LGConfig	L	TR			TR		L	T	R	L	TR	
Volume	467	1530	111		1423	60	10	245	364	272	926	146
Lane Width	12.0	13.0			12.0		12.0	12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left	A	P		
Thru		P				Thru		P		
Right		P				Right		P		
Peds						Peds				
WB Left					SB	Left	A	P		
Thru		P				Thru		P		
Right		P				Right		P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	8.0	65.0					10.0	28.0		
Yellow	3.0	6.0					4.0	5.0		
All Red	2.0	2.0					0.0	2.0		

Cycle Length: 135.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	120	1626	4.32	0.07	1578	F		
TR	2624	5060	0.69	0.52	26.0	C	369.9	F
Westbound								
TR	2508	4836	0.66	0.52	25.1	C	25.1	C
Northbound								
L	187	1641	0.06	0.32	34.5	C		
T	421	1776	0.65	0.24	53.9	D	113.0	F
R	345	1455	1.17	0.24	155.0	F		
Southbound								
L	251	1736	1.20	0.32	172.2	F		
TR	807	3405	1.48	0.24	272.3	F	252.1	F

Intersection Delay = 220.7 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/04/02
Period: PM
Project ID:
E/W St: Dey Rd

Inter.: Dey Rd & CR 535
Area Type: All other areas
Jurisd: Middlesex County, NJ
Year : 2028 NB Route 1 No Signals

N/S St: CR 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	0	0	0	0	0	0	1	0	0	1	0
LGConfig		LR						LT			TR	
Volume	242		239				91	697			901	291
Lane Width		12.0						14.0			14.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	A				NB	Left	A	P		
Thru						Thru	A	P		
Right	A					Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru		P		
Right						Right		P		
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	20.0						10.0	74.0		
Yellow	4.5						3.0	5.0		
All Red	2.0						0.0	1.5		

Cycle Length: 120.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LR	283	1695	1.89	0.17	463.8	F	463.8	F
Westbound								
Northbound								
LT	723	1855	1.21	0.76	121.7	F	121.7	F
Southbound								
TR	1155	1777	1.15	0.65	97.4	F	97.4	F

Intersection Delay = 176.9 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/08/02
Period: PM
Project ID: Rt 92 Model
E/W St: Dey Rd.

Inter.: US 130 & Dey Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 NB Rt 1 No Signals

N/S St: US 130

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	1	1	1	1	1	1	2	0	1	2	0
LGConfig	L	T	R	L	T	R	L	TR		L	TR	
Volume	506	219	138	156	63	150	18	1890	10	182	1669	160
Lane Width	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0		12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	A			
Thru		P			Thru		P		
Right		P			Right		P		
Peds					Peds				
WB Left	A				SB Left	A			
Thru		P			Thru		P		
Right		P			Right		P		
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	8.0	7.0				7.0	40.0		
Yellow	3.0	4.0				3.0	5.0		
All Red	0.0	1.0				0.0	1.0		

Cycle Length: 79.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	176	1736	3.19	0.10	1037	F		
T	167	1881	1.46	0.09	270.8	F	698.5	F
R	142	1599	1.08	0.09	133.7	F		
Westbound								
L	176	1736	0.98	0.10	98.1	F		
T	163	1845	0.43	0.09	42.2	D	150.5	F
R	121	1369	1.38	0.09	250.2	F		
Northbound								
L	152	1719	0.13	0.09	33.6	C		
TR	1522	3006	1.39	0.51	197.8	F	196.2	F
Southbound								
L	149	1687	1.36	0.09	233.4	F		
TR	1647	3252	1.23	0.51	130.2	F	139.5	F

Intersection Delay = 254.8 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/08/02
Period: PM
Project ID: Rt 92 Model
E/W St: Plainsboro Rd.

Inter.: Rt 535 & Plainsboro Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 NB Rt 1 No Signals

N/S St: Rt 535

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	0	1	0	0	0	1	1	0	0	1	0
LGConfig	L		R				L	T			TR	
Volume	281		10				10	191			619	293
Lane Width	12.0		12.0				12.0	12.0			12.0	
RTOR Vol			0									0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4			5	6	7	8
EB Left	P				NB	Left	P			
Thru						Thru	P			
Right	P					Right				
Peds						Peds				
WB Left					SB	Left				
Thru						Thru	P			
Right						Right	P			
Peds						Peds				
NB Right					EB	Right				
SB Right					WB	Right				
Green	26.0						26.0			
Yellow	4.0						4.0			
All Red	2.0						2.0			

Cycle Length: 64.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	719	1770	0.43	0.41	15.6	B		
							15.5	B
R	650	1599	0.02	0.41	11.4	B		
Westbound								
Northbound								
L	117	289	0.09	0.41	13.3	B		
T	728	1792	0.29	0.41	13.8	B	13.8	B
Southbound								
TR	683	1682	1.48	0.41	244.9	F	244.9	F

Intersection Delay = 164.3 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/08/02
Period: PM
Project ID: Rt 92 Model
E/W St: Scudder's Mill Rd.

Inter.: Scudder's Mill Rd.& Schalk's
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 NB Rt 1 No Signals

N/S St: Schalk's Crossing

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	3	0	2	2	1	2	2	1	2	2	0
LGConfig	L	TR		L	T	R	L	T	R	L	TR	
Volume	237	2075	285	77	684	173	106	86	69	276	202	70
Lane Width	12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A				NB Left	P			
Thru		P			Thru	P			
Right		P			Right	P			
Peds					Peds				
WB Left	A				SB Left		P		
Thru		P			Thru		P		
Right		P			Right		P		
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	6.0	33.0				10.0	10.0		
Yellow	4.0	4.0				4.0	4.0		
All Red	0.0	2.0				1.5	1.5		

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	130	1736	2.02	0.08	523.3	F		
TR	2062	4999	1.27	0.41	149.9	F	183.9	F
Westbound								
L	260	3467	0.33	0.08	35.8	D		
T	1460	3539	0.52	0.41	18.9	B	19.9	B
R	647	1568	0.30	0.41	16.9	B		
Northbound								
L	398	3183	0.30	0.13	33.7	C		
T	442	3539	0.22	0.13	32.6	C	34.4	C
R	200	1599	0.38	0.13	37.7	D		
Southbound								
L	421	3367	0.73	0.13	44.3	D		
TR	425	3401	0.71	0.13	43.3	D	43.8	D

Intersection Delay = 121.9 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

HCS2000: Signalized Intersections Release 4.1c

Analyst: MRM
Agency: Urbitran
Date: 12/08/02
Period: PM
Project ID: Rt 92 Model
E/W St: Scudder's Mill Rd.

Inter.: Scudder's Mill Rd.& Dey Rd.
Area Type: All other areas
Jurisd: Middlesex Co., NJ
Year : 2028 NB Rt 1 No Signals

N/S St: Dey Rd.

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	1	2	0	0	1	0	0	1	1
LGConfig	L	TR		L	TR			LTR			LT	R
Volume	1023	735	663	10	296	246	10	445	10	32	88	628
Lane Width	12.0	12.0		12.0	12.0			12.0			12.0	12.0
RTOR Vol			0			0			0			0

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	A	P			NB Left	P			
Thru		P			Thru	P			
Right		P			Right	P			
Peds					Peds				
WB Left	A	P			SB Left	P			
Thru		P			Thru	P			
Right		P			Right	P			
Peds					Peds				
NB Right					EB Right				
SB Right					WB Right				
Green	15.0	31.0				20.0			
Yellow	3.0	5.0				4.0			
All Red	0.0	1.0				1.0			

Cycle Length: 80.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
L	564	1770	2.02	0.61	475.2	F		
TR	1280	3304	1.21	0.39	128.2	F	274.8	F
Westbound								
L	429	1787	0.03	0.61	11.7	B		
TR	1277	3295	0.47	0.39	19.6	B	19.5	B
Northbound								
LTR	461	1843	1.12	0.25	108.7	F	108.7	F
Southbound								
LT	298	1190	0.45	0.25	30.2	C	319.9	F
R	400	1599	1.75	0.25	375.5	F		

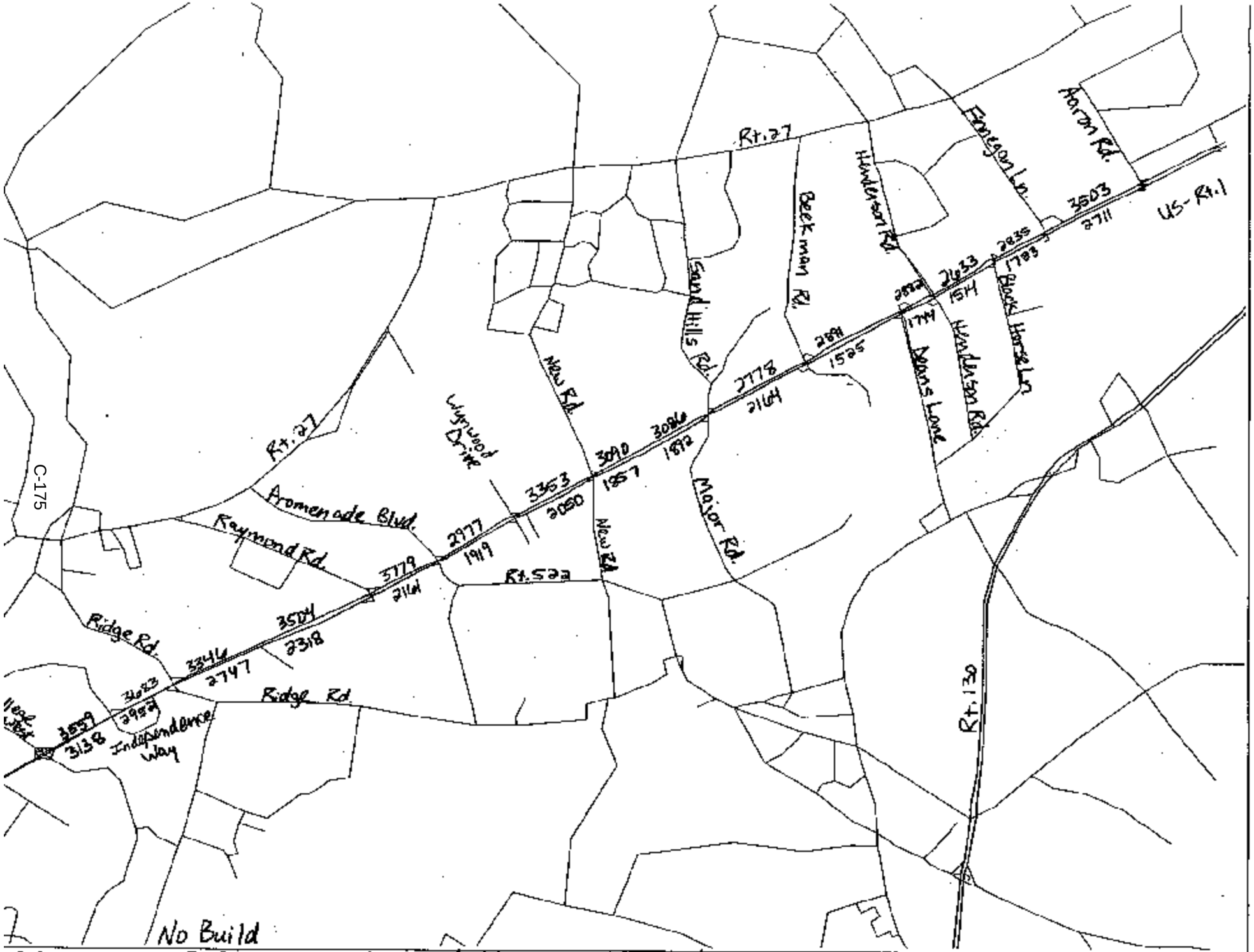
Intersection Delay = 230.8 (sec/veh) Intersection LOS = F

HCS2000: Signalized Intersections Release 4.1c

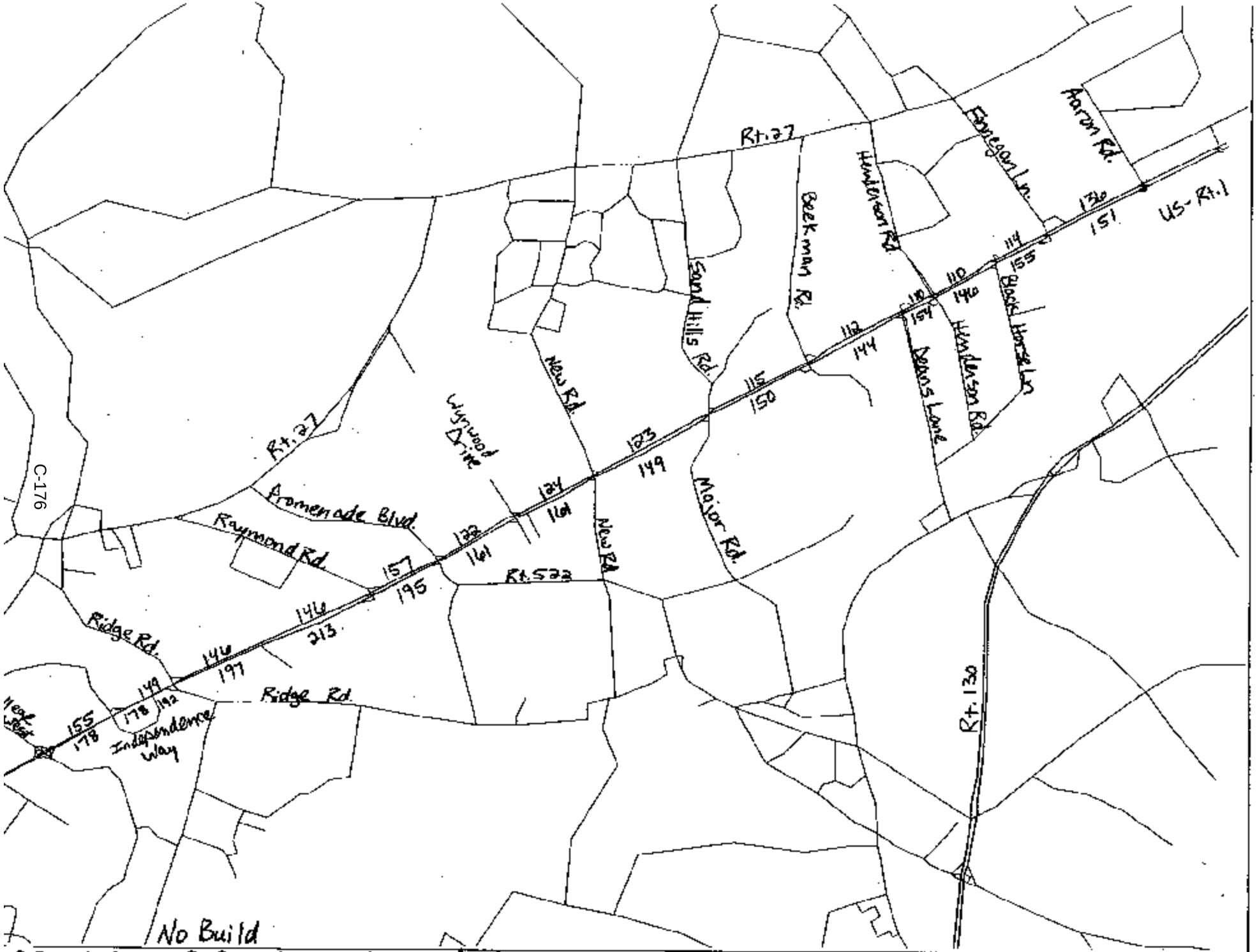
2.0 Average AM and PM Speeds and Volumes

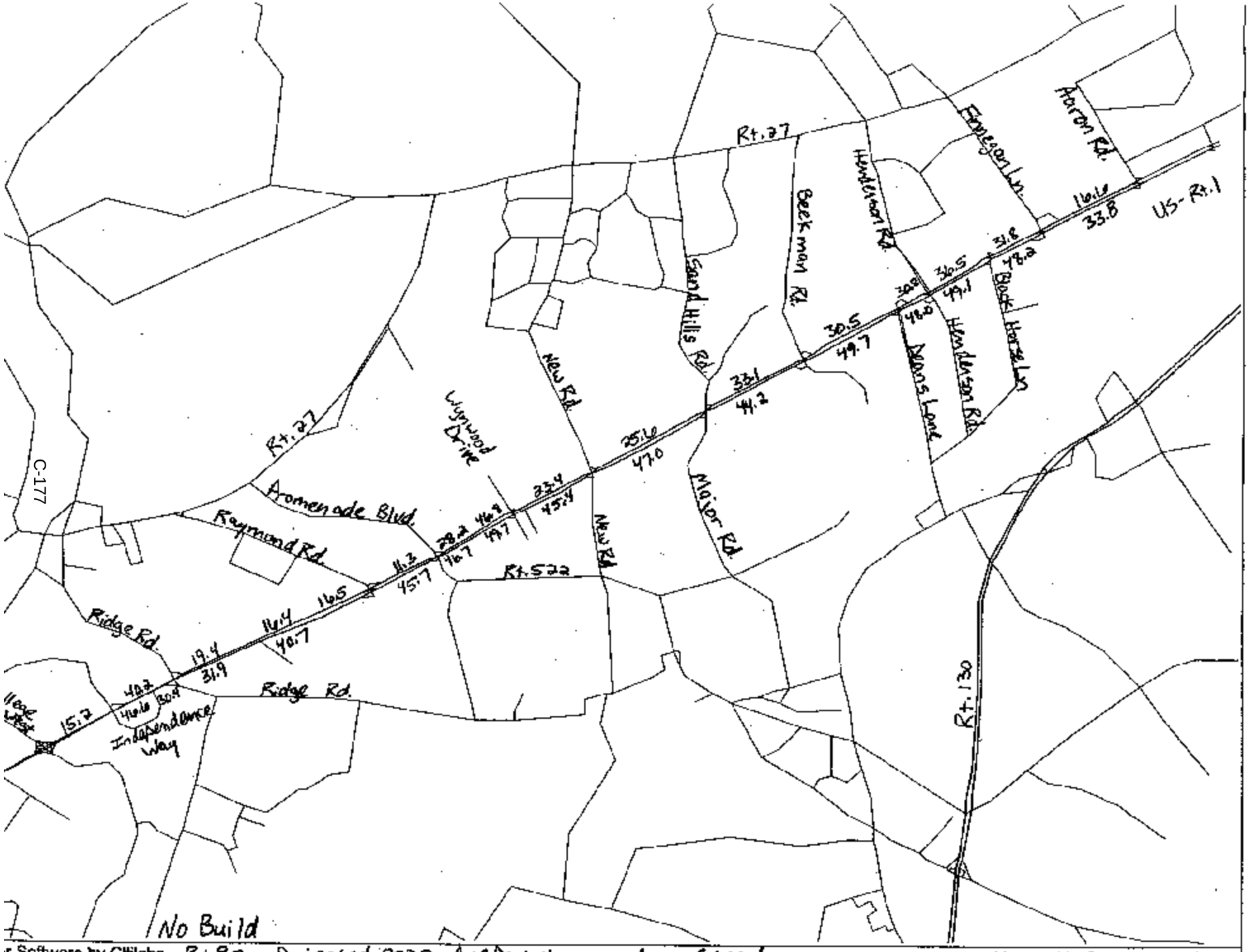
For the purpose of CDM's air quality analysis of proposed scenarios, Urbitran Associates generated average volume and speed data for a number of links for both AM and PM peak periods. For the 2028 No Build scenario, volumes and speeds are included along Route 1 between College Rd. and Aaron Rd., as well as for the intersection approaches at Rt. 32/Rt. 535, Rt. 535/Dey Rd., Rt. 130/Dey Rd., and Rt. 522/Kingston Rd. For the Build Route 92 Scenario, average volumes and speeds are provided for the intersection approaches described above, plus in detail along the proposed Route 92 including all entrance and exit ramps. Air quality analyses were also performed for two Route 1 alternatives. Hence, Urbitran documented average mid-block volumes and speeds along Route 1 from College Rd. to Aaron Rd. for the 6-Lane Route 1 scenario. Mid-block volumes and speeds are also provided for the 6-Lane Route 1 with Signals Removed scenario between College Rd. and Route 130, plus details at crossing streets where grade-separated interchanges or overpasses would be constructed under this scenario. These crossing streets include Rt. 522 (Promenade Blvd), New Rd., Sand Hills Rd./Major Rd., Beekman Rd./Northumberland Rd., Finnegan Lane, and Cozzens Lane/Adams Lane.

2.1 2028 No Build – Route 1 Mid-Block (College Rd. to Aaron Rd.)

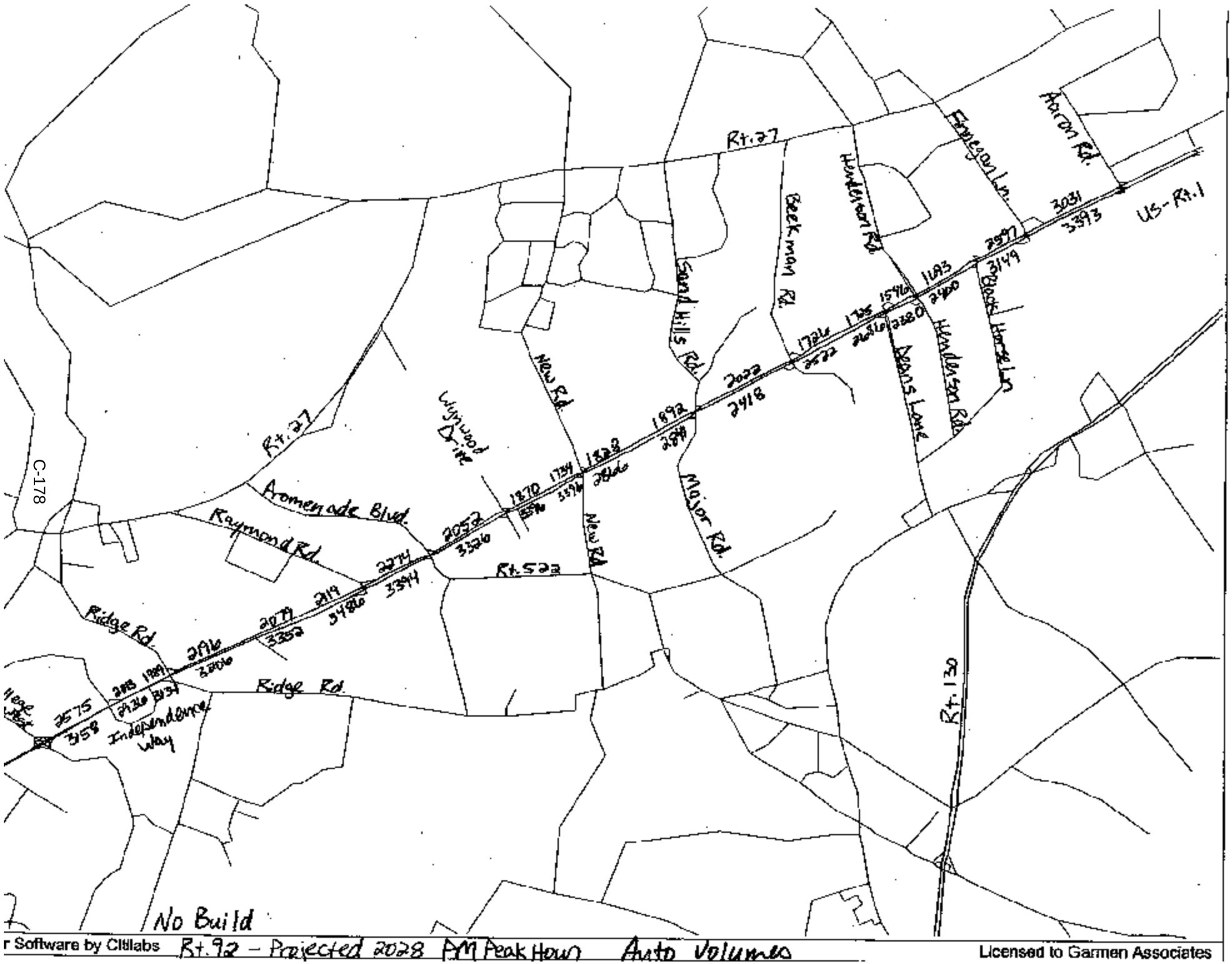


r Software by Citilabs Rt. 92 – Projected 2028 AM Peak Hour Auto Volumes Licensed to Garmen Associates

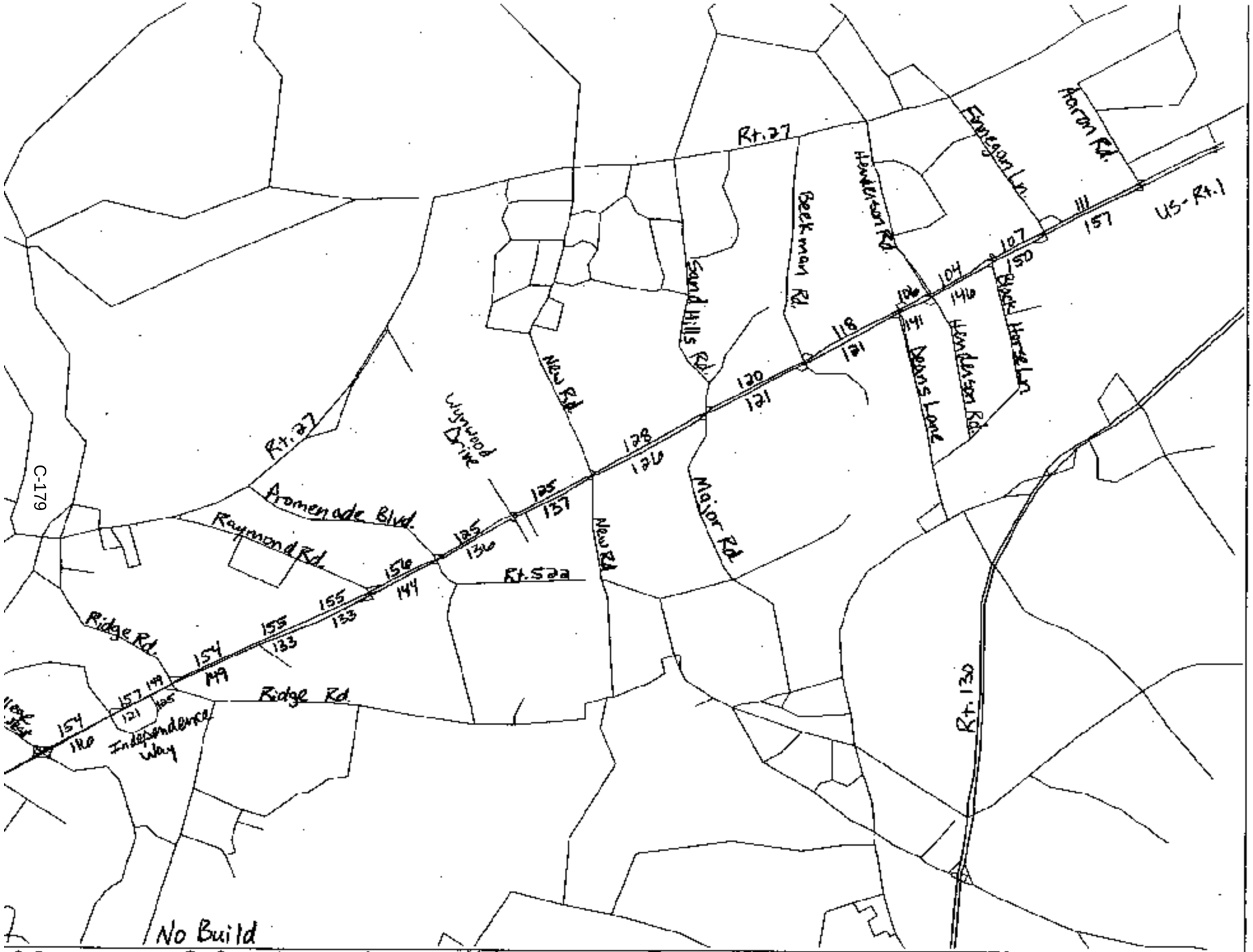

Rt. 27
Aaron Rd.
Bangor Ln.
Henderson Rd.
Beekman Rd.
Sand Hills Rd.
New Rd.
Wynwood Drive
Promenade Blvd.
Raymond Rd.
Rt. 523
Major Rd.
Dennis Lane
Henderson Rd.
Black Horse Ln.
US-Rt. 1
Rt. 130
Ridge Rd.
Independence Way
No Build
Rt. 92 - Projected 2028 AM Peak Hour Truck Volumes
Software by Citilabs
Licensed to Garmen Associates



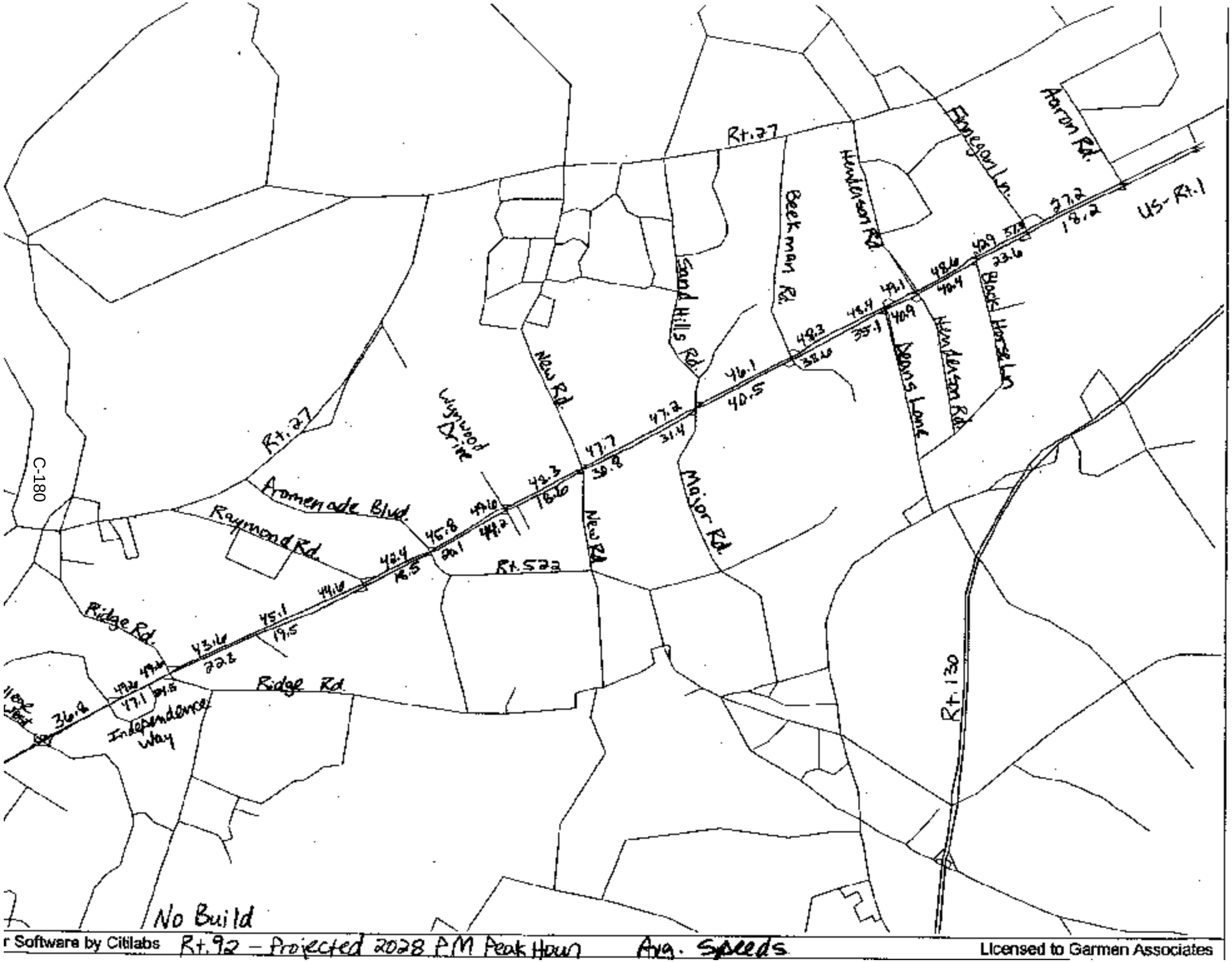
r Software by Cltilabs Rt. 92 - Projected 2028 AM Peak Hour Avg. Speeds Licensed to Gamen Associates



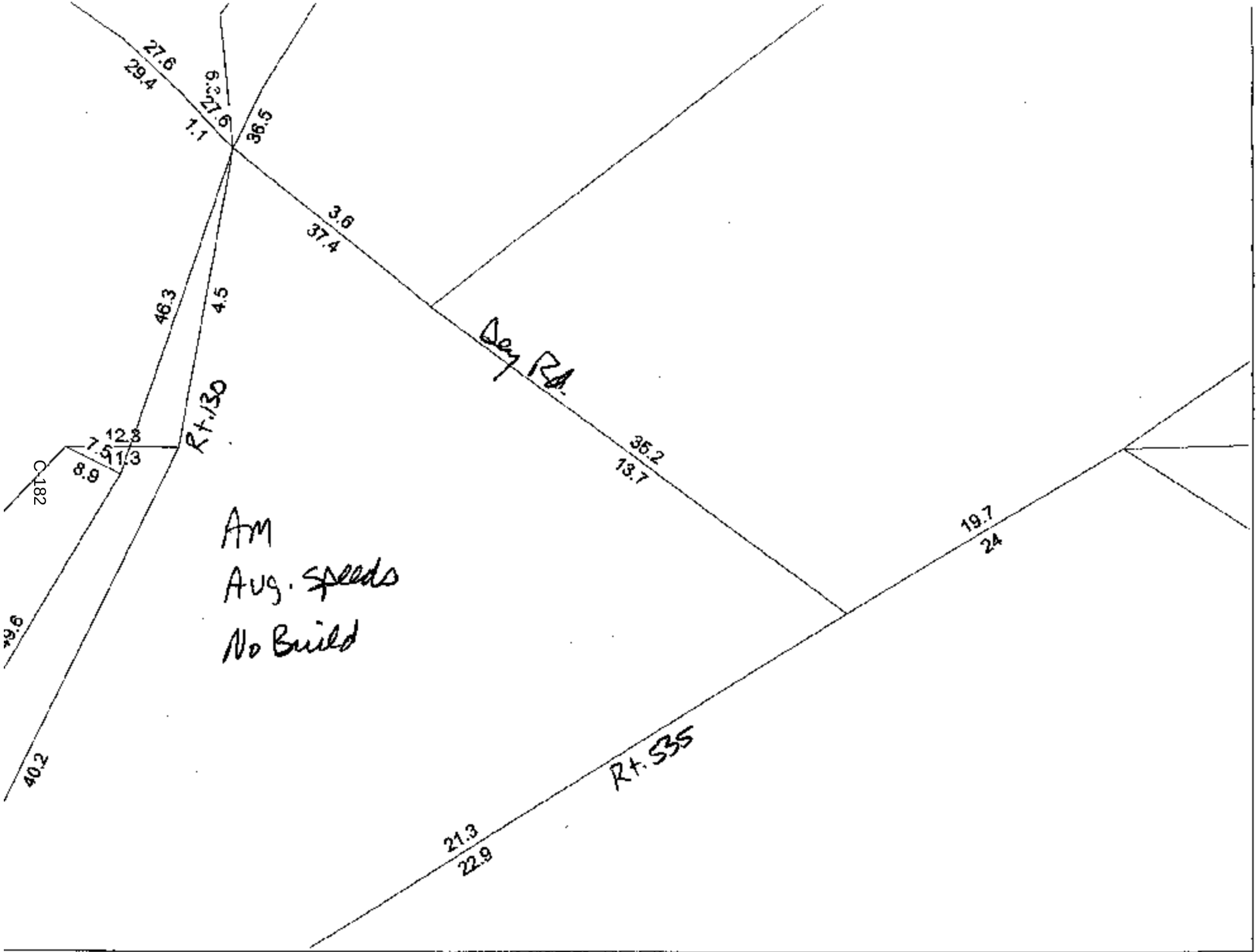
r Software by Citilabs Rt. 92 – Projected 2028 PM Peak Hour Auto Volumes Licensed to Garmen Associates



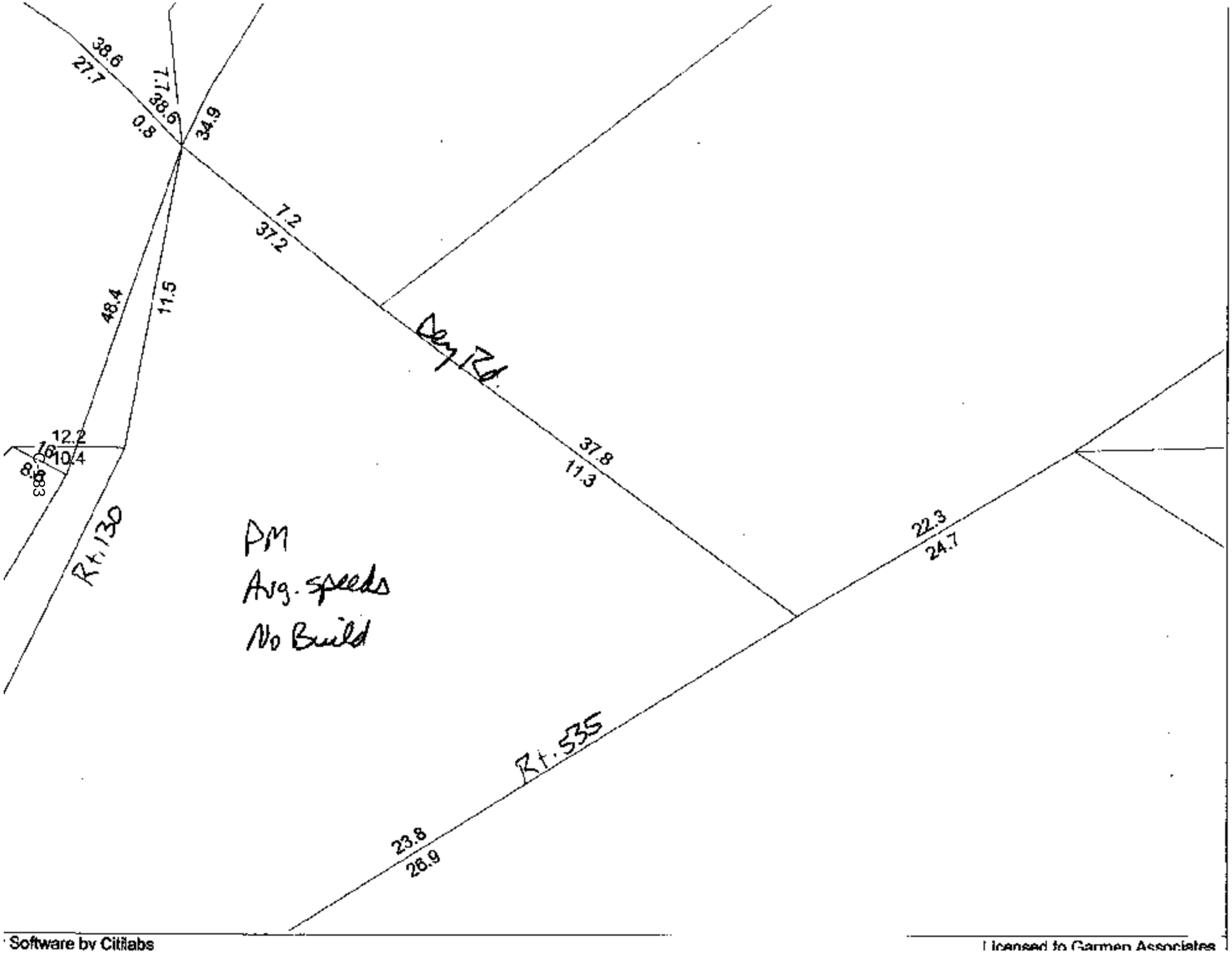
Software by Citilabs Rt.92 - Projected 2028 PM Peak Hour Truck Volumes Licensed to Garmen Associates

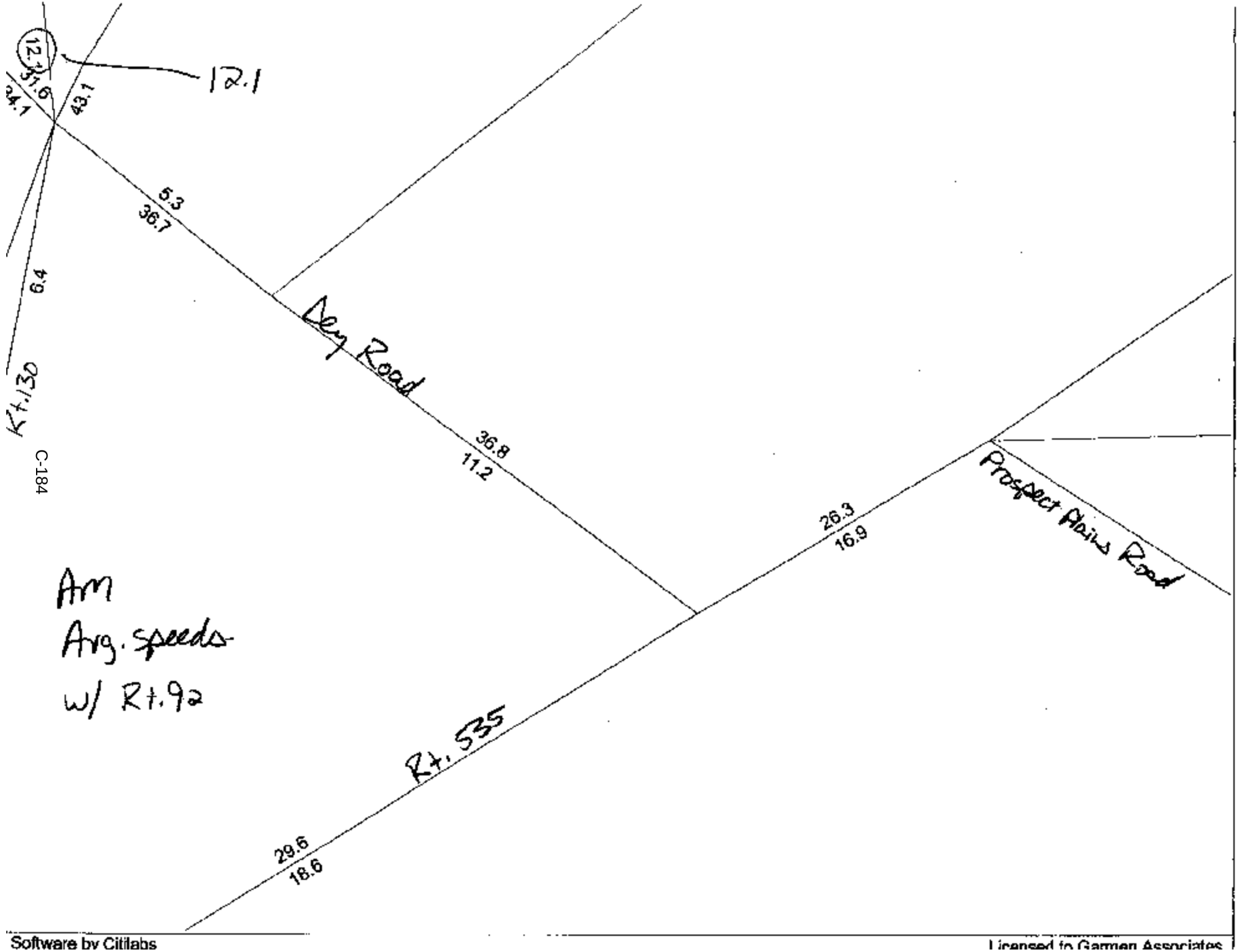

Rt.27
Aaron Rd.
Finnegan Ln.
Henderson Rd.
Beckman Rd.
Sand Hills Rd.
US-Rt.1
Black Horse Ln
Henderson Rd.
Adams Lane
New Rd.
Major Rd.
Wayswood Drive
Rt.27
Promenade Blvd.
Raymond Rd.
Rt.523
New Rd.
Ridge Rd.
Ridge Rd.
Independence Way
Rt.130
No Build
Software by Citilabs
Rt.92 – Projected 2028 PM Peak Hour Avg. Speeds
Licensed to Garmen Associates

2.2 2028 No Build – Four Intersections

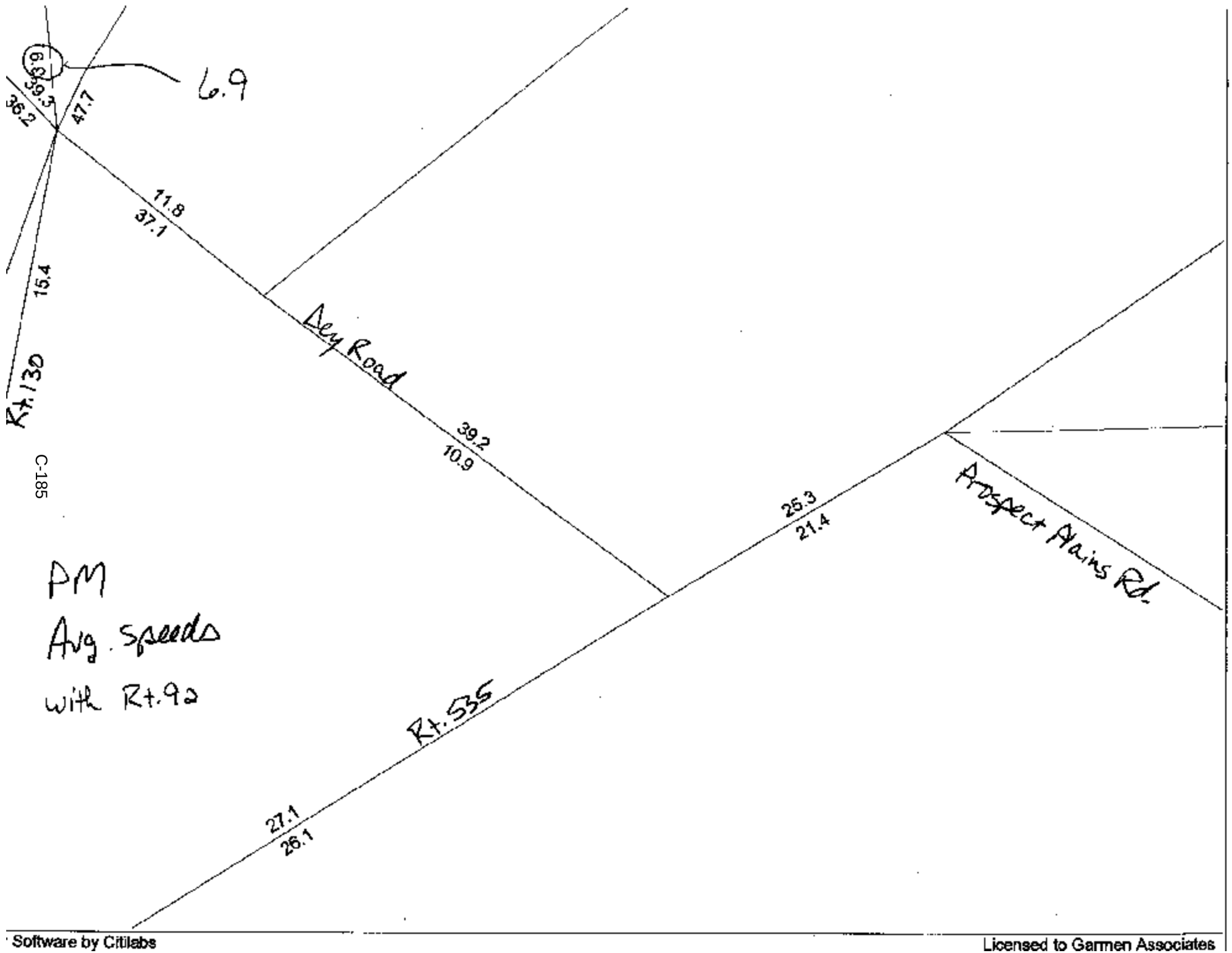


Software by Citilabs
Licensed to Garmen Associates

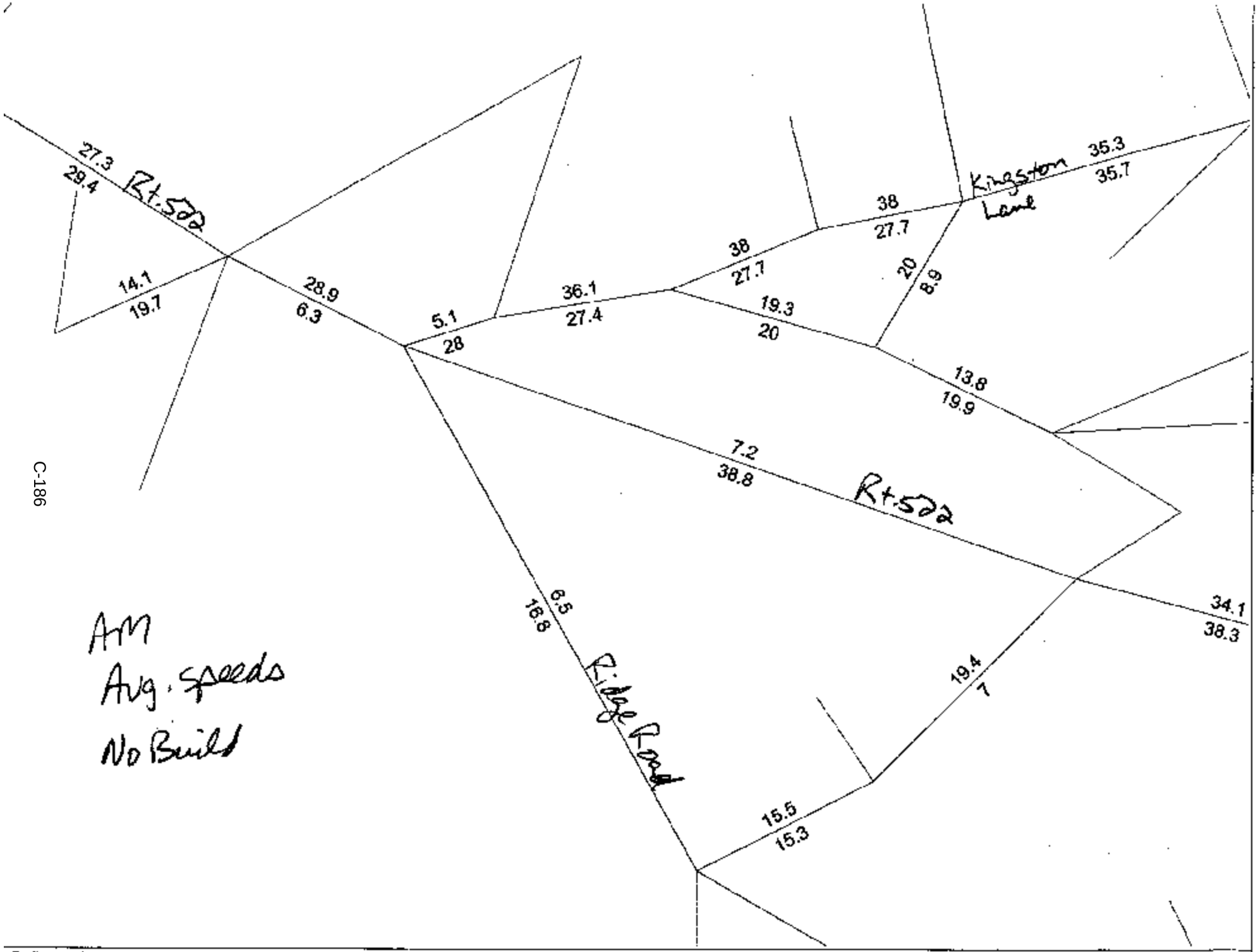

38.6
27.7
7.1
38.6
0.8
34.9
7.2
37.2
48.4
11.5
Dey Rd.
12.2
10.4
8.8
83
Rt. 130
37.8
11.3
22.3
24.7
PM
Avg. speeds
No Build
Rt. 535
23.8
26.9



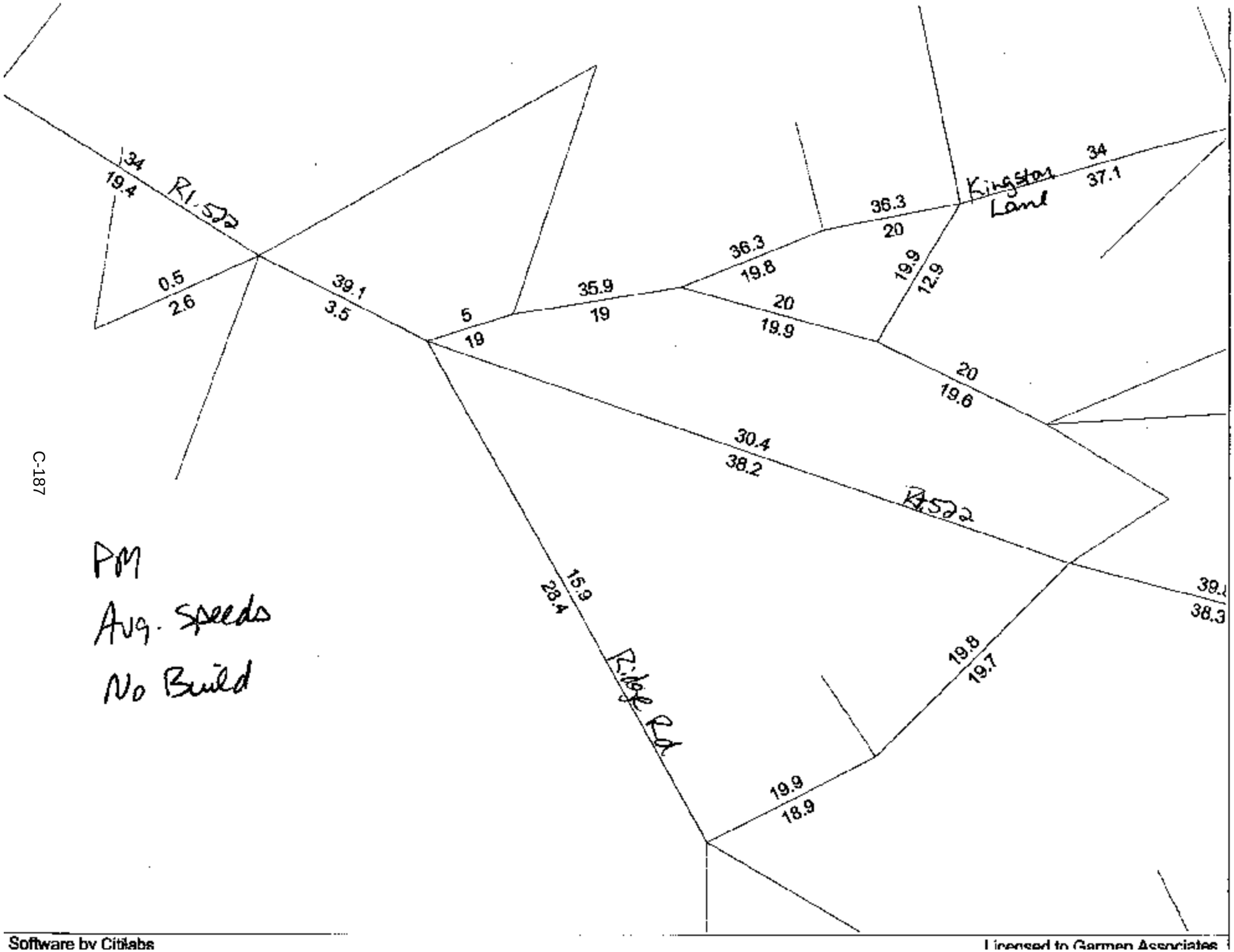
Software by Citilabs
Licensed to Garmen Associates



Software by Citilabs
Licensed to Garmen Associates

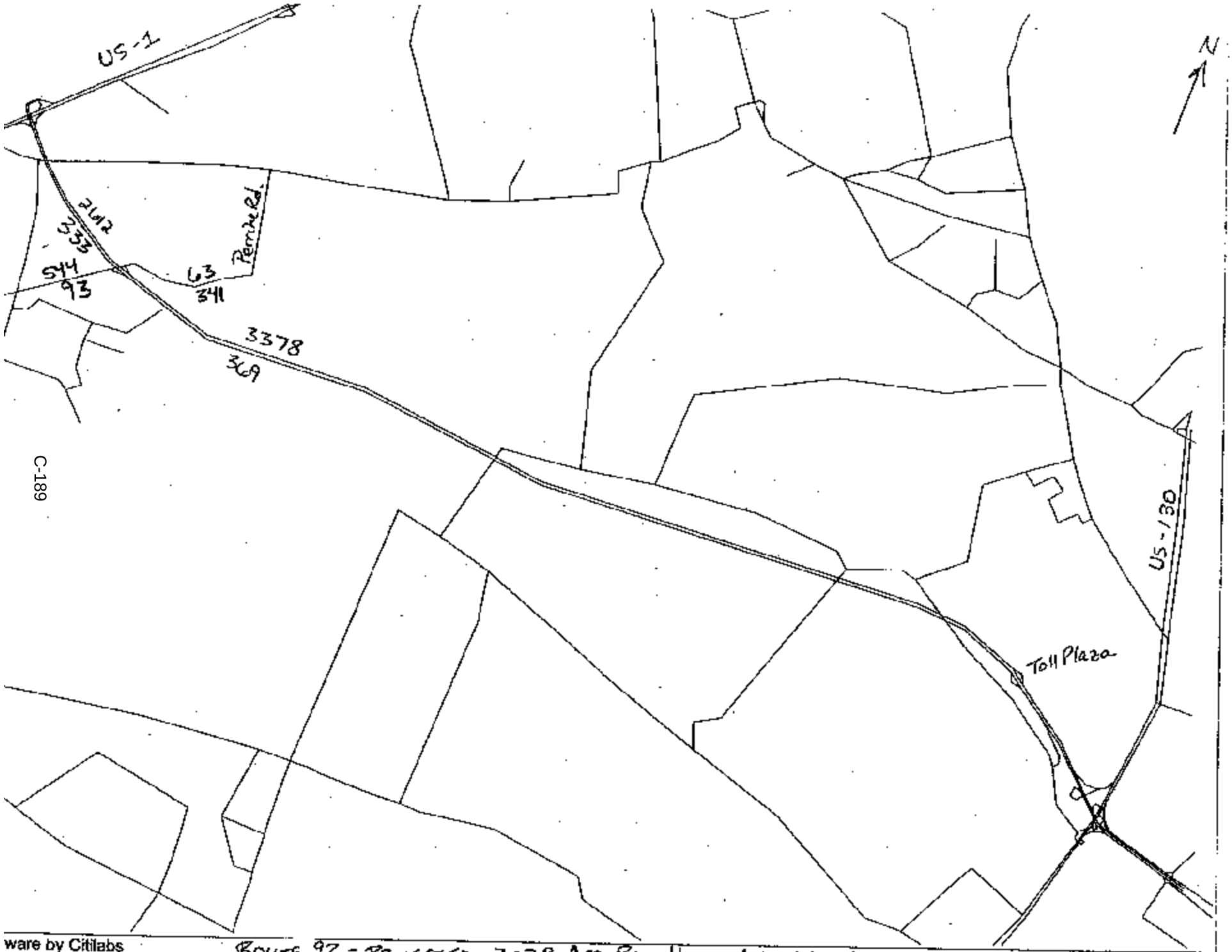


Software by Citilabs
Licensed to Garmen Associates



Software by Citilabs
Licensed to Garmen Associates

2.3 2028 Build Route 92 – Detail along Route 92 Alignment



ware by Citilabs

ROUTE 92 - PROJECTED 2028 AM PEAK HOUR Auto Volumes

Licensed to Garmen Associates

ware by Citilabs

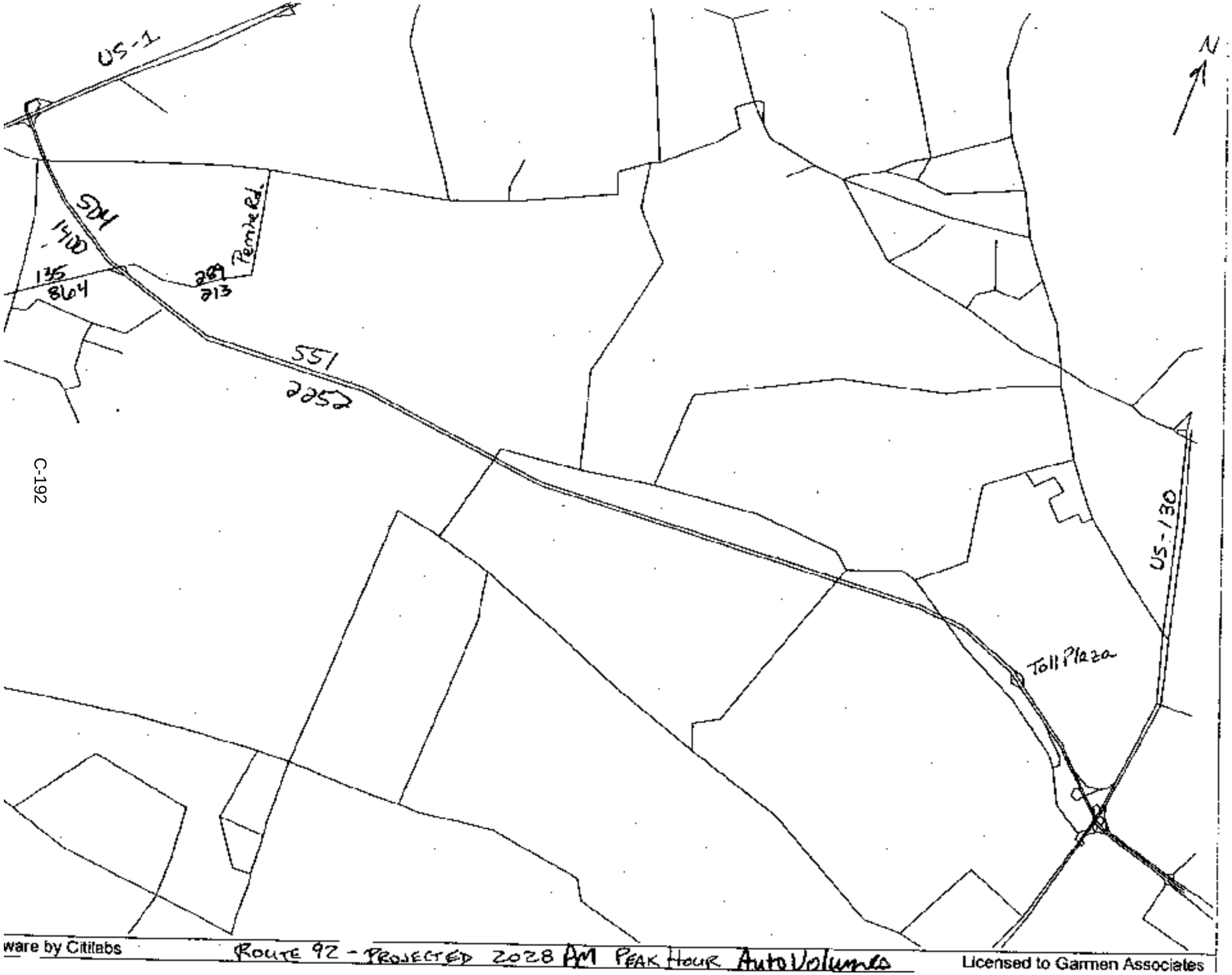
ROUTE 92 - PROJECTED 2028 AM PEAK HOUR TRUCK VOLUMES

Licensed to Garmen Associates

ware by Citilabs

ROUTE 92 - PROJECTED 2028 AM PEAK HOUR Avg. Speeds (mph)

Licensed to Garmen Associates



ware by Citilabs

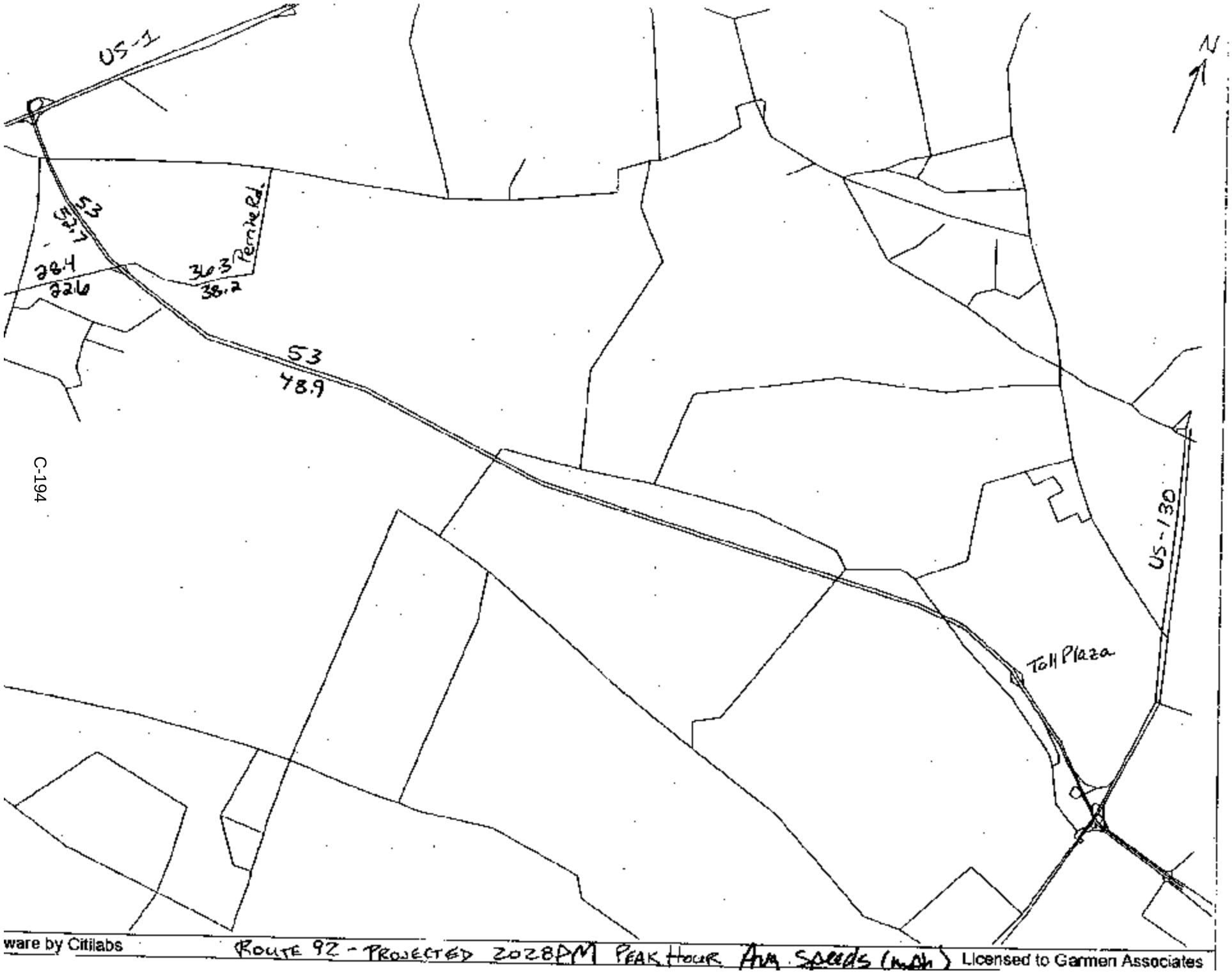
ROUTE 92 - PROJECTED 2028 AM PEAK HOUR AutoVolumes

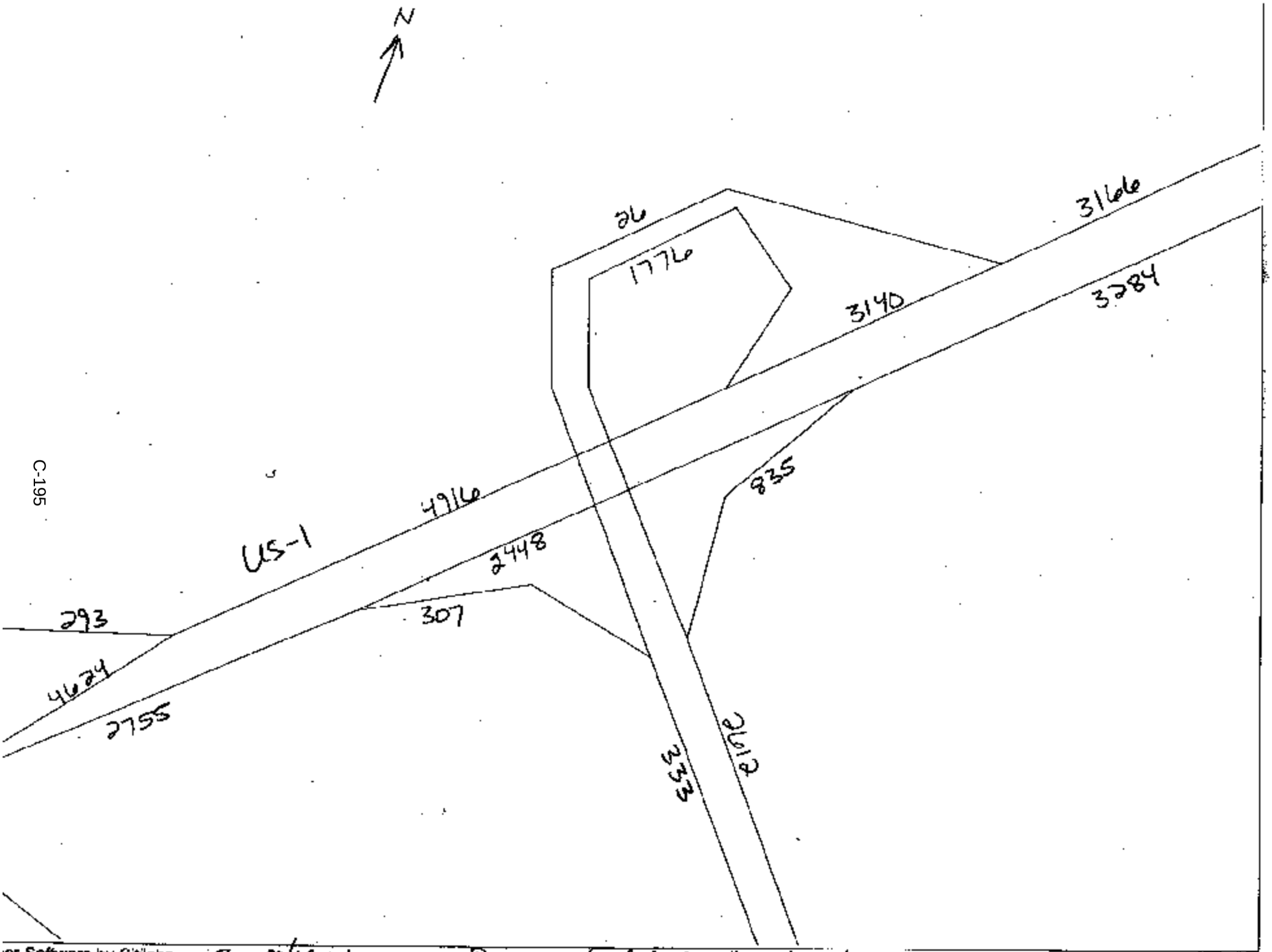
Licensed to Garmen Associates

ware by Citilabs

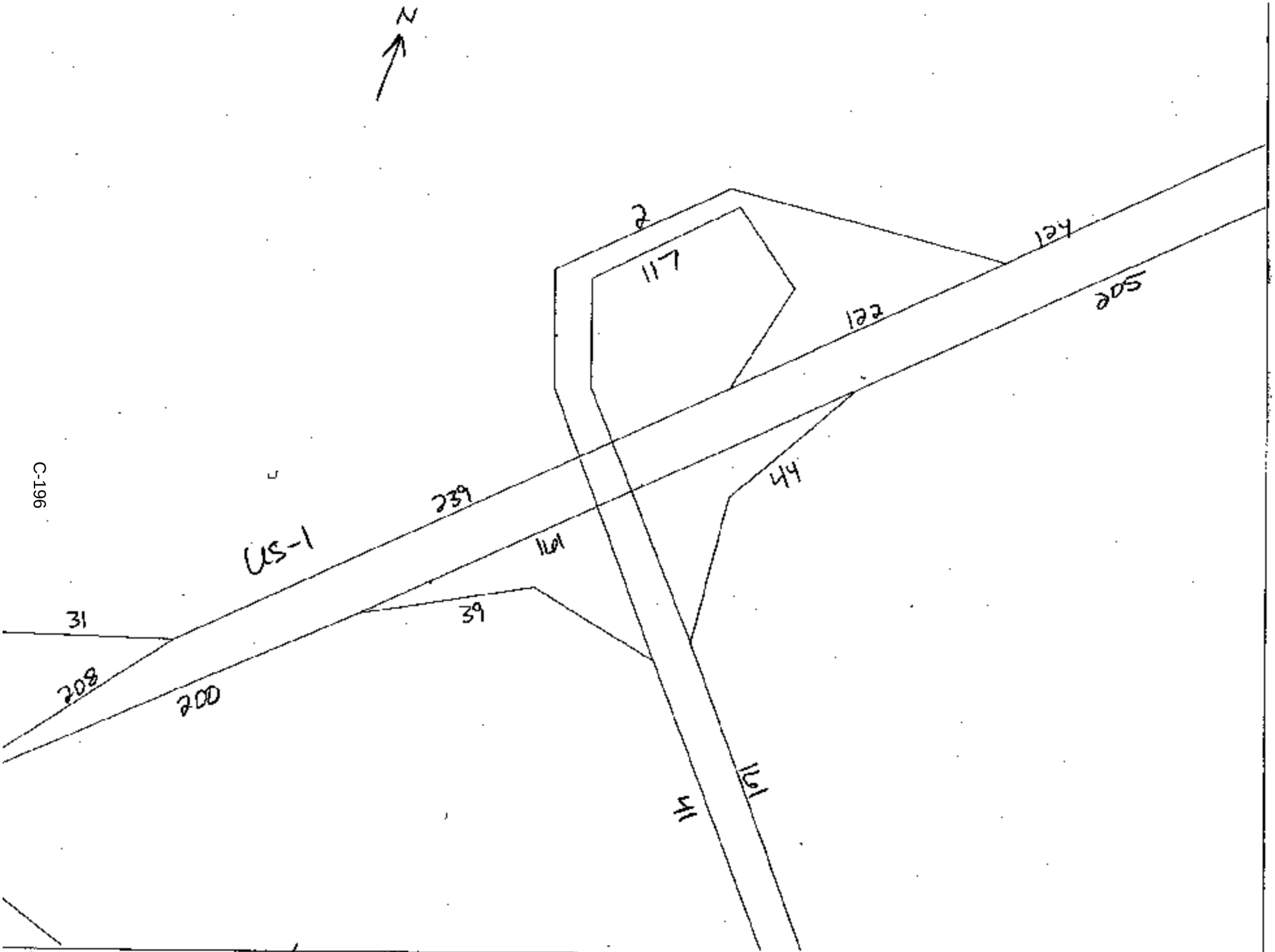
ROUTE 92 - PROJECTED 2028 AM PEAK HOUR TRUCK VOLUMES

Licensed to Garmen Associates

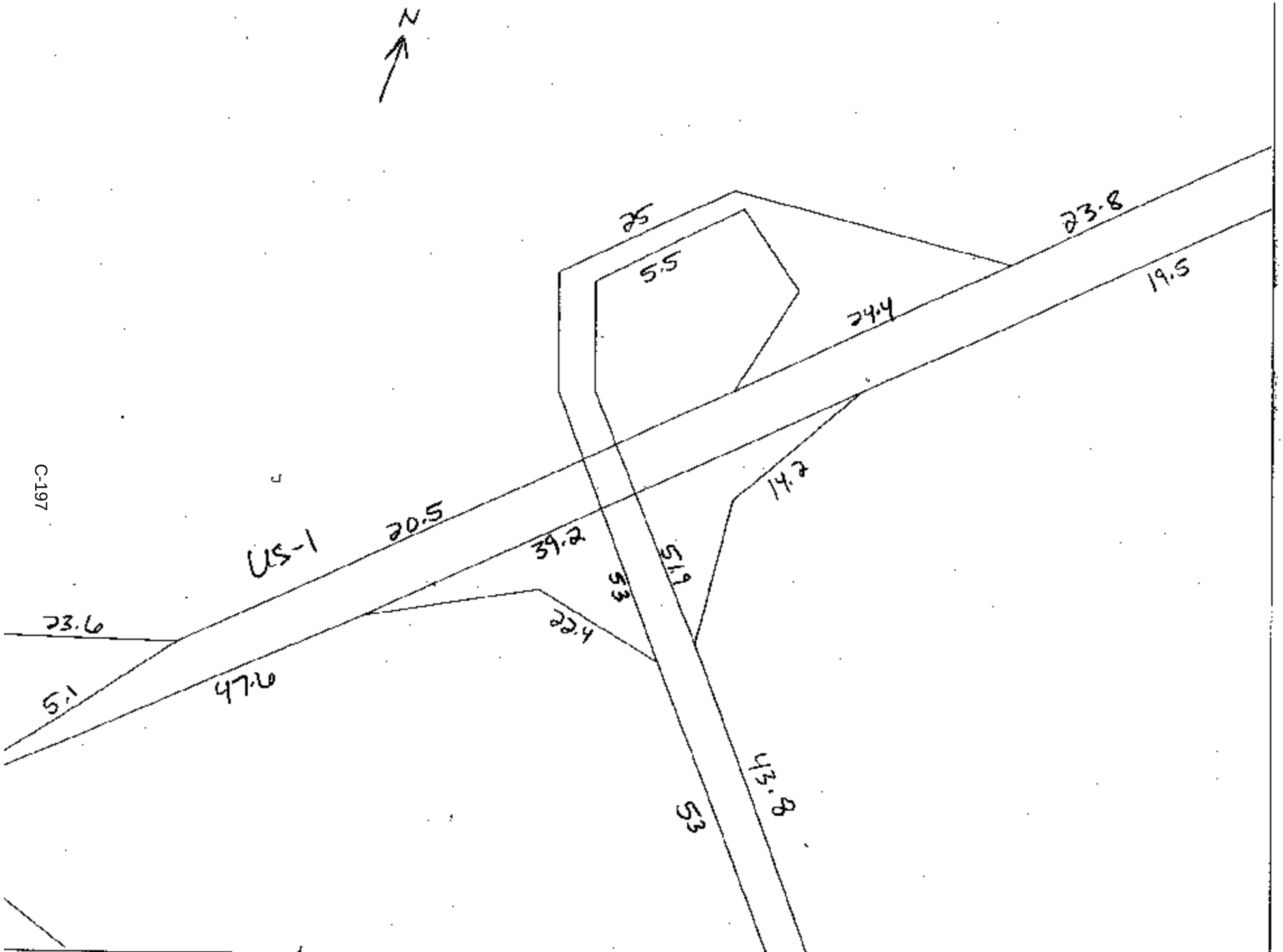

US-1
N
53
28.4
22.6
36.3
38.2
Perrine Rd.
53
48.9
US-130
Toll Plaza
ware by Citilabs
ROUTE 92 - PROJECTED 2028PM PEAK HOUR AM SPEEDS (MPH)
Licensed to Garmen Associates



er Software by Citilabs Route 92/US-1 Interchange - Projected 2028 AM Peak Hour Auto Volumes Licensed to Garmen Associates

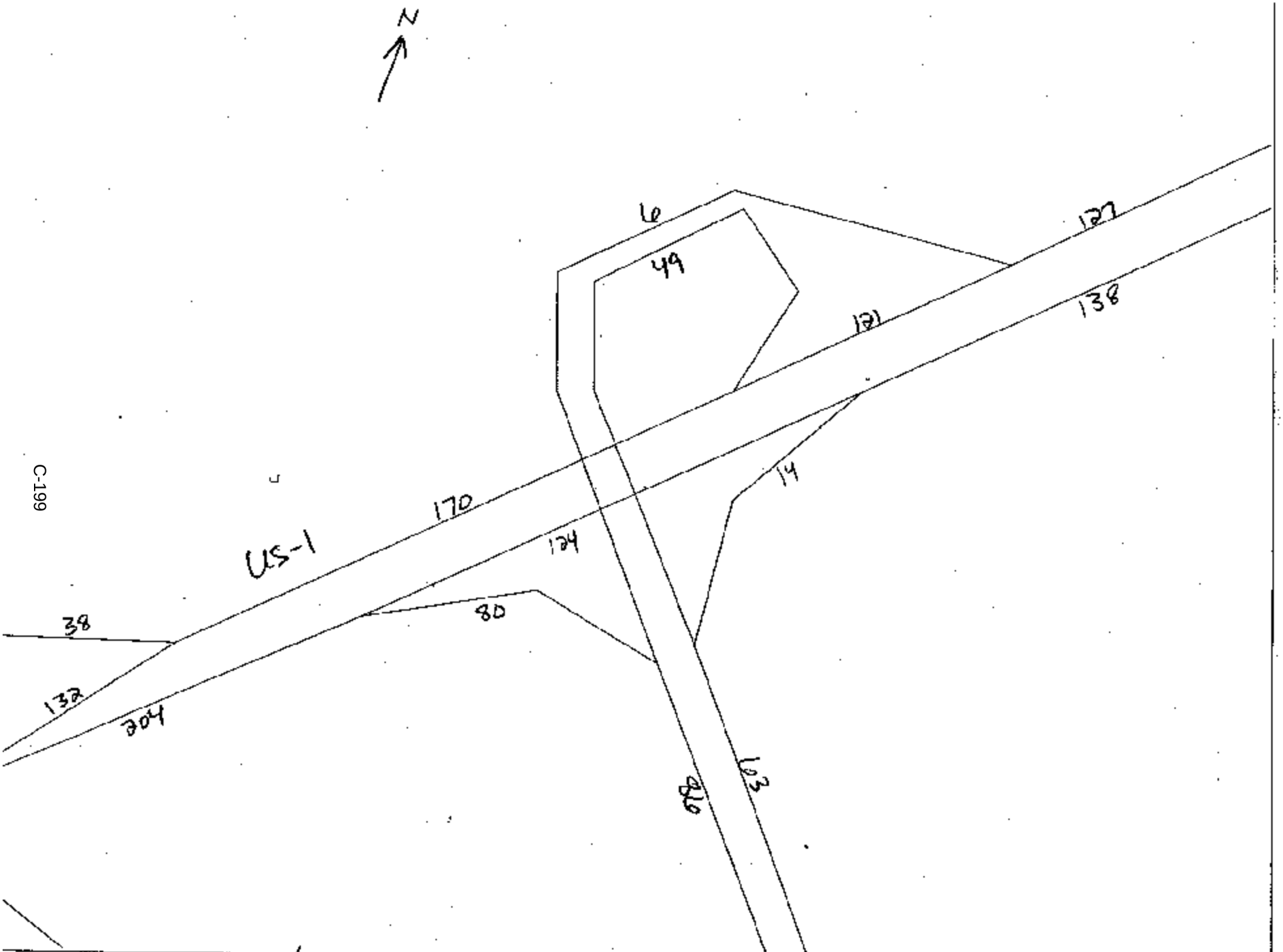


er Software by Citilabs Route 92/US-1 Interchange - Projected 2028 AM Peak Hour Truck Volumes Licensed to Germen Associates

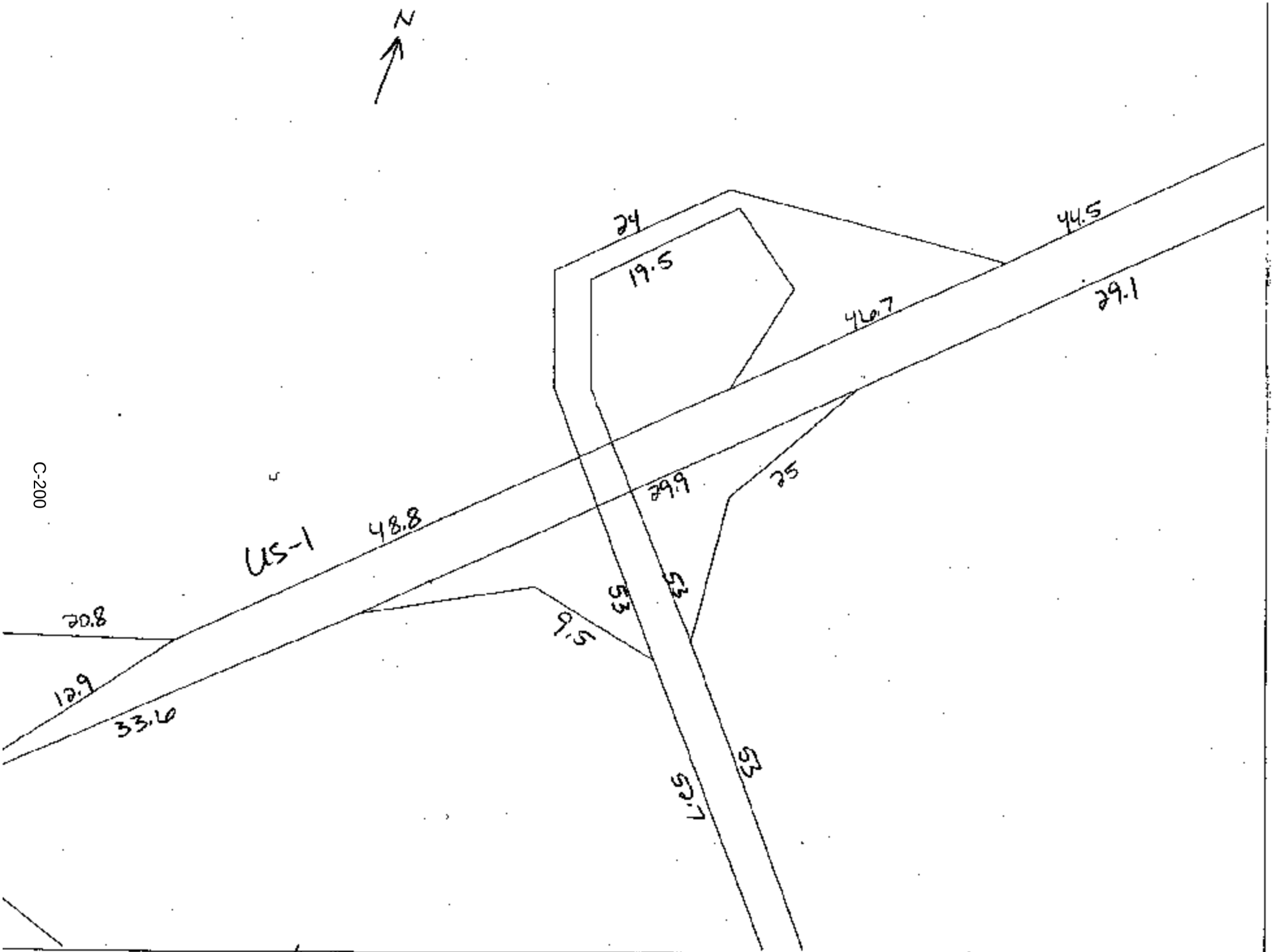


ber Software by Citilabs Route 92/US-1 Interchange - Projected 2028 AM Peak Hour Avg. Speeds (mph) Licensed to Garmen Associates

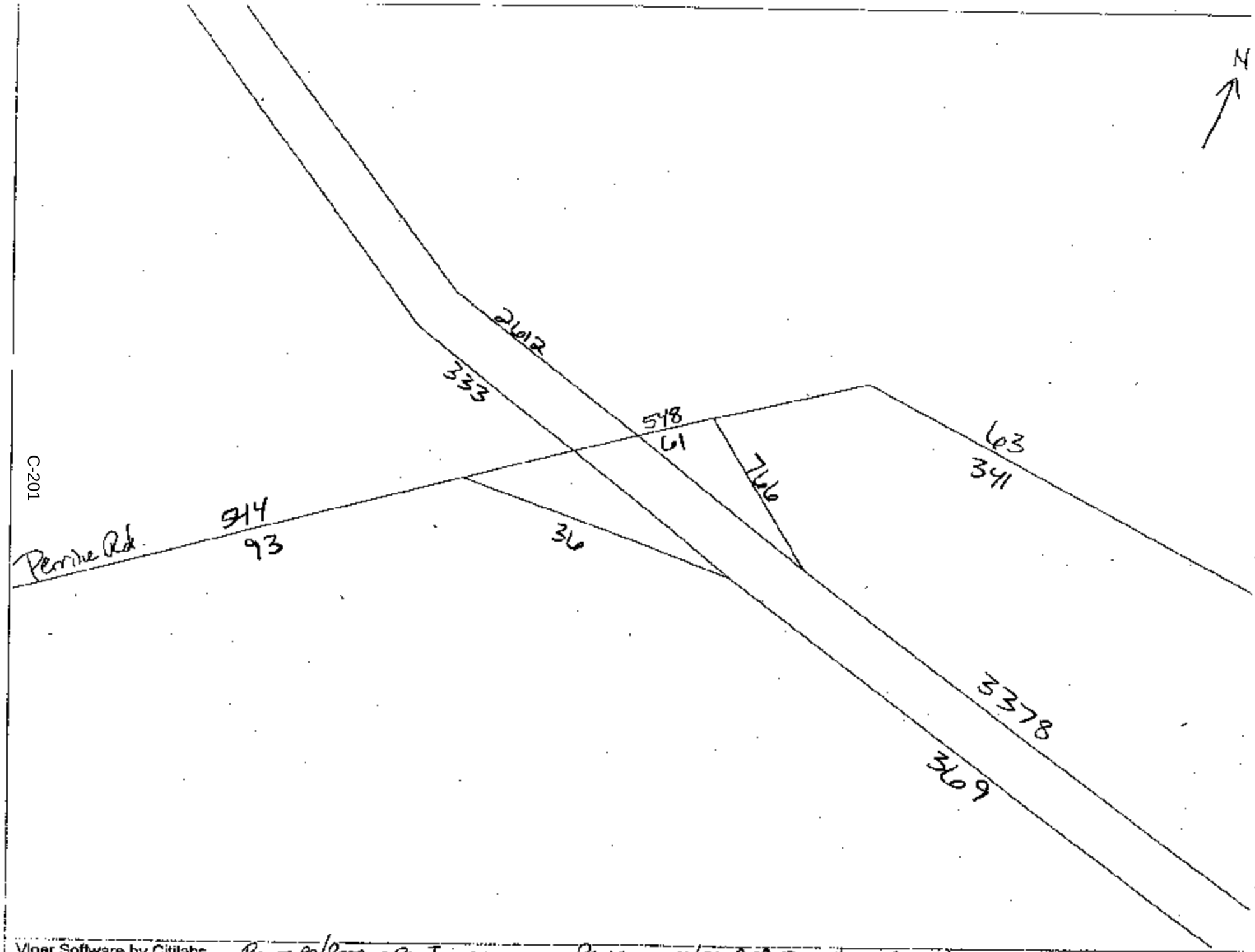
US-1
1400
504
1940
505
1921
2405
2442
2442
1982
1960
2442
N
Route 92/US-1 Interchange - Projected 2023 PM Peak Hour Auto Volumes
Licensed to Garmen Associates
er Software by Citilabs



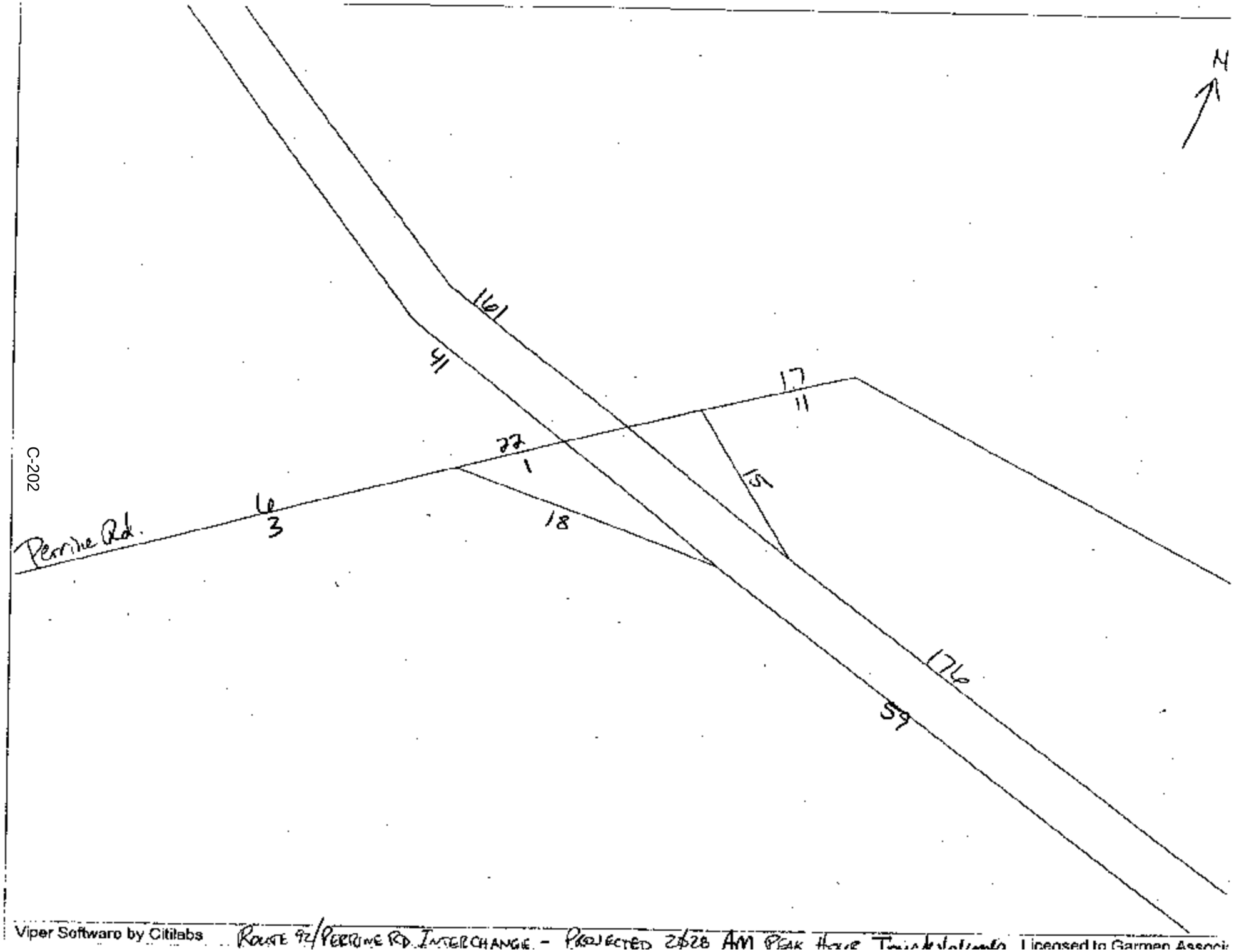
er Software by Citilabs Route 92/US-1 Interchange - Projected 2028 AM Peak Hour Truck Volumes Licensed to Garmen Associates



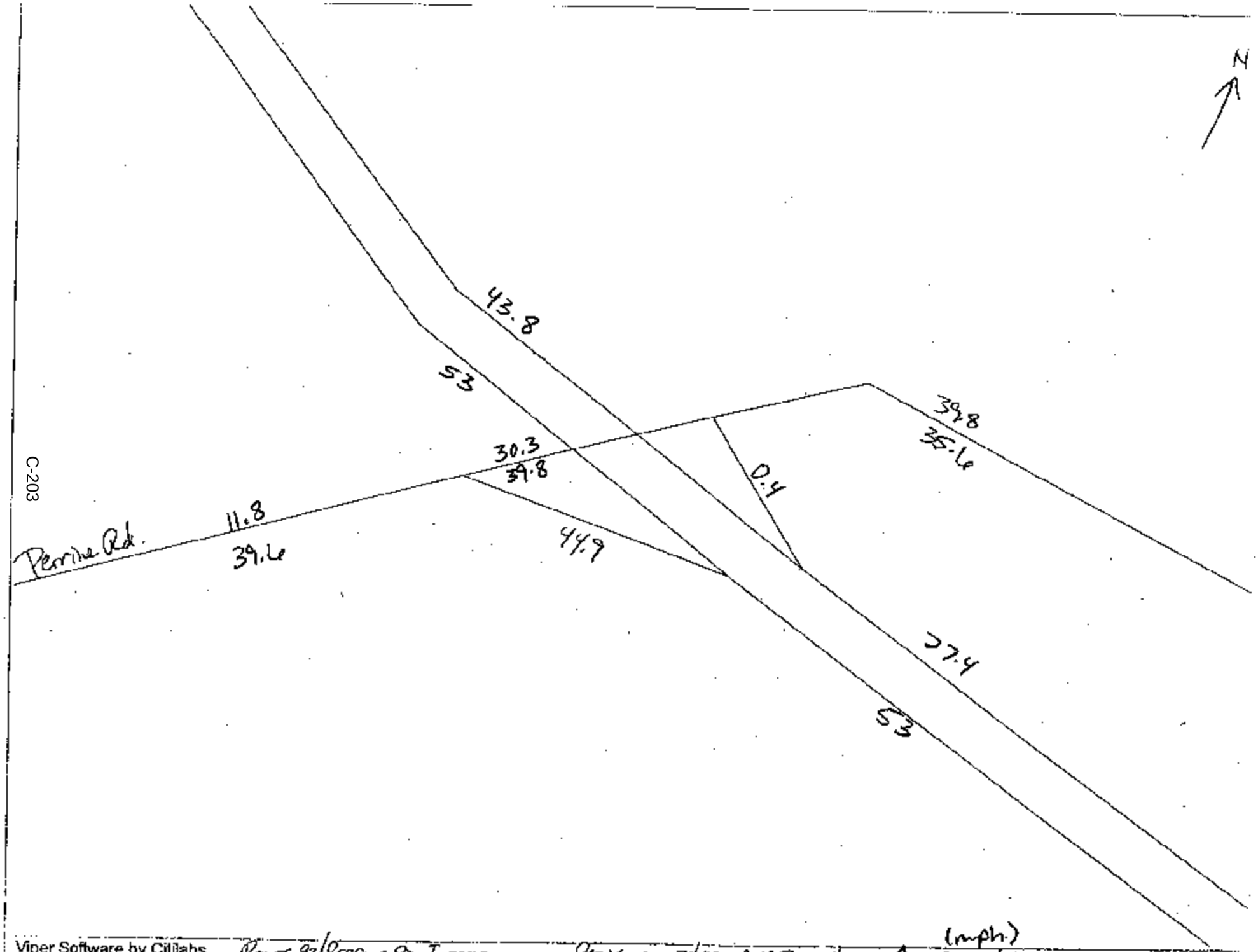
er Software by Citilabs Route 92/US-1 Interchange - Projected 2028 AM Peak Hour Avg. Speeds (mph) Licensed to Garmen Associates



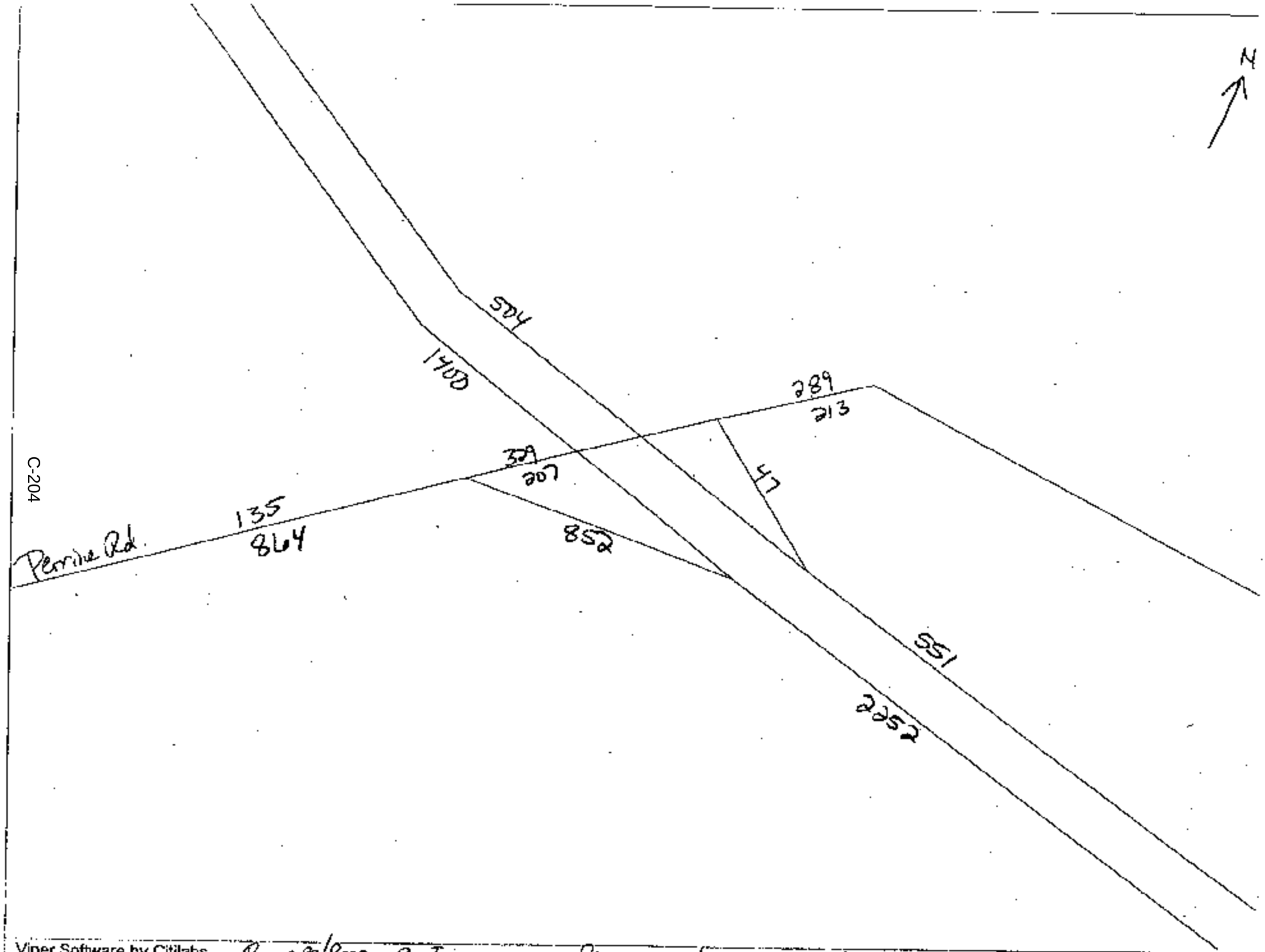
Viper Software by Citilabs. Route 92/Perrine Rd. Interchange - Projected 2028 AM Peak Hour Auto Volumes. Licensed to Garmen Associ



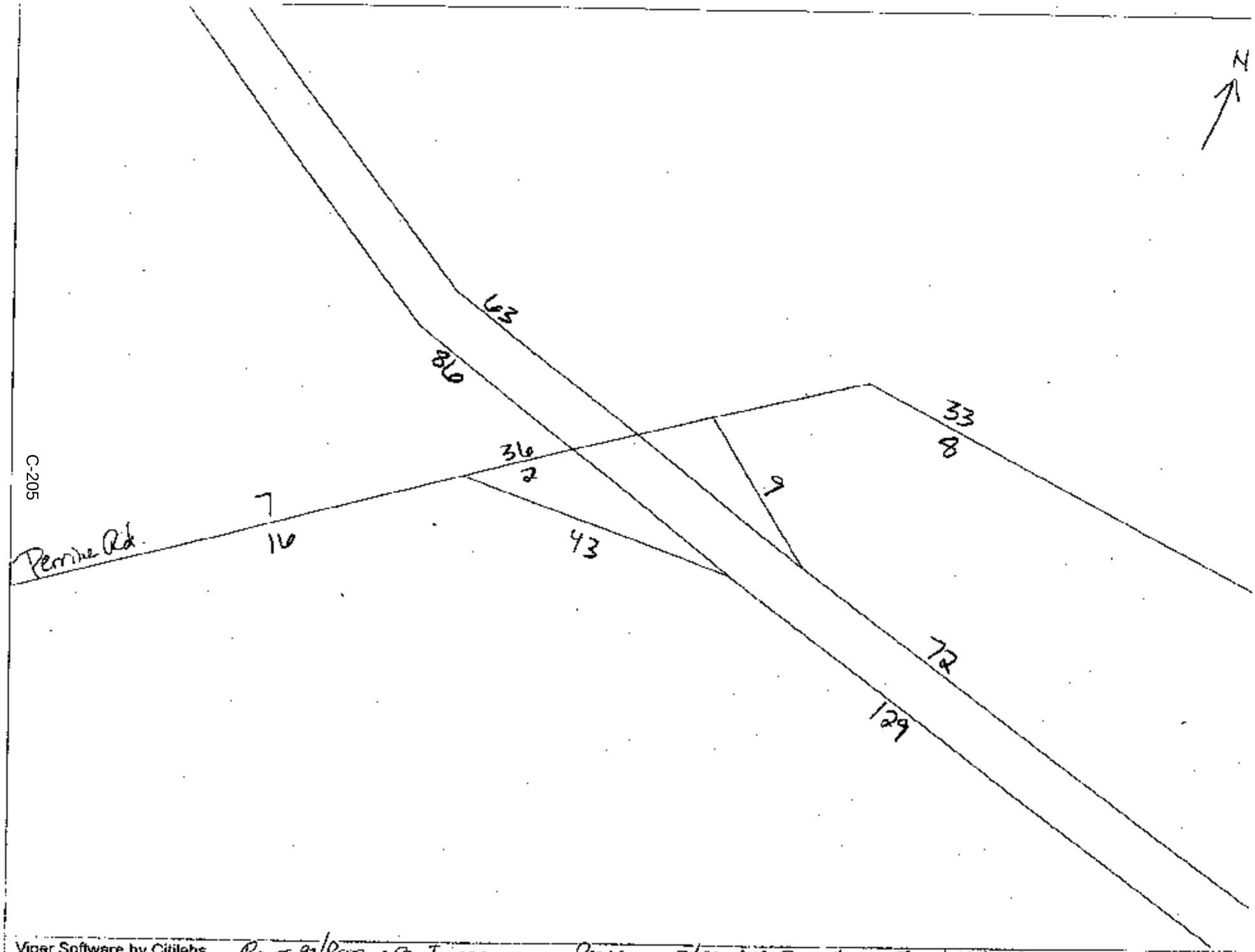
Viper Software by Citilabs Route 92/Perrine Rd. Interchange - Projected 2028 AM Peak Hour Traffic Volumes Licensed to Garmen Associ



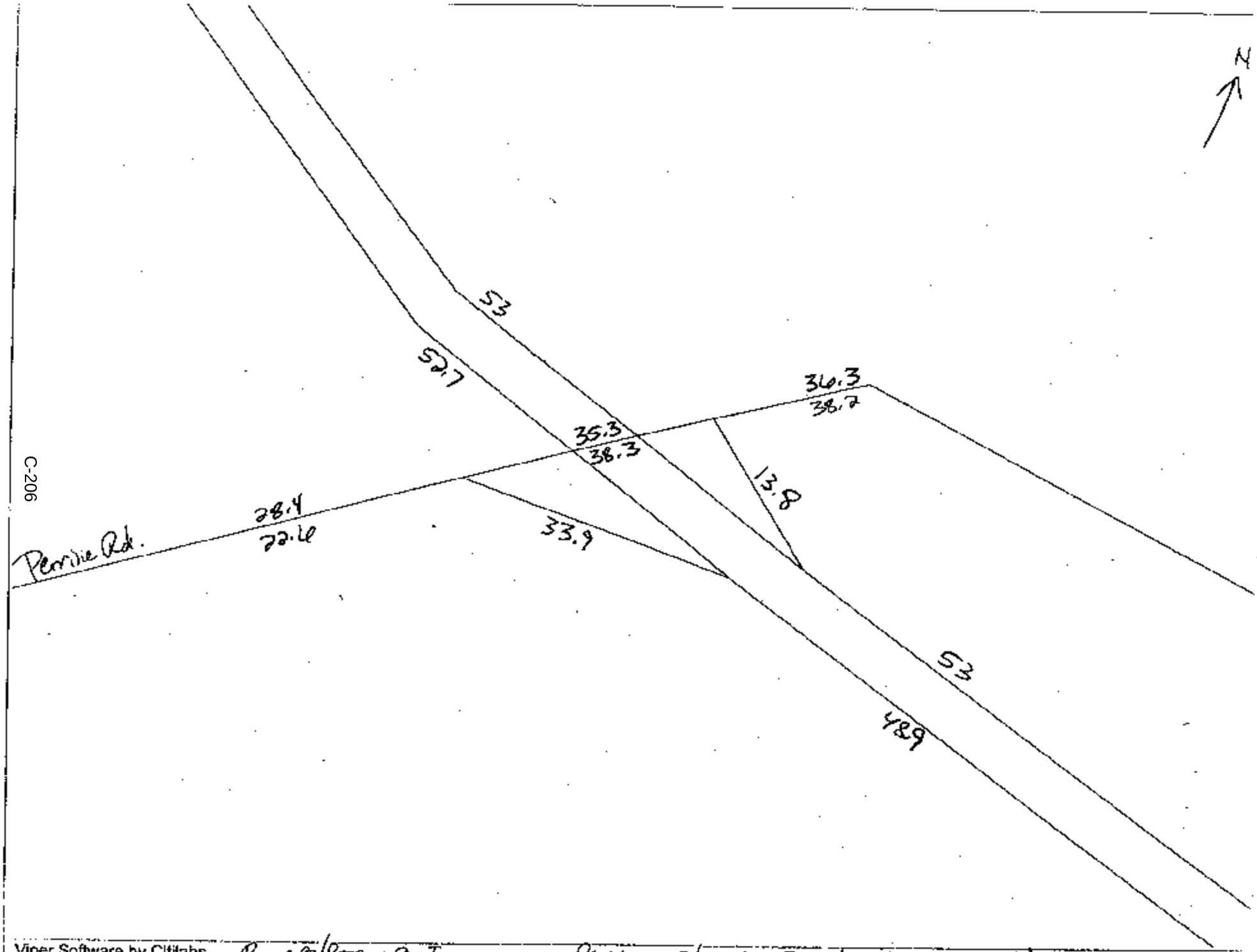
Viper Software by Citilabs Route 92/Perrine Rd. Interchange - Projected 2028 AM Peak Hour Avg. Speeds (mph) Licensed to Garmen Associ



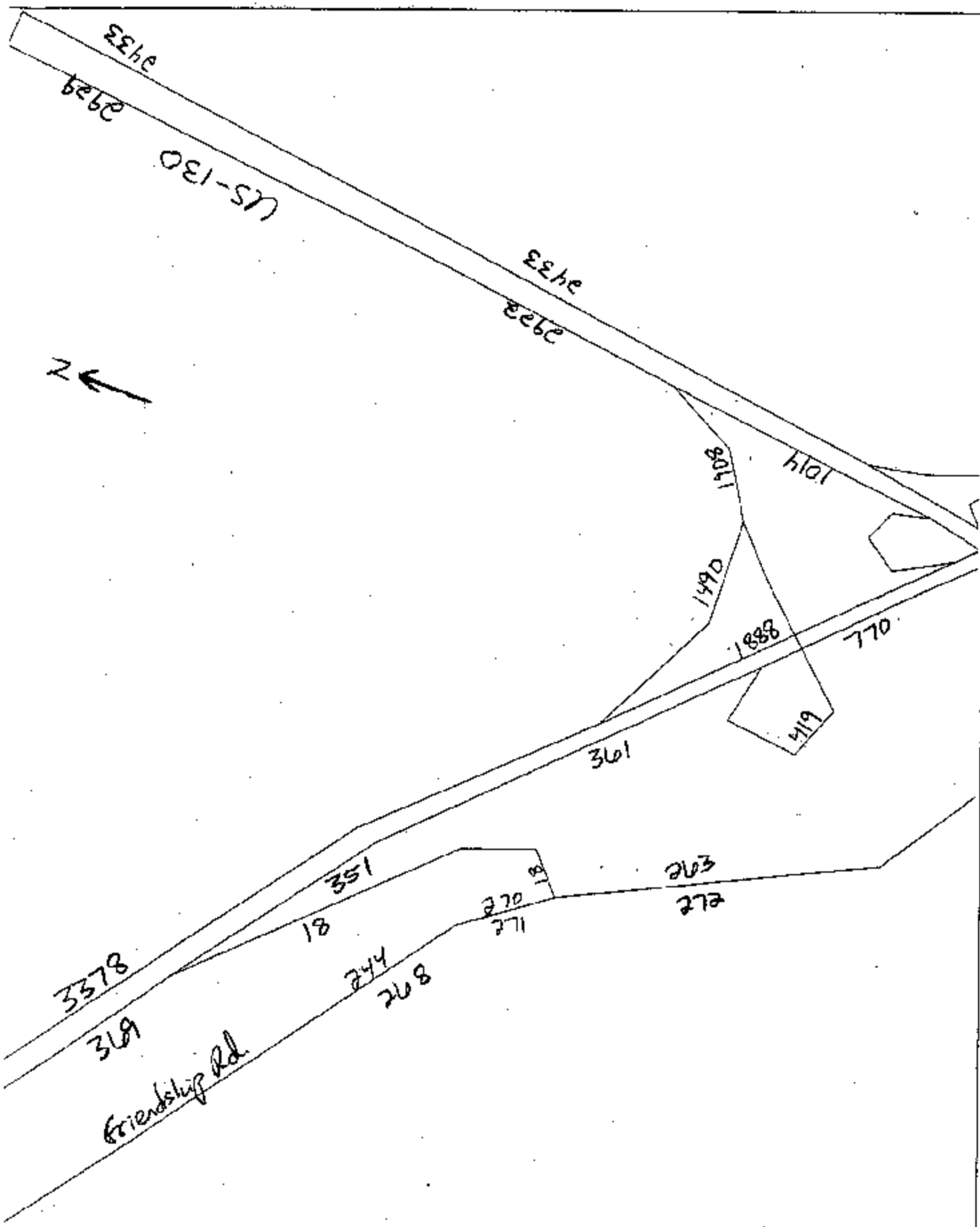
Viper Software by Citilabs ROUTE 92/PERRINE RD. INTERCHANGE - PROJECTED 2028 AM PEAK HOUR Auto Volumes Licensed to Garmen Associ



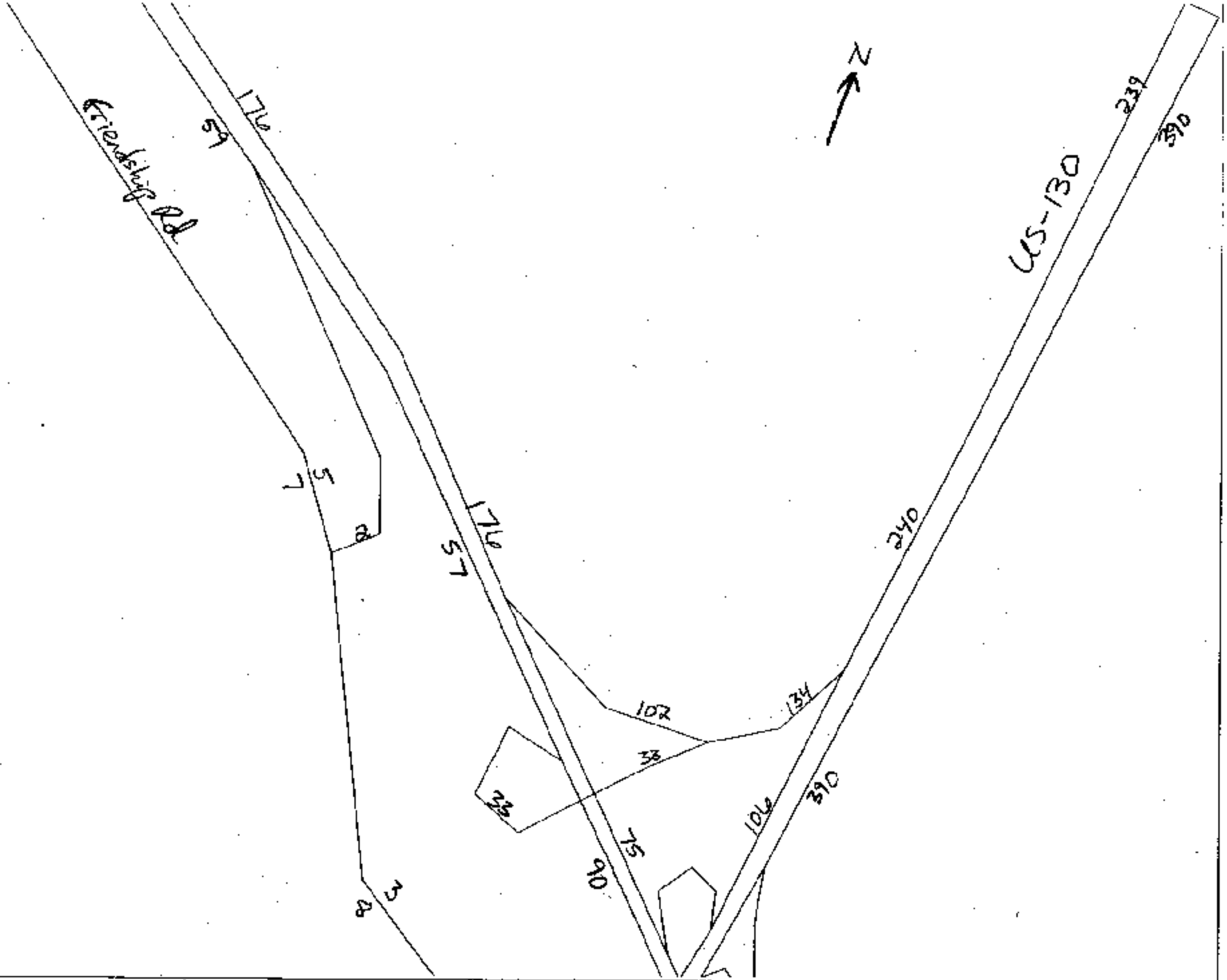
Viper Software by Citilabs Route 92/Perrine Rd. Interchange - Projected 2028 AM Peak Hour Truck Volumes Licensed to Garmen Associ



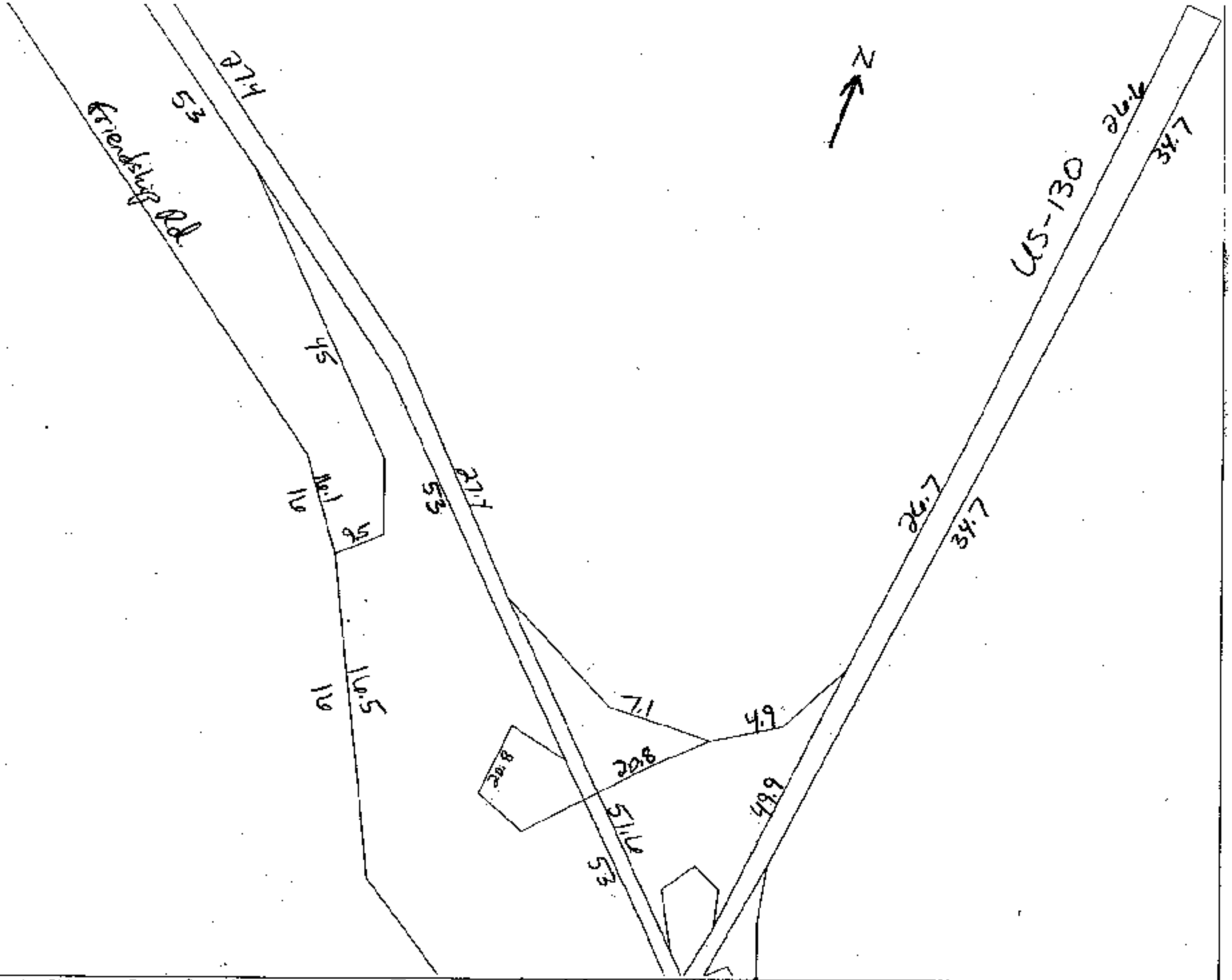
Viper Software by Citilabs Route 92/Perrine Rd. Interchange - Projected 2028 PM Peak Hour Avg. Speeds (mph) Licensed to Garmen Associ



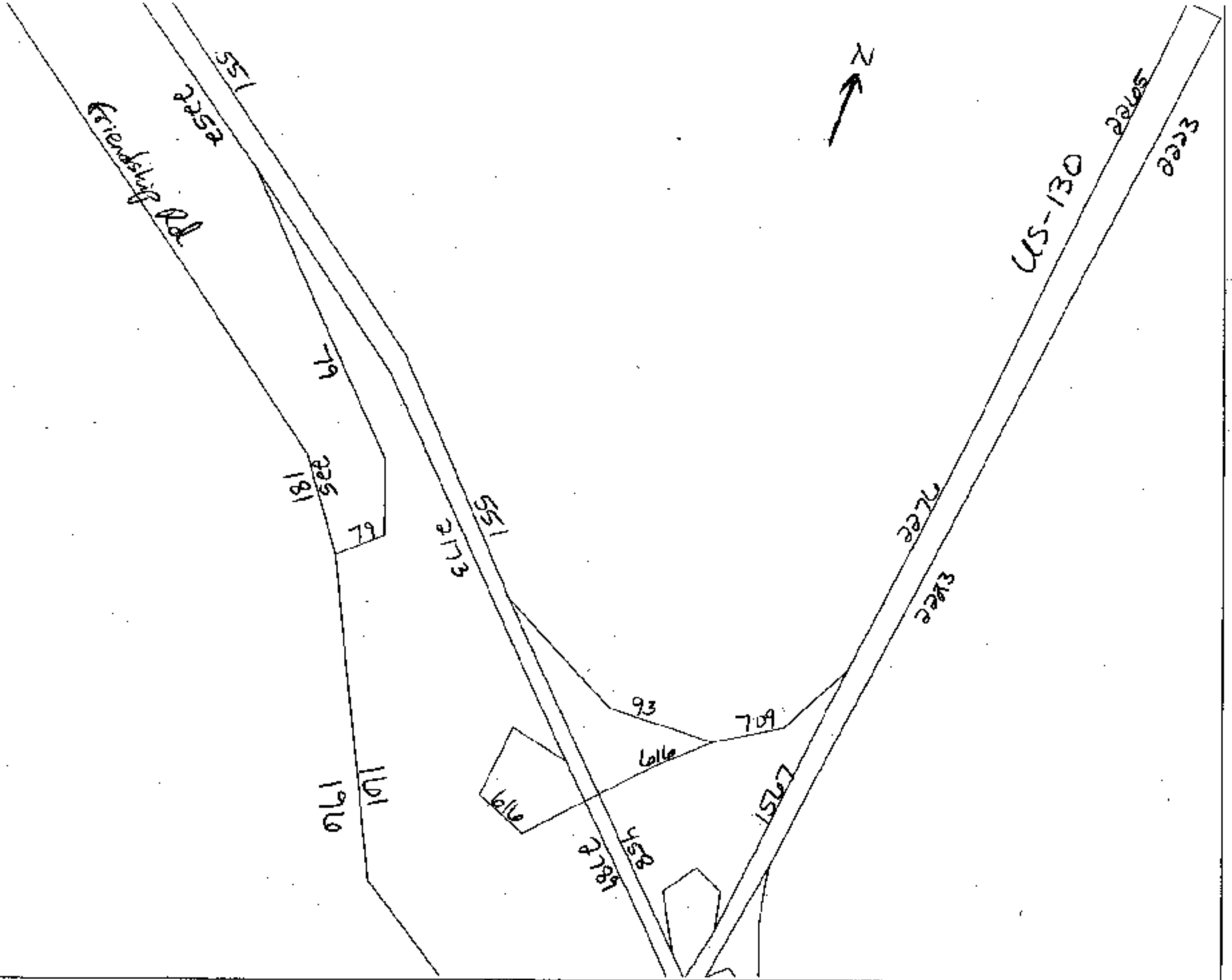
ar Software by Citilabs Route 92 West of US-130 -- Projected 2028 AM Peak Hour Auto Volumes Licensed to Garmen Associates



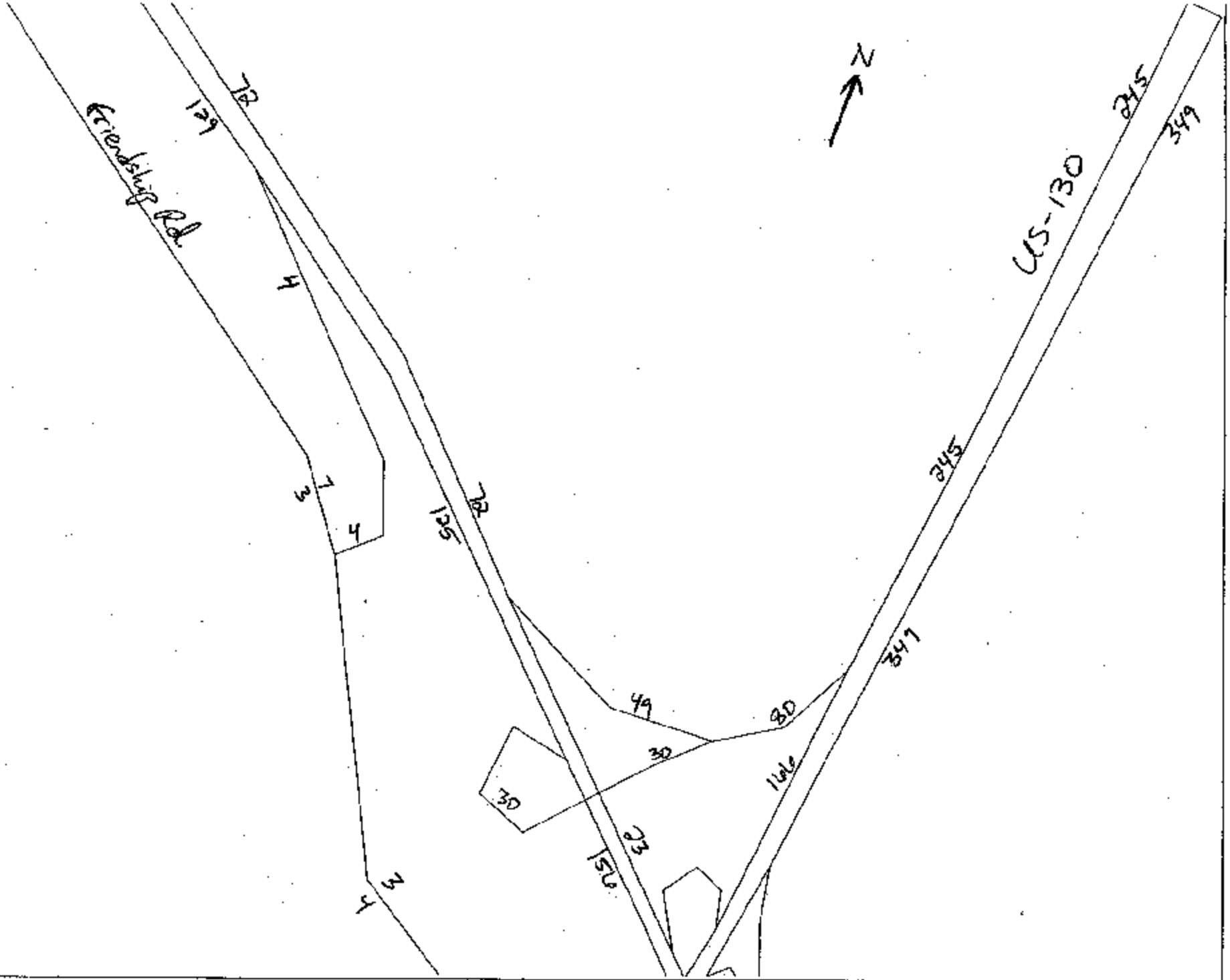
er Software by Citilabs Route 92 West of US-130 - Projected 2028 AM Peak Hour Truck Volumes Licensed to Garmen Associates



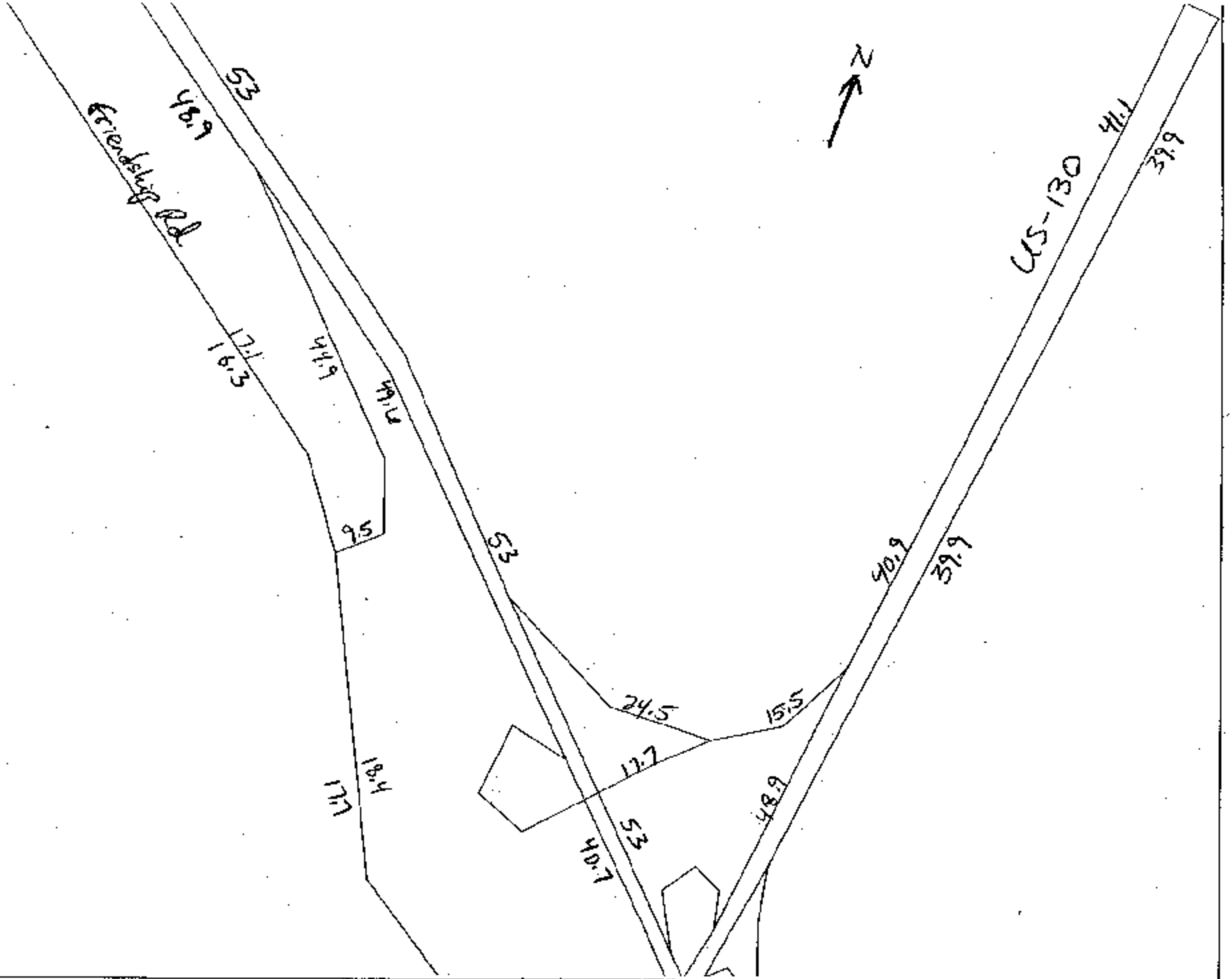
er Software by Citilabs Route 92 West of US-130 - Projected 2028 AM Peak Hour Avg. Speeds (mph) Licensed to Garmen Associates



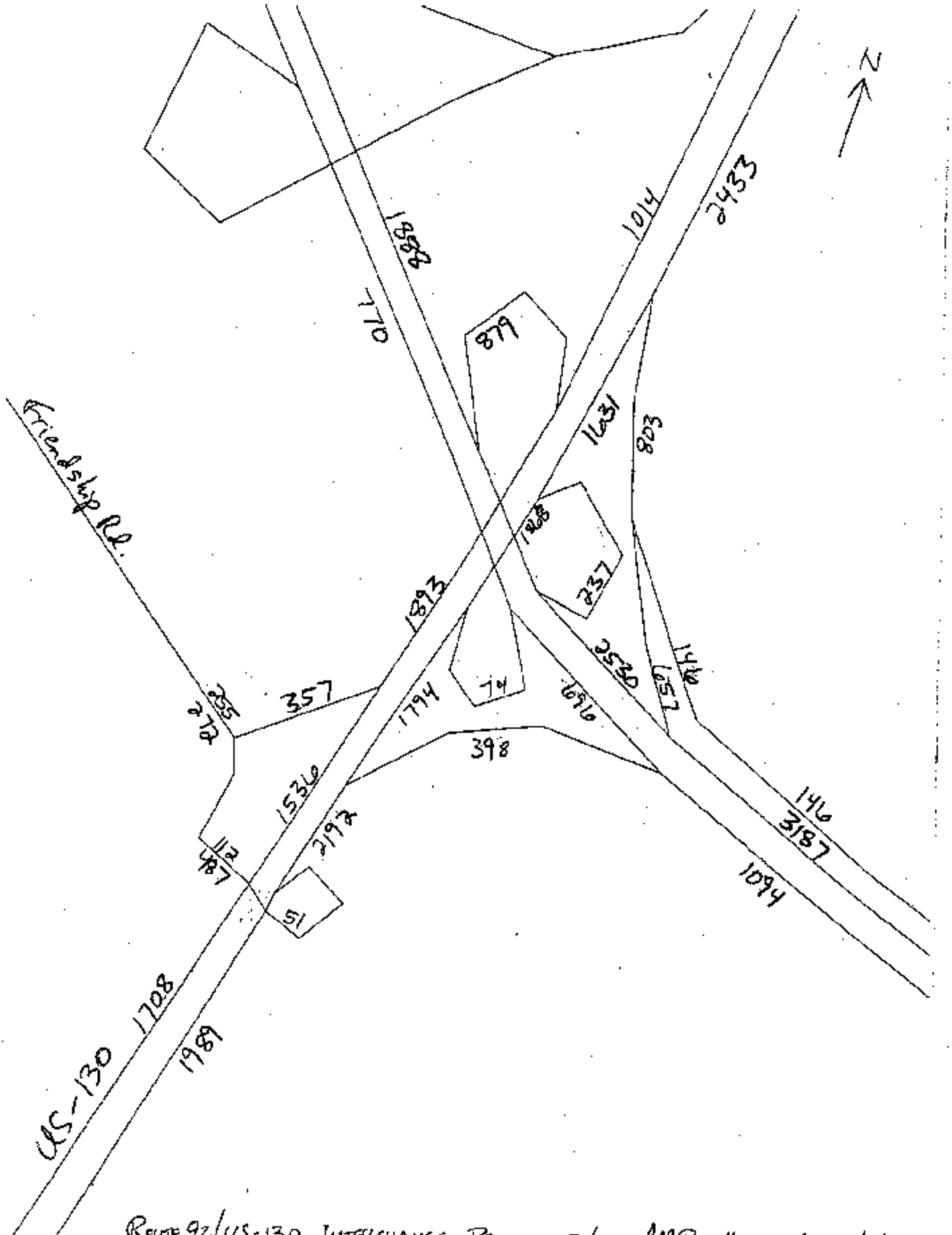
er Software by Citilabs Route 92 West of US-130 - Projected 2028 PM Peak Hour Auto Volumes Licensed to Garmen Associates



er Software by Citilabs Route 92 West of US-130 - Projected 2028 AM Peak Hour Truck Volumes Licensed to Garmen Associates



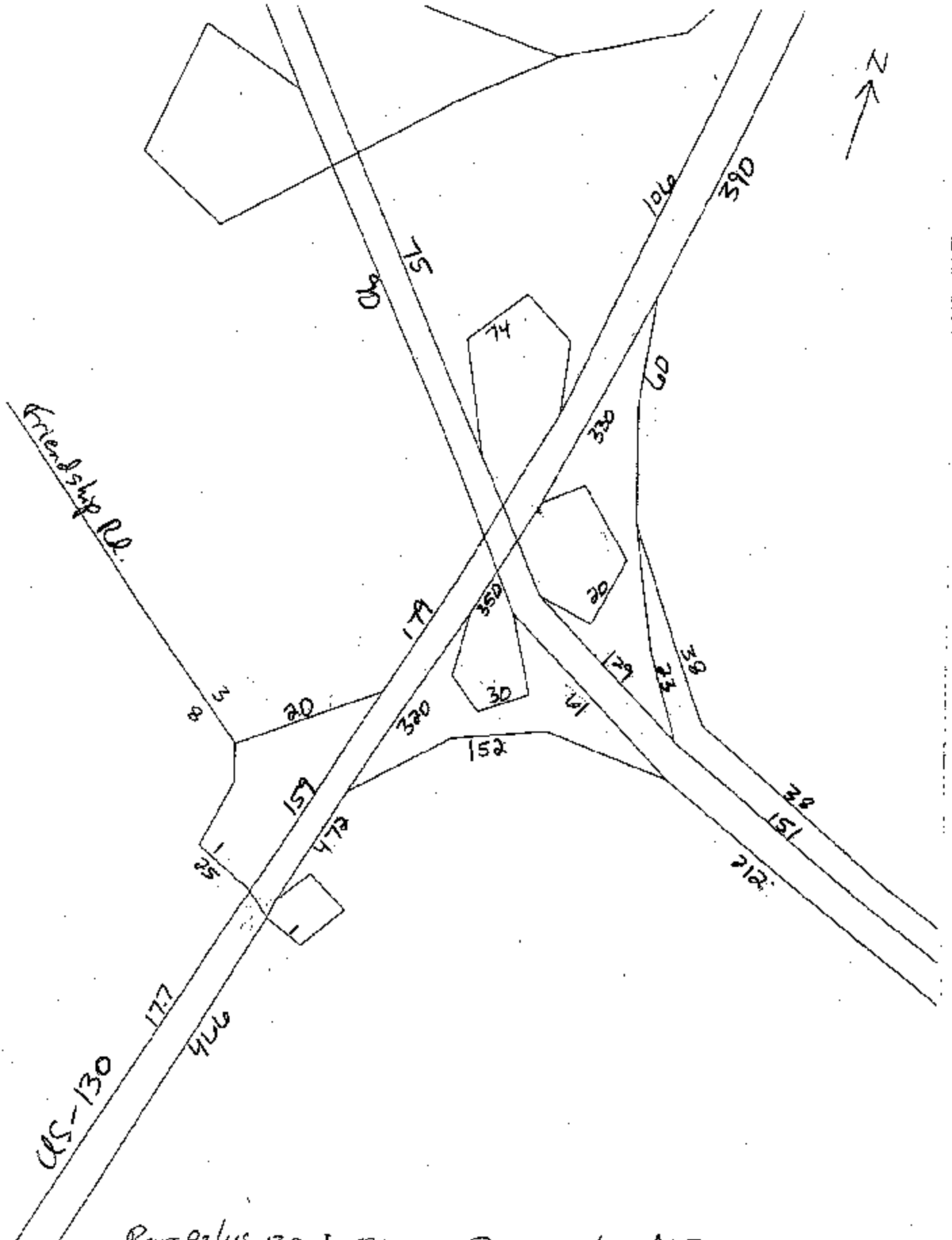
er Software by Citilabs Route 92 West of US-130 - Projected 2028 PM Peak Hour Avg. Speeds (mph) Licensed to Garmen Associates



Route 92/US-130 Interchange - Projected 2028 AM Peak Hour Auto Volumes

Viper Software by Citilabs

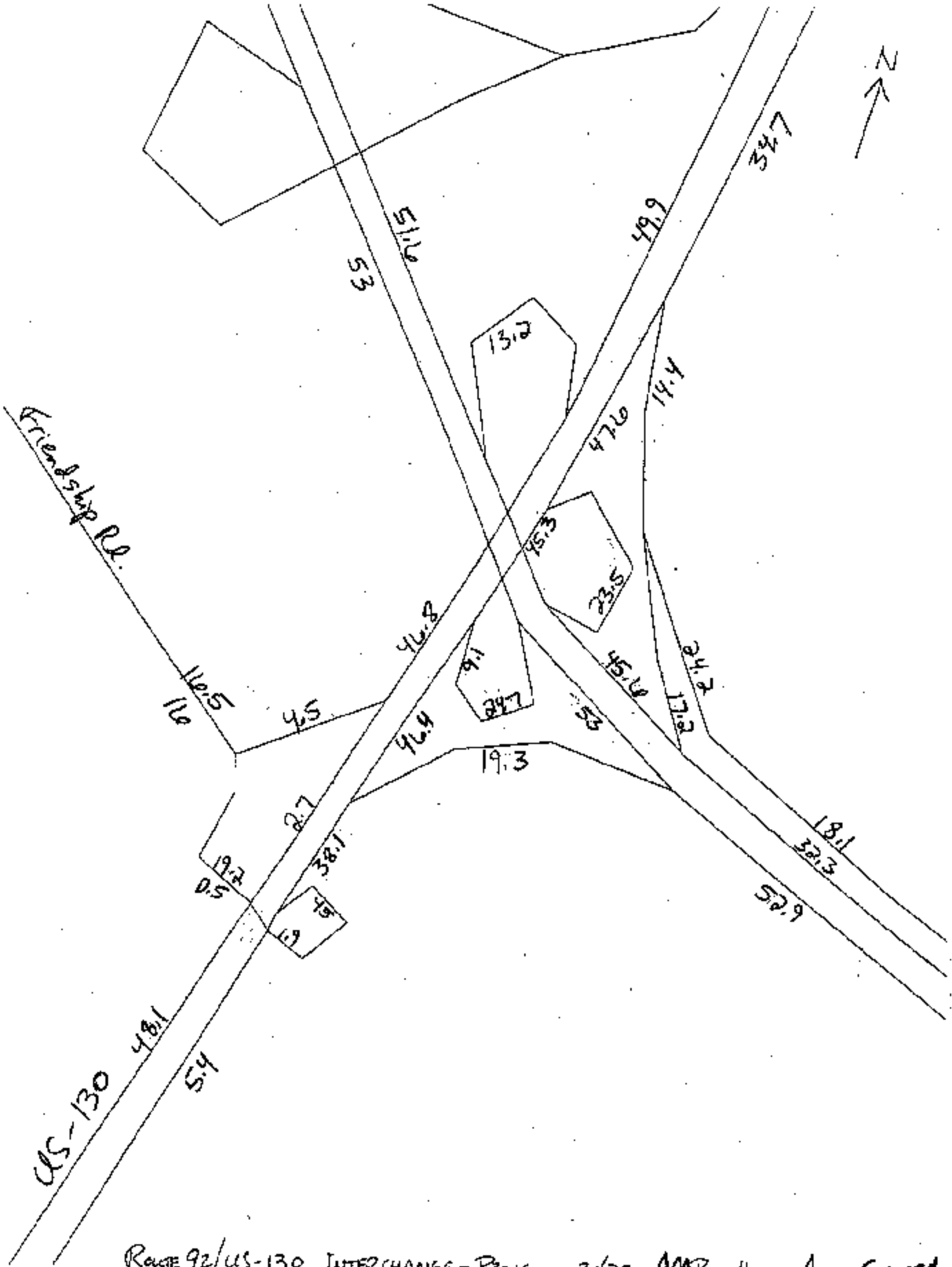
Licensec to Garmen Associates



Route 92/US-130 Interchange - Projected 2028 AM Peak Hour Truck Volumes

Viper Software by Citilabs

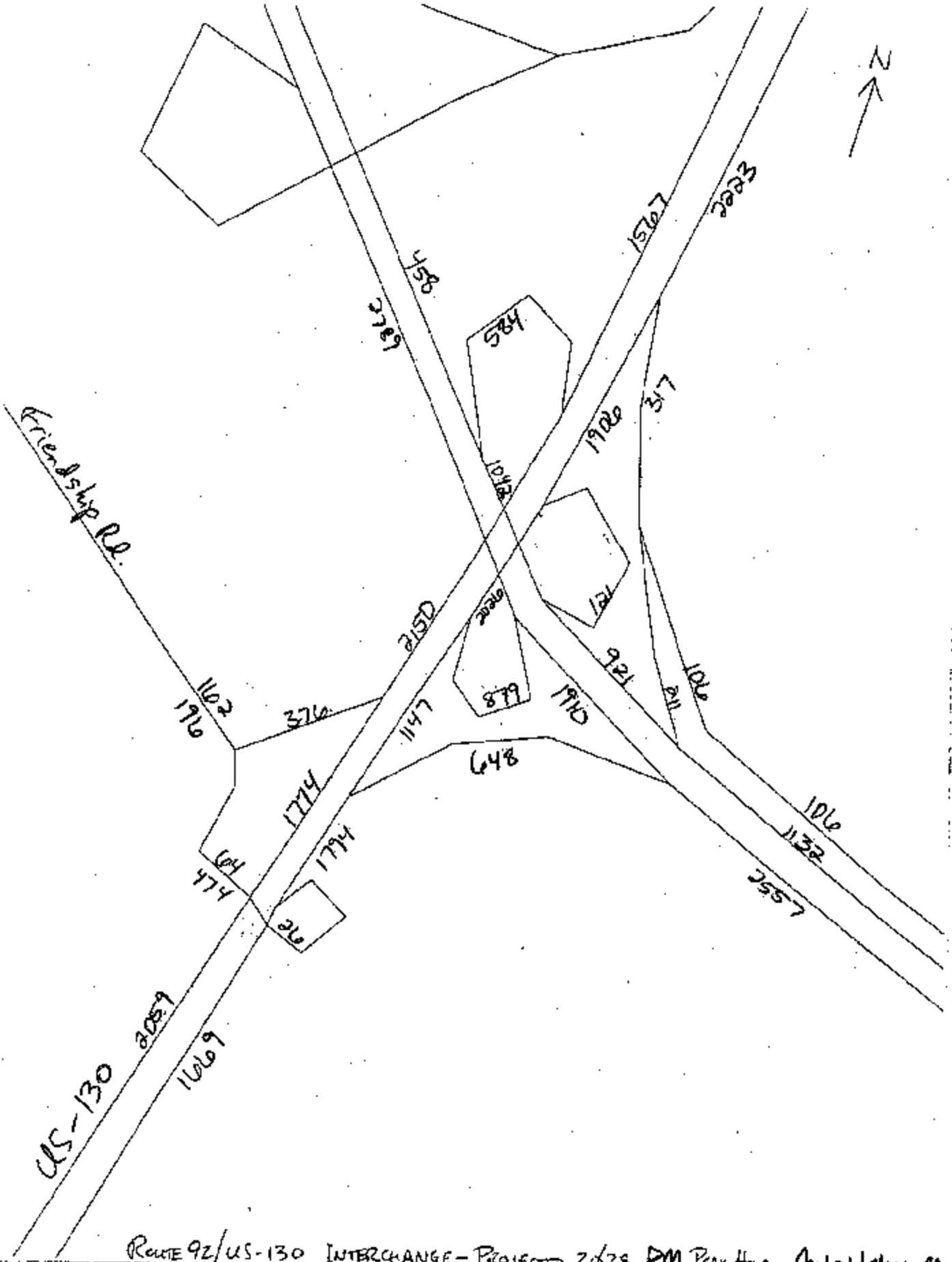
Licensed to Garmen Associates



Route 92/US-130 Interchange – Projected 2028 AM Peak Hour Avg. Speeds (mph)

Viper Software by Citilabs

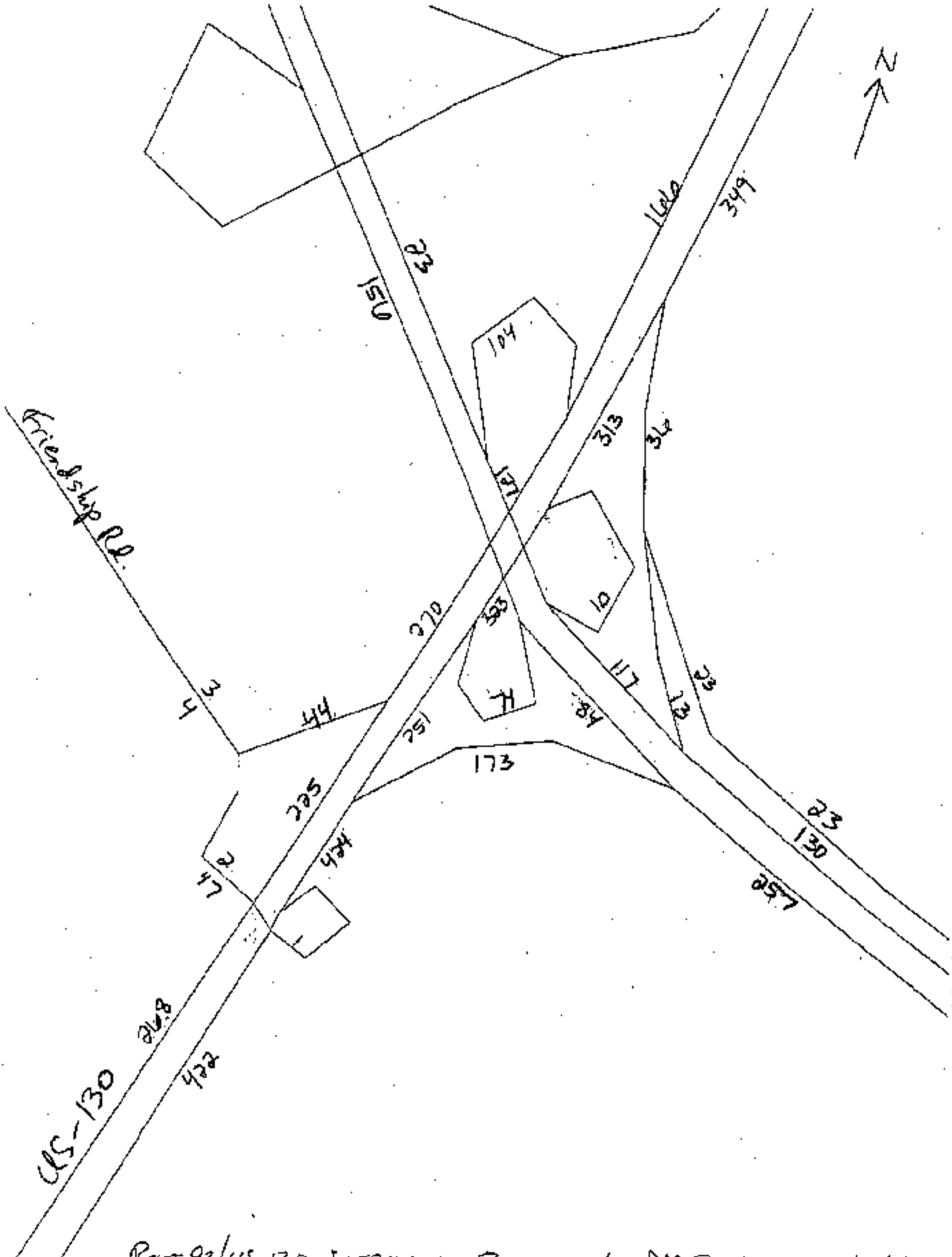
Licensed to Garmen Associates



Route 92/US-130 Interchange – Projected 2028 PM Peak Hour Auto Volumes

Viper Software by Citilabs

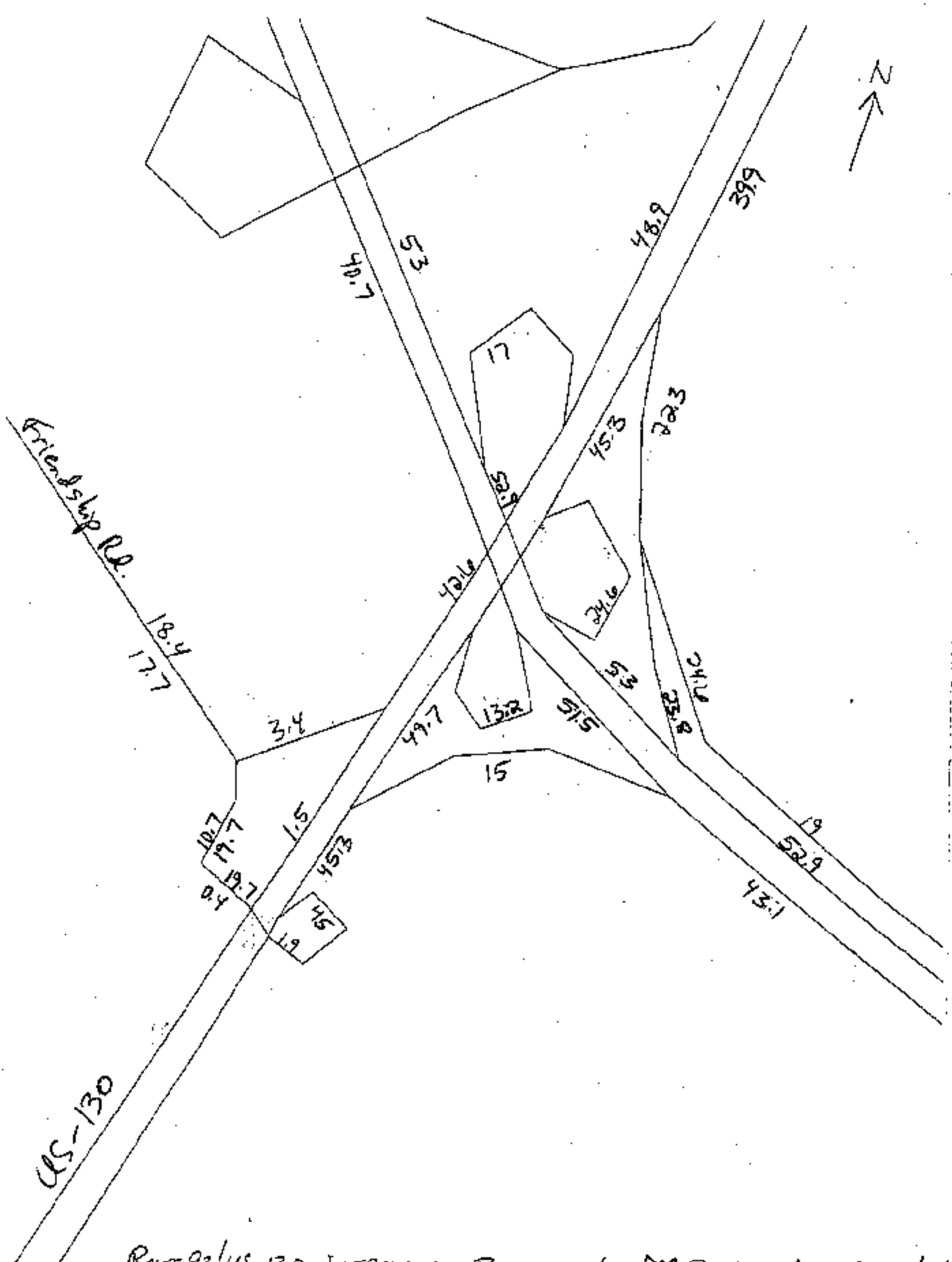
Licensed to Garmen Associates



Route 92/US-130 Interchange – Projected 2028 PM Peak Hour Truck Volumes

Viper Software by Citilabs

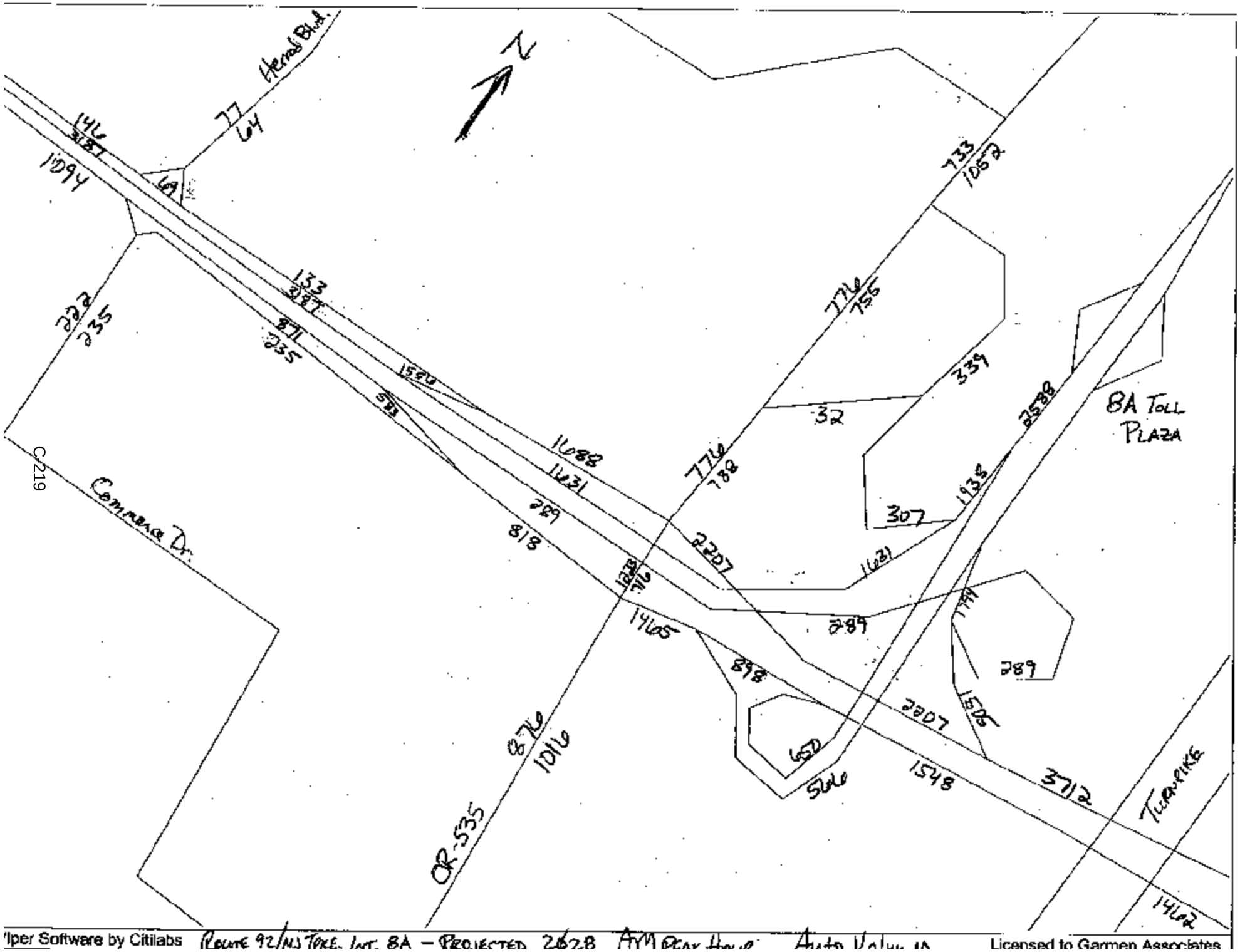
Licensed to Gannen Associates



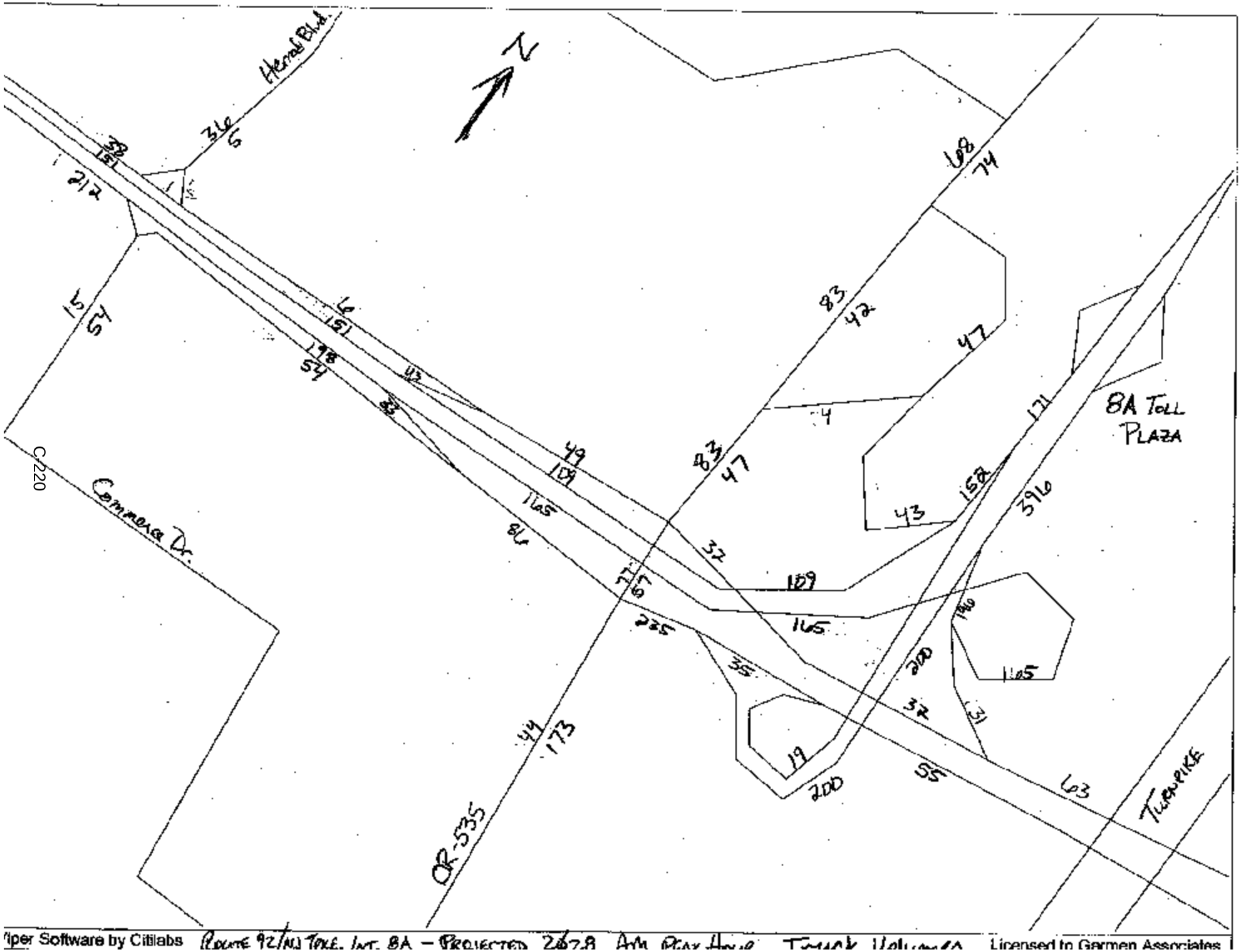
Route 92/US-130 Interchange – Projected 2028 AM Peak Hour Avg. Speeds (mph)

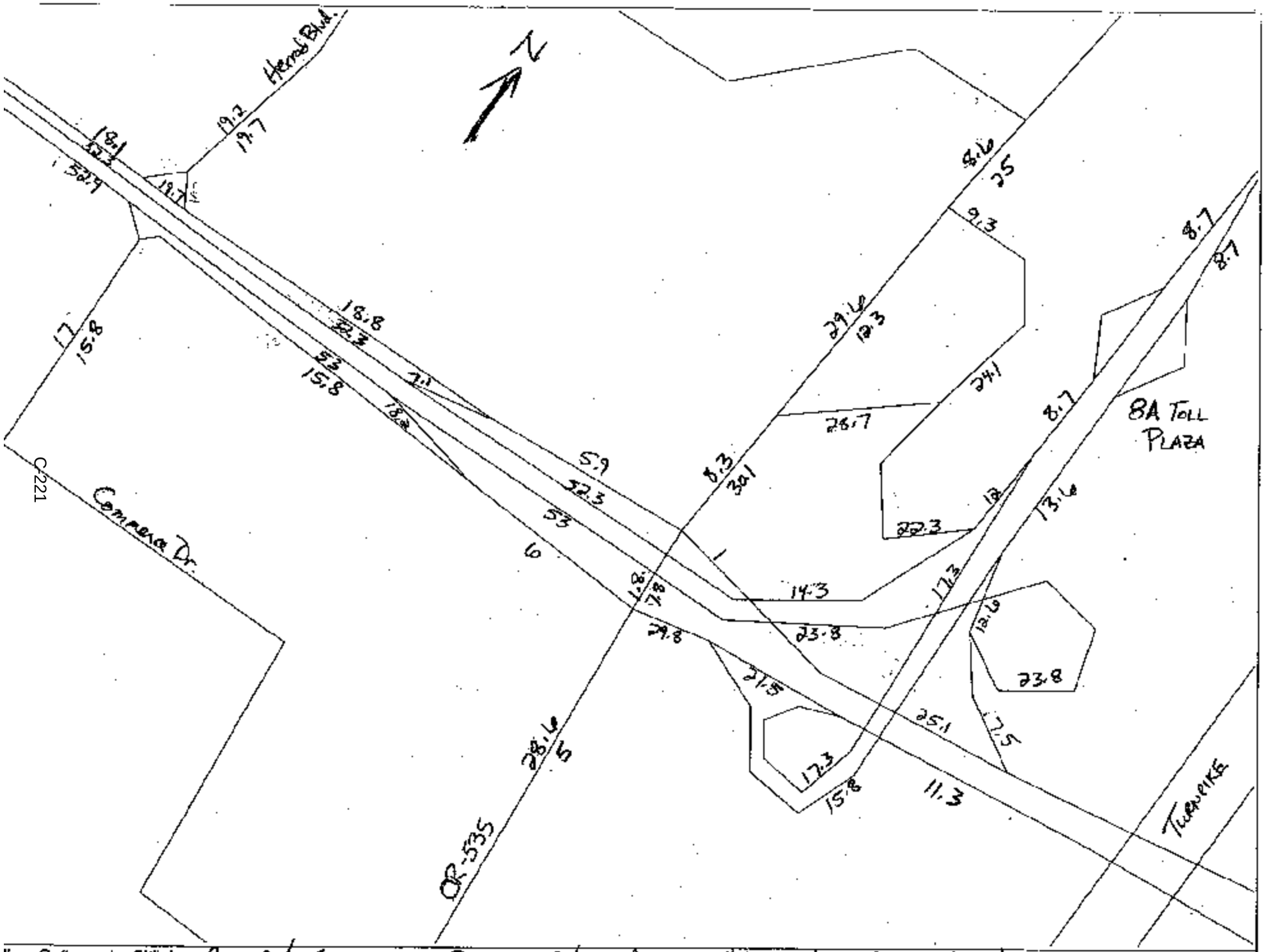
Viper Software by Citilabs

Licensed to Garmen Associates

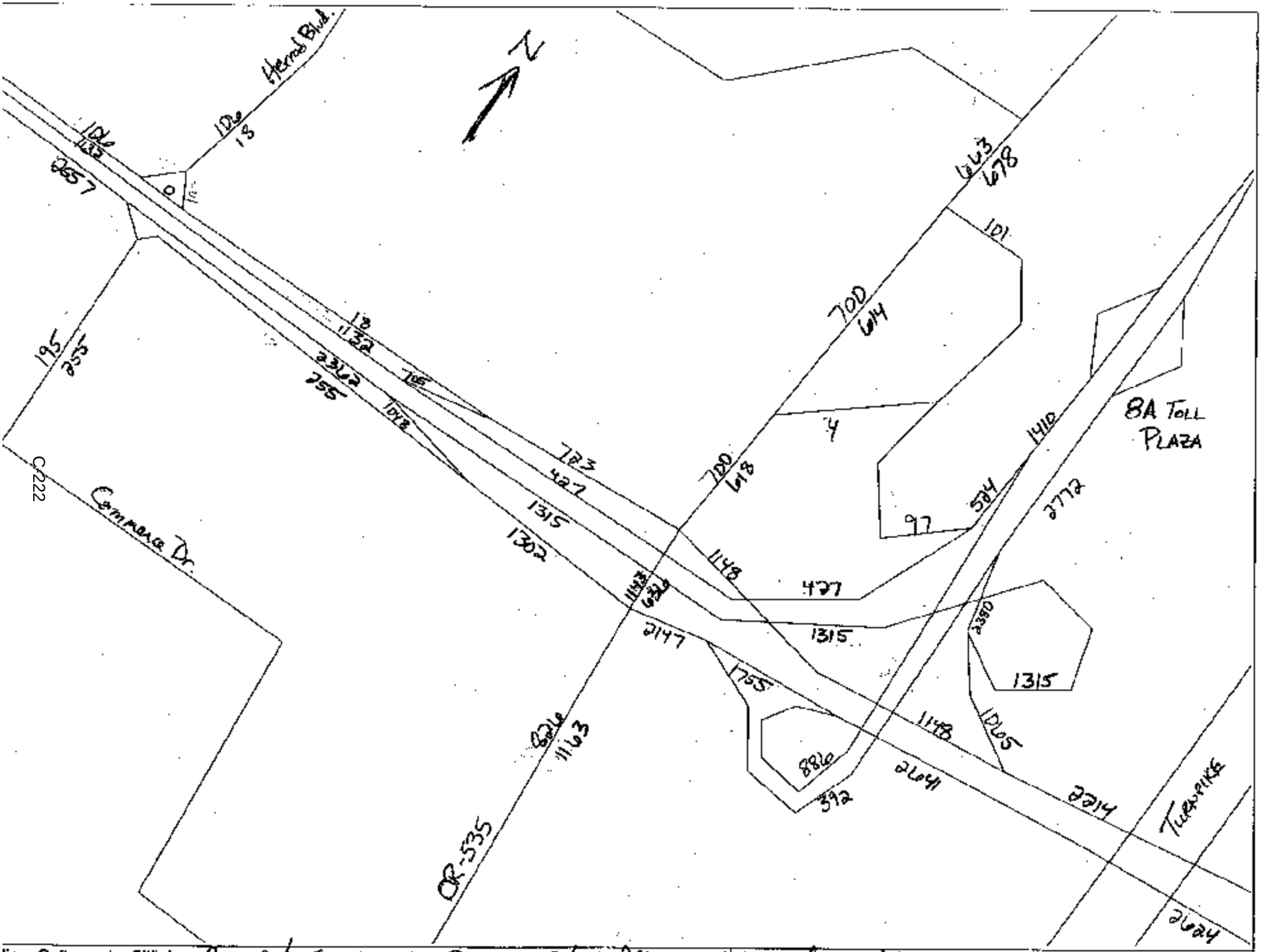


Viper Software by Citilabs Licensed to Garmen Associates

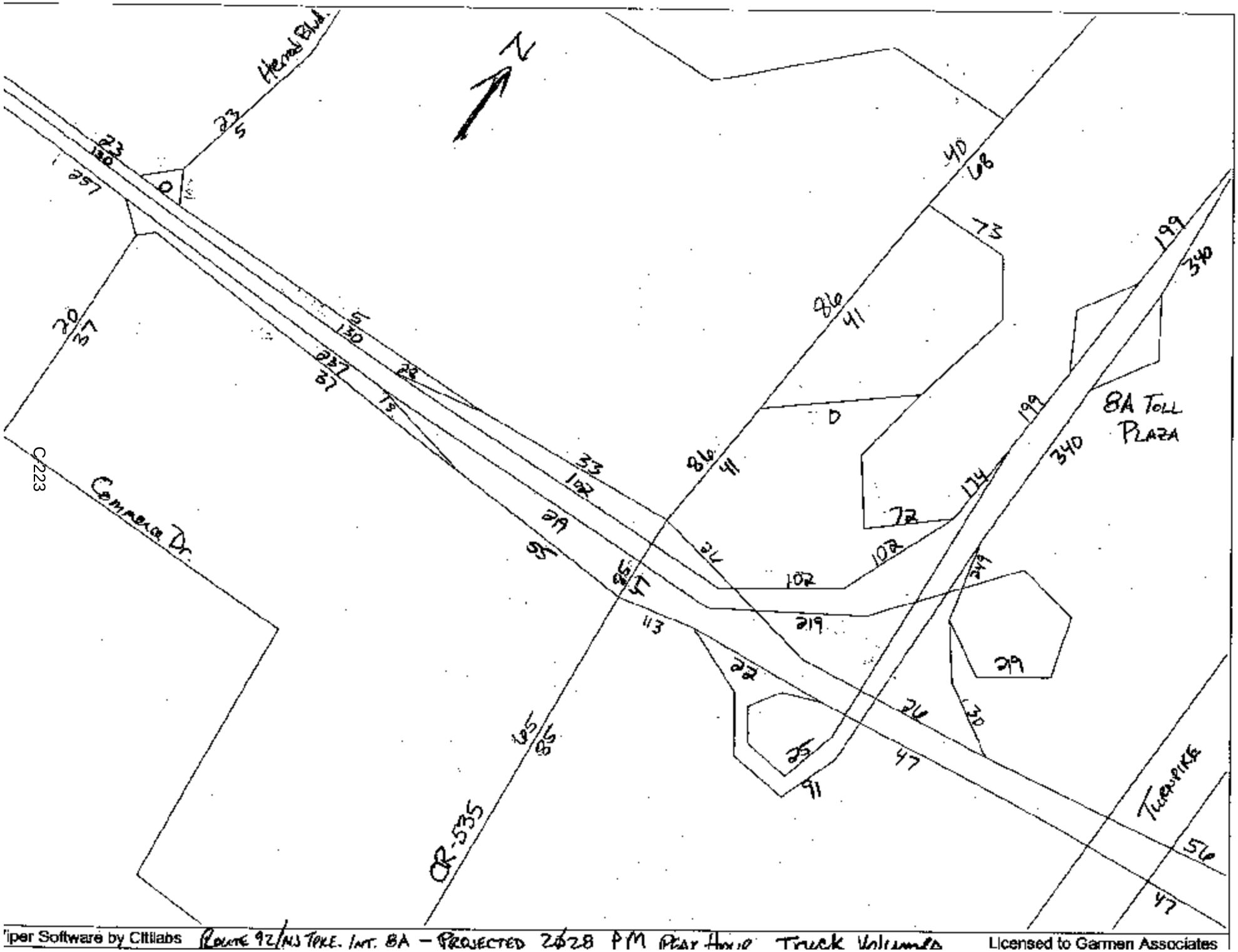

Herod Blvd.
N
Commerce Dr.
CR-535
8A Toll Plaza
Turnpike
Licensed to Garmen Associates



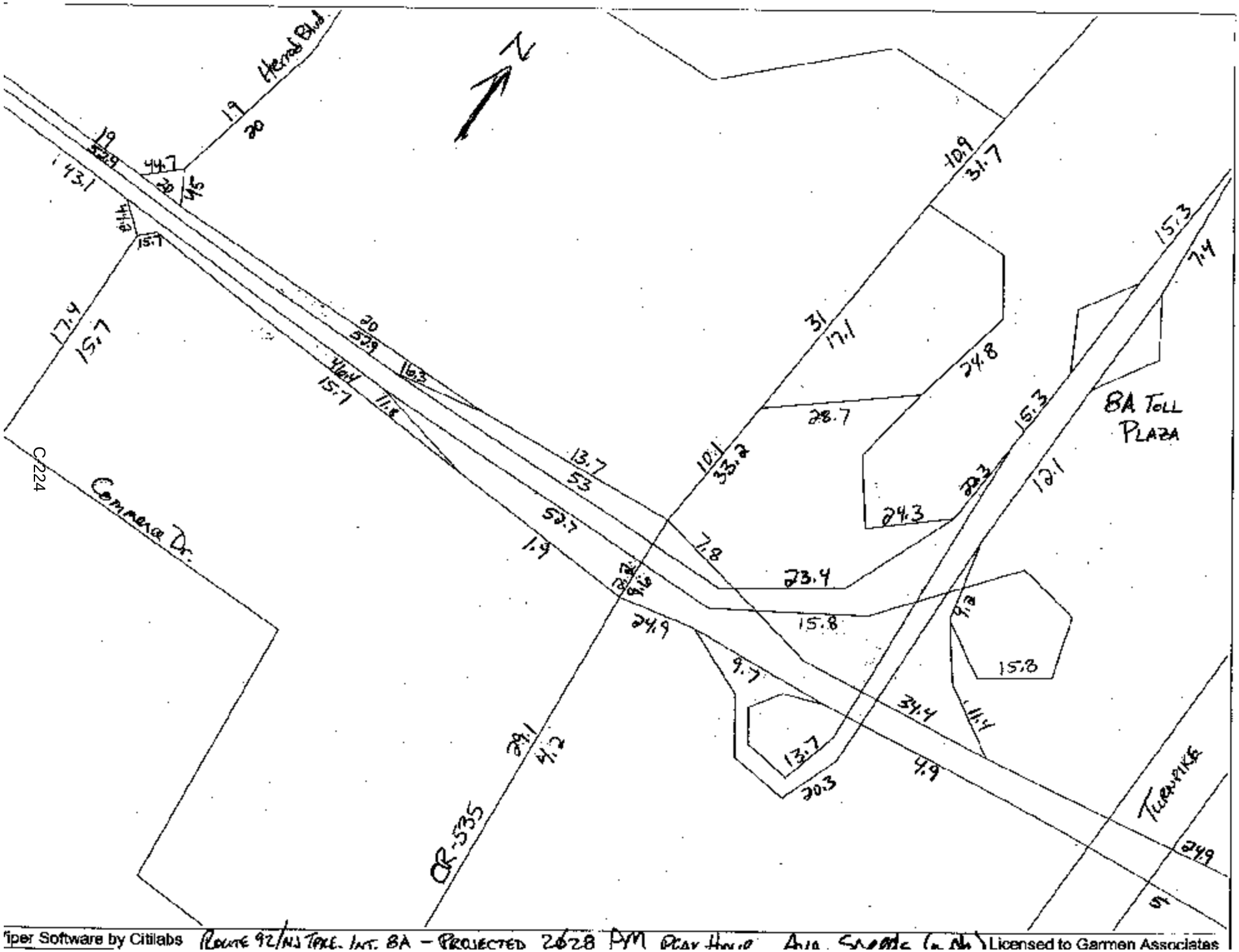
Viper Software by Citilabs (Route 92/NJ Tpke. Int. 8A – Projected 2028 AM Peak Hour Avg. Speeds (mph)) Licensed to Garmen Associates



Viper Software by Citilabs Route 92/NJ Turnpike Int. 8A – Projected 2028 AM Peak Hour Auto Volumes Licensed to Garmen Associates

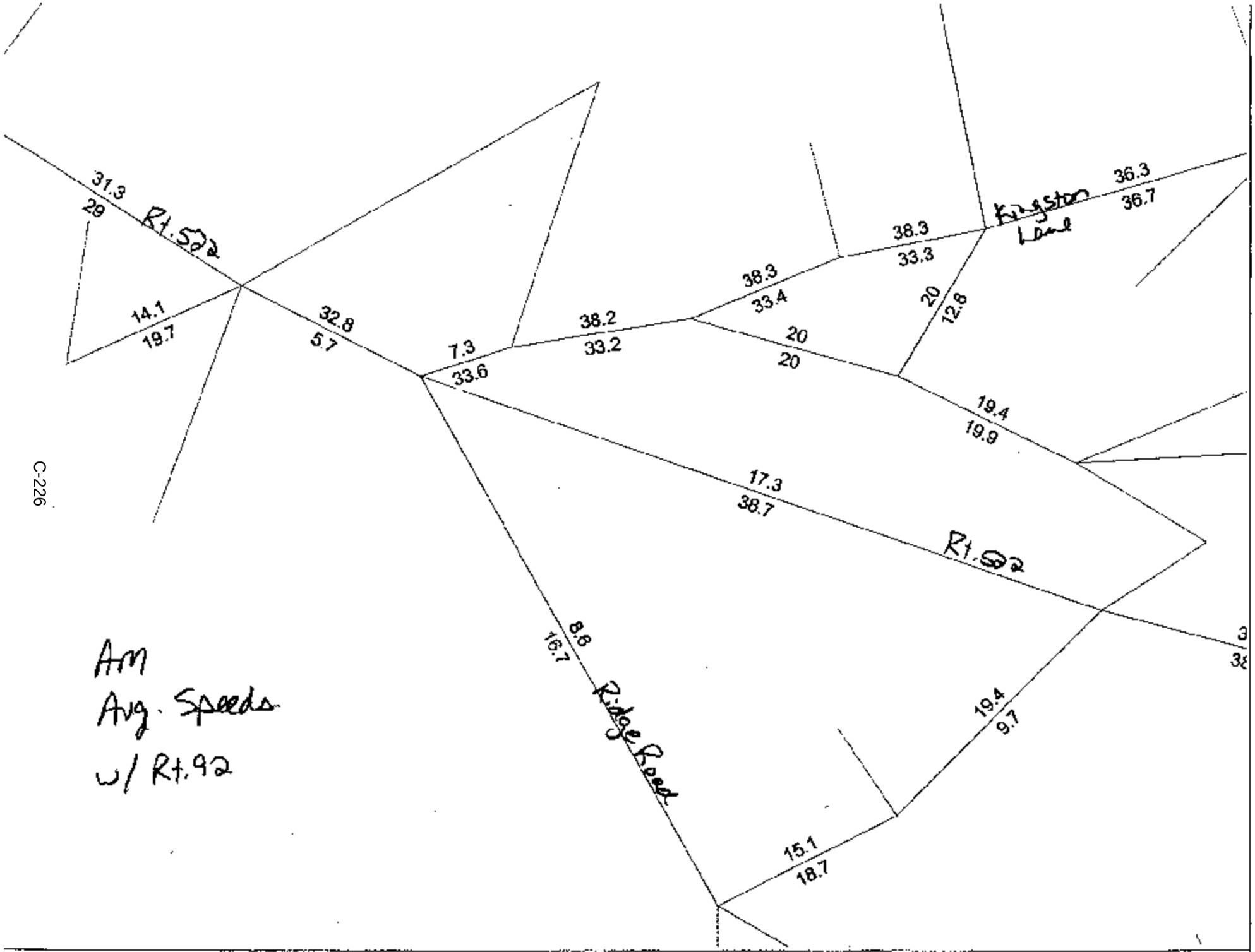


Tiper Software by Citilabs Route 92/NJ Tpke. Int. 8A – Projected 2028 PM Peak Hour Truck Volumes Licensed to Garmen Associates

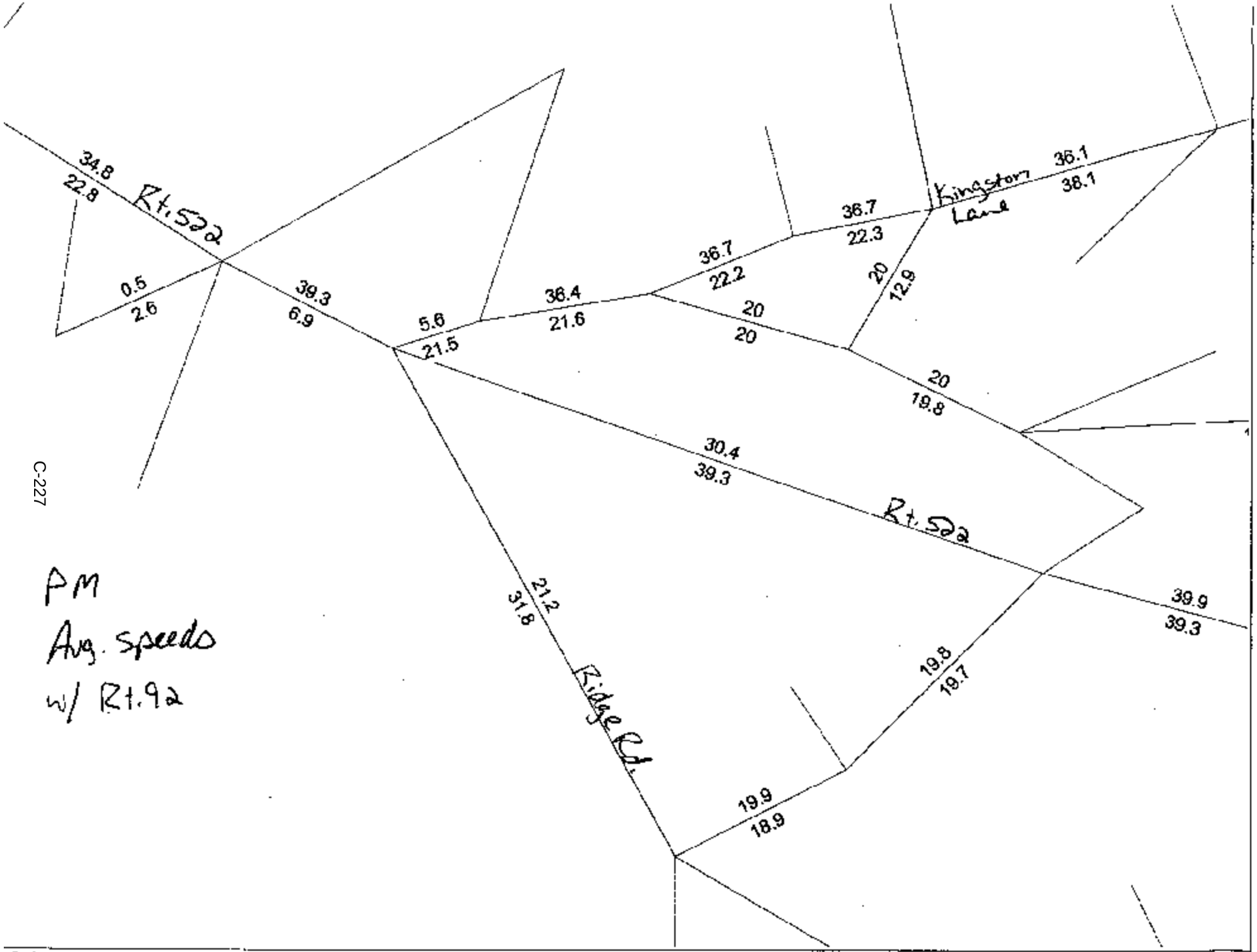


Tiper Software by Citilabs Route 92/NJ Tpke. Int. 8A – Projected 2028 PM Peak Hour Aug. Smooth (w. Alt.) Licensed to Garmen Associates

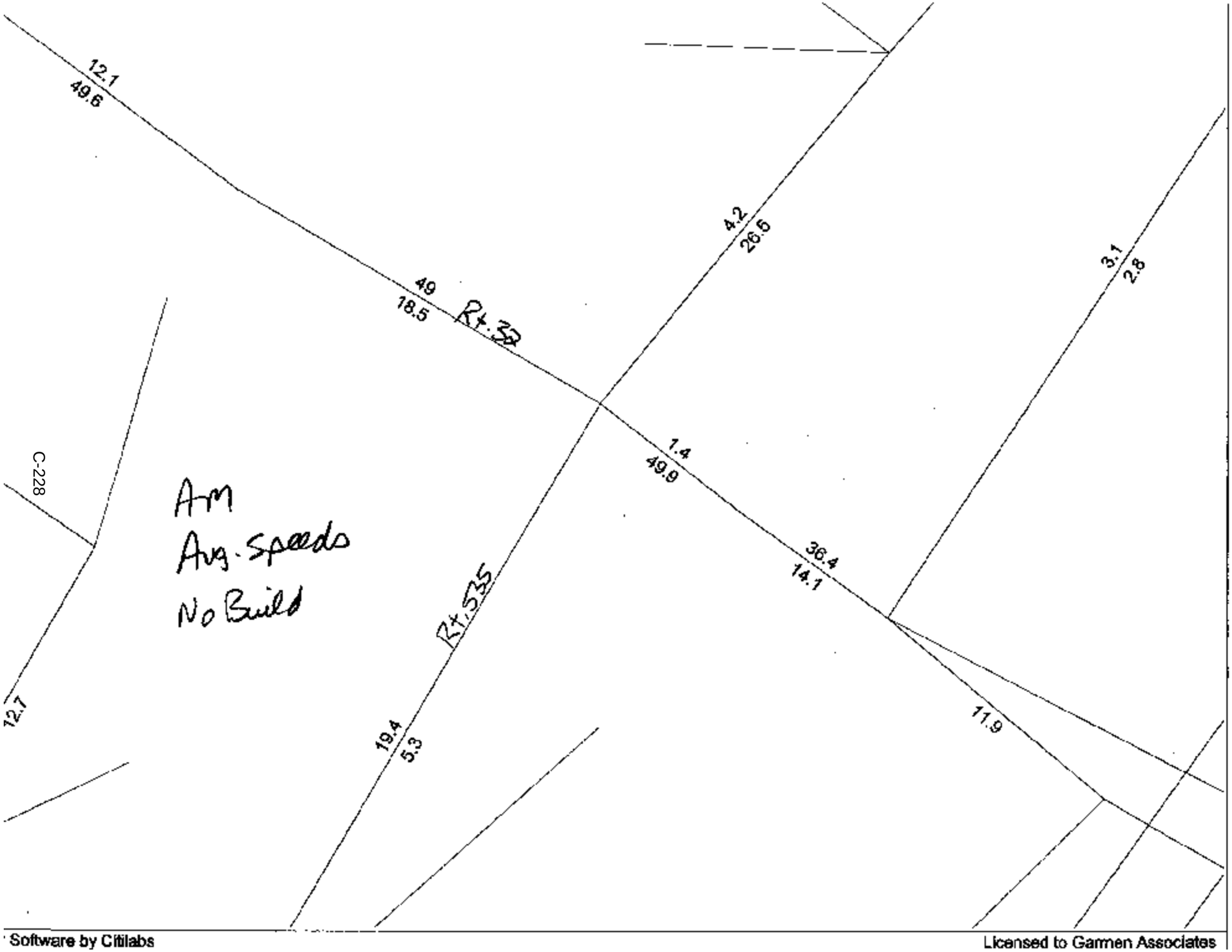
2.4 2028 Build Route 92 – Four Intersections

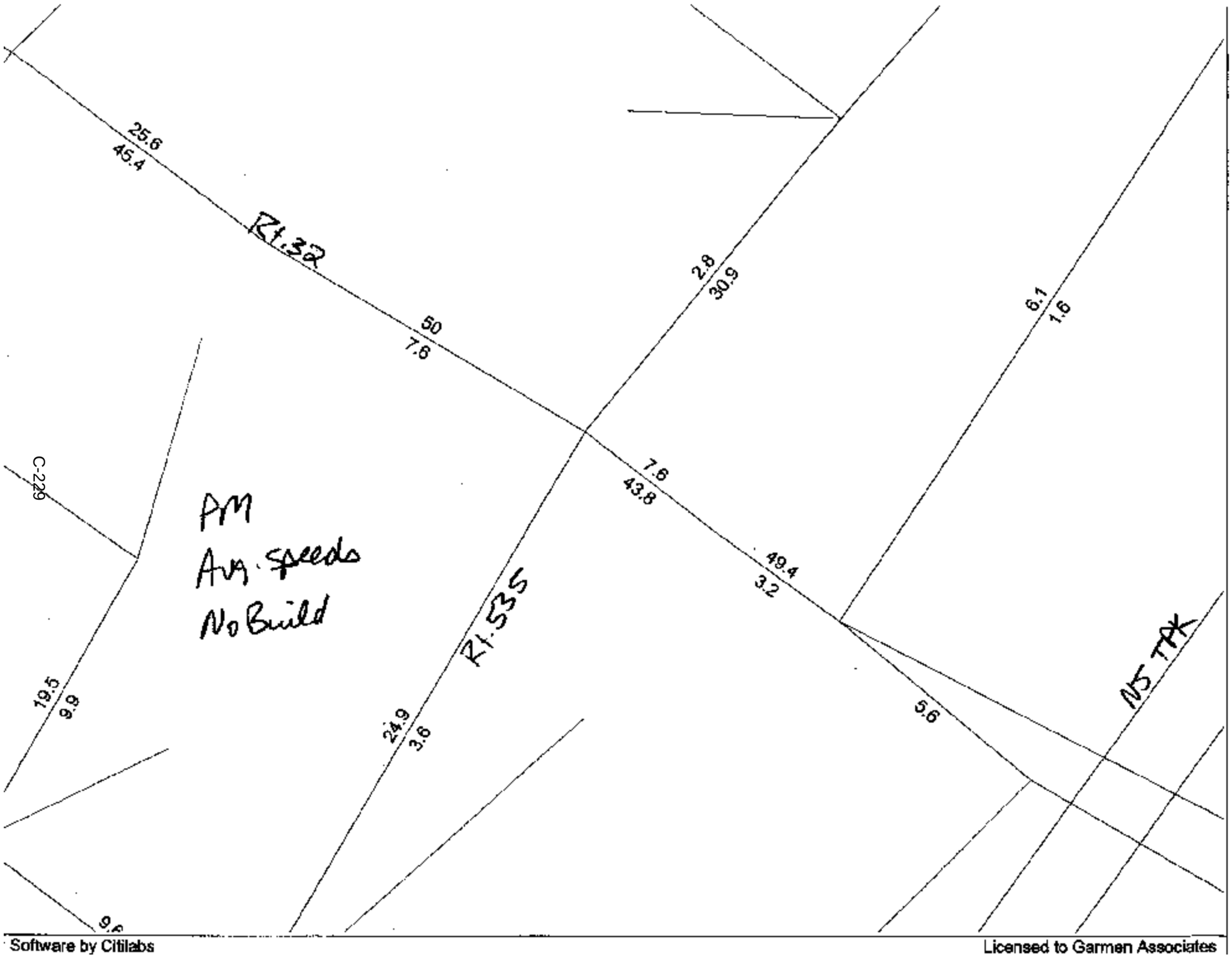


Software by Citilabs
Licensed to Garmen Associates

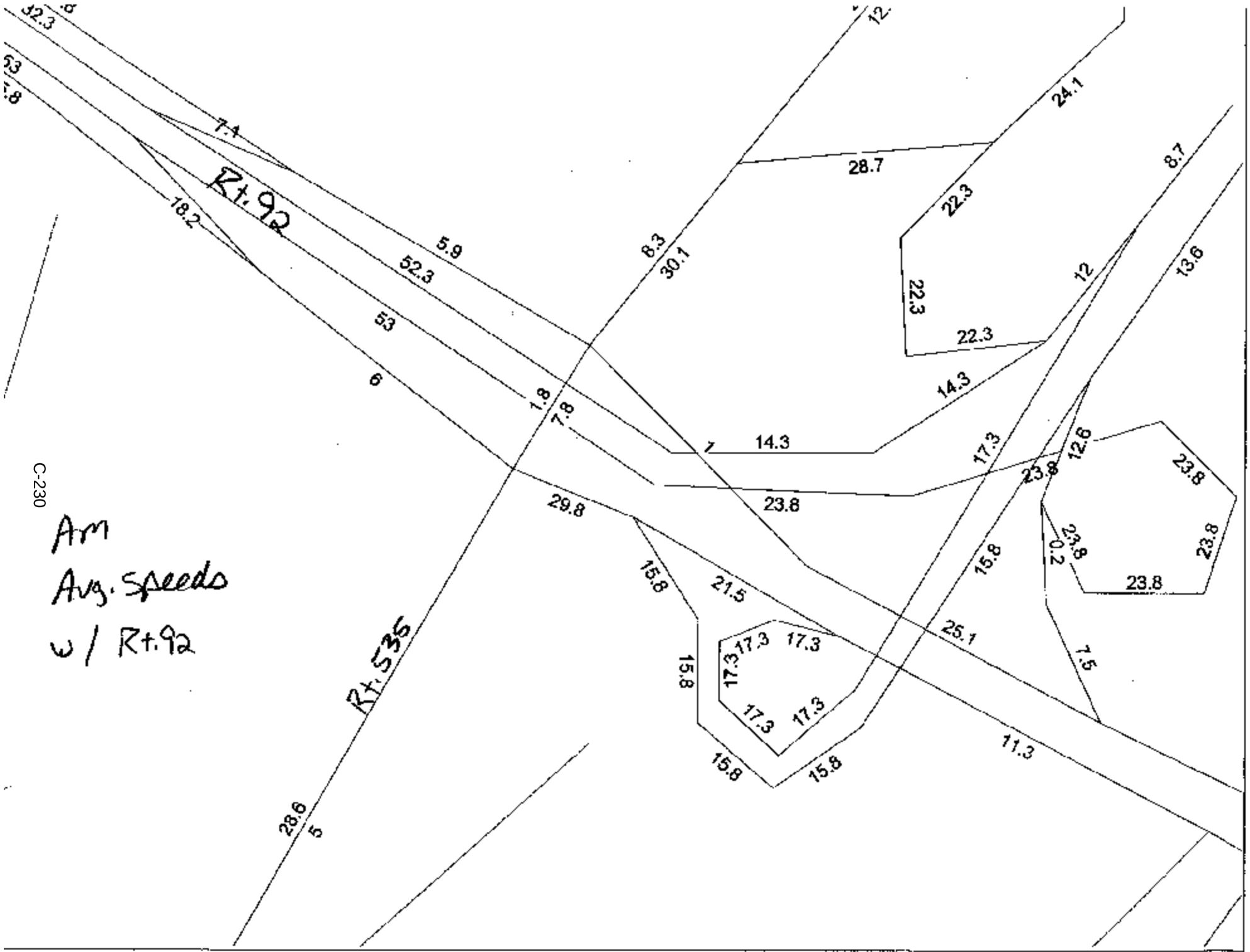


Software by Citilabs
Licensed to Garmen Associates


12.1
49.6
49
18.5
Rt. 30
4.2
26.6
3.1
2.8
1.4
49.9
36.4
14.1
11.9
Rt. 535
19.4
5.3
12.7
AM
Avg. Speeds
No Build
Software by Citilabs
Licensed to Gannen Associates

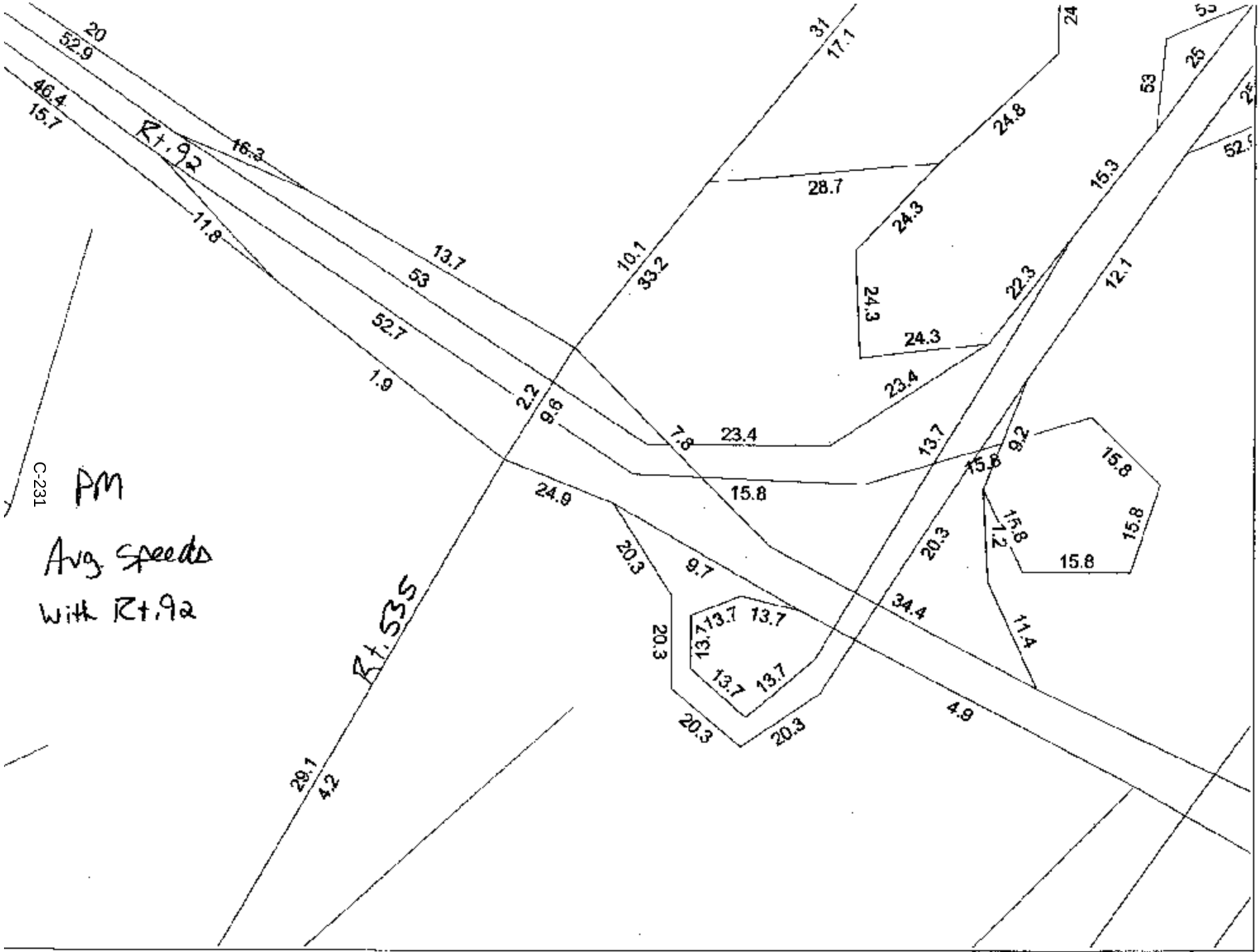


Software by Citilabs
Licensed to Garmen Associates



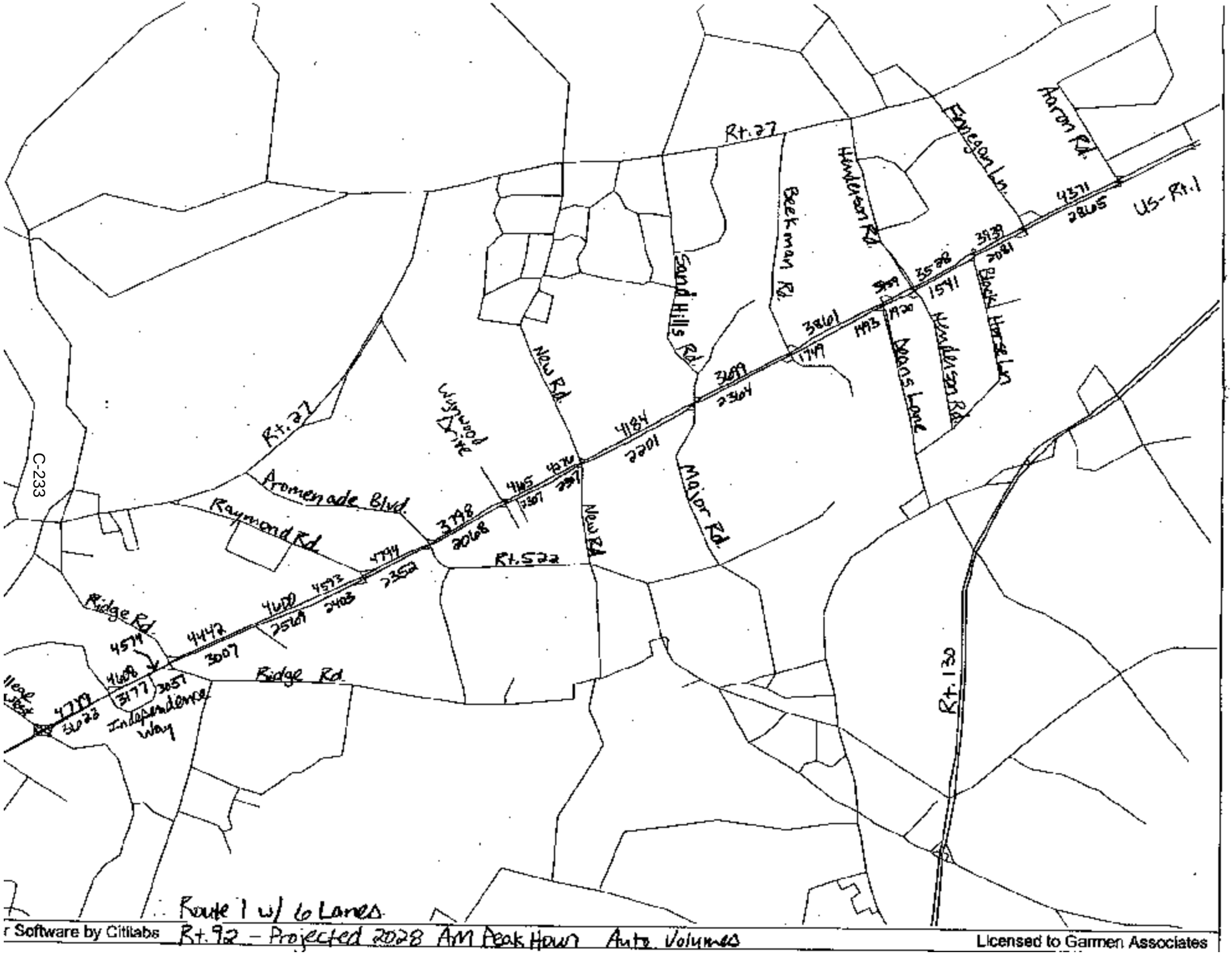
Software by Citilabs

Licensed to Garmen Associates



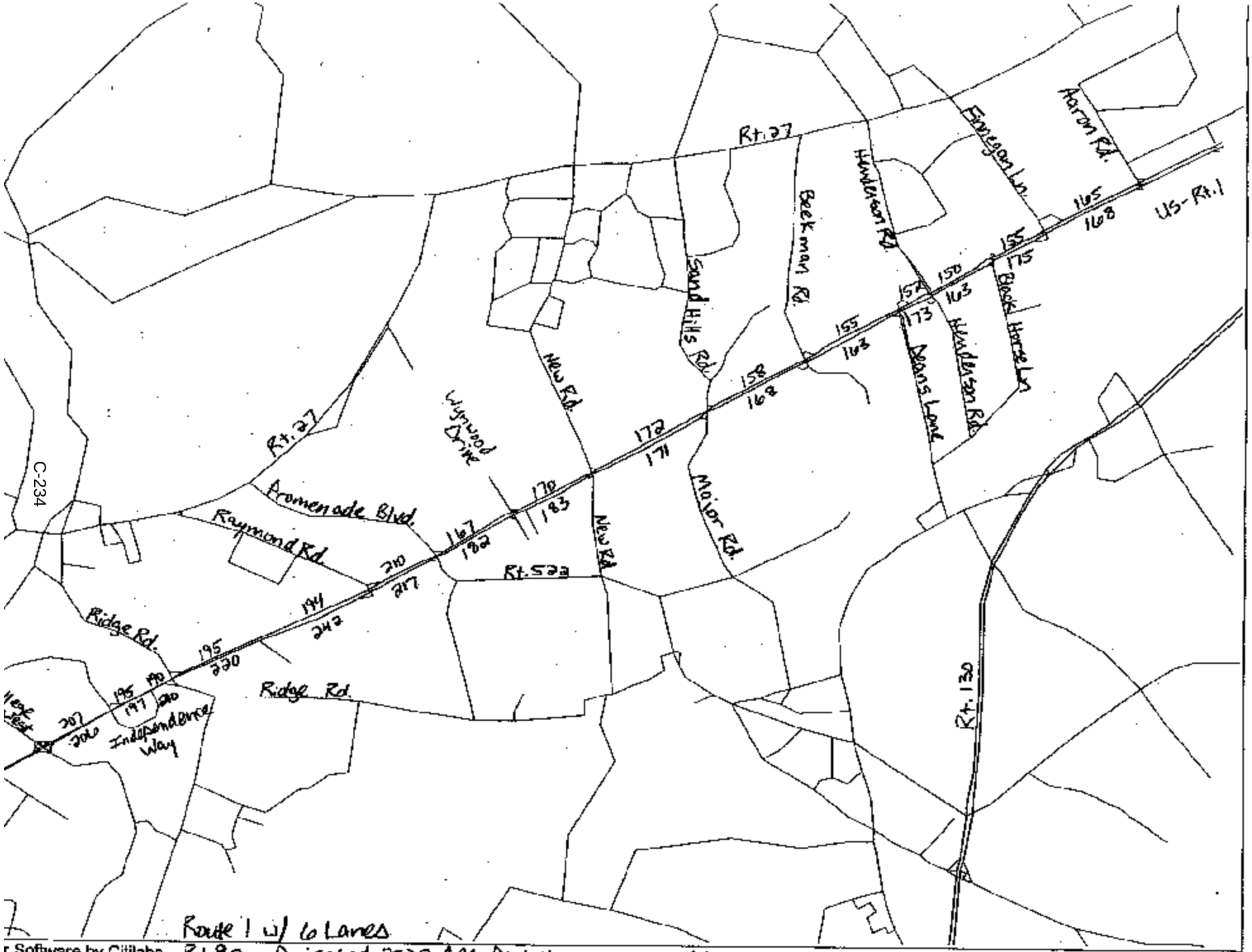
Software by Citilabs
Licensed to Garmen Associates

2.5 2028 Six-Lane Route 1 – Route 1 Mid-Block (College Rd. to Aaron Rd.)



r Software by Citilabs

Licensed to Garmen Associates

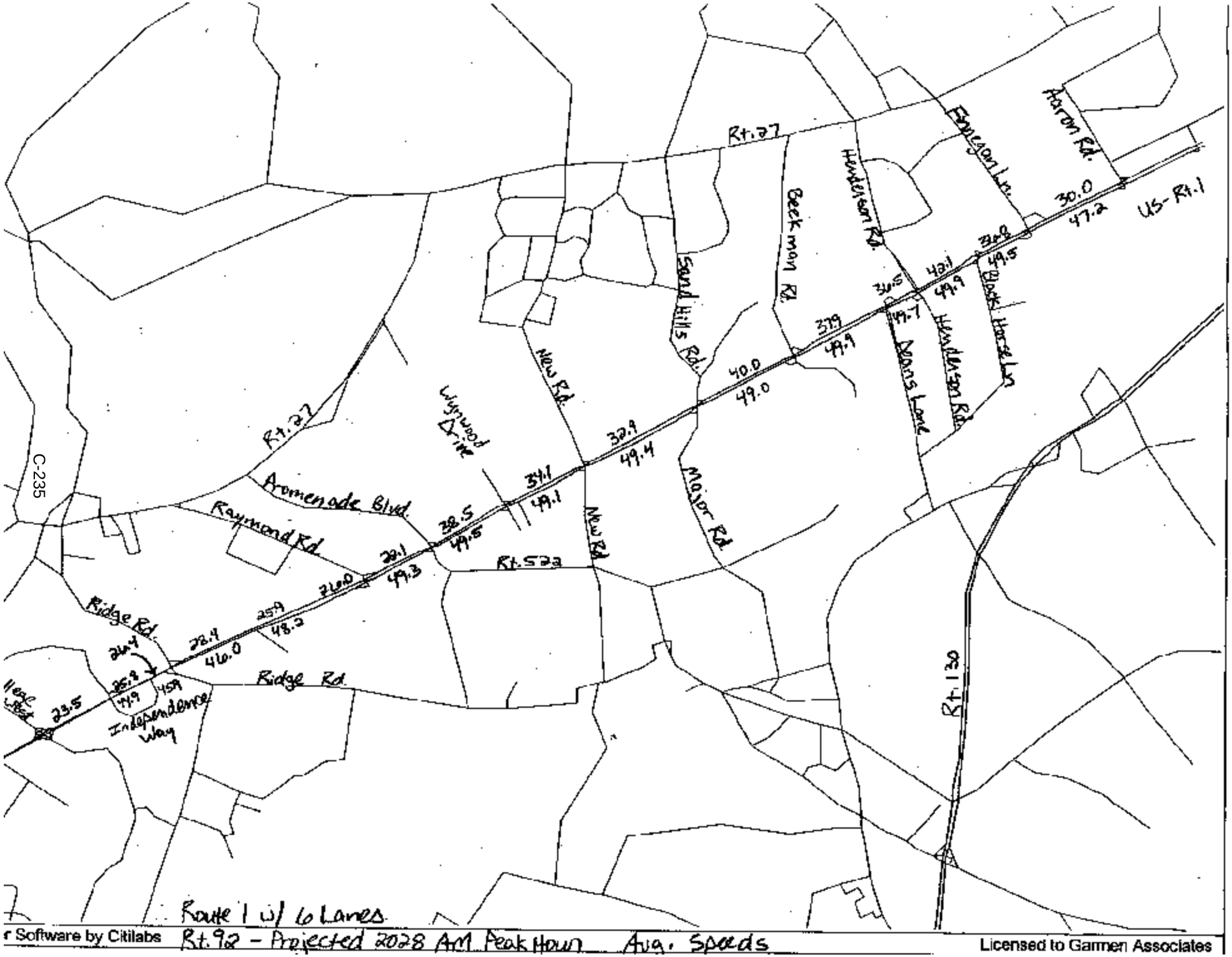


Route 1 w/ 6 Lanes

Rt. 92 - Projected 2028 AM Peak Hour Truck Volumes

r Software by Citilabs

Licensed to Garmen Associates

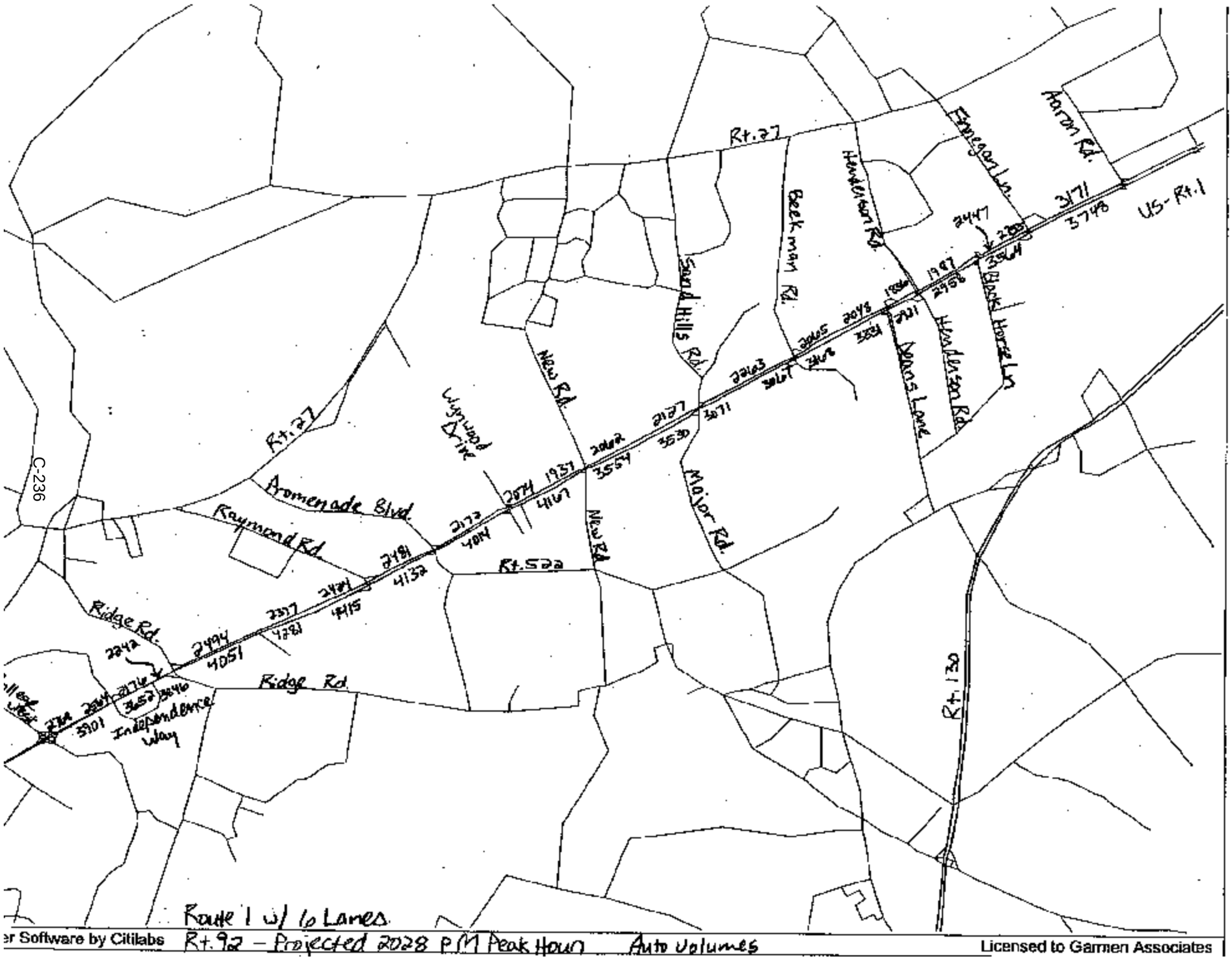


Route 1 w/ 6 Lanes

Rt. 92 - Projected 2028 AM Peak Hour Avg. Speeds

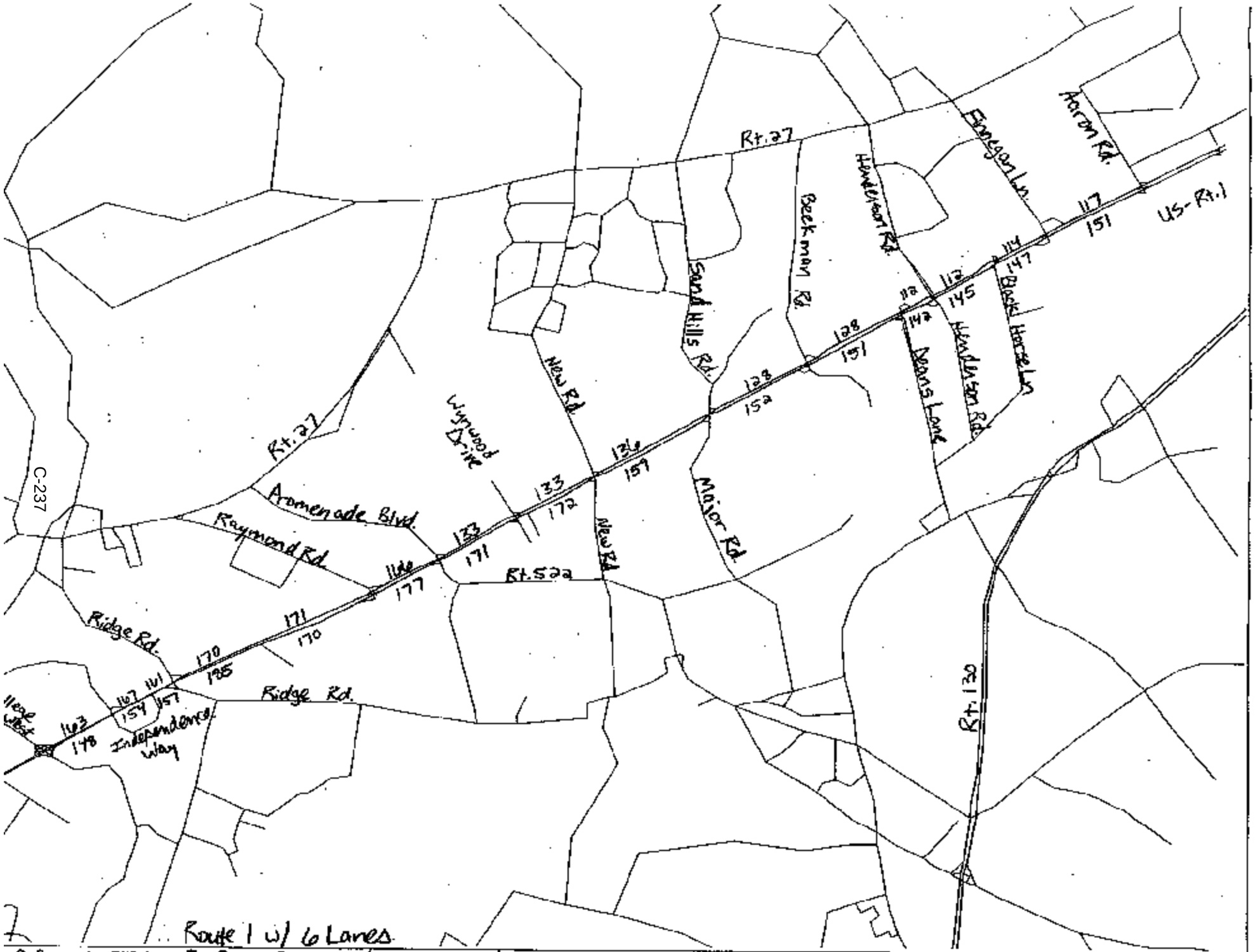
r Software by Citilabs

Licensed to Garmen Associates

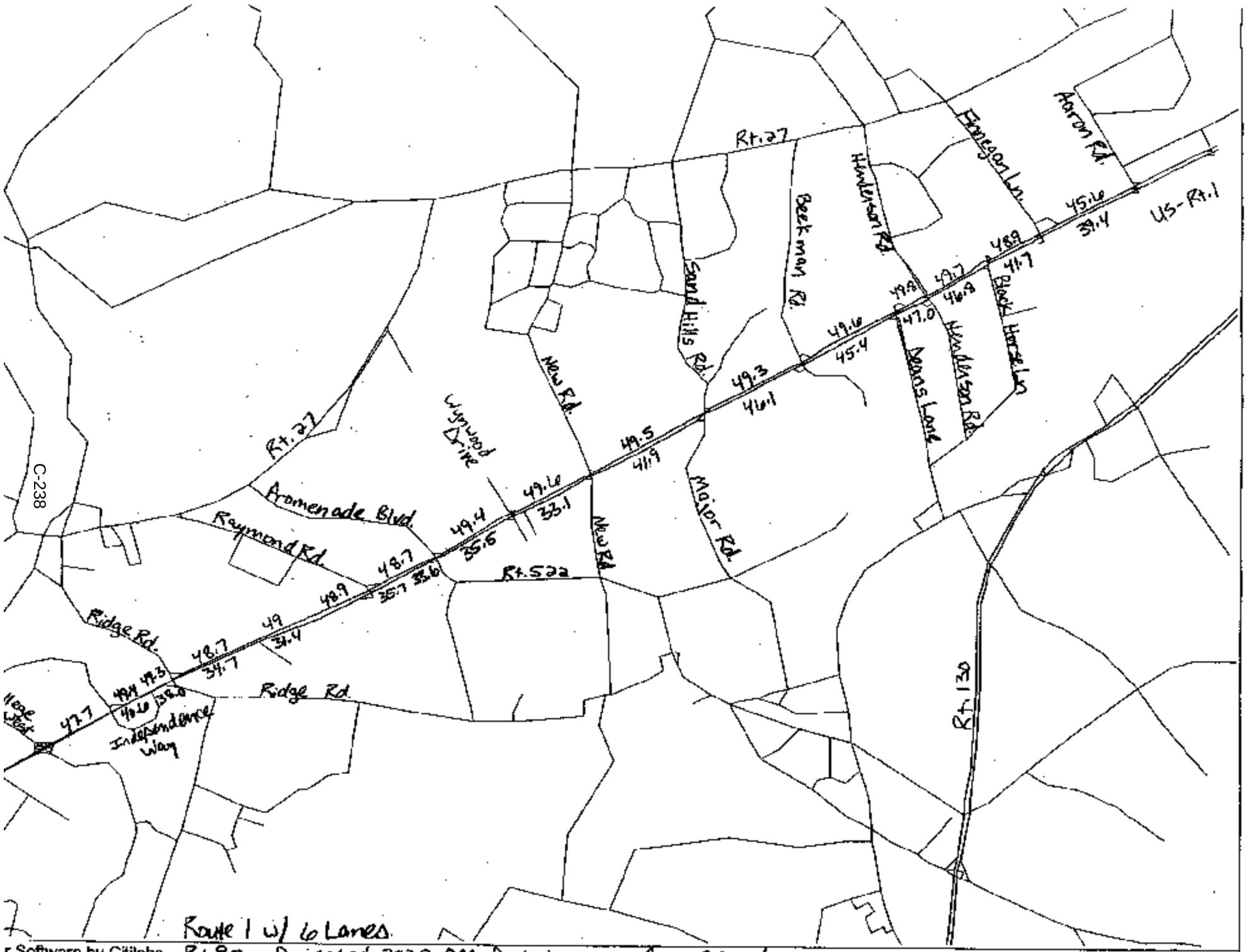


er Software by Citilabs

Licensed to Garmen Associates



r Software by Citilabs
Licensed to Garmen Associates



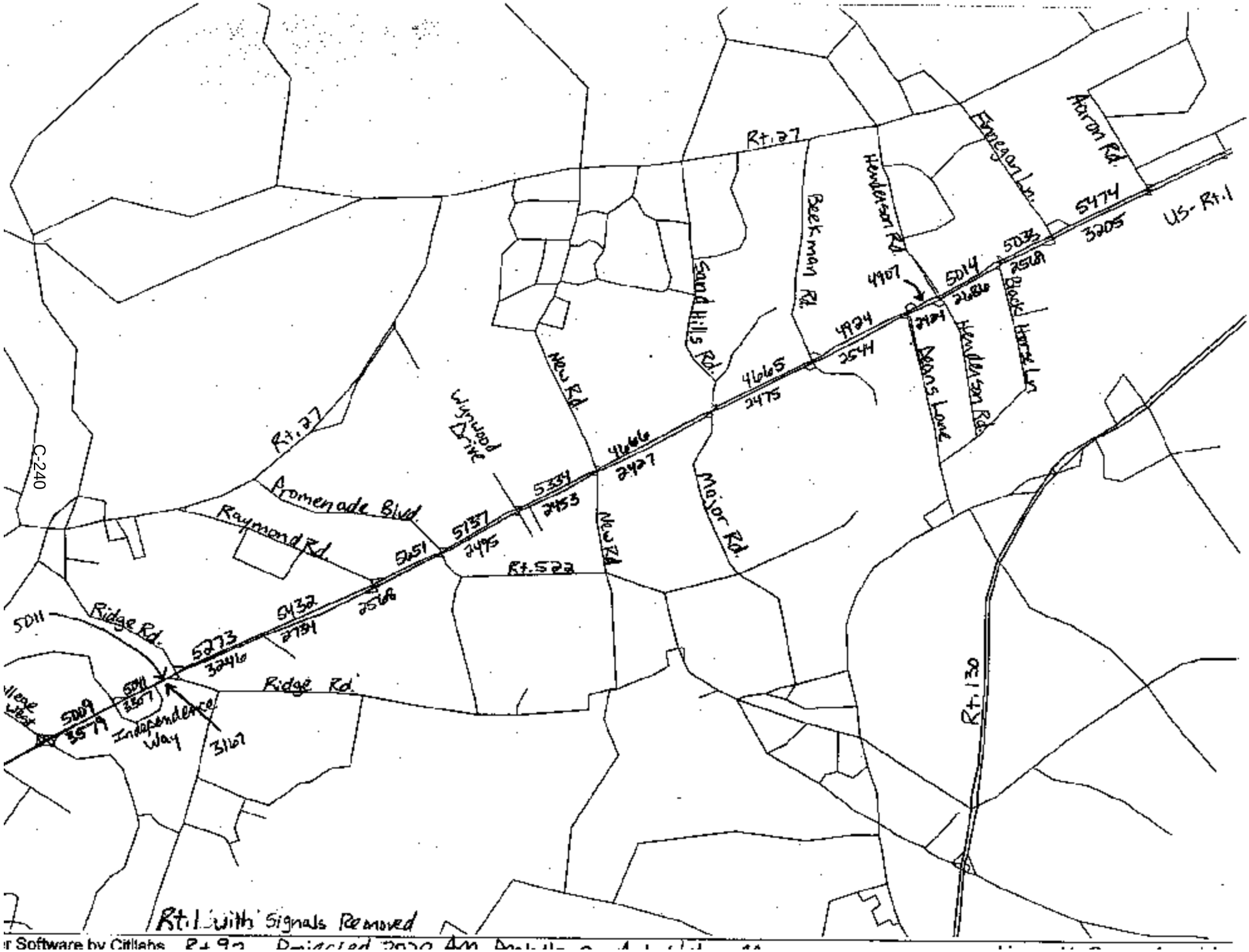
Route 1 w/ 6 Lanes

Rt. 92 – Projected 2028 PM Peak Hour Avg. Speeds.

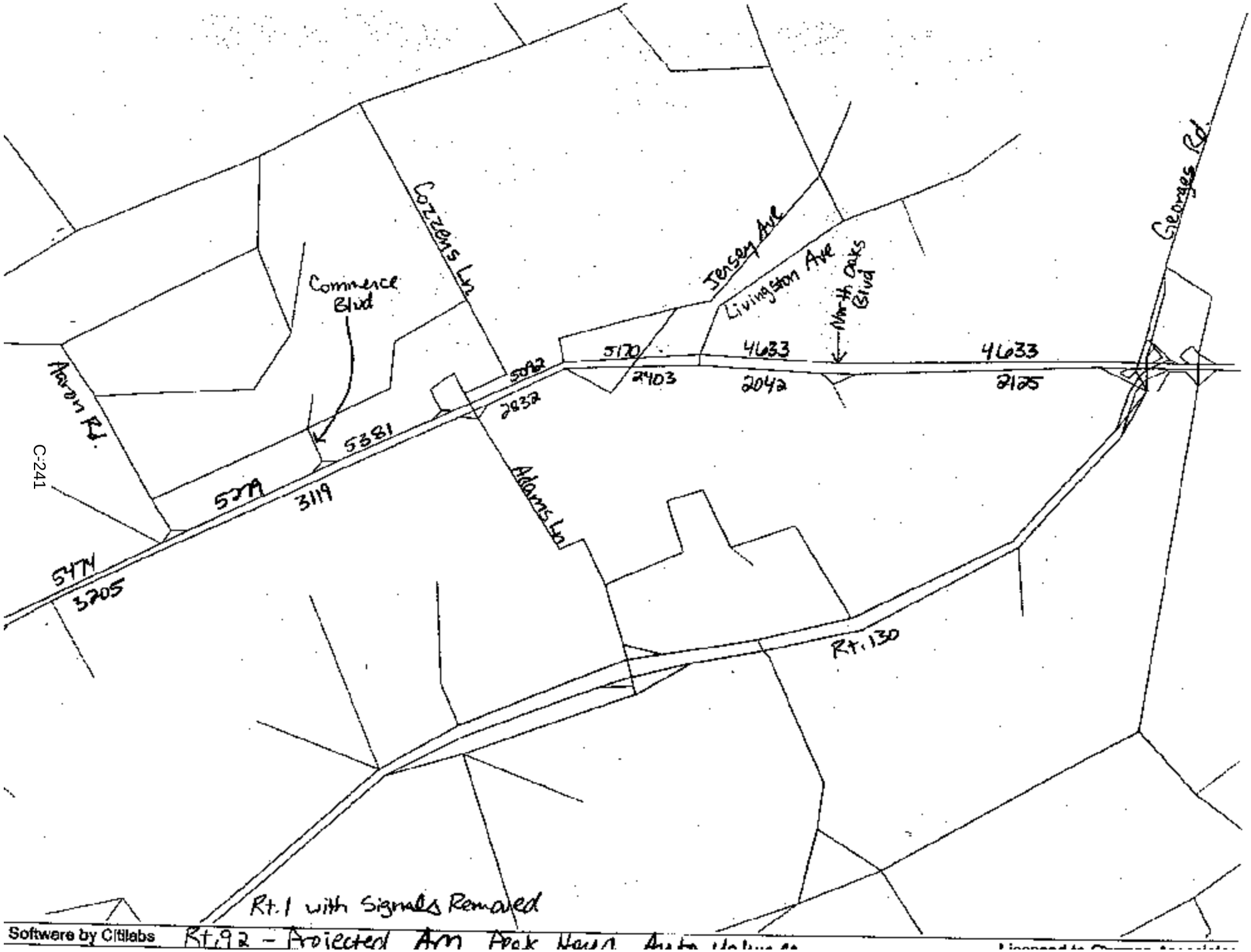
r Software by Citilabs

Licensed to Garmen Associates

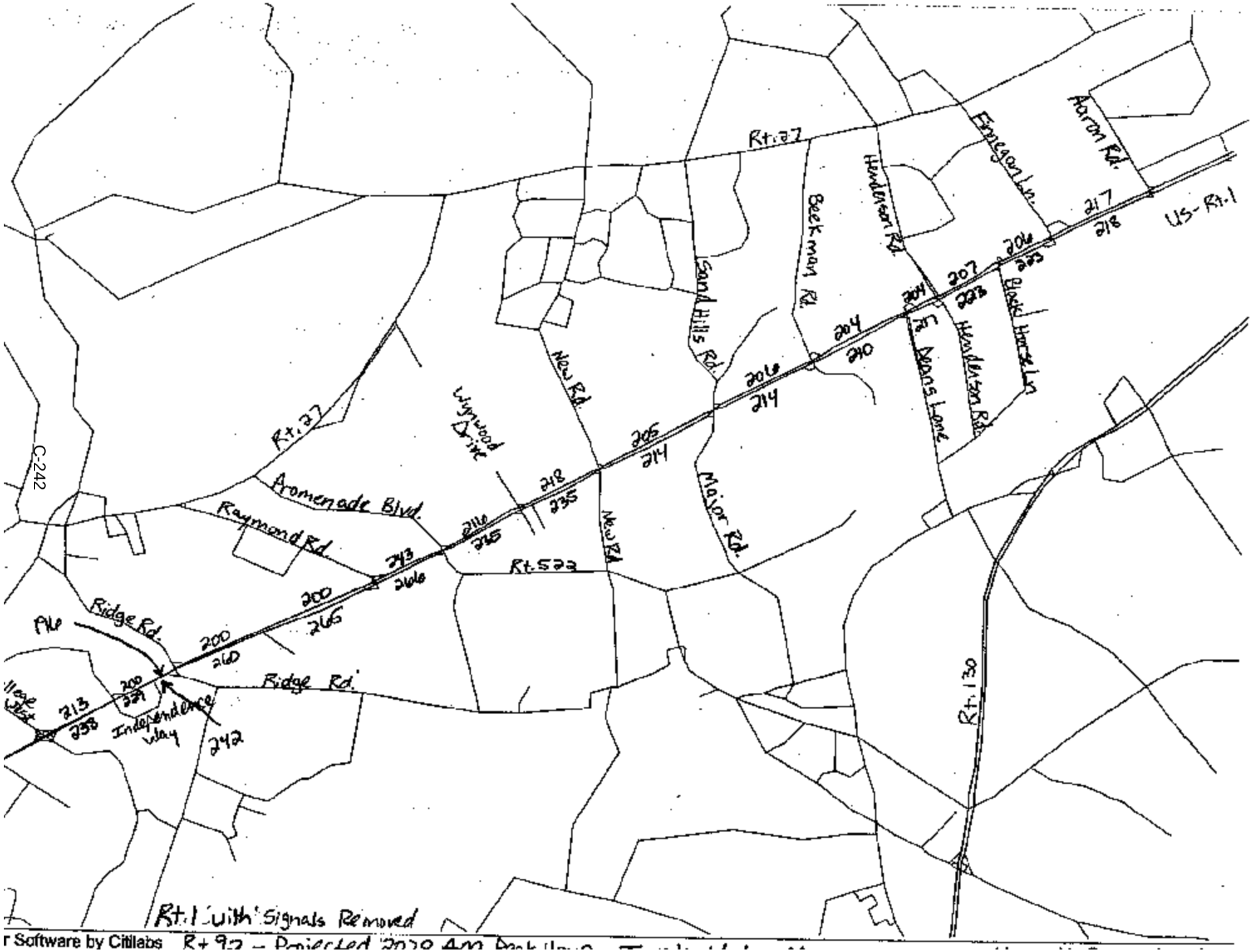
2.6 2028 Six-Lane Route 1 w/ Signals Removed – Route 1 Mid-Block (College Rd. to Rt. 130)



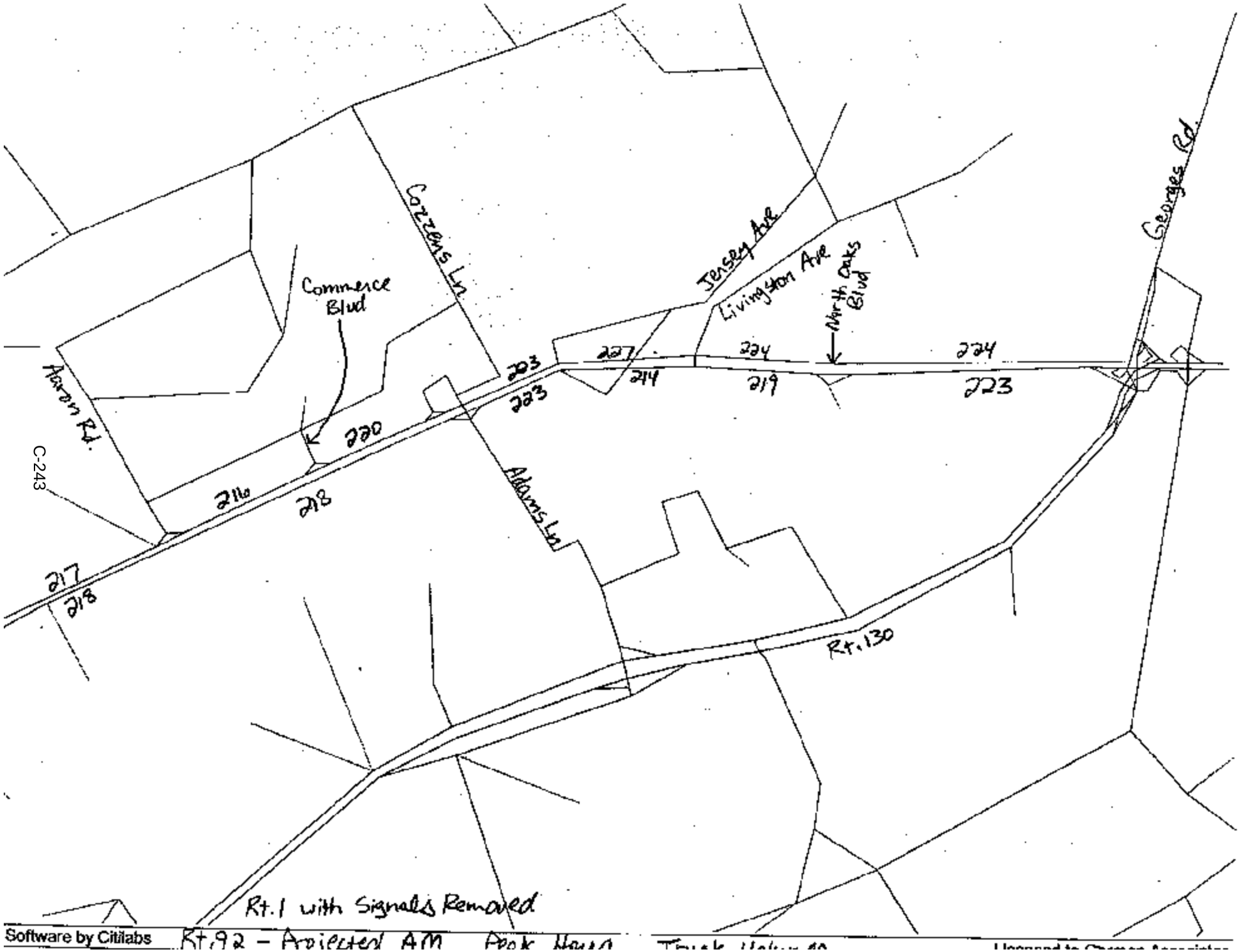
Rt. 1 with Signals Removed

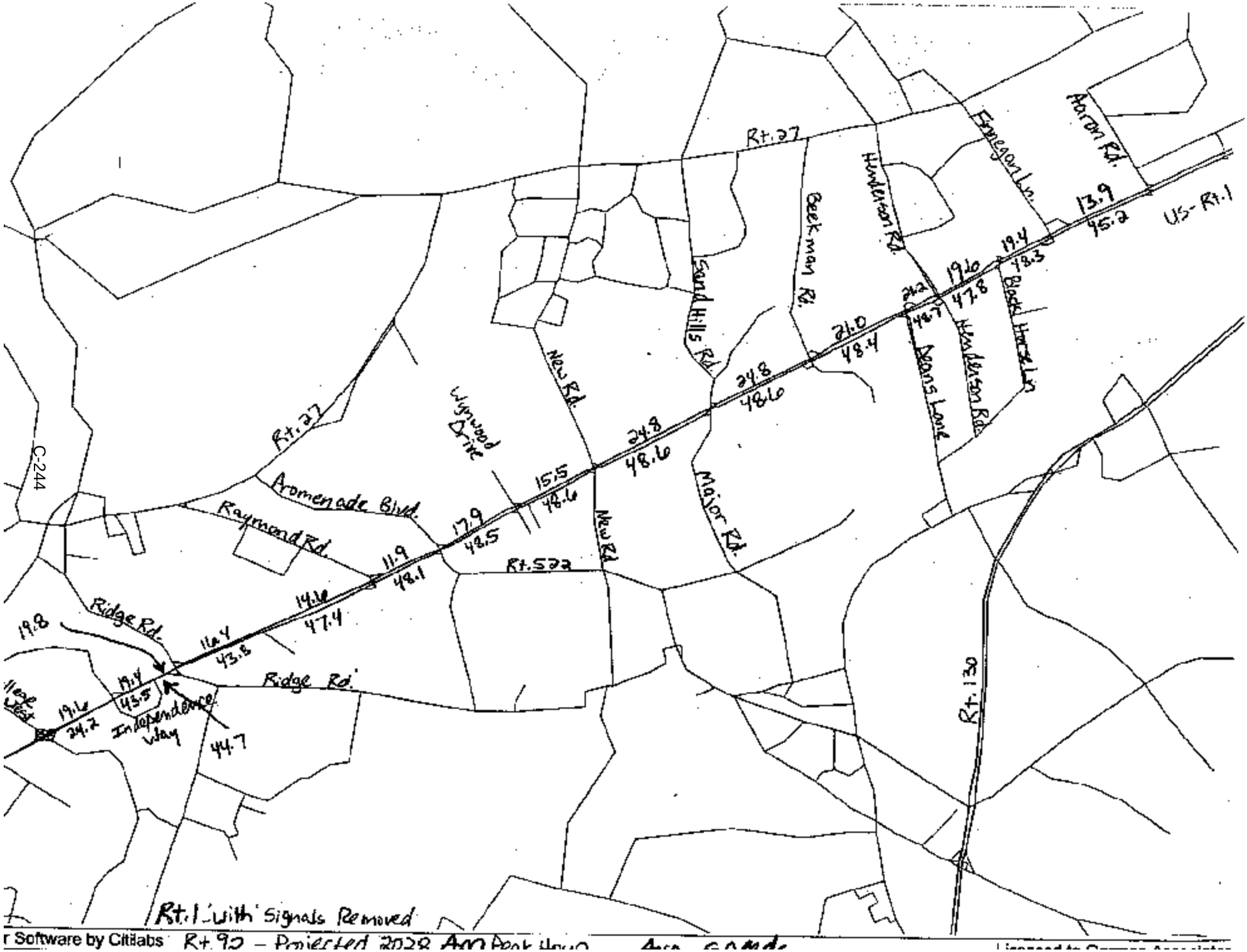


Software by Citilabs

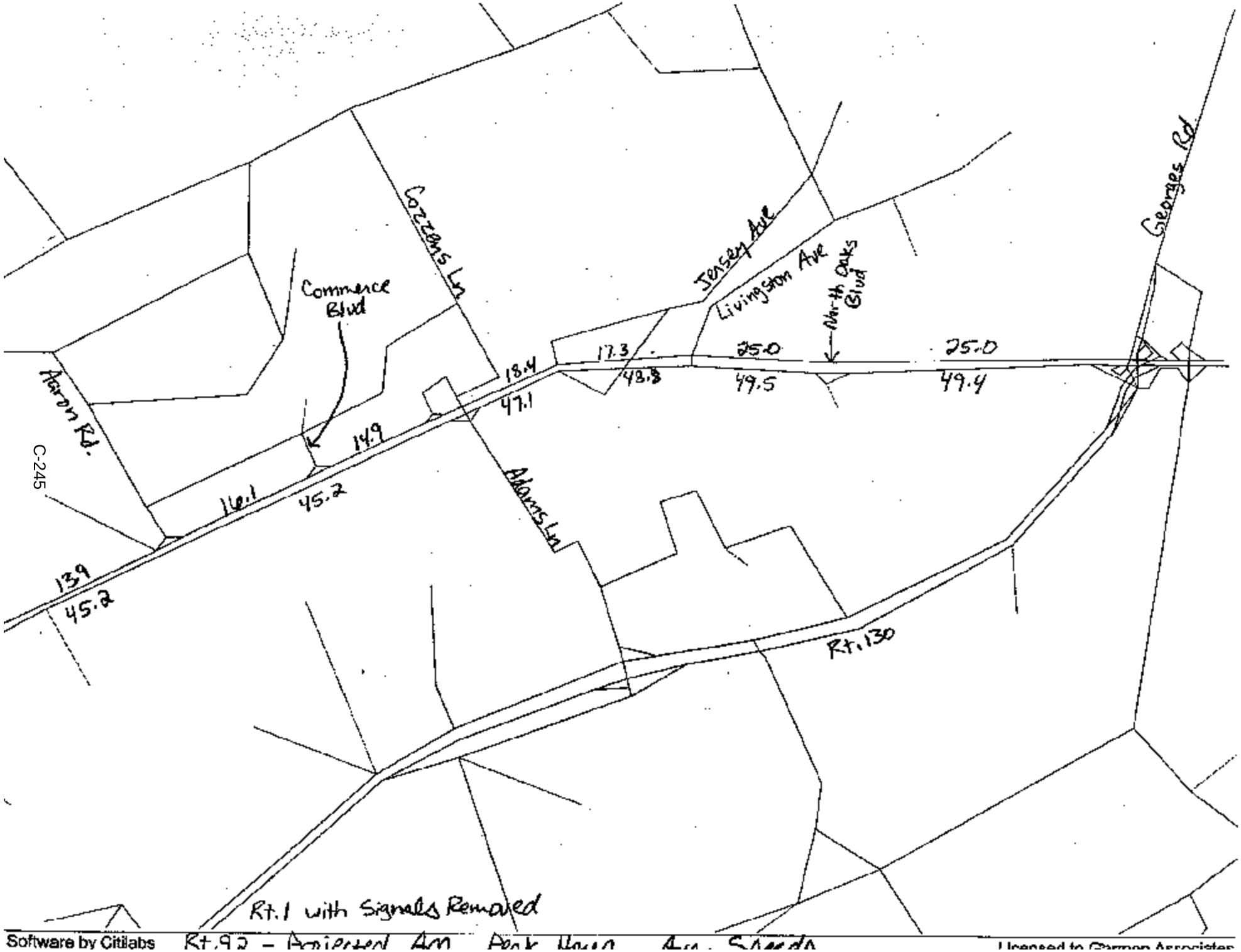


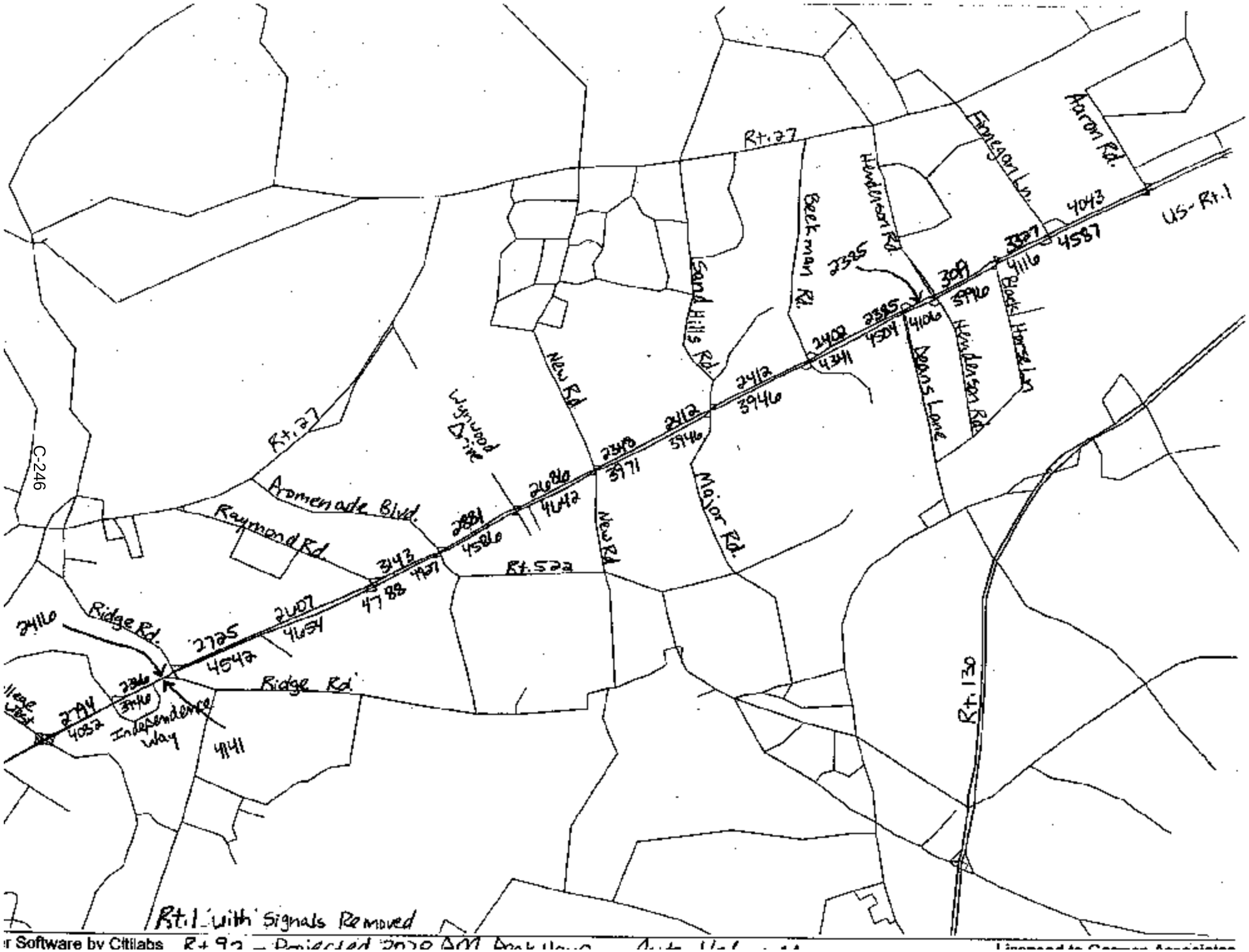
r Software by Citilabs


Commerce Blvd
Cozzens Ln
Jersey Ave
Livingston Ave
North Oaks Blvd
Georges Rd
Aaron Rd.
Adams Ln
Rt.130
Rt.1 with Signals Removed
Software by Citilabs
Rt.92 - Projected AM Peak Hour
203
223
227
214
224
219
224
223
220
211
218
217
218



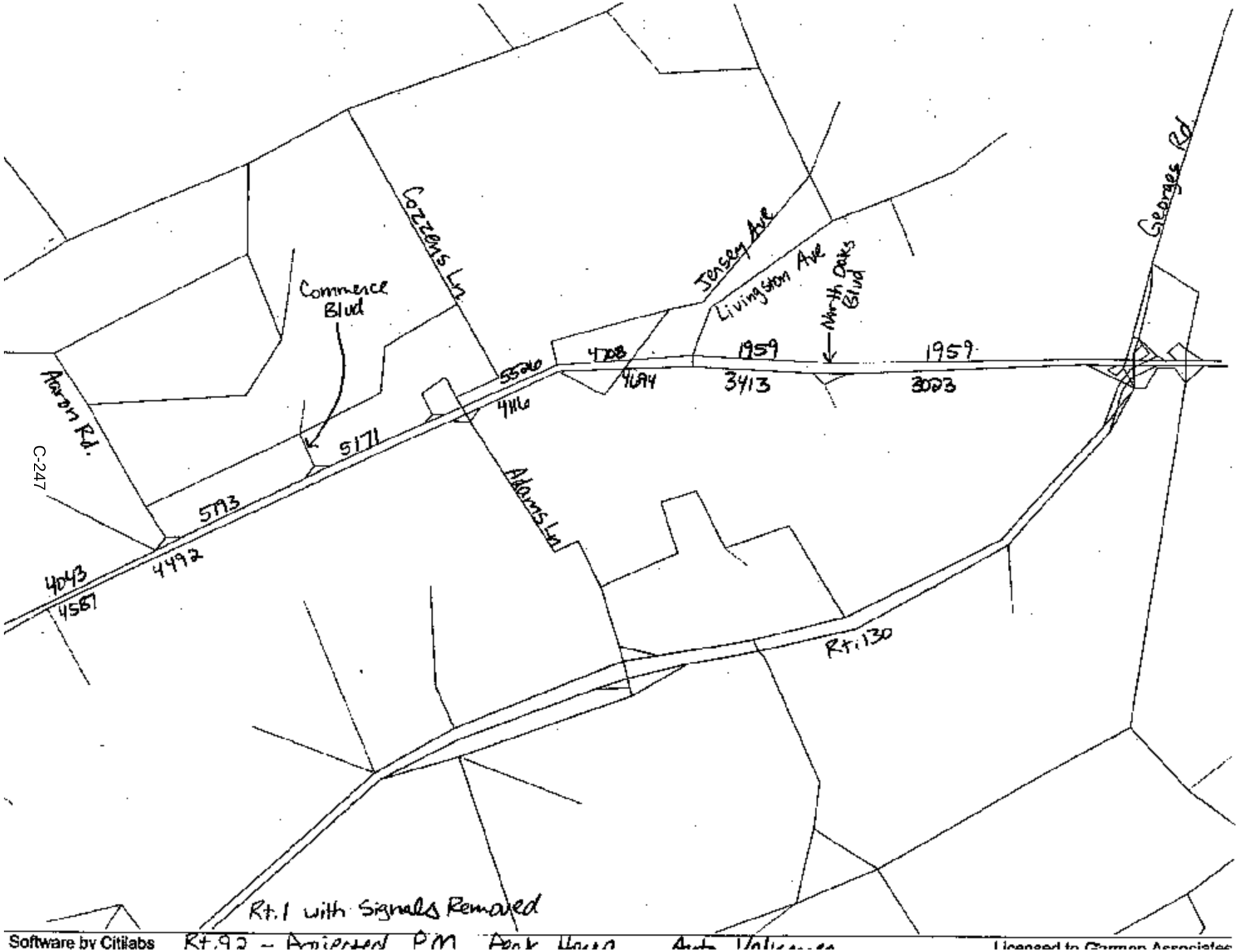
r Software by Citilabs


Cozzens Ln
Jersey Ave
Livingston Ave
North Oaks Blvd
Georges Rd.
Commerce Blvd
Aaron Rd.
Adams Ln
Rt. 130
17.3
25.0
25.0
18.4
48.8
49.5
49.4
47.1
14.9
16.1
45.2
13.9
45.2
Rt. 1 with Signals Removed
Software by Citilabs
Licensed to Carmen Associates

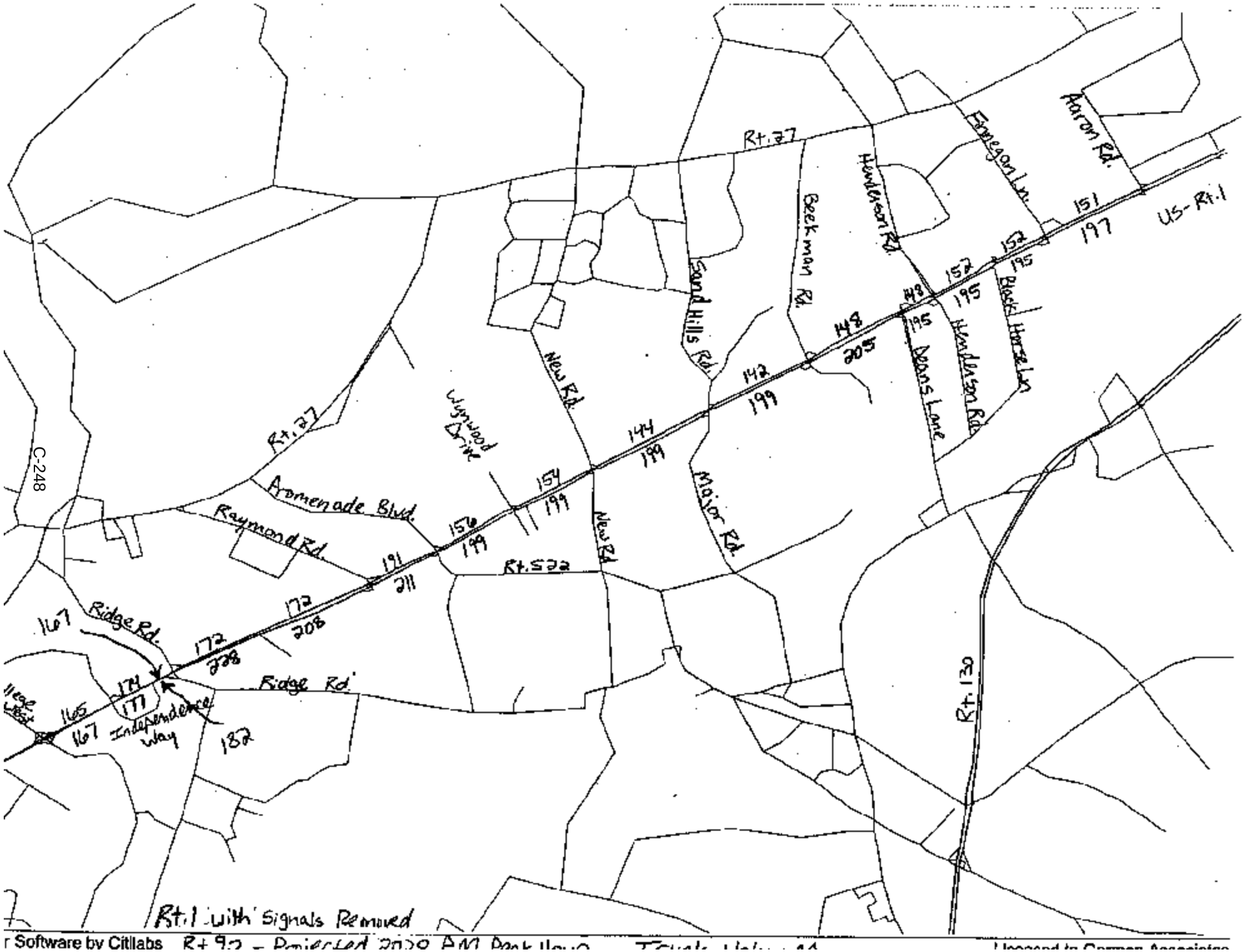


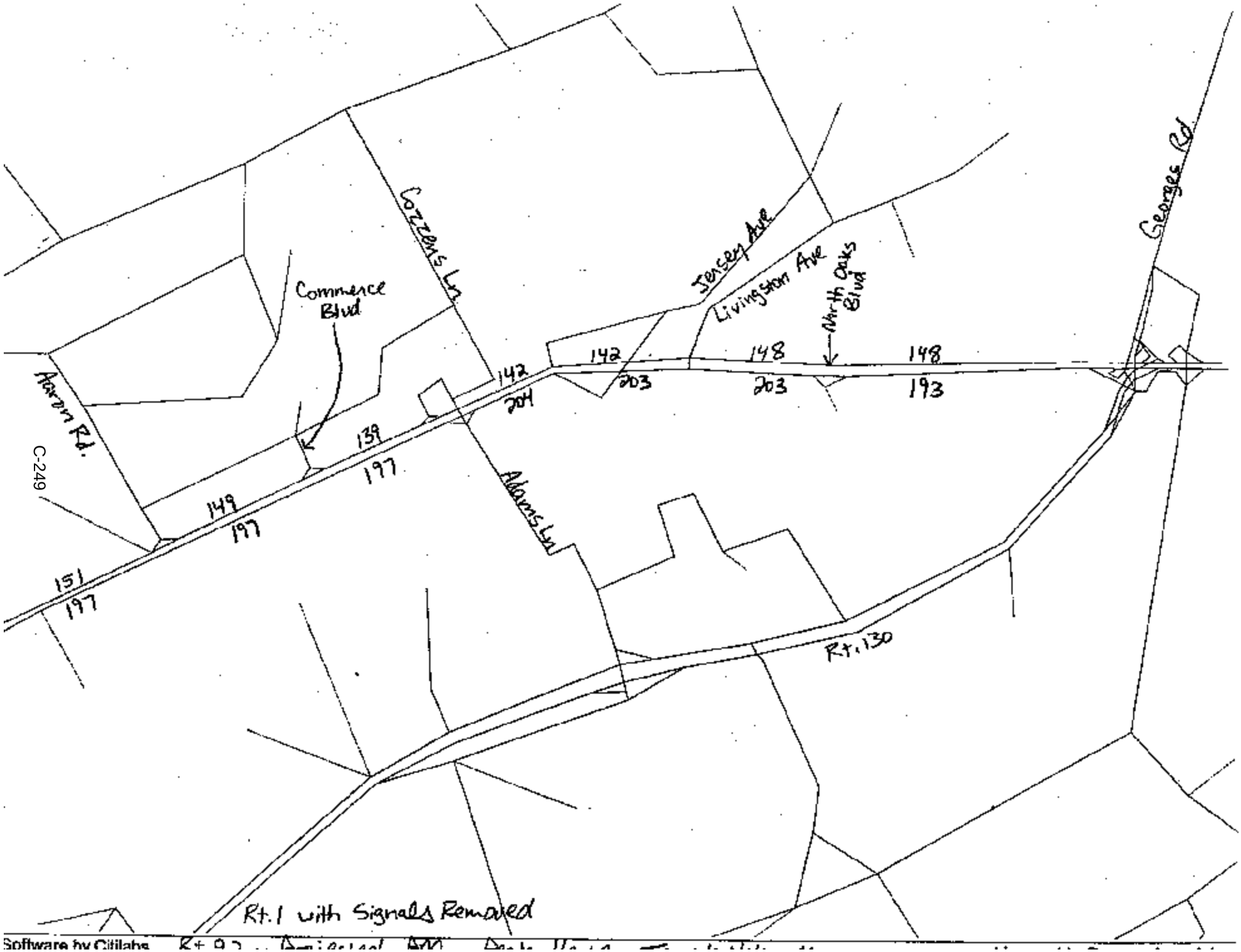
r Software by Citilabs

Licensed to Cameron Associates

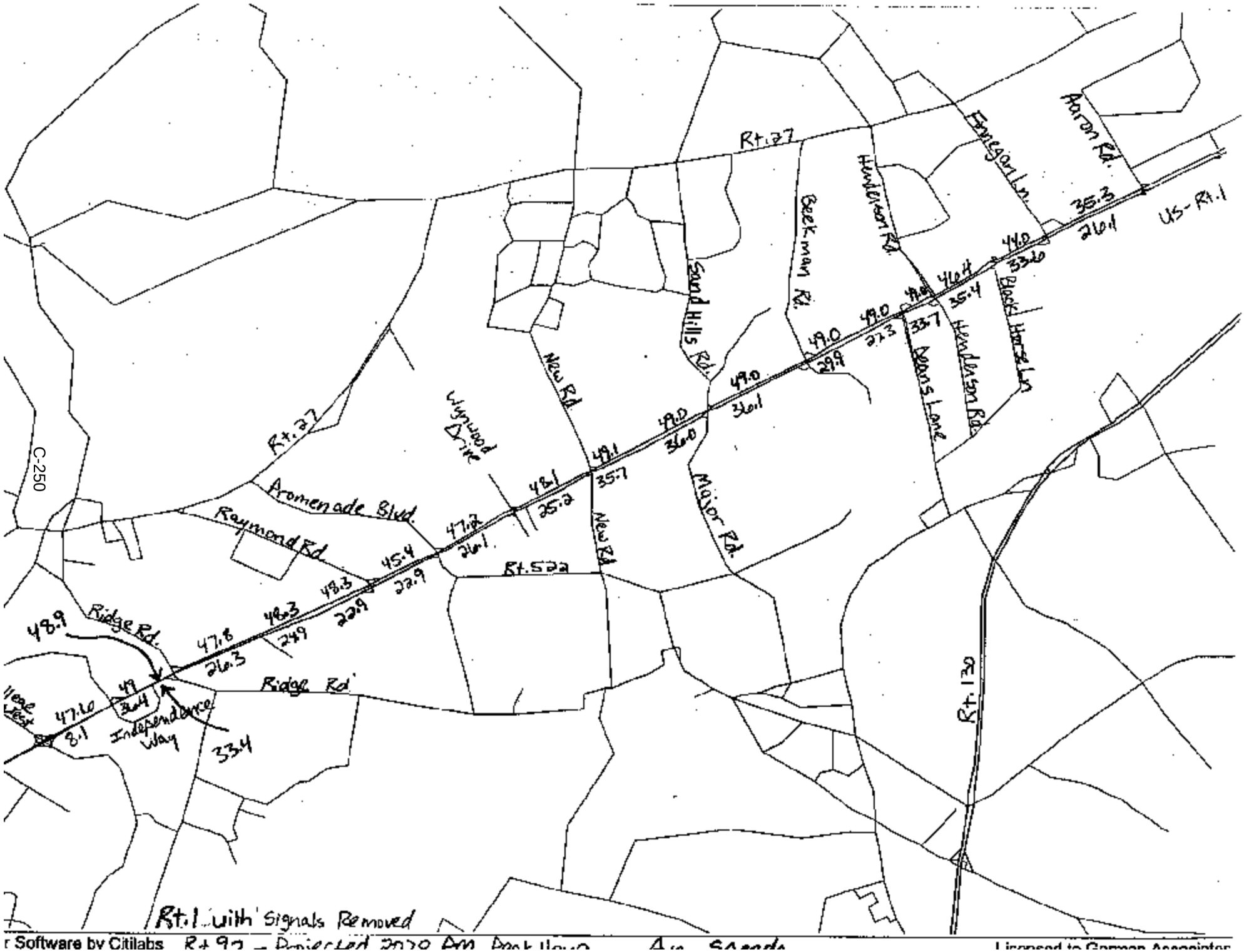


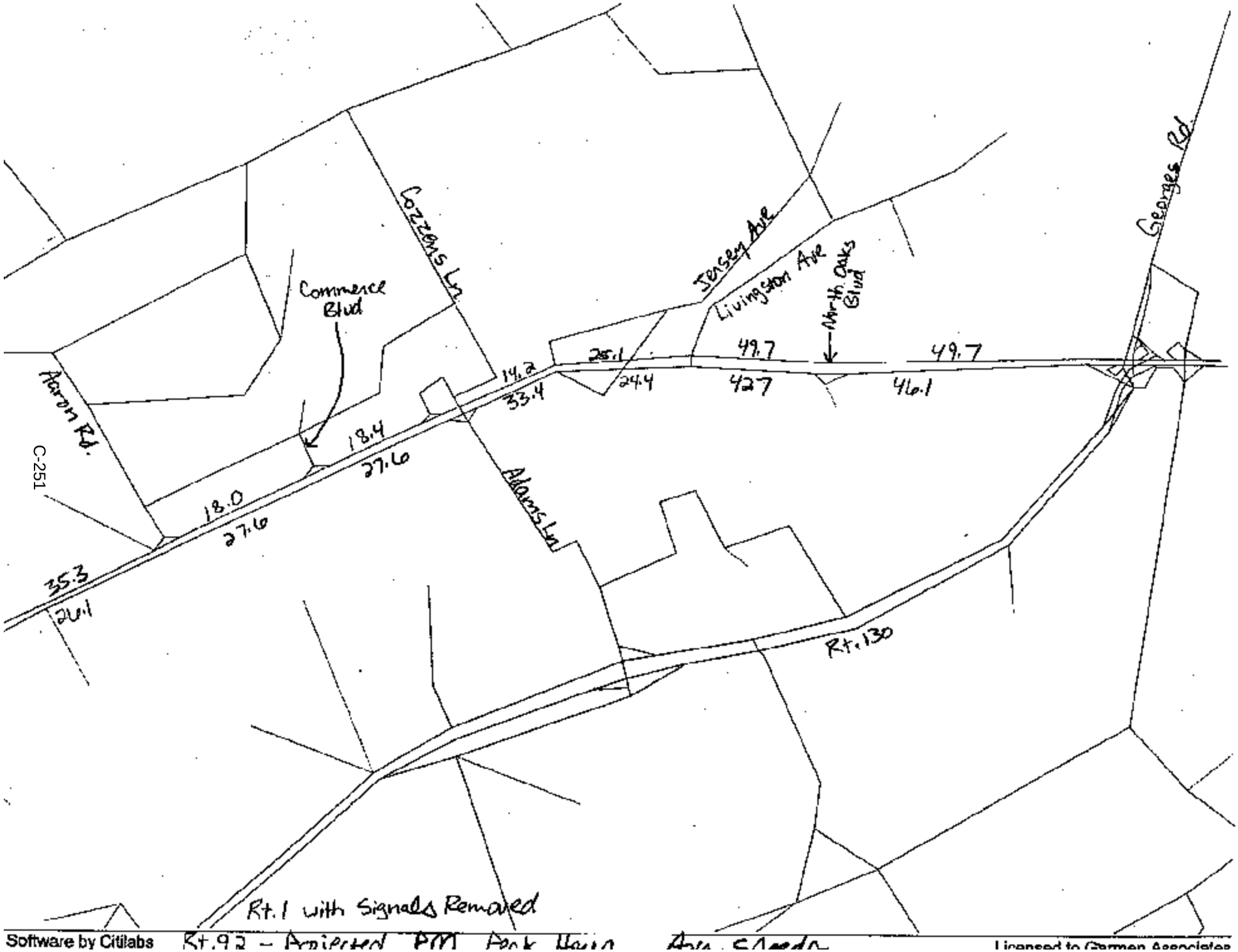
Software by Citilabs
Licensed to Carmen Associates


Rt. 27
Aaron Rd.
Eagleson Ln.
Huntleson Rd.
Beekman Rd.
Sand Hills Rd.
New Rd.
Wynwood Drive
Rt. 27
Promenade Blvd.
Raymond Rd.
Ridge Rd.
Ridge Rd.
Independence Way
Rt. 522
New Rd.
Major Rd.
Deans Lane
Huntleson Rd.
Black Horse Lane
US-Rt. 1
Rt. 130
151
197
152
195
152
195
148
195
148
205
142
199
144
199
157
199
156
199
191
211
172
208
172
208
174
177
165
167
167
182
Rt. 1 with Signals Removed

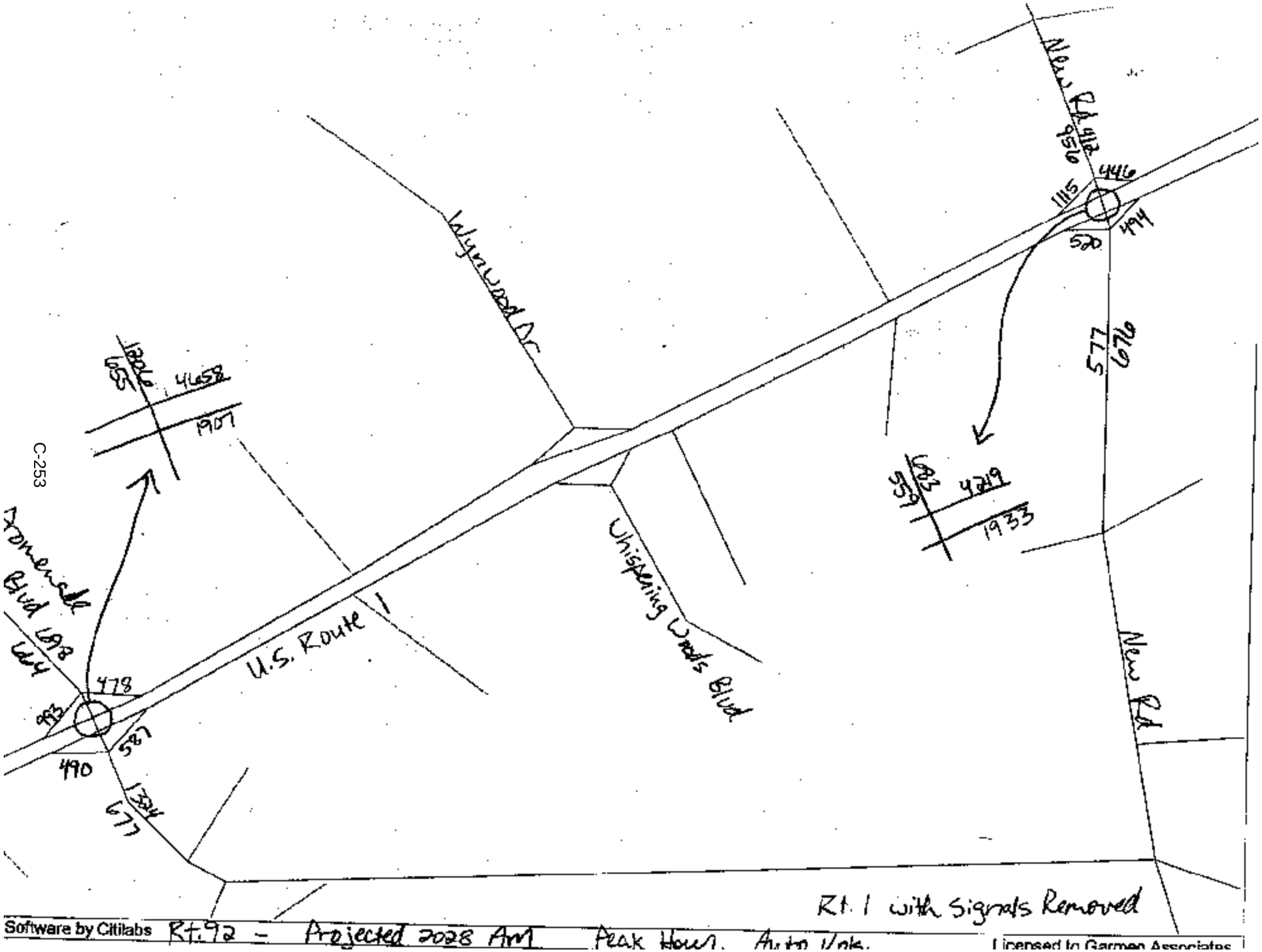


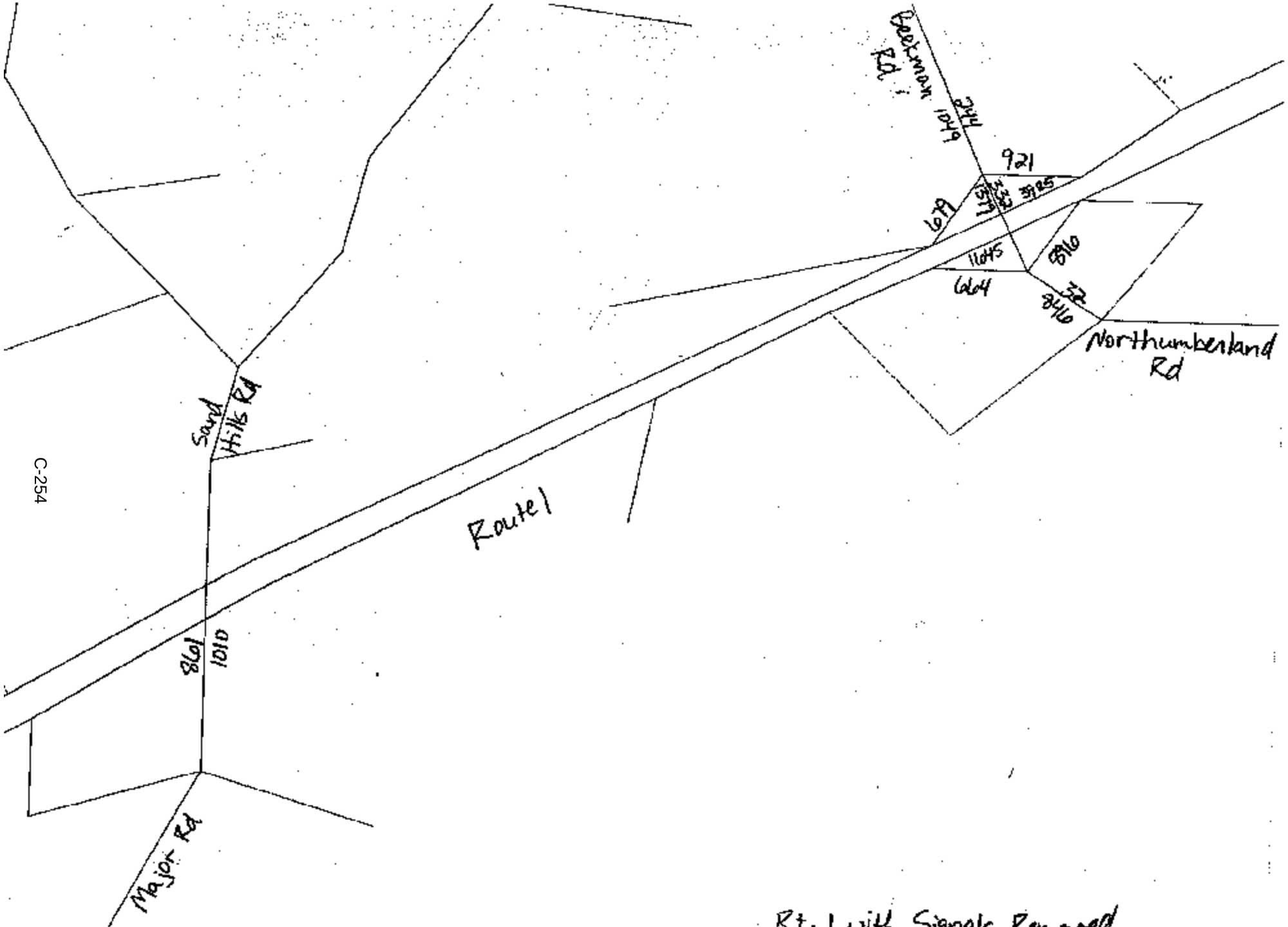
Software by Citilabs


Rt.27
Aaron Rd.
US-Rt.1
Beckman Rd.
Huntington Rd.
Sand Hills Rd.
Black Horse Ln.
Henderson Rd.
Beans Lane
Major Rd.
New Rd.
Wynwood Drive
Promenade Blvd.
Raymond Rd.
Rt.522
Ridge Rd.
Independence Way
Rt.130
48.9
Rt.1 with Signals Removed


Cozzens Ln
Commerce Blvd
Jersey Ave
Livingston Ave
North Oaks Blvd
Georges Rd.
Aaron Rd.
Adams Ln
Rt. 130
14.2
33.4
25.1
24.4
49.7
42.7
49.7
46.1
18.4
27.6
18.0
27.6
35.3
26.1
Rt. 1 with Signals Removed
Software by Citilabs
Licensed to Carmen Associates

2.7 2028 Six-Lane Route 1 w/ Signals Removed – Detail of Route 1 Cross Streets (College Rd. to Rt. 130)

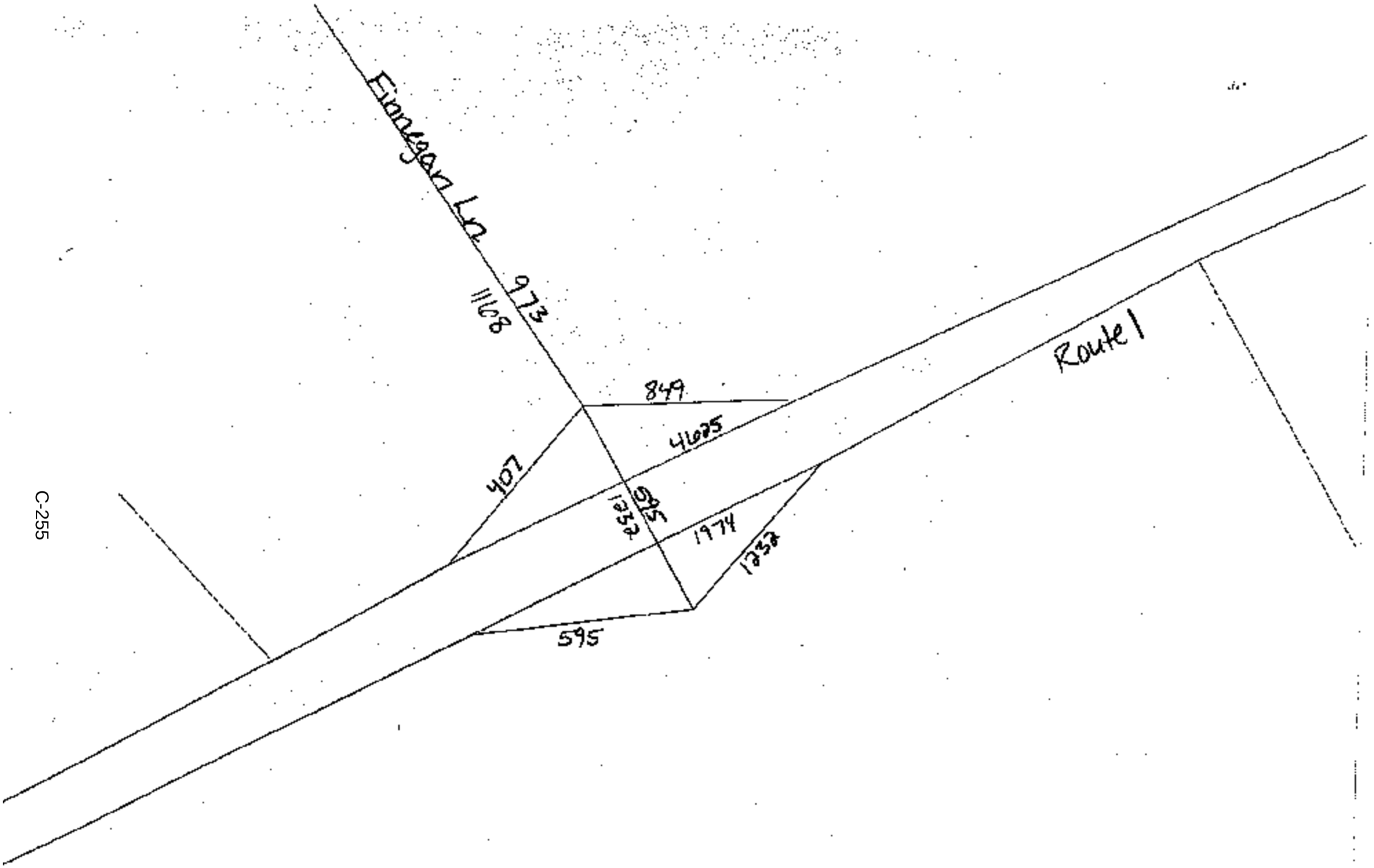

New Rd
912
956
446
1115
494
520
Idlewood Dr
577
676
1206
55
4658
1907
59
683
4219
1933
Whispering Woods Blvd
U.S. Route 1
Dunwoodie Blvd
478
493
587
490
1324
677
New Rd
Software by Citilabs
Rt. 1 with Signals Removed
Rt. 92 - Projected 2028 AM Peak Hour Auto Volume
Licensed to Garmen Associates



Rt. 1 with Signals Removed

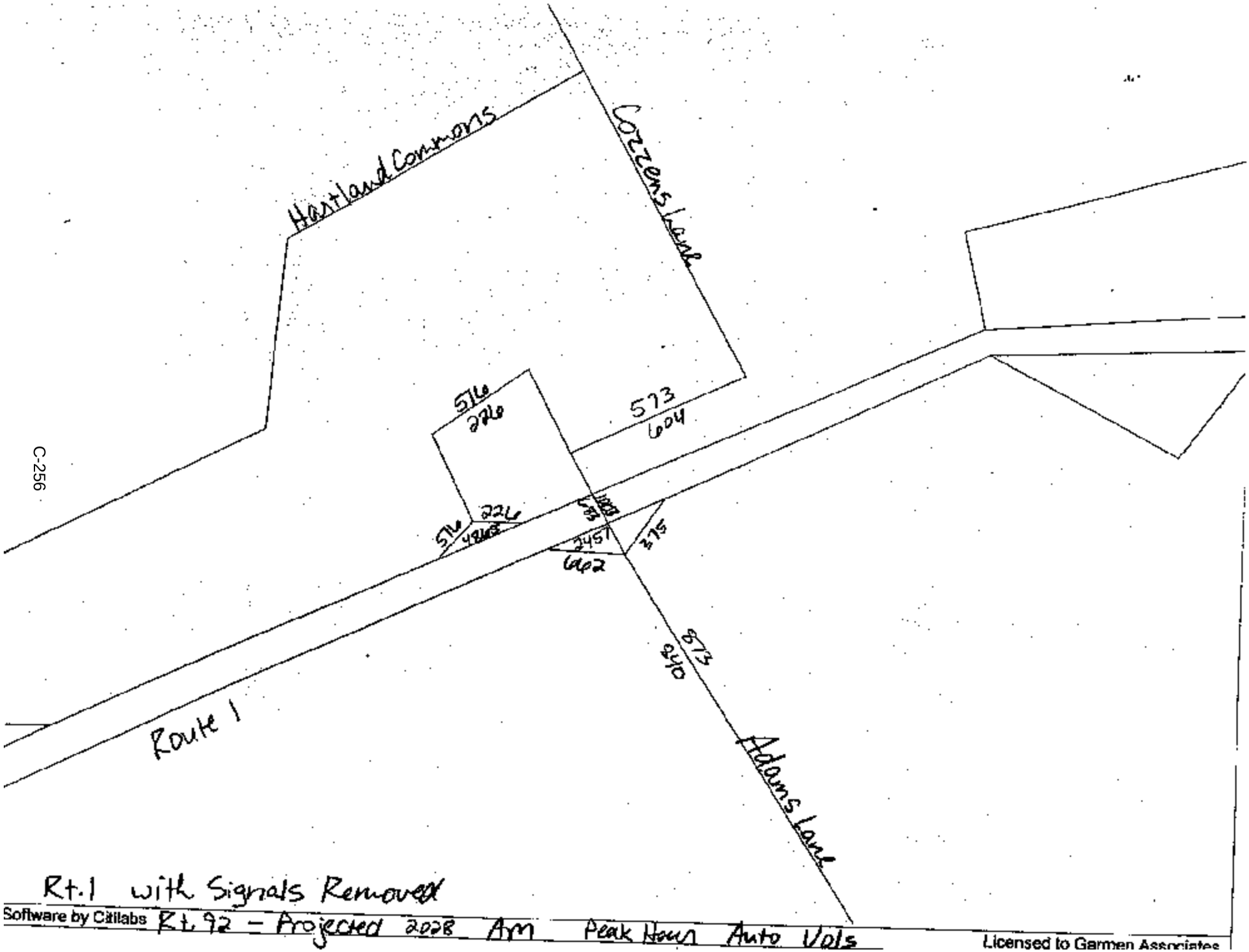
Software by Citilabs Rt. 92 - Projected 2028 AM Peak Hour Auto Vols

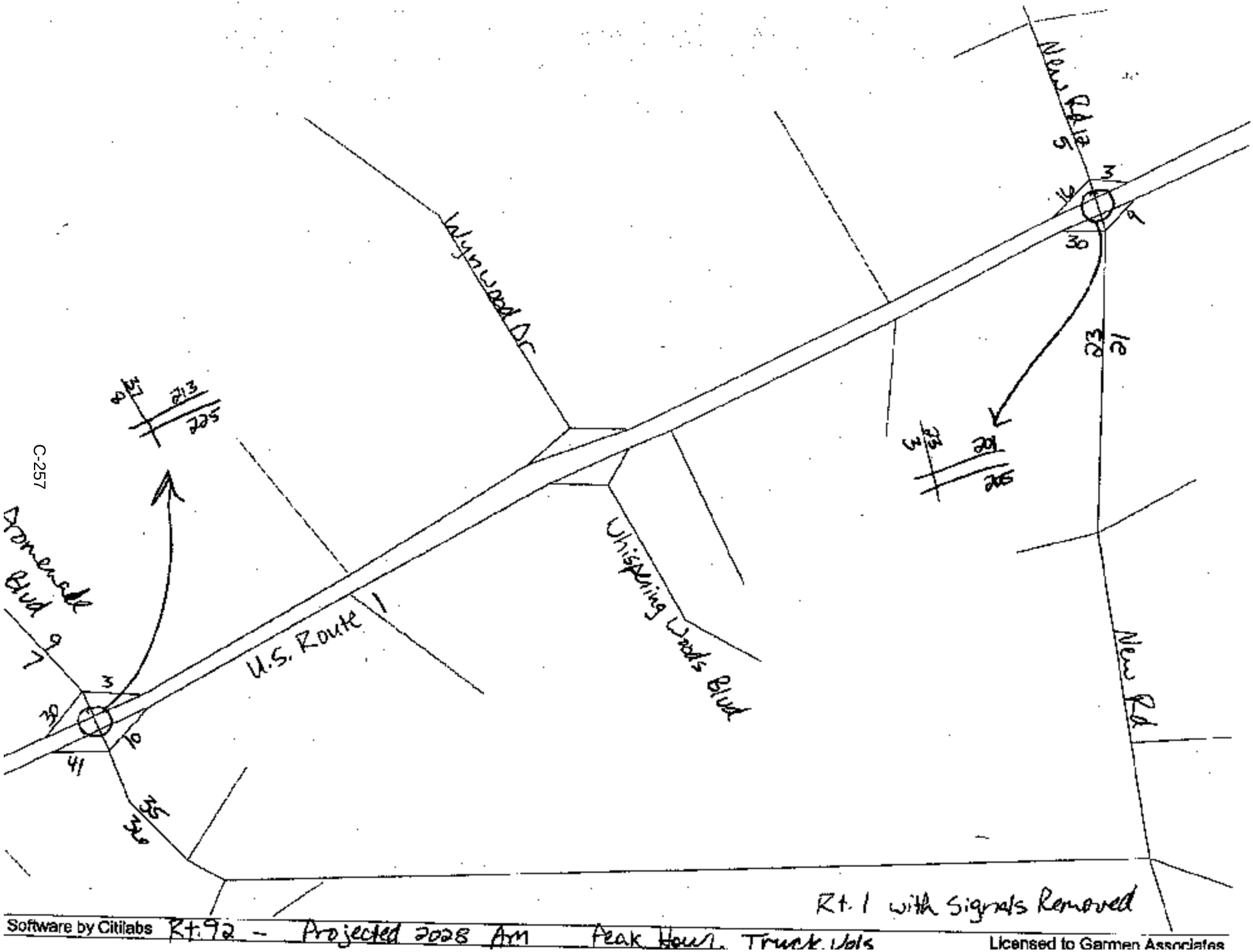
Licensed to Garmen Associates



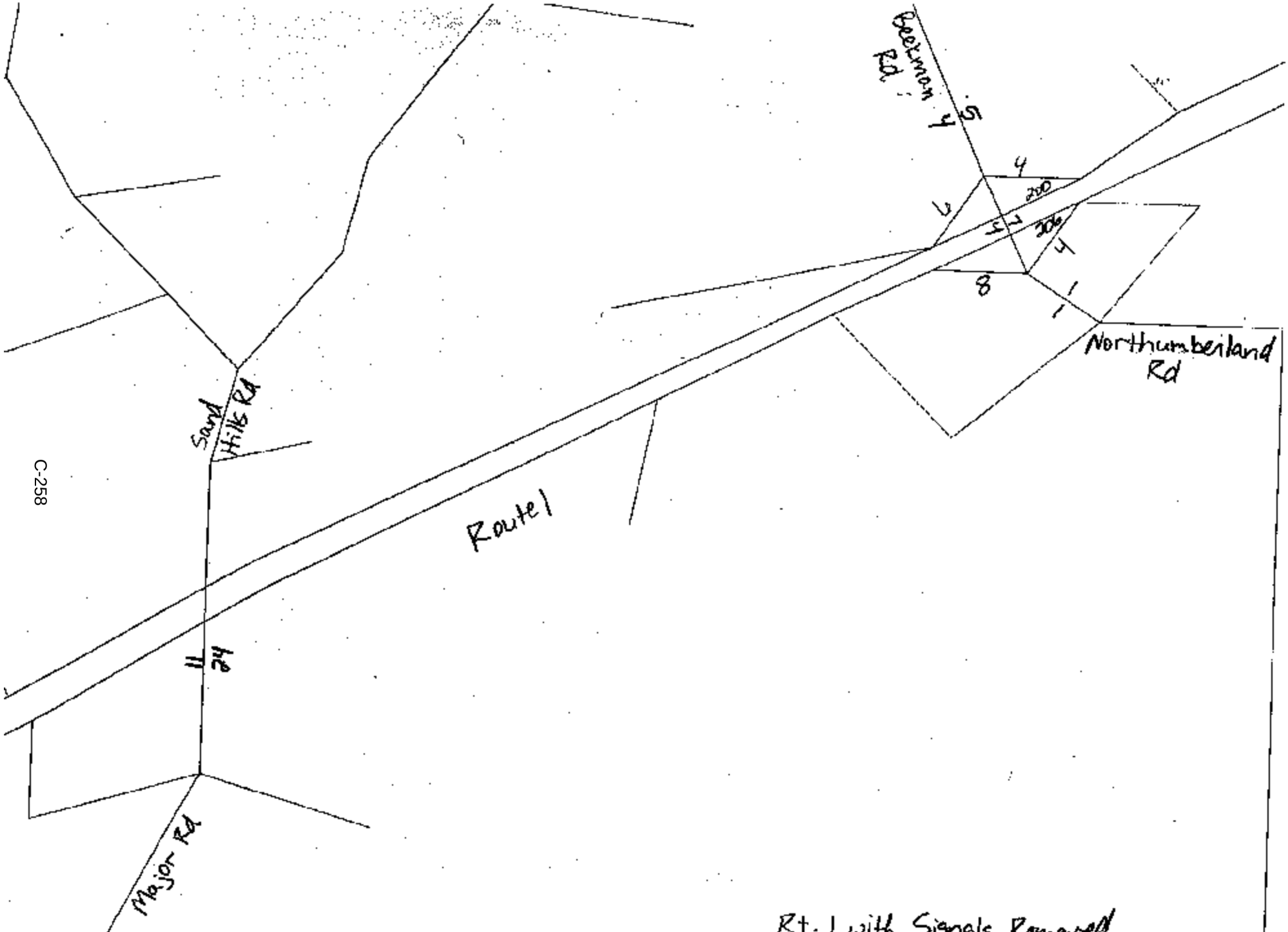
Rt 1 with Signals Removed

Software by Citilabs Rt. 92 – Projected 2028 AM Peak Hour Auto Vols Licensed to Garmen Associates


Hartland Commons
Cozzens Lane
516
226
573
604
516
226
486
2457
462
375
873
940
Route 1
Adams Lane
Rt.1 with Signals Removed
Rt. 92 - Projected 2028 AM Peak Hour Auto Vols
Software by Citilabs
Licensed to Garmen Associates



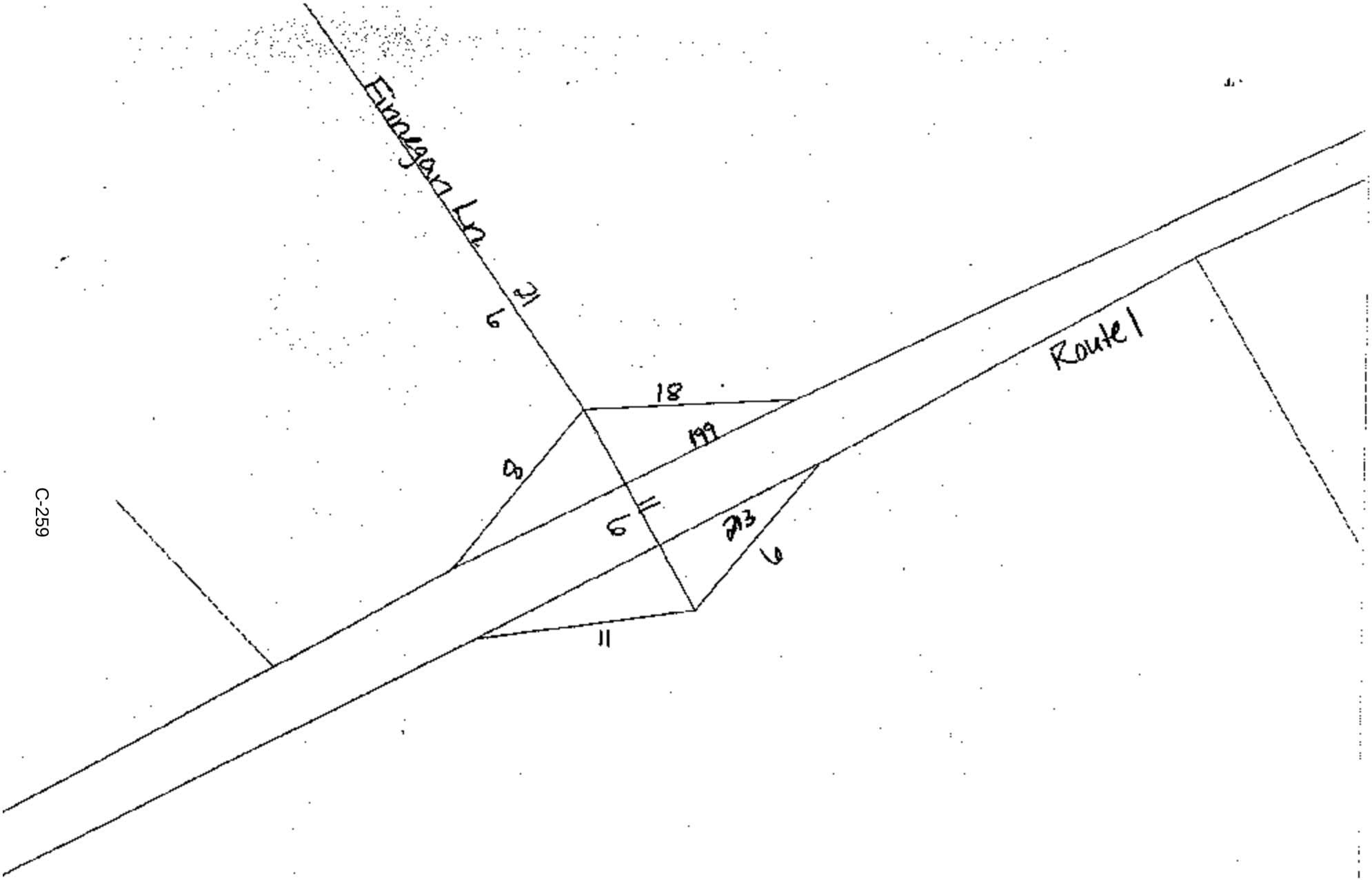
Software by Citilabs Rt. 92 - Projected 2028 AM Peak Hour Truck Vols Licensed to Garmen Associates



Rt. 1 with Signals Removed

Software by Citilabs Rt. 92 - Projected 2028 AM Peak Hour Truck Vols

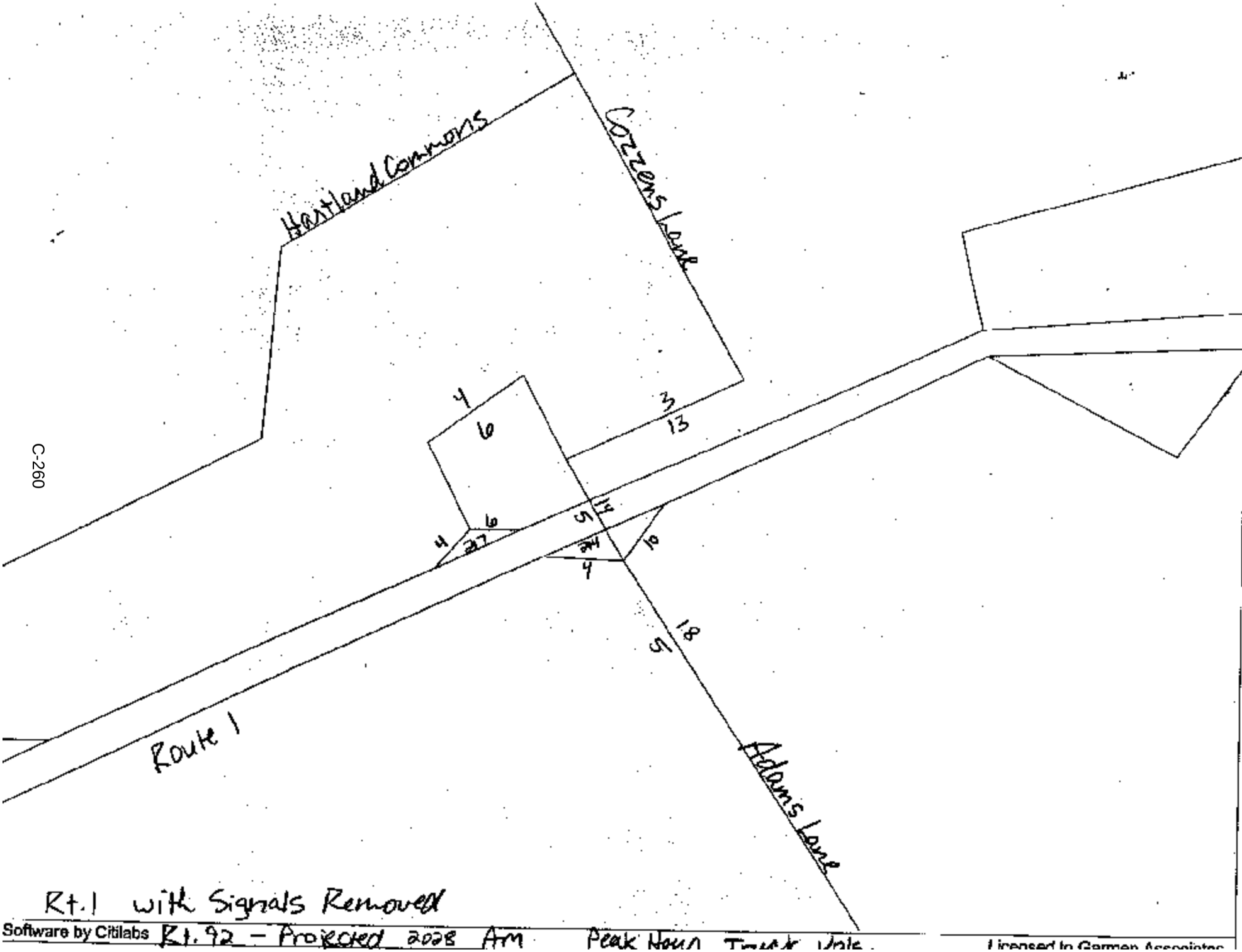
Licensed to Garman Associates

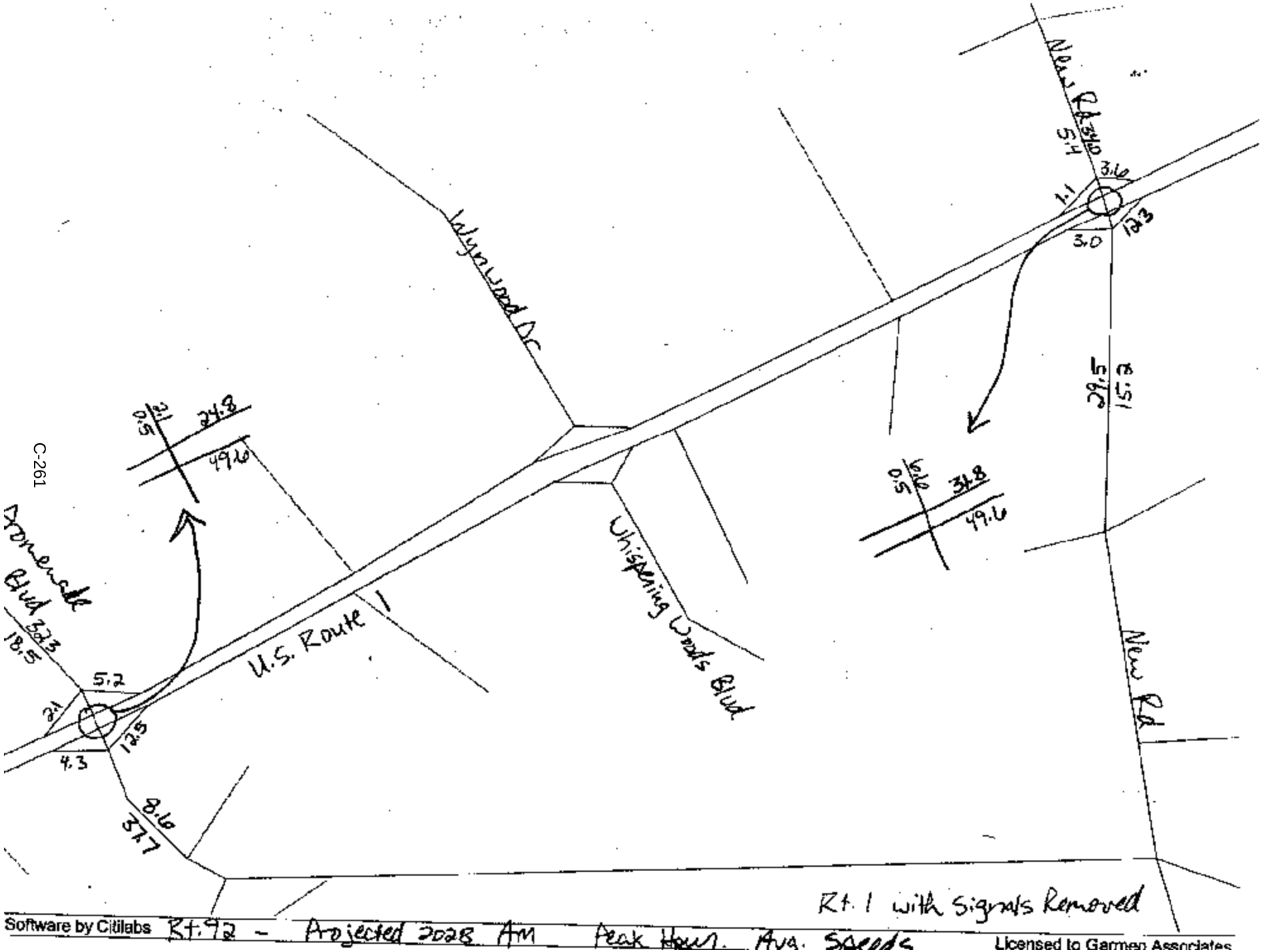


Rt. 1 with Signals Removed

Software by Citilabs Rt. 92 – Projected 2028 AM Peak Hour Trunk Vols

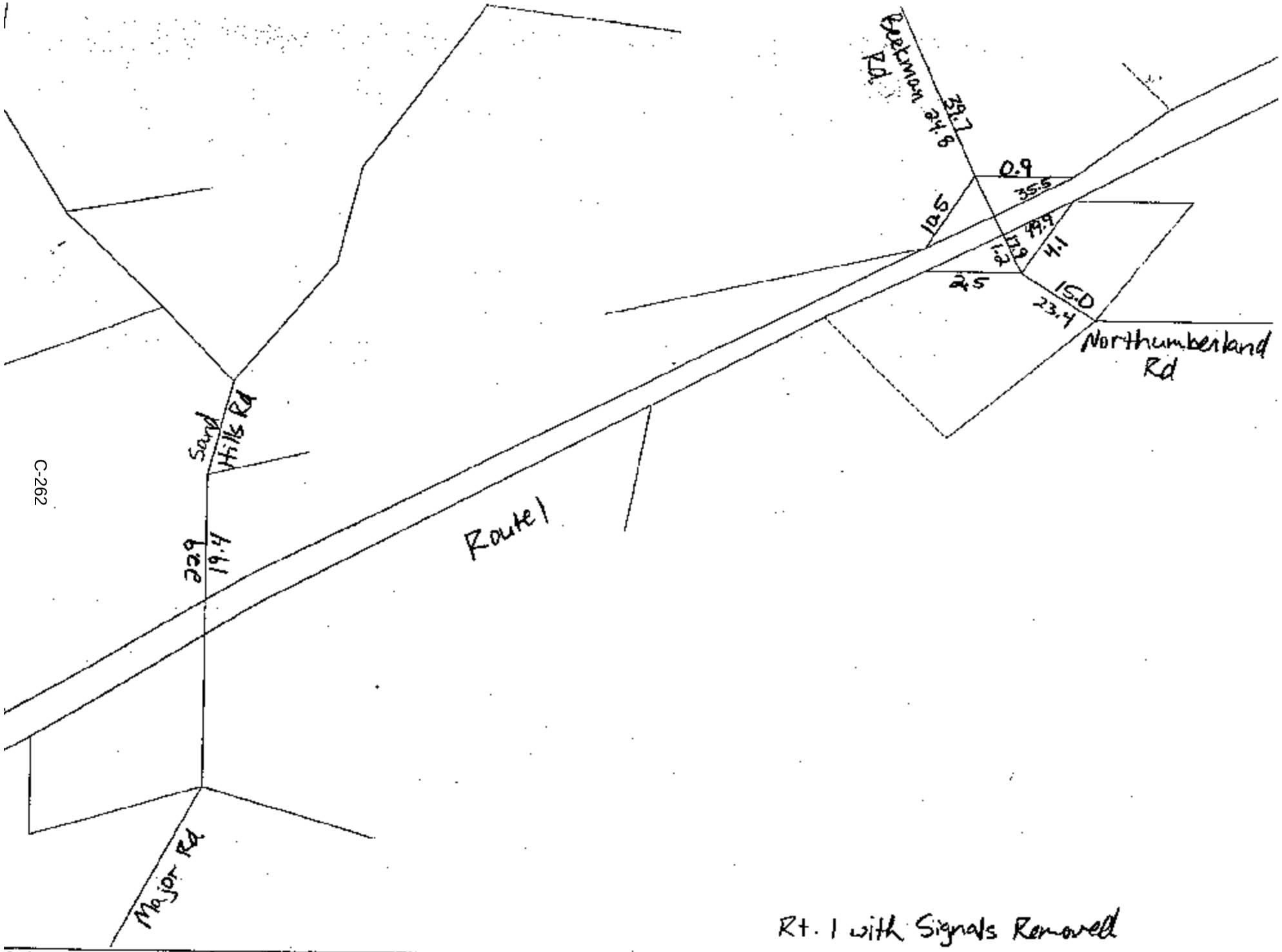
Licensed to Garmen Associates


Hartland Commons
Cozzens Lane
Route 1
Adams Lane
4
6
3
13
6
4
27
5
14
24
4
10
5
18
Rt. 1 with Signals Removed
Software by Citilabs
Rt. 92 - Projected 2028 AM Peak Hour Truck Vols.
Licensed to Garmen Associates



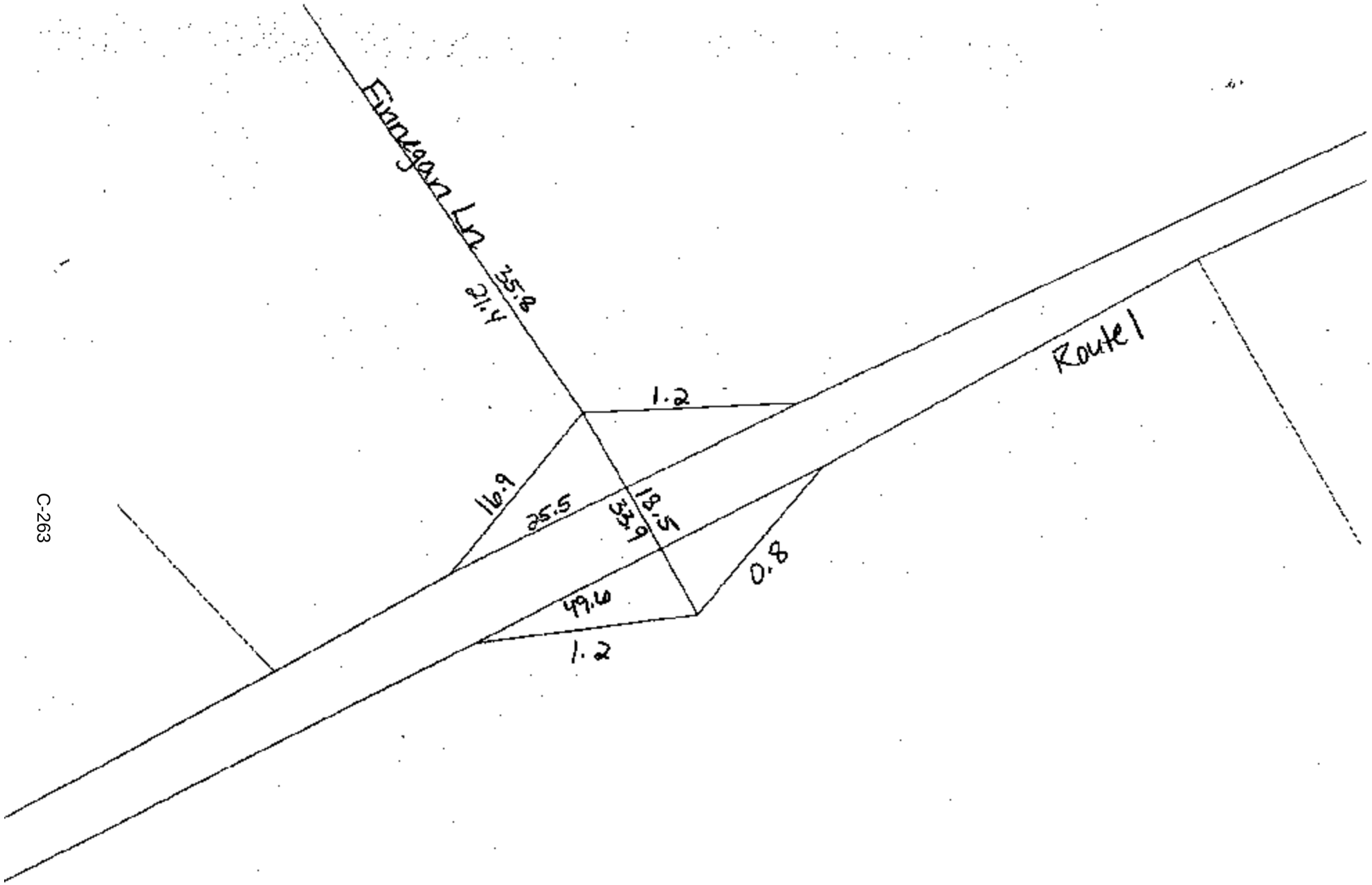
Software by Citilabs Rt. 92 - Projected 2028 AM Peak Hour Avg. Speeds

Licensed to Garmen Associates



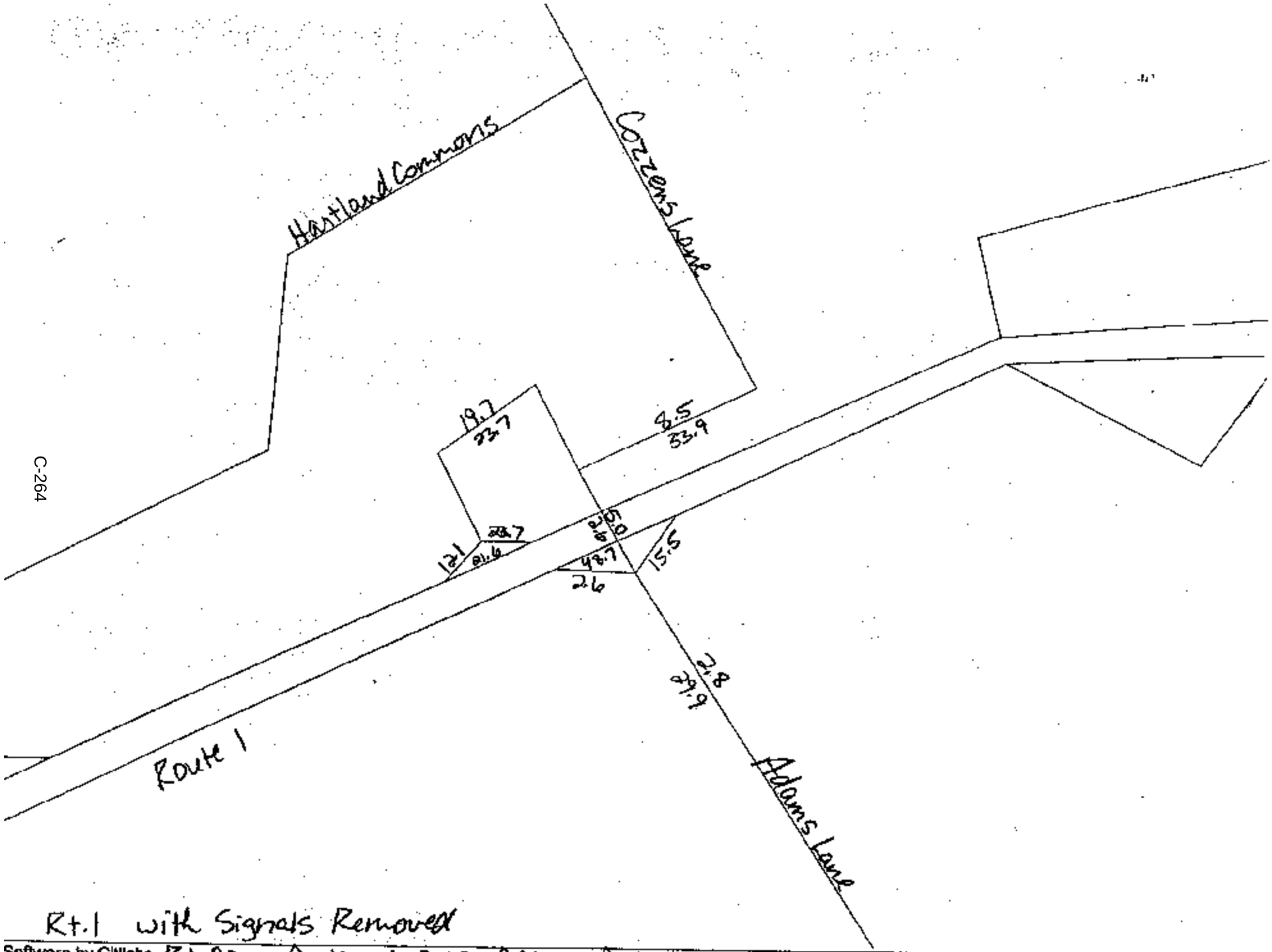
Rt. 1 with Signals Removed

Software by Citilabs Rt. 92 - Projected 2028 AM Peak Hour Avg. Speeds Licensed to Garmen Associates



Rt. 1 with Signals Removed

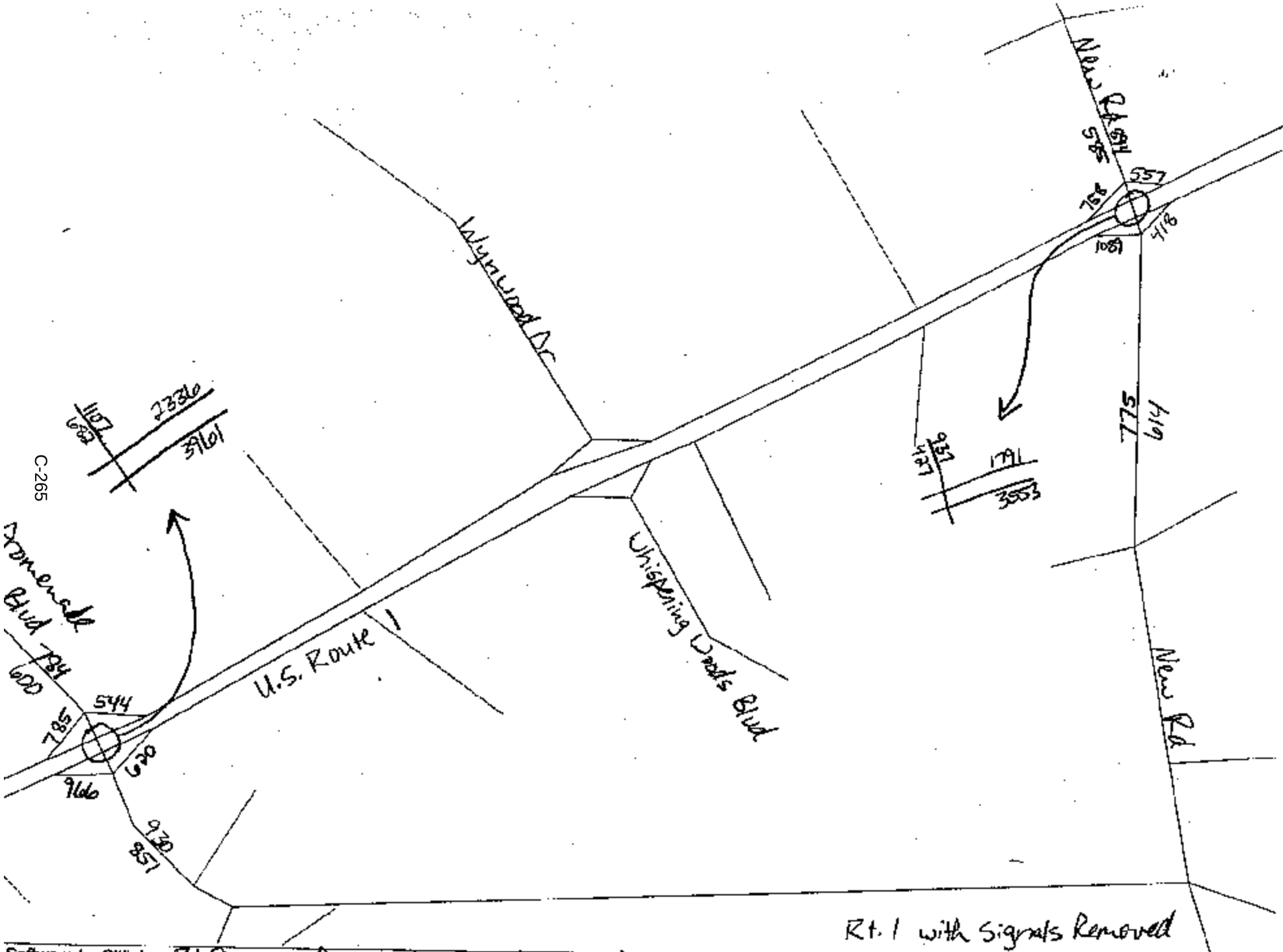
Software by Citilabs Rt. 92 – Projected 2028 AM Peak Hour Avg. Speeds. Licensed to Garmen Associates



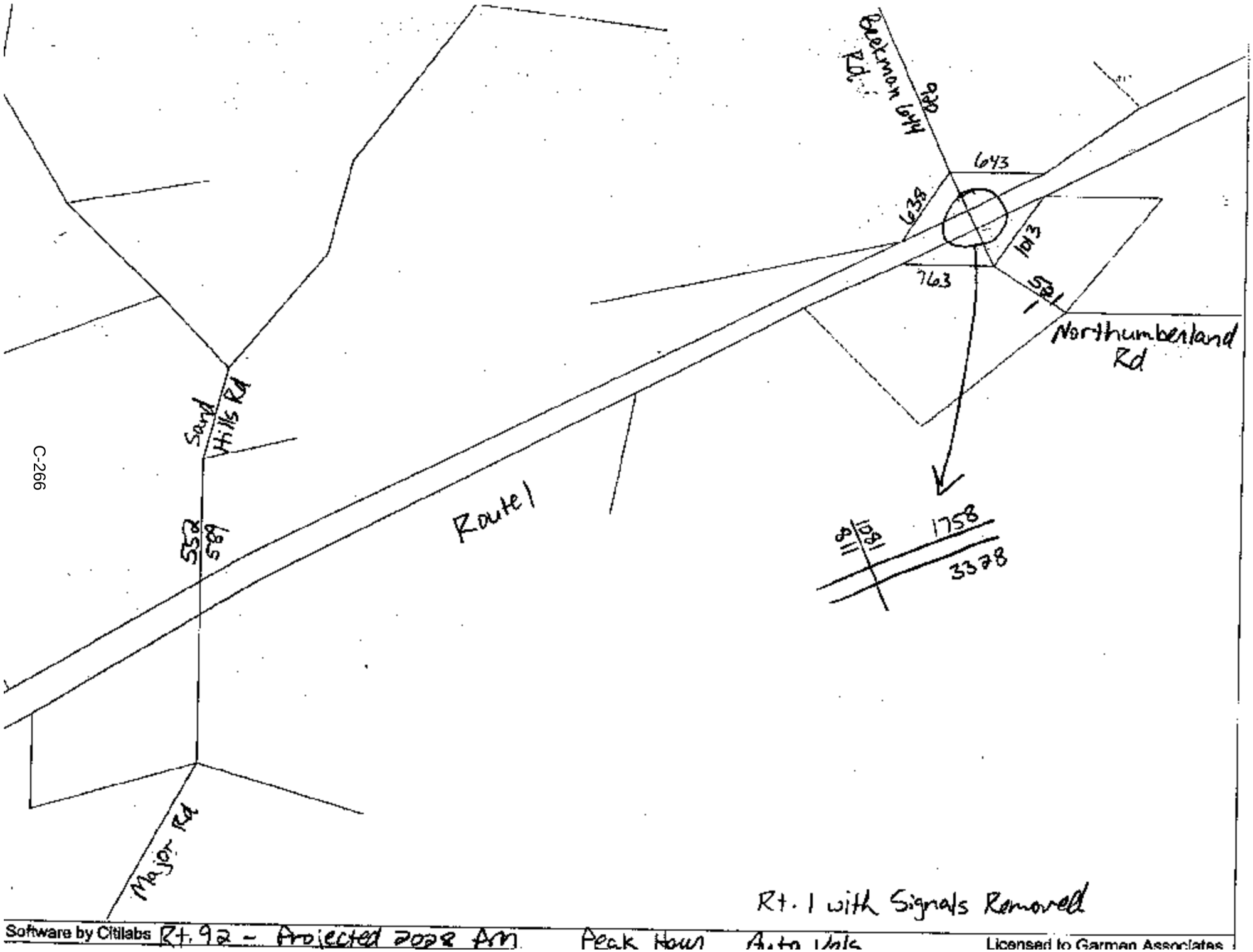
Rt.1 with Signals Removed

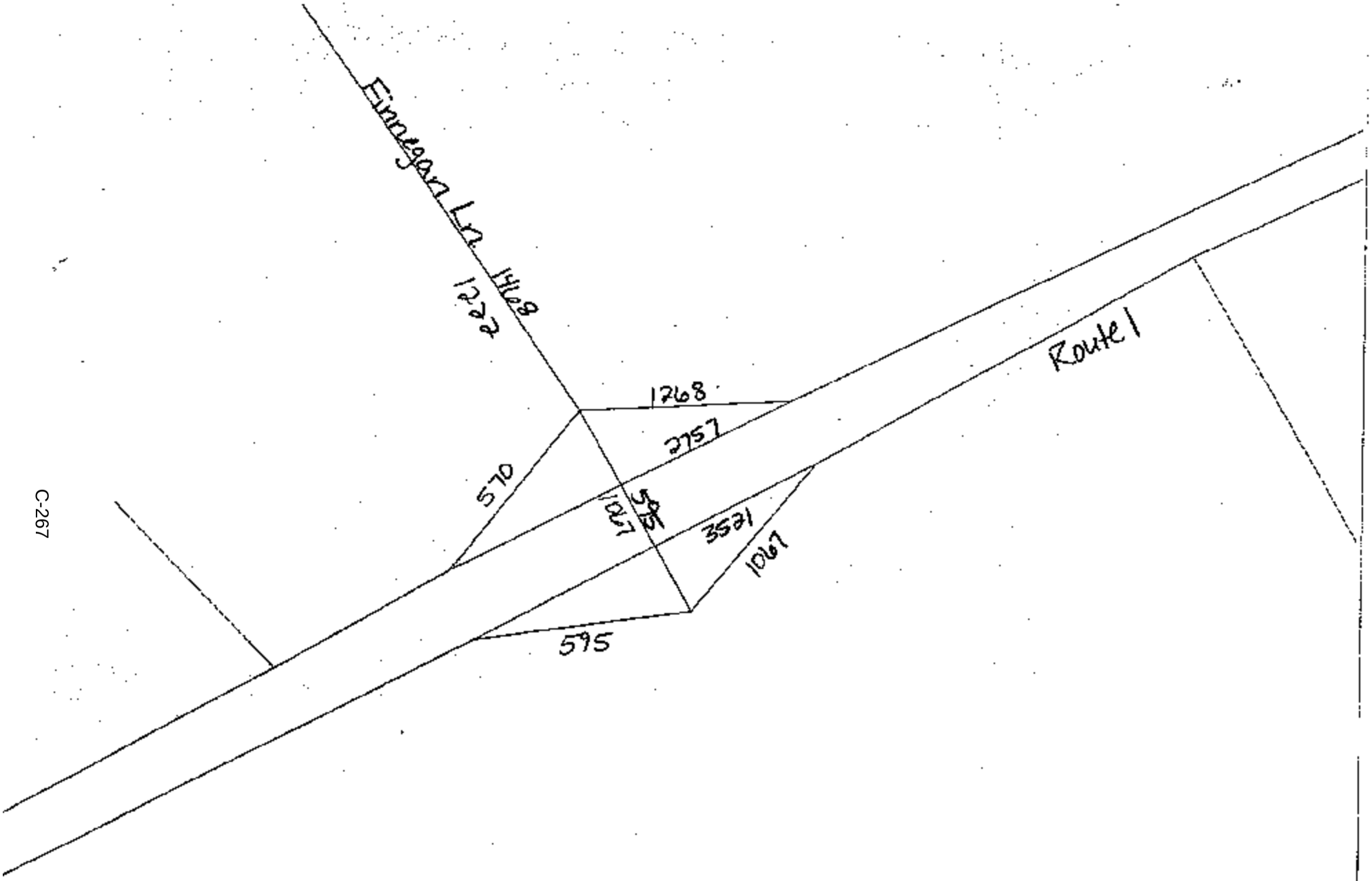
Software by Citilabs Rt. 92 – Projected 2028 AM Peak Hour Avg. Speeds

Licensed to Garmen Associates



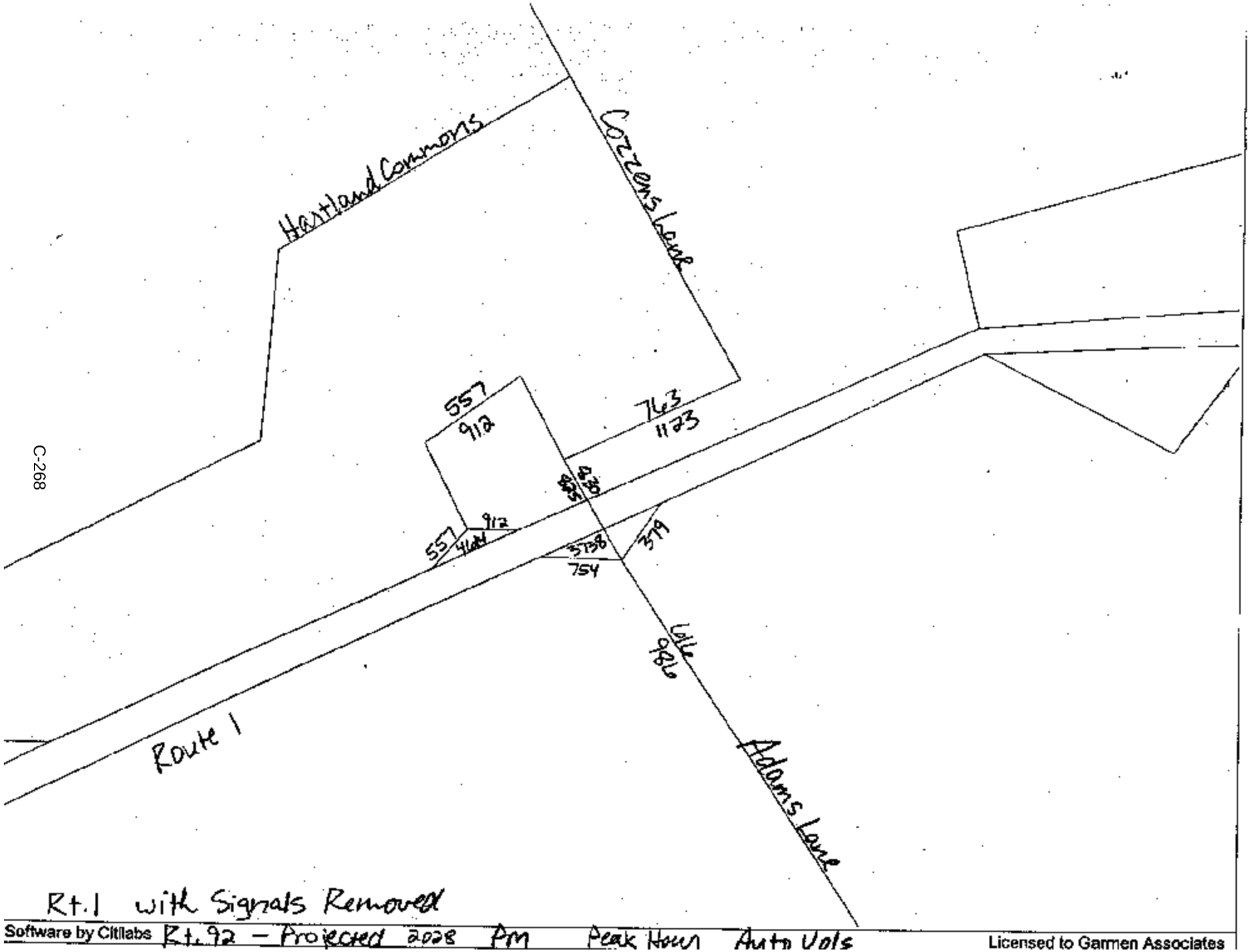
Software by Citilabs Rt. 92 - Projected 2028 AM Peak Hour. Auto Vols Licensed to Garmen Associates

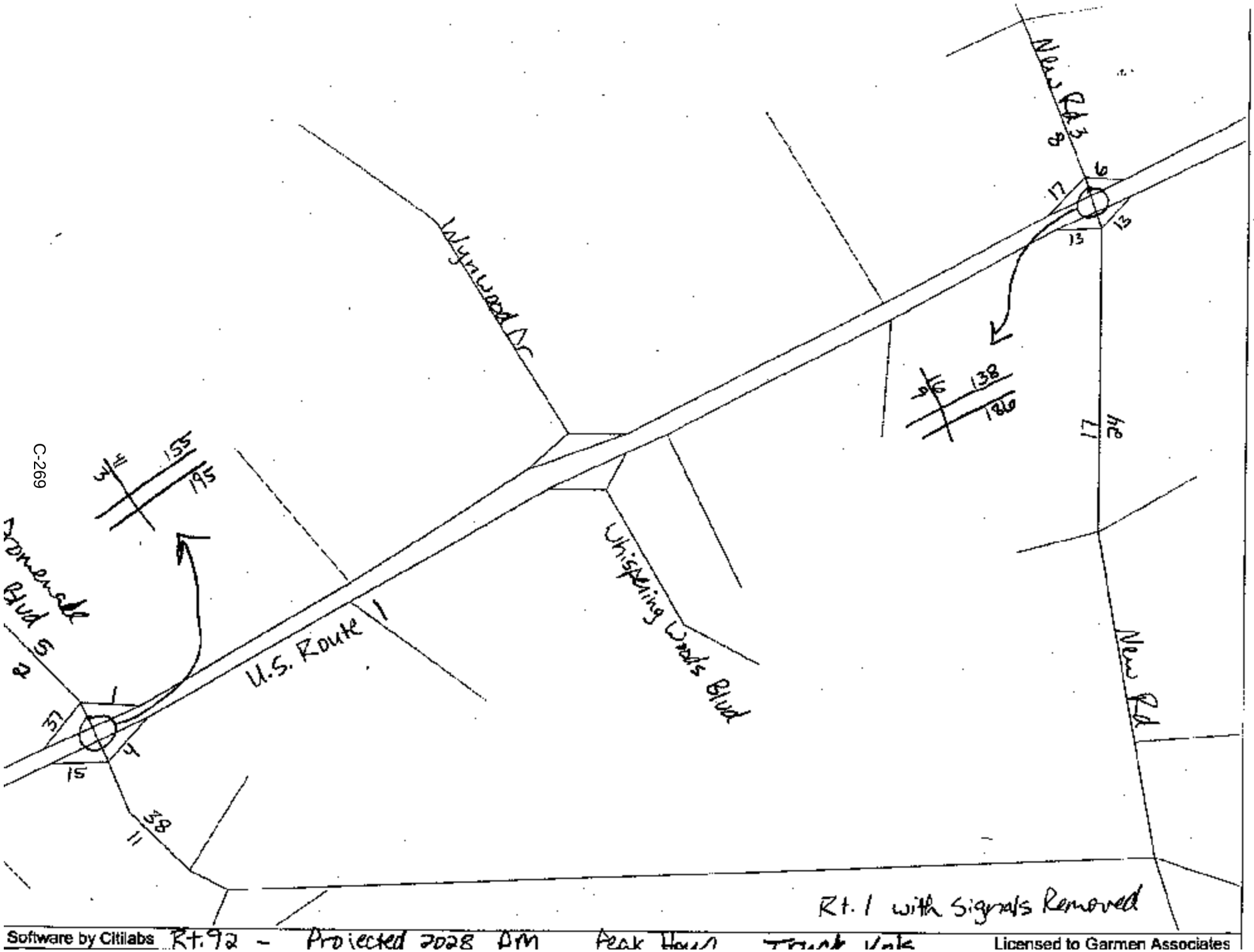

Beckman Hill Rd
90
643
638
763
101
58
1
Northumberland Rd
Sand Hills Rd
552
589
Route 1
811
1081
1758
3378
Major Rd
Rt. 1 with Signals Removed
Software by Citilabs
Rt. 92 - Projected 2028 AM Peak Hour Auto Vols
Licensed to Garmen Associates



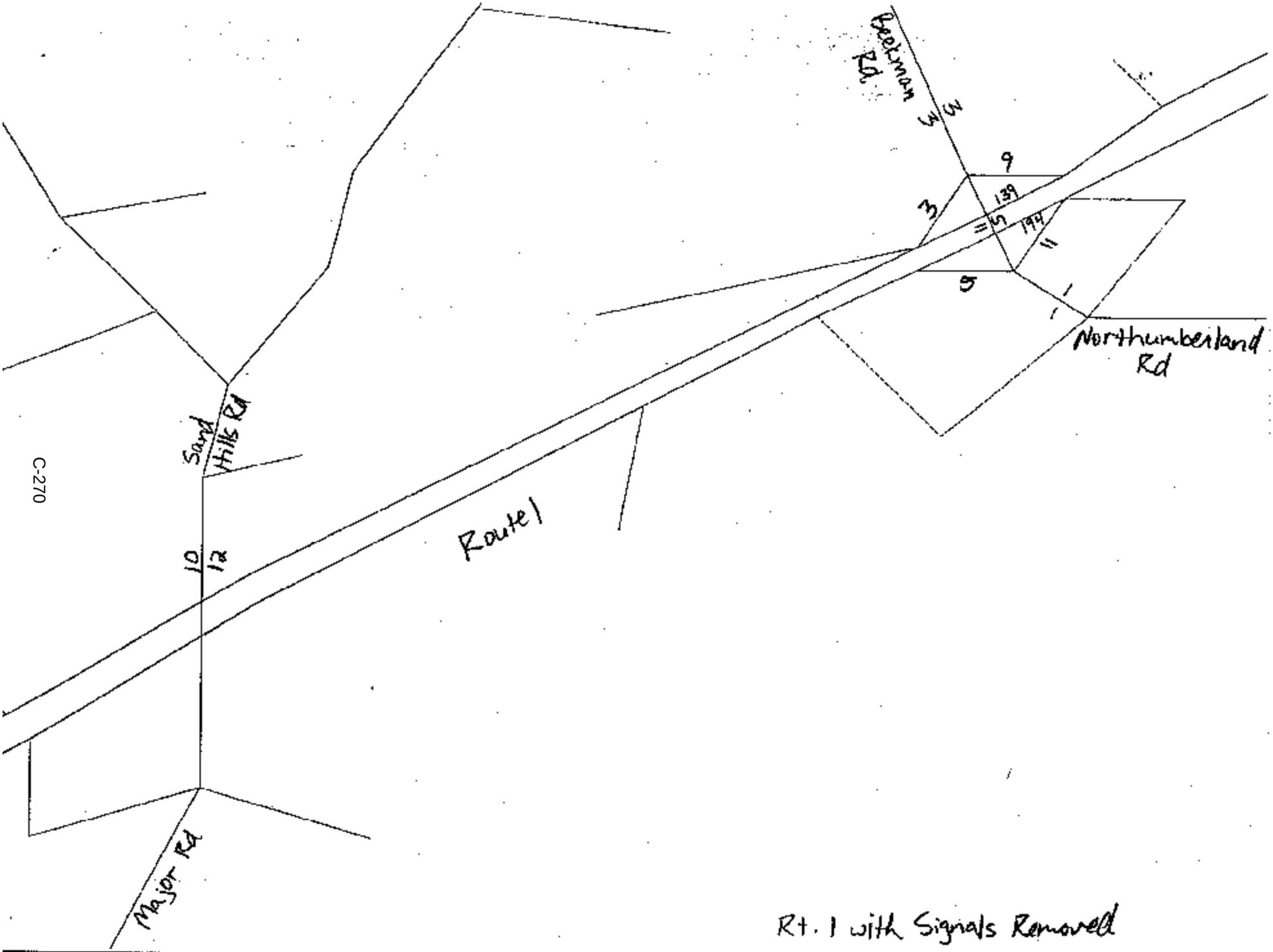
Rt. 1 with Signals Removed

Software by Citilabs Rt. 92 – Projected 2028 AM Peak Hour Auto Vols Licensed to Garmen Associates


Hartland Commons
Cozzens Lane
557
912
763
1123
420
557
912
464
3738
754
379
Lille
986
Route 1
Adams Lane
Rt. 1 with Signals Removed
Software by Citilabs
Rt. 92 – Projected 2028 PM Peak Hour Auto Vols
Licensed to Garmen Associates

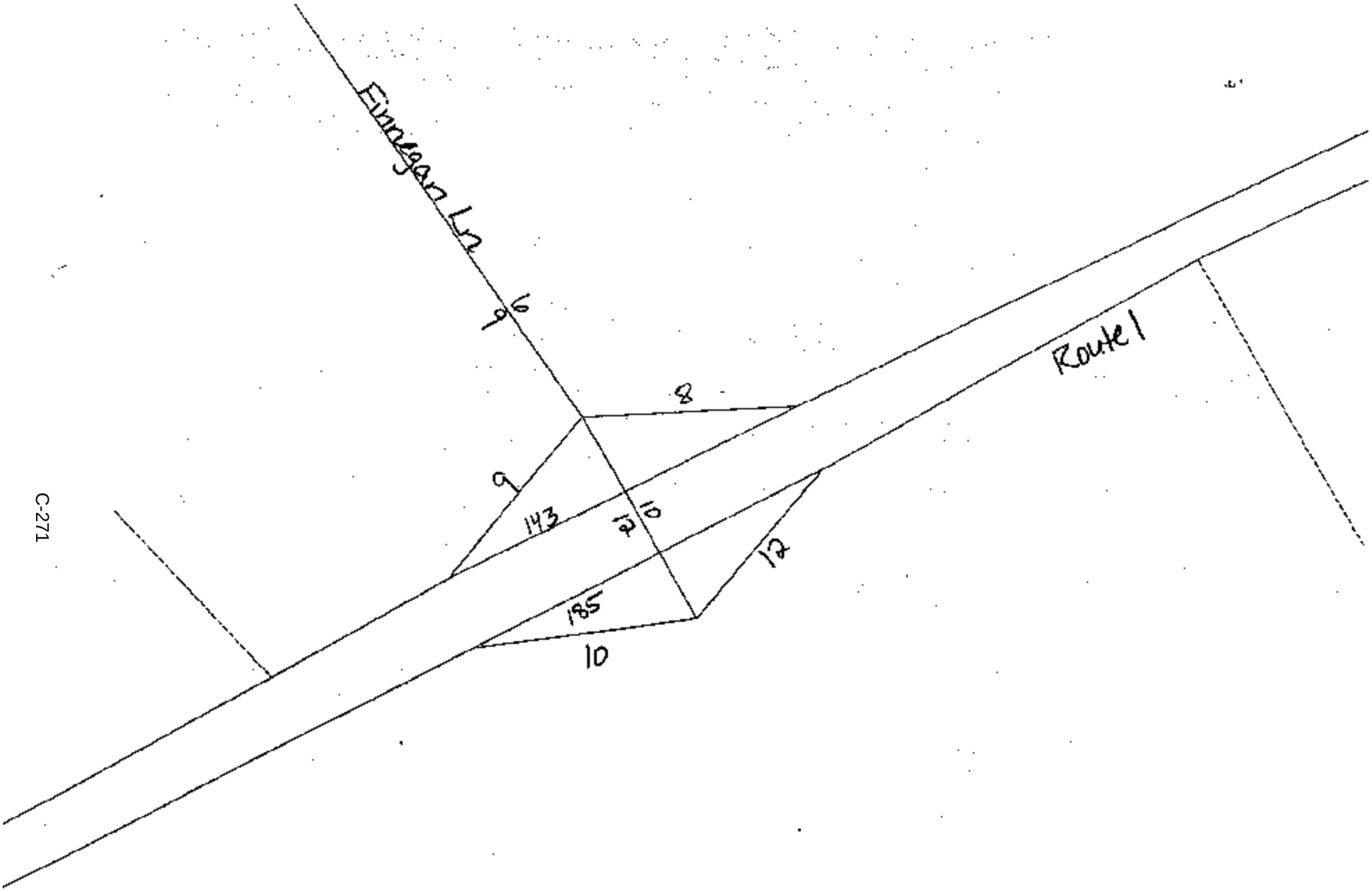


Software by Citilabs Rt. 92 - Projected 2028 PM Peak Hour Truck Volume Licensed to Garmen Associates

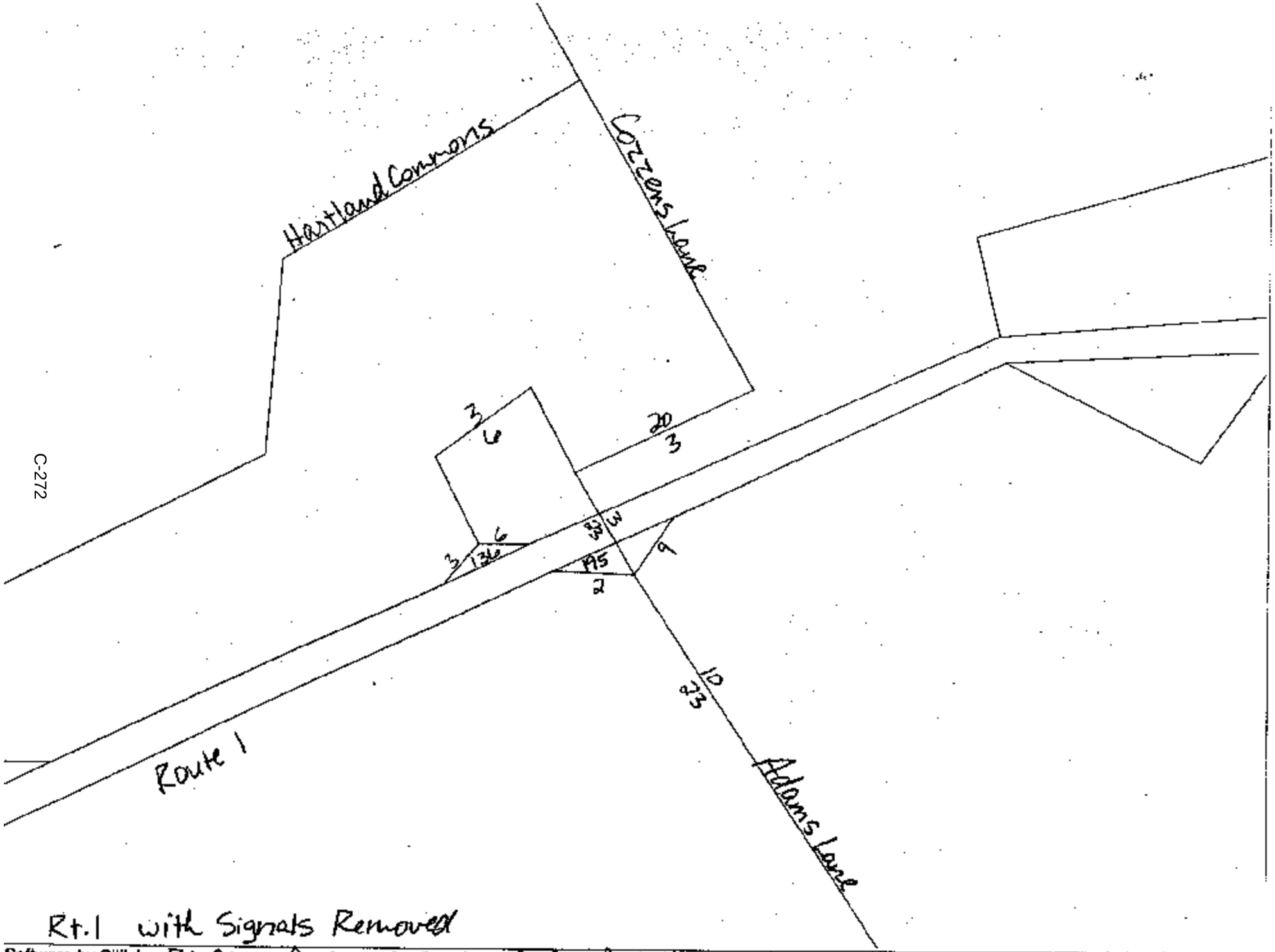


Rt. 1 with Signals Removed

Software by Citilabs Rt. 92 - Projected 2028 PM Peak Hour Truck Vols Licensed to Garmen Associates

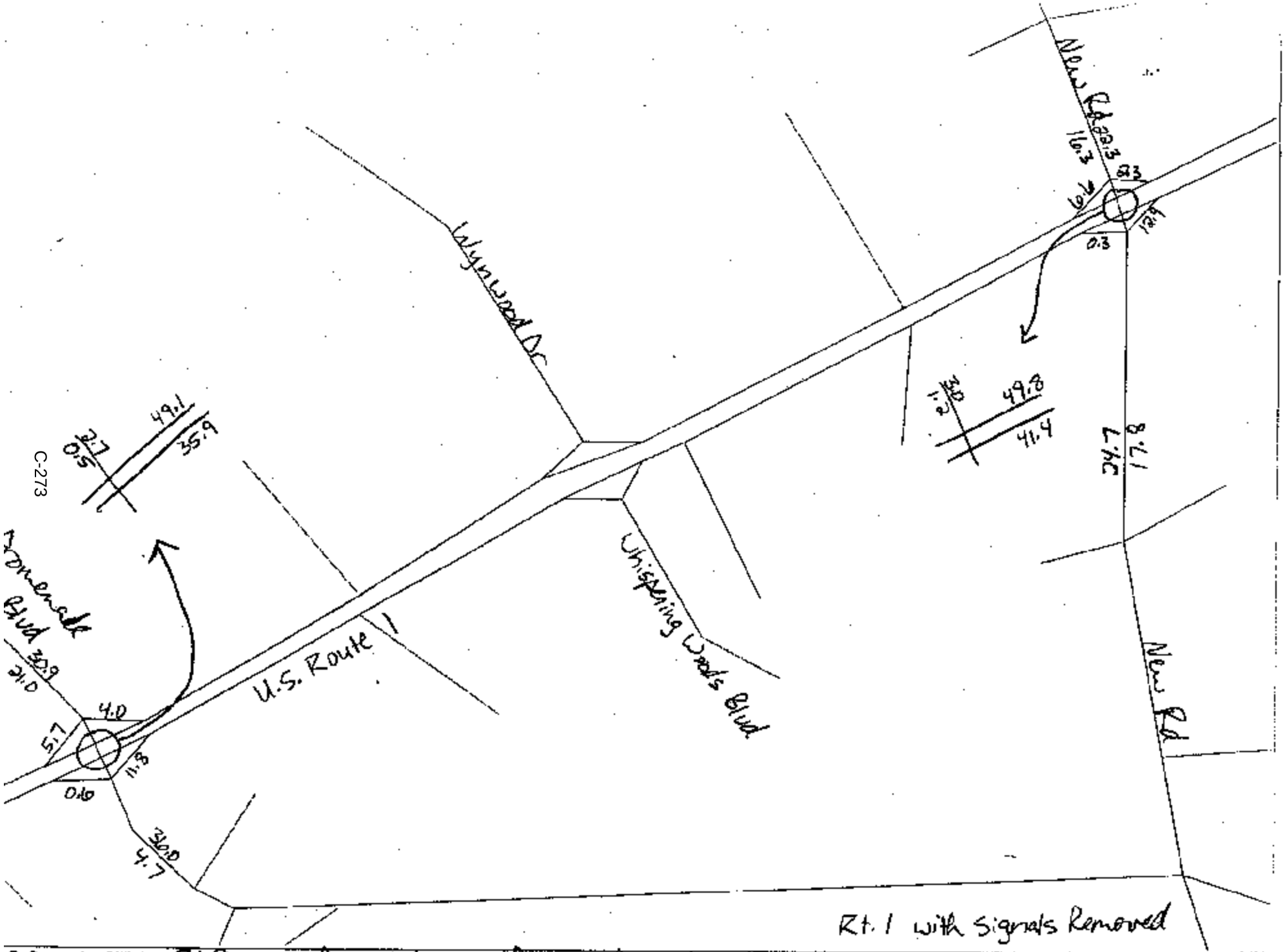


Rt. 1 with Signals Removed

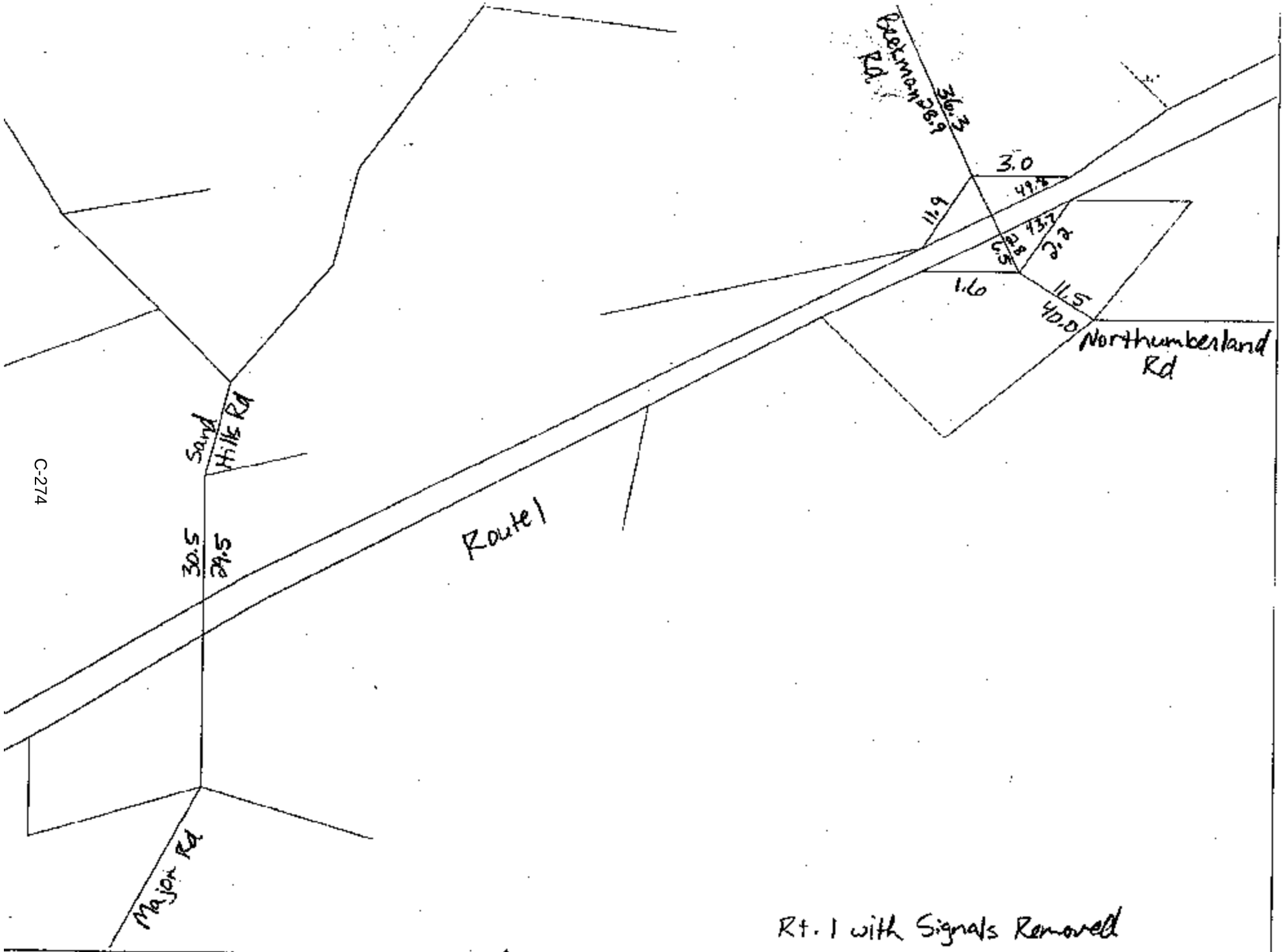


Rt.1 with Signals Removed

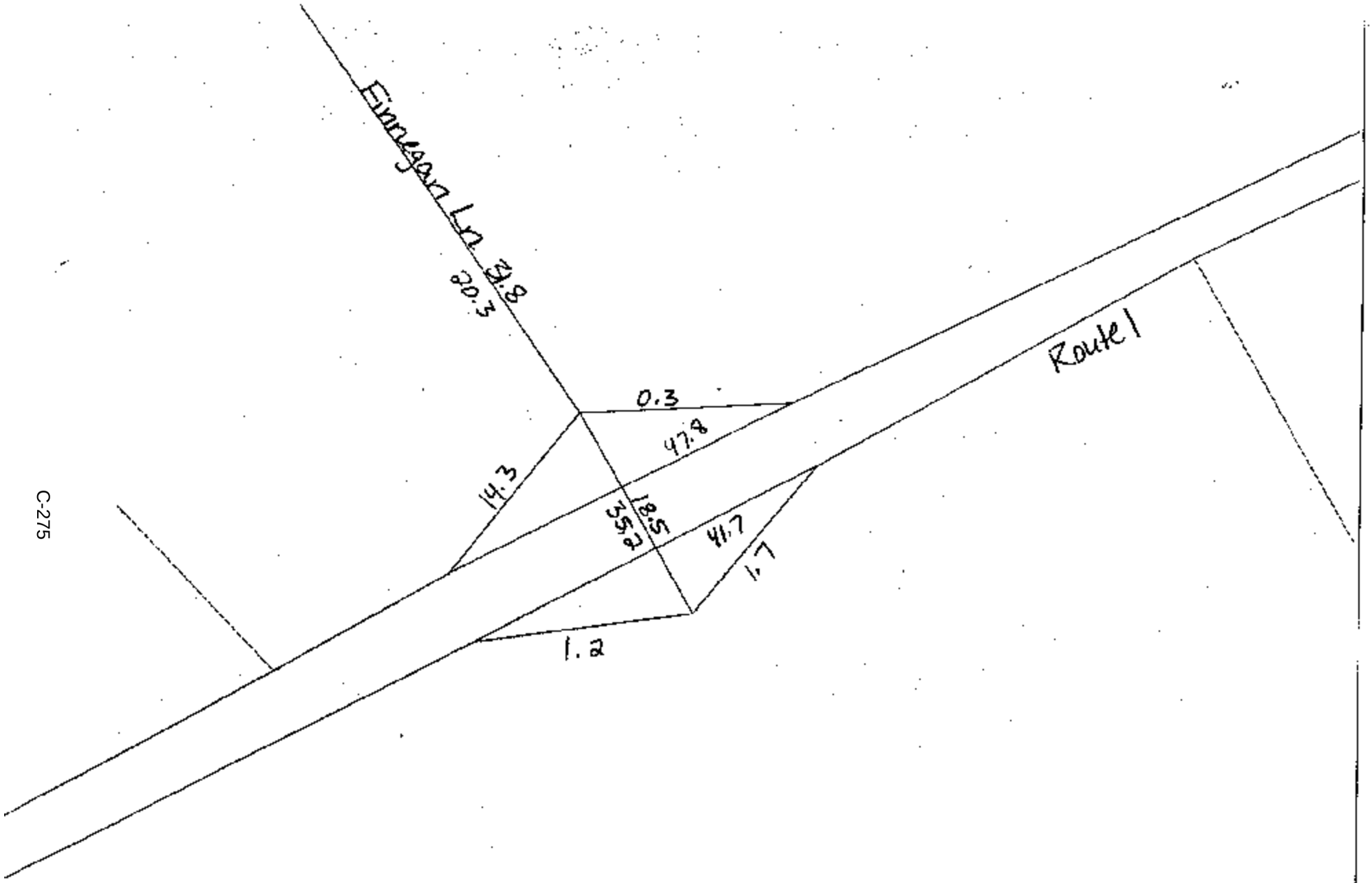
Software by Citilabs Rt. 92 – Projected 2028 PM Peak Hour Truck Hole Licensed to Garmen Associates



Software by Citilabs Rt. 92 – Projected 2028 PM Peak Hour Avg. Speeds Licensed to Garmen Associates

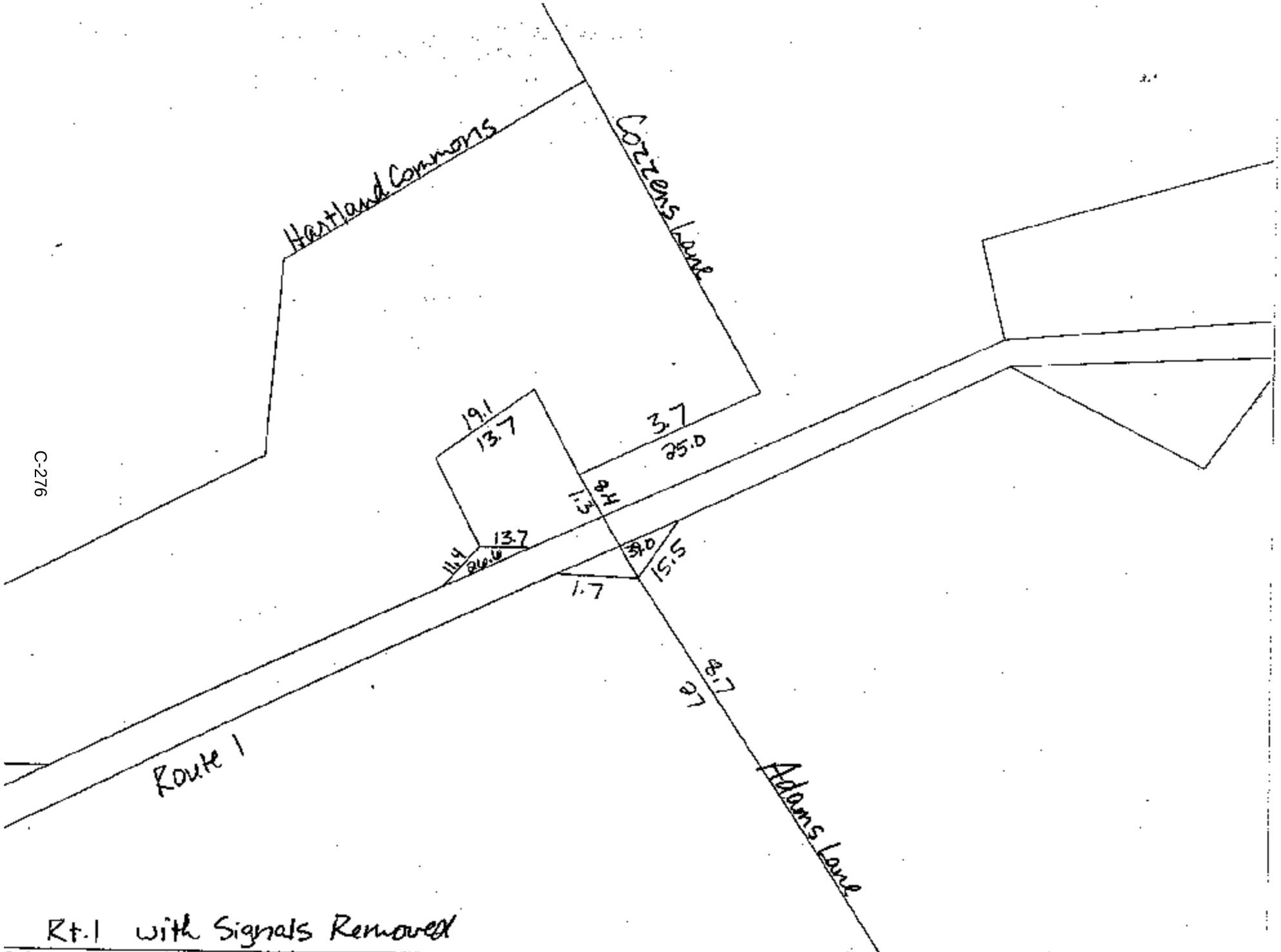


Software by Citilabs Rt. 92 - Projected 2028 AM Peak Hour Avg. Speeds Licensed to Garmen Associates



Rt. 1 with Signals Removed

Software by Citilabs Rt. 92 – Projected 2028 PM Peak Hour Avg. Speeds Licensed to Garmen Associates



Rt. 1 with Signals Removed

2.8 2028 Two-Lane Route 92

Software by Citilabs 2-LANE ROUTE 92 - PROJECTED 2028 AM PEAK HOUR Auto Volumes Licensed to Garmen Associates

Software by Citilabs 2-LANE ROUTE 92 - PROJECTED 2028 AM PEAK HOUR Truck Volumes Licensed to Garmen Associates

Software by Citilabs 2-LANE ROUTE 92 - PROJECTED 2028 AM PEAK HOUR Avg. Speeds (mph) Licensed to Garmen Associates

Software by Citilabs 2-LANE ROUTE 92 - PROJECTED 2028 PM PEAK HOUR Auto Volumes Licensed to Garmen Associates

Software by Citilabs 2-LANE ROUTE 92 - PROJECTED 2028 PM PEAK HOUR Truck Volumes Licensed to Garmen Associates

Software by Citilabs 2-LANE ROUTE 92 - PROJECTED 2028 PM PEAK HOUR Avg. Speeds (mph) Licensed to Garmen Associates

2.9 2028 Four-Lane Route 92 Without Perrine Road Interchange

(w/o Perrine Rd. Interchange)

Software by Citilabs 4-LANE ROUTE 92 - PROJECTED 2028 AM PEAK HOUR Auto Volumes Licensed to Garmen Associates

(w/o Perrine Rd. Interchange)

Software by Citilabs 4-LANE ROUTE 92 - PROJECTED 2028 AM PEAK HOUR Truck Volumes Licensed to Garmen Associates

(w/o Perrine Rd. Interchange)

Software by Citilabs 4-LANE ROUTE 92 - PROJECTED 2028 AM PEAK HOUR Avg. Speeds (mph) Licensed to Garmen Associates

(w/o Perrine Rd. Interchange)

oftware by Citilabs 4-LANE ROUTE 92 - PROJECTED 2028 PM PEAK HOUR Auto Volumes Licensed to Garmen Associates

(w/o Perrine Rd. Interchange)

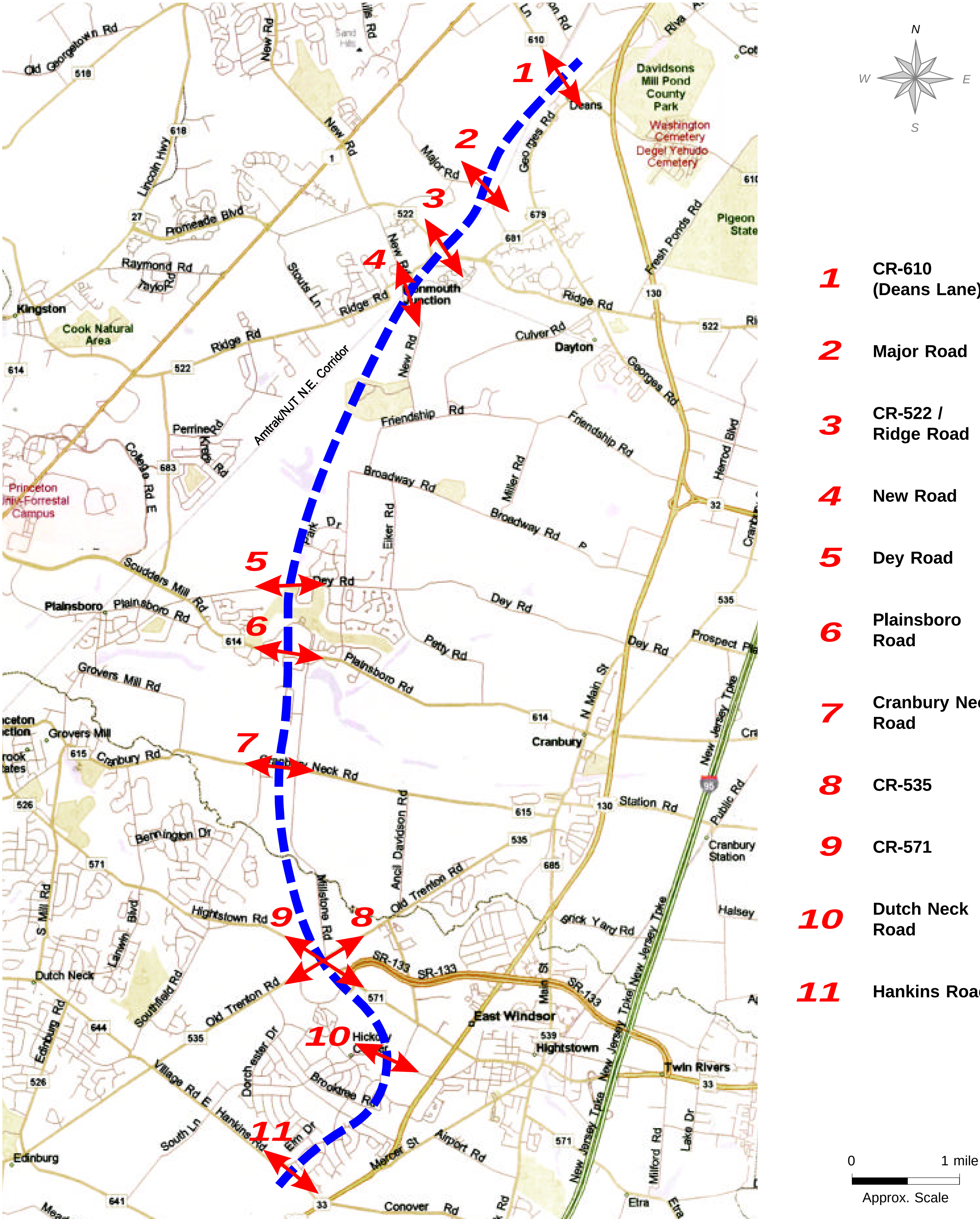
Software by Citilabs 4-LANE ROUTE 92 - PROJECTED 2028 PM PEAK HOUR Truck Volumes Licensed to Garmen Associates

(w/o Perrine Rd. Interchange)

oftware by Citilabs 4-LANE ROUTE 92 - PROJECTED 2028 PM PEAK HOUR Avg. Speeds (mph) Licensed to Garmen Associates

3.0 Screenline Volumes

3.1 2028 Projected Screenline Volumes - AM Autos



1	CR-610 (Deans Lane)
2	Major Road
3	CR-522 / Ridge Road
4	New Road
5	Dey Road
6	Plainsboro Road
7	Cranbury Neck Road
8	CR-535
9	CR-571
10	Dutch Neck Road
11	Hankins Road

MAP

Screenline Intercepting East - West Roads

2028 PROJECTED SCREENLINE VOLUMES -- AUTOS (1 OF 2)

EASTBOUND AM PEAK HOUR

	NO-BUILD			EPA MODIFIED NO-BUILD			NJTA ROUTE 92			TWO-LANE ROUTE 92			ROUTE 92 W/O PERRINE RD. INT.			6-LANE ROUTE 1		
Screenline Crossing	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regiona**	**Total**	**Local**	**Regiona**	**Total**	**Local**	**Regional**	**Total**
CR-610 (Deans Ln)	614	235	850	616	341	957	631	314	945	656	326	982	573	387	960	639	266	905
Major Road	287	29	315	322	23	344	259	25	285	272	21	293	274	23	297	279	20	298
CR-522 (Ridge Rd)	1,612	34	1,647	1,710	106	1,816	1,653	25	1,678	1,669	32	1,701	1,666	25	1,691	1,660	40	1,699
New Road	84	16	100	66	10	77	80	25	105	75	27	102	75	21	96	57	11	68
Dey Road	166	118	284	154	55	210	173	49	222	181	59	240	198	64	262	161	110	270
Plainsboro Road	687	199	886	711	175	886	682	126	807	673	122	795	654	100	754	677	182	859
Cranbury Neck Road	533	303	836	569	335	904	499	252	751	499	305	804	511	256	767	556	263	820
CR-535	590	718	1,309	496	603	1,099	529	876	1,405	529	793	1,322	523	840	1,363	520	831	1,351
CR-571	515	136	651	590	223	814	482	99	581	499	99	598	482	97	579	505	120	625
Dutch Neck Road	9	0	9	9	1	10	9	0	9	9	-	9	9	-	9	9	0	9
Hankins Road	317	352	668	274	369	644	329	281	610	315	312	627	328	265	593	313	326	639
Total	**5,415**	**2,141**	**7,556**	**5,517**	**2,242**	**7,760**	**5,327**	**2,072**	**7,399**	**5,377**	**2,096**	**7,473**	**5,293**	**2,078**	**7,371**	**5,376**	**2,169**	**7,546**

WESTBOUND AM PEAK HOUR

	NO-BUILD			EPA MODIFIED NO-BUILD			NJTA ROUTE 92			TWO-LANE ROUTE 92			ROUTE 92 W/O PERRINE RD. INT.			6-LANE ROUTE 1		
Screenline Crossing	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regiona**	**Total**	**Local**	**Regiona**	**Total**	**Local**	**Regional**	**Total**
CR-610 (Deans Ln)	705	552	1,257	705	582	1,287	358	627	985	449	611	1,060	345	622	967	771	509	1,281
Major Road	880	100	980	946	272	1,218	623	44	668	859	76	935	596	48	644	830	158	988
CR-522 (Ridge Rd)	1,781	90	1,870	1,719	93	1,813	1,364	20	1,385	1,296	194	1,490	1,441	28	1,469	1,677	175	1,852
New Road	421	96	517	468	87	555	320	99	419	377	92	469	337	88	425	442	106	548
Dey Road	1,205	162	1,367	1,280	286	1,566	1,165	56	1,221	1,146	133	1,279	1,163	59	1,222	1,185	117	1,302
Plainsboro Road	2,252	306	2,558	2,245	323	2,568	1,811	72	1,882	1,987	196	2,183	1,831	80	1,911	2,181	300	2,480
Cranbury Neck Road	1,858	250	2,107	1,997	277	2,273	1,542	148	1,690	1,676	184	1,860	1,554	150	1,704	1,830	237	2,066
CR-535	261	104	365	262	104	366	253	106	359	237	92	329	241	105	346	253	108	361
CR-571	2,492	1,036	3,528	2,408	929	3,337	2,242	937	3,179	2,341	993	3,334	2,222	929	3,151	2,374	996	3,370
Dutch Neck Road	27	19	46	21	7	28	27	17	44	27	18	45	27	17	44	27	3	30
Hankins Road	529	757	1,286	596	650	1,246	491	715	1,207	513	708	1,221	503	719	1,222	544	715	1,258
Total	**12,410**	**3,472**	**15,882**	**12,647**	**3,610**	**16,257**	**10,198**	**2,842**	**13,040**	**10,908**	**3,297**	**14,205**	**10,260**	**2,845**	**13,105**	**12,113**	**3,423**	**15,536**

2028 PROJECTED SCREENLINE VOLUMES -- AUTOS (2 OF 2)

EASTBOUND AM PEAK HOUR

	522 WIDENING & EXTENSION			DEY ROAD WIDENING			PLAINSBORO ROAD WIDENING			CRANBURY NECK ROAD WIDENING			ALL WIDENING PROJECTS COMBINED			ROUTE 1 WITH 6 LANES, NO SIGNALS		
Screenline Crossing	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**
CR-610 (Deans Ln)	621	247	868	596	340	936	603	305	908	620	341	961	573	305	878	364	254	618
Major Road	237	34	271	315	20	336	272	6	278	313	23	336	227	23	251	275	92	367
CR-522 (Ridge Rd)	1,814	107	1,921	1,701	105	1,806	1,739	99	1,838	1,711	102	1,813	1,870	122	1,992	1,738	126	1,864
New Road	70	20	90	124	11	135	70	10	80	67	11	78	52	11	63	44	2	46
Dey Road	185	136	320	206	178	384	145	58	203	162	57	220	186	140	325	165	118	283
Plainsboro Road	678	135	812	683	106	790	830	300	1,130	697	104	801	773	123	896	672	164	836
Cranbury Neck Road	535	330	865	563	339	903	431	294	725	654	437	1,091	533	305	838	544	253	797
CR-535	518	723	1,241	509	551	1,060	574	717	1,290	598	669	1,267	634	649	1,283	568	753	1,321
CR-571	536	143	678	564	207	771	584	169	752	529	117	646	538	85	624	469	120	588
Dutch Neck Road	9	1	10	9	1	10	9	1	10	9	1	10	9	1	10	9	0	9
Hankins Road	298	332	631	273	369	642	276	368	645	307	336	643	267	373	640	347	287	634
Total	**5,500**	**2,207**	**7,708**	**5,545**	**2,227**	**7,772**	**5,533**	**2,328**	**7,860**	**5,668**	**2,199**	**7,867**	**5,661**	**2,138**	**7,799**	**5,196**	**2,168**	**7,364**

WESTBOUND AM PEAK HOUR

	522 WIDENING & EXTENSION			DEY ROAD WIDENING			PLAINSBORO ROAD WIDENING			CRANBURY NECK ROAD WIDENING			ALL WIDENING PROJECTS COMBINED			ROUTE 1 WITH 6 LANES, NO SIGNALS		
Screenline Crossing	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**
CR-610 (Deans Ln)	593	724	1,317	623	597	1,220	654	571	1,225	687	579	1,266	565	604	1,168	482	355	837
Major Road	979	123	1,102	813	224	1,037	733	241	974	921	253	1,174	911	135	1,046	815	256	1,072
CR-522 (Ridge Rd)	2,002	255	2,257	1,847	51	1,898	1,781	49	1,830	1,711	70	1,780	2,008	166	2,174	1,744	58	1,802
New Road	385	104	489	477	73	550	452	62	514	456	81	537	339	94	433	457	70	526
Dey Road	1,218	133	1,351	1,759	343	2,102	1,121	251	1,372	1,176	204	1,380	1,566	293	1,858	1,190	108	1,298
Plainsboro Road	2,211	400	2,611	1,907	352	2,259	2,803	724	3,527	2,139	293	2,432	2,313	451	2,764	2,075	295	2,370
Cranbury Neck Road	1,860	265	2,125	1,912	252	2,163	1,836	265	2,101	2,621	415	3,037	2,171	333	2,503	1,796	209	2,005
CR-535	239	93	332	223	106	329	261	102	363	244	91	335	234	102	336	260	113	373
CR-571	2,493	881	3,375	2,428	912	3,340	2,294	980	3,274	2,331	880	3,211	2,218	843	3,061	2,226	964	3,190
Dutch Neck Road	22	16	38	21	7	28	21	7	28	21	7	28	20	16	36	27	3	30
Hankins Road	556	690	1,246	582	671	1,253	600	646	1,245	556	658	1,214	501	645	1,146	513	710	1,223
Total	**12,558**	**3,685**	**16,242**	**12,590**	**3,588**	**16,178**	**12,556**	**3,898**	**16,454**	**12,863**	**3,530**	**16,393**	**12,847**	**3,679**	**16,526**	**11,584**	**3,142**	**14,725**

3.2 2028 Projected Screenline Volumes - AM Trucks

2028 PROJECTED SCREENLINE VOLUMES -- TRUCKS (1 OF 2)

EASTBOUND AM PEAK HOUR

	NO-BUILD			EPA MODIFIED NO-BUILD			NJTA ROUTE 92			TWO-LANE ROUTE 92			ROUTE 92 W/O PERRINE RD. INT.			6-LANE ROUTE 1		
Screenline Crossing	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**
CR-610 (Deans Ln)	8	0	8	5	0	6	5	0	6	6	-	6	6	-	6	9	0	9
Major Road	2	0	2	6	(0)	6	4	0	4	3	-	3	3	1	4	4	0	4
CR-522 (Ridge Rd)	66	1	66	74	8	82	39	0	40	46	-	46	42	-	42	64	1	65
New Road	1	0	2	1	0	2	0	0	0	-	-	-	-	-	-	1	0	1
Dey Road	0	15	15	0	4	4	0	1	2	-	6	6	-	6	6	1	15	15
Plainsboro Road	4	7	11	4	10	14	4	4	8	4	3	7	4	4	8	4	6	10
Cranbury Neck Road	15	31	46	29	27	56	17	26	43	17	32	49	27	25	52	21	25	46
CR-535	430	8	438	516	1	517	441	20	461	444	13	457	436	14	450	434	8	442
CR-571	157	2	159	64	15	78	235	1	237	235	3	238	235	2	237	235	1	236
Dutch Neck Road	407	-	407	408	-	408	416	-	416	410	-	410	400	-	400	422	-	422
Hankins Road	147	31	178	144	36	180	46	20	66	49	25	74	58	20	78	46	25	71
Total	**1,238**	**95**	**1,333**	**1,250**	**101**	**1,351**	**1,209**	**74**	**1,283**	**1,214**	**82**	**1,296**	**1,211**	**72**	**1,283**	**1,240**	**82**	**1,322**

WESTBOUND AM PEAK HOUR

	NO-BUILD			EPA MODIFIED NO-BUILD			NJTA ROUTE 92			TWO-LANE ROUTE 92			ROUTE 92 W/O PERRINE RD. INT.			6-LANE ROUTE 1		
Screenline Crossing	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**
CR-610 (Deans Ln)	16	8	24	18	10	29	12	6	18	14	6	20	11	6	17	19	7	26
Major Road	22	1	23	19	3	22	11	1	12	18	2	20	9	1	10	20	1	21
CR-522 (Ridge Rd)	42	4	46	39	2	41	14	1	15	24	14	38	11	-	11	30	12	42
New Road	6	1	7	6	1	8	2	2	4	6	2	8	2	1	3	9	2	11
Dey Road	0	15	16	1	19	20	1	6	7	1	10	11	1	6	7	0	18	18
Plainsboro Road	9	34	43	8	33	42	5	8	13	5	21	26	5	6	11	6	33	39
Cranbury Neck Road	31	14	45	45	20	65	17	3	20	24	6	30	21	3	24	31	14	45
CR-535	52	1	52	54	0	54	56	1	57	52	-	52	52	-	52	51	0	52
CR-571	86	24	109	67	17	84	76	14	91	88	17	105	75	16	91	86	18	104
Dutch Neck Road	35	1	36	38	1	39	17	1	18	17	1	18	20	1	21	25	-	25
Hankins Road	25	30	55	27	19	46	25	29	54	25	28	53	25	28	53	25	30	55
Total	**323**	**132**	**455**	**323**	**126**	**449**	**236**	**72**	**308**	**274**	**107**	**381**	**232**	**68**	**300**	**304**	**134**	**438**

2028 PROJECTED SCREENLINE VOLUMES -- TRUCKS (2 OF 2)

EASTBOUND AM PEAK HOUR

	522 WIDENING & EXTENSION			DEY ROAD WIDENING			PLAINSBORO ROAD WIDENING			CRANBURY NECK ROAD WIDENING			ALL WIDENING PROJECTS COMBINED			ROUTE 1 WITH 6 LANES, NO SIGNALS		
Screenline Crossing	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**
CR-610 (Deans Ln)	10	4	14	6	0	6	11	13	23	5	0	6	7	5	12	8	1	9
Major Road	1	0	1	5	0	5	5	(0)	5	6	(0)	6	1	0	1	2	0	3
CR-522 (Ridge Rd)	70	12	82	70	8	78	72	7	79	73	8	81	75	12	86	67	0	67
New Road	1	0	2	1	0	1	1	0	1	1	0	2	1	0	1	1	-	1
Dey Road	1	19	19	1	18	20	0	4	4	0	4	4	0	16	16	1	14	14
Plainsboro Road	4	5	9	4	3	7	5	19	24	4	9	13	5	6	11	4	5	9
Cranbury Neck Road	20	27	46	19	33	52	15	32	47	20	38	58	26	23	49	14	25	39
CR-535	518	7	525	517	1	518	512	7	519	537	7	544	519	7	526	438	8	445
CR-571	138	7	145	66	15	81	71	4	75	48	3	51	47	1	48	133	1	133
Dutch Neck Road	417	-	417	411	-	411	414	-	414	414	-	414	414	-	414	410	-	410
Hankins Road	60	31	91	144	36	180	144	36	180	144	30	175	147	31	178	148	11	158
Total	**1,240**	**112**	**1,352**	**1,243**	**114**	**1,358**	**1,250**	**121**	**1,371**	**1,252**	**100**	**1,351**	**1,240**	**101**	**1,342**	**1,225**	**65**	**1,290**

WESTBOUND AM PEAK HOUR

	522 WIDENING & EXTENSION			DEY ROAD WIDENING			PLAINSBORO ROAD WIDENING			CRANBURY NECK ROAD WIDENING			ALL WIDENING PROJECTS COMBINED			ROUTE 1 WITH 6 LANES, NO SIGNALS		
Screenline Crossing	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**
CR-610 (Deans Ln)	20	11	31	19	8	27	15	12	27	18	9	27	16	7	23	14	2	17
Major Road	14	6	21	18	3	21	15	3	18	19	3	22	10	1	11	25	3	28
CR-522 (Ridge Rd)	46	5	51	40	2	42	39	1	40	36	2	38	50	5	55	33	1	34
New Road	7	1	8	7	1	9	3	1	4	5	1	6	5	2	7	7	7	14
Dey Road	0	12	12	2	27	29	0	18	18	1	16	18	4	29	33	0	17	17
Plainsboro Road	9	37	46	9	32	41	14	64	78	8	27	35	9	37	47	6	31	36
Cranbury Neck Road	47	18	65	46	16	61	45	14	59	73	35	109	67	18	85	32	21	53
CR-535	54	0	54	54	0	54	55	0	55	54	0	54	54	0	54	52	0	52
CR-571	75	18	92	66	16	82	60	15	75	60	10	70	76	12	88	68	14	82
Dutch Neck Road	32	0	32	38	1	39	38	1	39	38	1	39	14	1	15	23	-	23
Hankins Road	27	19	46	27	19	46	27	19	47	27	19	46	27	19	46	25	29	54
Total	**331**	**128**	**458**	**327**	**124**	**451**	**311**	**147**	**458**	**340**	**124**	**464**	**332**	**131**	**463**	**285**	**125**	**410**

3.3 2028 Projected Screenline Volumes - PM Autos

2028 PROJECTED SCREENLINE VOLUMES -- AUTOS (1 OF 2)

EASTBOUND PM PEAK HOUR

	NO-BUILD			EPA MODIFIED NO-BUILD			NJTA ROUTE 92			TWO-LANE ROUTE 92			ROUTE 92 W/O PERRINE RD. INT.			6-LANE ROUTE 1		
Screenline Crossing	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**
CR-610 (Deans Ln)	362	331	694	373	304	677	266	211	477	332	259	591	273	196	469	392	294	686
Major Road	245	108	353	241	92	333	237	28	265	254	19	273	188	103	291	235	93	328
CR-522 (Ridge Rd)	2,848	50	2,899	2,883	99	2,982	2,491	29	2,520	2,657	35	2,692	2,608	38	2,646	2,802	53	2,855
New Road	163	43	206	162	28	190	138	29	167	143	26	169	136	30	166	161	42	203
Dey Road	1,368	411	1,779	1,362	269	1,631	1,006	173	1,179	1,083	250	1,333	1,100	182	1,282	1,241	361	1,602
Plainsboro Road	1,339	244	1,583	1,306	297	1,604	1,310	175	1,485	1,350	177	1,527	1,326	181	1,507	1,343	221	1,564
Cranbury Neck Road	855	77	932	880	81	962	708	50	758	760	69	829	696	62	758	764	61	825
CR-535	110	73	183	98	66	164	97	63	160	73	77	150	97	69	166	104	67	171
CR-571	1,415	631	2,046	1,368	673	2,041	1,238	571	1,809	1,315	573	1,888	1,242	564	1,806	1,328	661	1,989
Dutch Neck Road	-	-	-	(66)	-	(66)	-	-	-	(24)	-	(24)	(23)	-	(23)	(52)	-	(52)
Hankins Road	441	481	922	418	529	947	389	431	820	402	455	857	389	436	825	473	444	917
Total	**9,147**	**2,450**	**11,597**	**9,026**	**2,438**	**11,464**	**7,882**	**1,760**	**9,641**	**8,345**	**1,940**	**10,285**	**8,032**	**1,861**	**9,893**	**8,791**	**2,296**	**11,087**

WESTBOUND PM PEAK HOUR

	NO-BUILD			EPA MODIFIED NO-BUILD			NJTA ROUTE 92			TWO-LANE ROUTE 92			ROUTE 92 W/O PERRINE RD. INT.			6-LANE ROUTE 1		
Screenline Crossing	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**
CR-610 (Deans Ln)	364	211	575	346	199	546	365	155	520	365	156	521	333	161	494	348	160	509
Major Road	961	22	983	947	21	968	872	1	873	894	1	895	887	-	887	913	16	929
CR-522 (Ridge Rd)	1,085	28	1,113	1,082	23	1,105	1,062	3	1,066	1,046	4	1,050	1,071	4	1,075	1,109	30	1,139
New Road	150	22	172	163	24	187	131	25	156	133	12	145	156	26	182	109	24	133
Dey Road	631	123	754	652	95	747	617	28	645	626	40	666	623	40	663	633	103	736
Plainsboro Road	510	30	540	524	38	562	492	32	524	512	20	532	532	16	548	494	37	531
Cranbury Neck Road	941	200	1,141	900	182	1,082	884	154	1,038	883	139	1,022	844	159	1,003	925	204	1,128
CR-535	347	396	744	346	383	729	267	415	682	314	395	709	261	420	681	303	396	699
CR-571	670	361	1,031	709	395	1,104	633	331	964	628	378	1,006	651	334	985	673	342	1,016
Dutch Neck Road	0	-	0	0	-	0	-	-	-	-	-	-	-	-	-	0	-	0
Hankins Road	333	259	593	327	278	605	323	292	614	327	271	598	321	293	614	319	283	602
Total	**5,992**	**1,652**	**7,644**	**5,997**	**1,639**	**7,635**	**5,645**	**1,437**	**7,082**	**5,728**	**1,416**	**7,144**	**5,679**	**1,453**	**7,132**	**5,826**	**1,596**	**7,422**

2028 PROJECTED SCREENLINE VOLUMES -- AUTOS (2 OF 2)

EASTBOUND PM PEAK HOUR

	522 WIDENING & EXTENSION			DEY ROAD WIDENING			PLAINSBORO ROAD WIDENING			CRANBURY NECK ROAD WIDENING			ALL WIDENING PROJECTS COMBINED			ROUTE 1 WITH 6 LANES, NO SIGNALS		
Screenline Crossing	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**
CR-610 (Deans Ln)	316	279	595	358	297	655	362	331	694	411	385	796	327	289	617	503	277	780
Major Road	149	102	251	234	84	318	245	108	353	234	86	320	219	21	239	224	125	349
CR-522 (Ridge Rd)	3,173	188	3,360	2,884	76	2,960	2,848	50	2,899	2,889	104	2,993	3,049	185	3,234	2,659	51	2,710
New Road	152	33	185	153	31	183	163	43	206	166	27	193	121	17	139	162	34	196
Dey Road	1,310	448	1,759	1,583	504	2,087	1,368	411	1,779	1,324	257	1,581	1,295	456	1,752	1,220	347	1,567
Plainsboro Road	1,350	230	1,580	1,274	199	1,473	1,339	244	1,583	1,335	221	1,556	1,608	456	2,064	1,348	214	1,562
Cranbury Neck Road	890	81	971	826	79	905	855	77	932	1,191	124	1,315	930	87	1,018	806	64	870
CR-535	101	66	168	95	70	165	110	73	183	68	63	131	56	61	117	80	94	174
CR-571	1,327	584	1,911	1,355	646	2,001	1,415	631	2,046	1,291	617	1,907	1,235	574	1,809	1,323	541	1,864
Dutch Neck Road	(24)	-	(24)	(67)	-	(67)	(44)	-	(44)	(23)	-	(23)	(23)	-	(23)	-	-	-
Hankins Road	377	523	900	406	469	875	441	481	922	391	491	882	368	459	827	427	453	880
Total	**9,120**	**2,536**	**11,656**	**9,102**	**2,454**	**11,556**	**9,102**	**2,450**	**11,552**	**9,277**	**2,375**	**11,652**	**9,187**	**2,606**	**11,793**	**8,751**	**2,200**	**10,951**

WESTBOUND PM PEAK HOUR

	522 WIDENING & EXTENSION			DEY ROAD WIDENING			PLAINSBORO ROAD WIDENING			CRANBURY NECK ROAD WIDENING			ALL WIDENING PROJECTS COMBINED			ROUTE 1 WITH 6 LANES, NO SIGNALS		
Screenline Crossing	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**
CR-610 (Deans Ln)	336	168	504	362	208	570	364	211	575	345	208	553	354	200	554	286	24	310
Major Road	684	44	728	944	15	958	961	22	983	945	20	965	632	25	656	1,029	57	1,086
CR-522 (Ridge Rd)	1,413	86	1,499	1,070	17	1,088	1,085	28	1,113	1,089	18	1,107	1,421	82	1,503	1,082	16	1,098
New Road	189	31	220	156	93	249	150	22	172	165	25	190	197	37	234	63	-	63
Dey Road	627	109	736	753	173	927	631	123	754	644	90	734	673	147	819	634	96	731
Plainsboro Road	507	27	533	444	19	463	510	30	540	501	37	538	505	22	527	466	43	509
Cranbury Neck Road	977	174	1,151	930	169	1,099	941	200	1,141	1,095	216	1,311	1,127	226	1,352	958	165	1,122
CR-535	324	397	721	321	387	708	347	396	744	333	373	706	336	397	733	263	424	687
CR-571	654	356	1,010	678	387	1,065	670	361	1,031	630	362	992	581	340	921	651	346	997
Dutch Neck Road	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0
Hankins Road	328	280	608	328	273	601	333	259	593	330	278	608	329	278	607	320	257	577
Total	**6,037**	**1,673**	**7,709**	**5,988**	**1,741**	**7,729**	**5,992**	**1,652**	**7,644**	**6,076**	**1,628**	**7,705**	**6,154**	**1,752**	**7,906**	**5,752**	**1,428**	**7,180**

3.4 2028 Projected Screenline Volumes - PM Trucks

2028 PROJECTED SCREENLINE VOLUMES -- TRUCKS (1 OF 2)

EASTBOUND PM PEAK HOUR

	NO-BUILD			EPA MODIFIED NO-BUILD			NJTA ROUTE 92			TWO-LANE ROUTE 92			ROUTE 92 W/O PERRINE RD. INT.			6-LANE ROUTE 1		
Screenline Crossing	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**
CR-610 (Deans Ln)	9	10	19	13	2	15	6	2	8	8	1	9	6	2	8	14	2	17
Major Road	7	4	11	9	4	13	2	0	3	2	-	2	4	4	8	9	4	13
CR-522 (Ridge Rd)	41	1	42	43	1	44	13	0	13	23	1	24	16	-	16	36	1	37
New Road	1	0	1	1	0	1	0	0	0	-	-	-	-	-	-	2	0	2
Dey Road	2	40	41	2	24	25	0	4	4	-	7	7	-	6	6	1	33	34
Plainsboro Road	6	9	15	6	11	17	7	4	11	7	5	12	7	5	12	6	7	13
Cranbury Neck Road	8	5	13	9	5	14	4	1	5	4	3	7	4	4	8	5	5	10
CR-535	21	0	21	19	0	19	23	0	24	27	-	27	20	-	20	21	0	21
CR-571	37	3	40	31	7	38	31	3	34	29	1	30	35	3	38	34	5	39
Dutch Neck Road	5	-	5	8	-	8	2	-	2	2	-	2	2	-	2	5	-	5
Hankins Road	12	13	25	12	13	25	12	12	23	12	12	24	12	11	23	12	11	23
Total	**149**	**86**	**234**	**153**	**66**	**219**	**100**	**26**	**126**	**114**	**30**	**144**	**106**	**35**	**141**	**145**	**69**	**214**

WESTBOUND PM PEAK HOUR

	NO-BUILD			EPA MODIFIED NO-BUILD			NJTA ROUTE 92			TWO-LANE ROUTE 92			ROUTE 92 W/O PERRINE RD. INT.			6-LANE ROUTE 1		
Screenline Crossing	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**
CR-610 (Deans Ln)	13	36	49	13	7	20	11	6	17	11	6	17	10	6	16	14	8	22
Major Road	33	1	34	24	0	24	5	0	5	6	-	6	6	-	6	21	1	22
CR-522 (Ridge Rd)	48	1	49	52	1	53	24	0	24	25	-	25	29	-	29	58	0	58
New Road	3	0	3	2	0	2	1	0	1	1	1	2	1	-	1	3	0	3
Dey Road	1	6	7	1	5	7	0	0	1	-	1	1	1	-	1	1	6	7
Plainsboro Road	5	5	10	5	6	10	5	3	7	4	3	7	5	3	8	4	5	9
Cranbury Neck Road	21	7	28	22	8	30	18	11	29	18	8	26	18	10	28	17	7	24
CR-535	13	0	13	17	1	19	19	1	20	13	-	13	18	1	19	11	0	12
CR-571	76	19	95	74	19	93	70	16	86	75	21	96	71	16	87	78	19	97
Dutch Neck Road	0	-	0	0	-	0	-	-	-	-	-	-	-	-	-	0	-	0
Hankins Road	19	14	33	19	14	33	19	13	32	19	13	32	19	13	32	19	14	33
Total	**231**	**89**	**320**	**229**	**61**	**291**	**171**	**51**	**222**	**172**	**53**	**225**	**178**	**49**	**227**	**226**	**61**	**287**

2028 PROJECTED SCREENLINE VOLUMES -- TRUCKS (2 OF 2)

EASTBOUND PM PEAK HOUR

	522 WIDENING & EXTENSION			DEY ROAD WIDENING			PLAINSBORO ROAD WIDENING			CRANBURY NECK ROAD WIDENING			ALL WIDENING PROJECTS			RT 1 W/ 6 LANES, NO SIGNALS		
Screenline Crossing	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**
CR-610 (Deans Ln)	7	2	9	12	3	15	9	10	19	14	10	24	10	2	12	27	4	31
Major Road	2	4	6	7	5	12	7	4	11	6	3	10	5	0	5	7	1	7
CR-522 (Ridge Rd)	56	5	61	41	1	42	41	1	42	46	1	47	50	6	56	27	1	28
New Road	1	0	1	3	0	3	1	0	1	1	0	1	1	0	1	1	0	1
Dey Road	2	39	40	3	43	47	2	40	41	1	23	25	2	34	36	1	25	26
Plainsboro Road	6	7	13	6	5	11	6	9	15	6	11	18	9	15	24	7	7	14
Cranbury Neck Road	8	5	12	7	5	12	8	5	13	15	6	21	8	5	13	4	2	7
CR-535	22	1	24	23	(0)	23	21	0	21	20	0	20	27	0	27	23	0	24
CR-571	34	2	36	27	4	31	37	3	40	36	3	39	29	1	30	30	1	31
Dutch Neck Road	2	-	2	9	-	9	5	-	5	2	-	2	2	-	2	4	-	4
Hankins Road	12	13	25	12	12	24	12	13	25	12	13	24	11	12	23	12	7	19
Total	**151**	**79**	**229**	**149**	**78**	**227**	**149**	**86**	**234**	**159**	**71**	**230**	**153**	**75**	**228**	**143**	**49**	**192**

WESTBOUND PM PEAK HOUR

	522 WIDENING & EXTENSION			DEY ROAD WIDENING			PLAINSBORO ROAD WIDENING			CRANBURY NECK ROAD WIDENING			ALL WIDENING PROJECTS			RT 1 W/ 6 LANES, NO SIGNALS		
Screenline Crossing	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**	**Local**	**Regional**	**Total**
CR-610 (Deans Ln)	10	8	18	12	7	19	13	36	49	12	5	17	10	6	16	13	2	15
Major Road	35	1	36	23	1	23	33	1	34	23	0	23	18	1	18	29	1	30
CR-522 (Ridge Rd)	48	6	54	51	1	51	48	1	49	52	1	53	63	6	69	45	0	45
New Road	3	1	4	1	5	5	3	0	3	2	0	3	1	2	3	3	0	3
Dey Road	1	8	8	3	12	15	1	6	7	1	5	6	2	11	13	1	5	6
Plainsboro Road	4	5	10	4	4	8	5	5	10	4	6	10	5	5	10	4	6	10
Cranbury Neck Road	19	7	26	24	8	32	21	7	28	30	8	39	29	12	40	19	7	27
CR-535	19	3	22	18	1	19	13	0	13	17	1	18	19	1	21	18	1	19
CR-571	70	16	86	72	19	91	76	19	95	71	19	90	67	17	84	68	14	83
Dutch Neck Road	1	-	1	0	-	0	0	-	0	0	-	0	0	-	0	1	-	1
Hankins Road	17	14	31	19	14	33	19	14	33	19	14	33	19	16	35	17	15	32
Total	**227**	**69**	**295**	**226**	**71**	**297**	**231**	**89**	**320**	**232**	**60**	**292**	**233**	**77**	**310**	**219**	**52**	**271**

3.5 2028 Total Peak Hour Traffic Crossing Screenline on Local E-W Roads and % Change

2028 Total Peak Hour Traffic Crossing Screenline on Local E-W Roads

Scenario	AUTOS				TRUCKS			
	AM		PM		AM		PM	
	E/B	W/B	E/B	W/B	E/B	W/B	E/B	W/B
No-Build	7,556	15,882	11,597	7,644	1,333	455	234	320
EPA No-Build	7,760	16,257	11,464	7,635	1,351	449	219	291
"Full" Route 92	7,399	13,040	9,641	7,082	1,283	308	126	222
2-lane Route 92	7,473	14,205	10,285	7,144	1,296	381	144	225
4-lane Route 92 w/o Perrine Rd. Int.	7,371	13,105	9,893	7,132	1,283	300	141	227
6-lane Route 1	7,546	15,536	11,087	7,422	1,322	438	214	287
522 Widening & Extension	7,708	16,242	11,656	7,709	1,352	458	229	295
Dey Road Widening	7,772	16,178	11,556	7,729	1,358	451	227	297
Plainsboro Road Widening	7,860	16,454	11,552	7,644	1,371	458	234	320
Cranbury Neck Widening	7,867	16,393	11,652	7,705	1,351	464	230	292
All Widening Projects Combined	7,799	16,526	11,793	7,906	1,342	463	228	310

Change in 2028 Total Peak Hour Trafic Crossing Screenline on Local E-W Roads (Relative to No-Build)

Scenario	AUTOS				TRUCKS			
	AM		PM		AM		PM	
	E/B	W/B	E/B	W/B	E/B	W/B	E/B	W/B
No-Build	0%	0%	0%	0%	0%	0%	0%	0%
EPA No-Build	3%	2%	-1%	0%	1%	-1%	-7%	-9%
"Full" Route 92	-2%	-18%	-17%	-7%	-4%	-32%	-46%	-31%
2-lane Route 92	-1%	-11%	-11%	-7%	-3%	-16%	-39%	-30%
4-lane Route 92 w/o Perrine Rd. Int.	-2%	-17%	-15%	-7%	-4%	-34%	-40%	-29%
6-lane Route 1	0%	-2%	-4%	-3%	-1%	-4%	-9%	-11%
522 Widening & Extension	2%	2%	1%	1%	1%	1%	-2%	-8%
Dey Road Widening	3%	2%	0%	1%	2%	-1%	-3%	-7%
Plainsboro Road Widening	4%	4%	0%	0%	3%	1%	0%	0%
Cranbury Neck Widening	4%	3%	0%	1%	1%	2%	-2%	-9%
All Widening Projects Combined	3%	4%	2%	3%	1%	2%	-3%	-3%

Change in 2028 Total Peak Hour Traffic Using Local E-W Roads (Relative to EPA No-Build)

Scenario	AUTOS				TRUCKS			
	AM		PM		AM		PM	
	E/B	W/B	E/B	W/B	E/B	W/B	E/B	W/B
No-Build								
EPA No-Build	0%	0%	0%	0%	0%	0%	0%	0%
"Full" Route 92	-5%	-20%	-16%	-7%	-5%	-31%	-42%	-24%
2-lane Route 92	-4%	-13%	-10%	-6%	-4%	-15%	-34%	-23%
4-lane Route 92 w/o Perrine Rd. Int.	-5%	-19%	-14%	-7%	-5%	-33%	-36%	-22%
6-lane Route 1	-3%	-4%	-3%	-3%	-2%	-2%	-2%	-1%
522 Widening & Extension	-1%	0%	2%	1%	0%	2%	5%	2%
Dey Road Widening	0%	0%	1%	1%	0%	0%	4%	2%
Plainsboro Road Widening	1%	1%	1%	0%	1%	2%	7%	10%
Cranbury Neck Widening	1%	1%	2%	1%	0%	3%	5%	0%
All Widening Projects Combined	1%	2%	3%	4%	-1%	3%	4%	7%

Change in 2028 Total Peak Hour Traffic Using Local E-W Roads (Relative to "Full" Route 92)

Scenario	AUTOS				TRUCKS			
	AM		PM		AM		PM	
	E/B	W/B	E/B	W/B	E/B	W/B	E/B	W/B
No-Build								
EPA No-Build								
"Full" Route 92	0%	0%	0%	0%	0%	0%	0%	0%
2-lane Route 92	1%	9%	7%	1%	1%	24%	14%	1%
4-lane Route 92 w/o Perrine Rd. Int.	0%	0%	3%	1%	0%	-3%	11%	2%
6-lane Route 1	2%	19%	15%	5%	3%	42%	69%	29%
522 Widening & Extension	4%	25%	21%	9%	5%	49%	81%	33%
Dey Road Widening	5%	24%	20%	9%	6%	46%	79%	34%
Plainsboro Road Widening	6%	26%	20%	8%	7%	49%	85%	44%
Cranbury Neck Widening	6%	26%	21%	9%	5%	50%	82%	31%
All Widening Projects Combined	5%	27%	22%	12%	5%	50%	80%	40%

3.6 2028 Non-Local Peak Hour Traffic Crossing Screenline on Local E-W Roads and % Change

2028 Non-Local Peak Hour Traffic Crossing Screenline on Local E-W Roads

Scenario	AUTOS				TRUCKS			
	AM		PM		AM		PM	
	E/B	W/B	E/B	W/B	E/B	W/B	E/B	W/B
No-Build	2,141	3,472	2,450	1,652	95	132	86	89
EPA No-Build	2,242	3,610	2,438	1,639	101	126	66	61
"Full" Route 92	2,072	2,842	1,760	1,437	74	72	26	51
2-lane Route 92	2,096	3,297	1,940	1,416	82	107	30	53
4-lane Route 92 w/o Perrine Rd. Int.	2,078	2,845	1,861	1,453	72	68	35	49
6-lane Route 1	2,169	3,423	2,296	1,596	82	134	69	61
522 Widening & Extension	2,207	3,685	2,536	1,673	112	128	79	69
Dey Road Widening	2,227	3,588	2,454	1,741	114	124	78	71
Plainsboro Road Widening	2,328	3,898	2,450	1,652	121	147	86	89
Cranbury Neck Widening	2,199	3,530	2,375	1,628	100	124	71	60
All Widening Projects Combined	2,138	3,679	2,606	1,752	101	131	75	77

Change in 2028 Non-Local Peak Hour Trafic Crossing Screenline on Local E-W Roads (Relative to No-Build)

Scenario	AUTOS				TRUCKS			
	AM		PM		AM		PM	
	E/B	W/B	E/B	W/B	E/B	W/B	E/B	W/B
No-Build	0%	0%	0%	0%	0%	0%	0%	0%
EPA No-Build	5%	4%	0%	-1%	7%	-4%	-23%	-31%
"Full" Route 92	-3%	-18%	-28%	-13%	-22%	-46%	-69%	-43%
2-lane Route 92	-2%	-5%	-21%	-14%	-14%	-19%	-65%	-41%
4-lane Route 92 w/o Perrine Rd. Int.	-3%	-18%	-24%	-12%	-24%	-48%	-59%	-45%
6-lane Route 1	1%	-1%	-6%	-3%	-14%	2%	-19%	-32%
522 Widening & Extension	3%	6%	3%	1%	18%	-3%	-8%	-23%
Dey Road Widening	4%	3%	0%	5%	20%	-6%	-9%	-21%
Plainsboro Road Widening	9%	12%	0%	0%	27%	11%	0%	0%
Cranbury Neck Widening	3%	2%	-3%	-1%	5%	-6%	-17%	-33%
All Widening Projects Combined	0%	6%	6%	6%	7%	-1%	-13%	-14%

Change in 2028 Non-Local Peak Hour Traffic Crossing Screenline on Local E-W Roads (Relative to EPA No-Build)

Scenario	AUTOS				TRUCKS			
	AM		PM		AM		PM	
	E/B	W/B	E/B	W/B	E/B	W/B	E/B	W/B
No-Build								
EPA No-Build	0%	0%	0%	0%	0%	0%	0%	0%
"Full" Route 92	-8%	-21%	-28%	-12%	-27%	-43%	-60%	-17%
2-lane Route 92	-7%	-9%	-20%	-14%	-19%	-15%	-55%	-14%
4-lane Route 92 w/o Perrine Rd. Int.	-7%	-21%	-24%	-11%	-29%	-46%	-47%	-20%
6-lane Route 1	-3%	-5%	-6%	-3%	-19%	6%	5%	-1%
522 Widening & Extension	-2%	2%	4%	2%	11%	1%	19%	12%
Dey Road Widening	-1%	-1%	1%	6%	13%	-1%	17%	16%
Plainsboro Road Widening	4%	8%	0%	1%	19%	17%	30%	46%
Cranbury Neck Widening	-2%	-2%	-3%	-1%	-2%	-1%	8%	-3%
All Widening Projects Combined	-5%	2%	7%	7%	0%	4%	13%	26%

Change in 2028 Non-Local Peak Hour Traffic Crossing Screenline on Local E-W Roads (Relative to "Full" Route 92)

Scenario	AUTOS				TRUCKS			
	AM		PM		AM		PM	
	E/B	W/B	E/B	W/B	E/B	W/B	E/B	W/B
No-Build								
EPA No-Build								
"Full" Route 92	0%	0%	0%	0%	0%	0%	0%	0%
2-lane Route 92	1%	16%	10%	-1%	11%	49%	15%	4%
4-lane Route 92 w/o Perrine Rd. Int.	0%	0%	6%	1%	-2%	-5%	34%	-4%
6-lane Route 1	5%	20%	30%	11%	11%	86%	165%	20%
522 Widening & Extension	7%	30%	44%	16%	52%	78%	200%	35%
Dey Road Widening	7%	26%	39%	21%	55%	73%	197%	40%
Plainsboro Road Widening	12%	37%	39%	15%	64%	104%	227%	76%
Cranbury Neck Widening	6%	24%	35%	13%	35%	73%	173%	17%
All Widening Projects Combined	3%	29%	48%	22%	37%	82%	186%	52%

3.7 Total Projected Peak Hour Non-Local Volumes at Screenline Crossings

TOTAL PROJECTED (A.M. + P.M.) PEAK-HOUR NON-LOCAL VOLUMES AT SCREENLINE CROSSINGS

Screenline Crossing	NO-BUILD	EPA MODIFIED NO-BUILD	"FULL" ROUTE 92	2-LANE ROUTE 92	4-LANE ROUTE 92 W/O PERRINE RD. INT.	ROUTE 1 WIDENING AND SIGNAL REMOVAL	6-LANE ROUTE 1	522 WIDENING & EXTENSION	DEY ROAD WIDENING	PLAINSBORO ROAD WIDENING	CRANBURY NECK ROAD WIDENING	WIDENING PROJECTS COMBINED
CR-610 (Deans Ln)	1,384	1,447	1,322	1,365	1,380	920	1,248	1,442	1,459	1,488	1,537	1,418
Major Road	265	414	101	119	180	535	292	315	351	385	388	206
CR-522 (Ridge Rd)	208	333	78	280	95	253	312	664	261	237	306	583
New Road	179	151	180	160	166	113	186	192	215	139	146	164
Dey Road	890	757	317	506	363	732	764	904	1,300	910	658	1,126
Plainsboro Road	835	892	423	547	395	764	791	846	721	1,395	708	1,115
Cranbury Neck Road	886	936	646	746	669	747	814	907	900	893	1,280	1,008
CR-535	1,301	1,158	1,482	1,370	1,449	1,393	1,410	1,291	1,115	1,296	1,205	1,217
CR-571	2,212	2,277	1,973	2,085	1,961	2,000	2,162	2,007	2,204	2,181	2,011	1,873
Dutch Neck Road	20	9	18	19	18	3	3	17	9	9	9	18
Hankins Road	1,938	1,909	1,793	1,824	1,785	1,770	1,848	1,903	1,864	1,836	1,840	1,834
Total	**10,117**	**10,284**	**8,334**	**9,021**	**8,461**	**9,229**	**9,829**	**10,488**	**10,398**	**10,770**	**10,087**	**10,560**

3.8 2028 Non-Local Peak Hour Traffic Crossing Screenline on Local E-W Road, as % of Total Screenline-Crossing Traffic

2028 Non-Local Peak Hour Traffic Crossing Screenline on Local E-W Roads, as Percent of Total Screenline-Crossing Traffic

Scenario	AUTOS				TRUCKS			
	AM		PM		AM		PM	
	E/B	W/B	E/B	W/B	E/B	W/B	E/B	W/B
No-Build	28%	22%	21%	22%	7%	29%	37%	28%
EPA No-Build	29%	22%	21%	21%	7%	28%	30%	21%
Route 92	28%	22%	18%	20%	6%	23%	21%	23%
2-lane Route 92	28%	23%	19%	20%	6%	28%	21%	24%
4-lane Route 92 w/o Perrine Rd. Ir	28%	22%	19%	20%	6%	23%	25%	22%
6-lane Route 1	29%	22%	21%	21%	6%	31%	32%	21%
522 Widening & Extension	29%	23%	22%	22%	8%	28%	34%	23%
Dey Road Widening	29%	22%	21%	23%	8%	28%	34%	24%
Plainsboro Road Widening	30%	24%	21%	22%	9%	32%	37%	28%
Cranbury Neck Widening	28%	22%	20%	21%	7%	27%	31%	20%
All Widening Projects Combined	27%	22%	22%	22%	8%	28%	33%	25%

3.9 Total Projected AM Peak Hour Westbound Volumes at Screenline Crossings

TOTAL PROJECTED A.M. PEAK-HOUR WESTBOUND VOLUMES AT SCREENLINE CROSSINGS

Screenline Crossing	NO-BUILD	EPA MODIFIED NO-BUILD	NJTA ROUTE 92	TWO-LANE ROUTE 92	ROUTE 92 W/O PERRINE RD. INT.	6-LANE ROUTE 1	522 WIDENING & EXTENSION	DEY ROAD WIDENING	PLAINSBORO ROAD WIDENING	CRANBURY NECK ROAD WIDENING	WIDENING PROJECTS COMBINED
CR-610 (Deans Ln)	1,281	1,315	1,003	1,080	984	1,307	1,348	1,247	1,252	1,293	1,191
Major Road	1,003	1,240	680	955	654	1,009	1,123	1,058	992	1,196	1,057
CR-522 (Ridge Rd)	1,916	1,854	1,399	1,528	1,480	1,894	2,308	1,940	1,870	1,819	2,229
New Road	524	563	423	477	428	558	497	559	518	543	440
Dey Road	1,383	1,586	1,228	1,290	1,229	1,320	1,363	2,131	1,390	1,398	1,891
Plainsboro Road	2,601	2,609	1,895	2,209	1,922	2,520	2,657	2,299	3,605	2,467	2,811
Cranbury Neck Road	2,152	2,338	1,711	1,890	1,728	2,111	2,190	2,224	2,160	3,145	2,588
CR-571	3,637	3,421	3,270	3,439	3,242	3,474	3,467	3,422	3,349	3,281	3,149
Hankins Road	1,341	1,292	1,261	1,274	1,275	1,313	1,292	1,299	1,292	1,259	1,192
Total	**15,838**	**16,219**	**12,870**	**14,142**	**12,942**	**15,507**	**16,246**	**16,179**	**16,427**	**16,401**	**16,548**

3.10 Total Projected PM Peak Hour Eastbound Volumes at Screenline Crossings

TOTAL PROJECTED P.M. PEAK-HOUR EASTBOUND VOLUMES AT SCREENLINE CROSSINGS

Screenline Crossing	NO-BUILD	EPA MODIFIED NO-BUILD	NJTA ROUTE 92	TWO-LANE ROUTE 92	ROUTE 92 W/O PERRINE RD. INT.	6-LANE ROUTE 1	522 WIDENING & EXTENSION	DEY ROAD WIDENING	PLAINSBORO ROAD WIDENING	CRANBURY NECK ROAD WIDENING	WIDENING PROJECTS COMBINED
CR-610 (Deans Ln)	713	692	485	600	477	703	604	670	713	819	629
Major Road	364	346	268	275	299	341	257	329	364	330	245
CR-522 (Ridge Rd)	2,941	3,025	2,533	2,716	2,662	2,892	3,422	3,002	2,941	3,040	3,290
New Road	207	191	168	169	166	205	185	186	207	194	139
Dey Road	1,820	1,656	1,183	1,340	1,288	1,636	1,799	2,133	1,820	1,606	1,787
Plainsboro Road	1,598	1,620	1,496	1,539	1,519	1,577	1,593	1,484	1,598	1,574	2,088
Cranbury Neck Road	945	976	763	836	766	835	983	917	945	1,337	1,030
CR-571	2,086	2,079	1,843	1,918	1,844	2,028	1,947	2,032	2,086	1,947	1,839
Hankins Road	947	972	843	881	848	940	925	900	947	906	850
Total	**11,622**	**11,557**	**9,582**	**10,274**	**9,869**	**11,156**	**11,716**	**11,654**	**11,622**	**11,752**	**11,898**

3.11 Projected Peak Hour (AM + PM) Truck Volumes at Screenline Crossings

PROJECTED PEAK HOUR (A.M. + P.M.) TRUCK VOLUMES AT SCREENLINE CROSSINGS

Screenline Crossing	NO-BUILD	EPA MODIFIED NO-BUILD	"FULL" ROUTE 92	2-LANE ROUTE 92	4-LANE ROUTE 92 W/O PERRINE RD. INT.	ROUTE 1 WIDENING AND SIGNAL REMOVAL
CR-610 (Deans Ln)	101	69	48	52	47	72
Major Road	69	64	24	31	28	68
CR-522 (Ridge Rd)	203	220	92	133	98	174
New Road	13	13	6	10	4	20
Dey Road	79	56	14	25	20	64
Plainsboro Road	79	82	39	52	39	69
Cranbury Neck Road	131	166	98	112	112	125
CR-535	525	608	561	549	541	540
CR-571	403	294	448	469	453	329
Dutch Neck Road	449	455	436	430	423	438
Hankins Road	291	283	176	183	186	264
Total	**2,343**	**2,310**	**1,940**	**2,046**	**1,951**	**2,162**

3.12 Projected Daily 2-Way Volumes at Screenline Crossings (Unconstrained & Constrained)

PROJECTED DAILY 2-WAY VOLUMES AT SCREENLINE CROSSINGS (UNCONSTRAINED)

Screenline Crossing	NO-BUILD	EPA MODIFIED NO-BUILD	NJTA ROUTE 92	TWO-LANE ROUTE 92	ROUTE 92 W/O PERRINE RD. INT.	6-LANE ROUTE 1	522 WIDENING & EXTENSION	DEY ROAD WIDENING	PLAINSBORO ROAD WIDENING	CRANBURY NECK ROAD WIDENING	WIDENING PROJECTS COMBINED
CR-610 (Deans Ln)	23,200	23,600	19,800	21,400	19,600	23,000	22,400	23,000	23,500	24,300	21,900
Major Road	18,000	19,500	14,100	16,200	14,300	17,400	16,100	18,100	17,700	19,000	14,900
CR-522 (Ridge Rd)	51,500	52,900	44,900	47,100	46,500	51,700	61,900	53,100	52,600	52,800	61,100
New Road	6,700	6,800	5,700	6,000	5,800	6,500	6,700	7,600	6,500	6,700	5,900
Route 92	-	-	**41,000**	**26,400**	**38,700**	-	-	-	-	-	-
Dey Road	28,400	28,100	21,900	23,600	23,000	26,600	28,300	37,400	27,900	26,500	32,400
Plainsboro Road	37,600	38,000	31,600	33,900	31,700	36,700	37,400	33,700	46,000	36,000	42,300
Cranbury Neck Road	34,300	35,900	28,900	30,800	29,000	33,100	35,100	34,800	33,600	46,500	39,300
CR-535	20,800	19,800	21,100	20,400	20,600	20,700	20,600	19,200	21,300	20,500	20,600
CR-571	51,100	50,600	46,500	48,600	46,500	49,800	48,900	49,700	49,300	46,700	44,400
Dutch Neck Road	3,400	2,900	3,300	3,100	3,000	2,900	3,200	2,900	3,000	3,100	3,000
Hankins Road	25,100	24,800	22,800	23,200	22,900	24,000	23,900	24,400	24,600	24,200	23,300
Total	**300,100**	**302,900**	**301,600**	**300,700**	**301,600**	**292,400**	**304,500**	**303,900**	**306,000**	**306,300**	**309,100**

PROJECTED DAILY 2-WAY VOLUMES AT SCREENLINE CROSSINGS (CONSTRAINED)

Screenline Crossing	NO-BUILD	EPA MODIFIED NO-BUILD	NJTA ROUTE 92	TWO-LANE ROUTE 92	ROUTE 92 W/O PERRINE RD. INT.	6-LANE ROUTE 1	522 WIDENING & EXTENSION	DEY ROAD WIDENING	PLAINSBORO ROAD WIDENING	CRANBURY NECK ROAD WIDENING	WIDENING PROJECTS COMBINED
CR-610 (Deans Ln)	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000
Major Road	18,000	18,000	14,100	16,200	14,300	17,400	16,100	18,000	17,700	18,000	14,900
CR-522 (Ridge Rd)	51,500	52,000	44,900	47,100	46,500	51,700	61,900	52,000	52,000	52,000	61,100
New Road	6,700	6,800	5,700	6,000	5,800	6,500	6,700	7,600	6,500	6,700	5,900
Route 92	-	-	**41,000**	**26,400**	**38,700**	-	-	-	-	-	-
Dey Road	26,000	26,000	21,900	23,600	23,000	26,000	26,000	37,400	26,000	26,000	32,400
Plainsboro Road	26,000	26,000	26,000	26,000	26,000	26,000	26,000	26,000	46,000	26,000	42,300
Cranbury Neck Road	26,000	26,000	26,000	26,000	26,000	26,000	26,000	26,000	26,000	46,500	39,300
CR-535	20,800	19,800	21,100	20,400	20,600	20,700	20,600	19,200	21,300	20,500	20,600
CR-571	51,100	50,600	46,500	48,600	46,500	49,800	48,900	49,700	49,300	46,700	44,400
Dutch Neck Road	3,400	2,900	3,300	3,100	3,000	2,900	3,200	2,900	3,000	3,100	3,000
Hankins Road	25,100	24,800	22,800	23,200	22,900	24,000	23,900	24,400	24,600	24,200	23,300
Total	**272,600**	**270,900**	**291,300**	**284,600**	**291,300**	**269,000**	**277,300**	**281,200**	**290,400**	**287,700**	**305,200**

4.0 Travel Time Summaries

4.1 Travel Time Data - June, 2002

TRAVEL TIME DATA JUNE, 2002

	Highway	Dir	From	To	SURVEY A.M. 7-9	SURVEY MIDDAY 12-2	SURVEY P.M. 4:30-6:30	5/29/02 P.M.	MODEL A.M. 7-9	MODEL MIDDAY 12-2	MODEL P.M. 4:30-6:30
	NJ-18	WB	Int. 9	US-1	2.5	3.5	5.3	1.4	2.8	2.1	2.4
	US-1	SB	NJ-18	CR-522	32.6	23.5	35.9	17.5	16.3	15.2	16.0
	US-1	SB	CR-522	Scudders Mill	4.1	3.5	6.7	4.1	8.3	6.3	6.3
	US-1	SB	Scudders Mill	CR-571	7.8	6.1	8.7	4.1	2.0	1.9	2.0
	US-1	SB	CR-571	I-295	4.3	3.8	6.5	10.2	7.9	7.7	8.8
	I-295	SB	US-1	I-195	11.5	10.7	9.2	7.3	7.3	7.3	7.4
	I-195	EB	I-295	NJ Tpke	6.4	5.8	8.0	6.5	7.3	7.3	7.5
	NJ Tpke	NB	Int. 7A	Int. 8	10.1	8.2	9.9	7.5	7.9	7.6	7.8
	NJ Tpke	NB	Int. 8	Int. 8A	8.4	7.7	8.0	7.1	7.2	6.8	6.9
	NJ Tpke	NB	Int. 8A	Int. 9	14.0	11.7	14.4	#N/A	10.9	10.6	10.6
	NJ-18	EB	US-1	Int. 9	10.0	3.9	6.8	2.3	2.6	2.1	2.8
	US-1	NB	CR-522	NJ-18	29.2	22.9	28.3	23.5	17.1	15.4	16.1
	US-1	NB	Scudders Mill	CR-522	8.3	6.3	8.1	#N/A	6.3	6.5	7.8
	US-1	NB	CR-571	Scudders Mill	5.6	3.2	5.8	#N/A	2.2	1.9	2.0
	US-1	NB	I-295	CR-571	11.0	7.2	12.3	#N/A	10.2	7.7	8.0
	I-295	NB	I-195	US-1	7.1	7.4	7.1	#N/A	7.4	7.2	7.2
	I-195	WB	NJ Tpke	I-295	8.4	6.8	9.8	#N/A	7.6	7.3	7.3
	NJ Tpke	SB	Int. 8	Int. 7A	15.1	9.8	13.6	#N/A	7.8	7.7	7.8
	NJ Tpke	SB	Int. 8A	Int. 8	10.2	8.0	10.9	#N/A	6.8	6.8	7.1
	NJ Tpke	SB	Int. 9	Int. 8A	10.5	9.5	11.9	#N/A	10.6	10.6	10.7
	NJ-32	WB	Int. 8A	US-130	2.1	2.0	2.3	2.9	2.0	1.6	1.7
	US-130	NB	NJ-32	CR-522	3.4	3.5	3.0	2.8	2.5	2.4	2.4
	CR-522	WB	US-130	US-1	7.1	7.3	7.4	5.8	6.8	6.8	6.8
	NJ-32	EB	US-130	Int. 8A	3.3	2.9	4.2	#N/A	1.8	1.7	2.0
	US-130	SB	CR-522	NJ-32	3.6	3.3	3.4	#N/A	2.4	2.4	2.5
	CR-522	EB	US-1	US-130	6.3	6.8	6.1	#N/A	6.7	6.8	6.8
	US-130	SB	NJ-32	Dey	2.4	2.5	2.5	2.6	2.2	2.1	2.2
	Dey	WB	US-130	Scudders Mill	7.2	6.3	6.1	5.9	8.8	7.1	7.4
	Scudders Mill	WB	Dey	US-1	3.9	4.0	4.1	5.3	4.1	3.3	3.3
	US-130	NB	Dey	NJ-32	2.5	2.0	2.0	#N/A	2.2	2.1	2.2
	Dey	EB	Scudders Mill	US-130	8.2	6.8	9.2	#N/A	7.3	7.1	8.4
	Scudders Mill	EB	US-1	Dey	4.4	3.7	6.8	#N/A	3.3	3.3	3.7
	NJ-33	EB	Int. 8	NJ-133	1.4	1.3	1.0	#N/A	2.3	2.3	2.3
	NJ-133	WB	NJ-33	CR-571	4.7	5.3	3.4	#N/A	3.6	3.6	3.6
	CR-571	WB	NJ-133	US-1	13.7	10.5	6.9	#N/A	12.4	9.2	9.2
	NJ-33	WB	NJ-133	Int. 8	1.0	1.1	1.0	0.0	2.3	2.3	2.3
	NJ-133	EB	CR-571	NJ-33	4.6	5.0	5.0	17.8	3.7	3.5	3.6
	CR-571	EB	US-1	NJ-133	9.6	10.1	11.7	0.0	9.2	9.2	10.6

TRAVEL TIME DATA JUNE, 2002

	Highway	Dir	From	To	SURVEY A.M. 7-9	SURVEY MIDDAY 12-2	SURVEY P.M. 4:30-6:30	5/29/02 P.M.	MODEL A.M. 7-9	MODEL MIDDAY 12-2	MODEL P.M. 4:30-6:30			
↓	NJ-32	WB	Int. 8A	US-130	2.1	2.0	2.3	2.9	2.0	1.6	1.7			
↓	US-130	NB	NJ-32	CR-522	3.4	3.5	3.0	2.8	2.5	2.4	2.4			
↓	CR-522	WB	US-130	US-1	7.1	7.3	7.4	5.8	6.8	6.8	6.8			
↑	NJ-32	EB	US-130	Int. 8A	3.3	2.9	4.2	#N/A	1.8	1.7	2.0			
↑	US-130	SB	CR-522	NJ-32	3.6	3.3	3.4	#N/A	2.4	2.4	2.5			
↑	CR-522	EB	US-1	US-130	6.3	6.8	6.1	#N/A	6.7	6.8	6.8			
↓	US-130	SB	NJ-32	Dey	2.4	2.5	2.5	2.6	2.2	2.1	2.2			
↓	Dey	WB	US-130	Scudders Mill	7.2	6.3	6.1	5.9	8.8	7.1	7.4			
↓	Scudders Mill	WB	Dey	US-1	3.9	4.0	4.1	5.3	4.1	3.3	3.3			
↑	US-130	NB	Dey	NJ-32	2.5	2.0	2.0	#N/A	2.2	2.1	2.2			
↑	Dey	EB	Scudders Mill	US-130	8.2	6.8	9.2	#N/A	7.3	7.1	8.4			
↑	Scudders Mill	EB	US-1	Dey	4.4	3.7	6.8	#N/A	3.3	3.3	3.7			
↓	NJ-33	EB	Int. 8	NJ-133	1.4	1.3	1.0	#N/A	2.3	2.3	2.3			
↓	NJ-133	WB	NJ-33	CR-571	4.7	5.3	3.4	#N/A	3.6	3.6	3.6			
↓	CR-571	WB	NJ-133	US-1	13.7	10.5	6.9	#N/A	12.4	9.2	9.2			
↑	NJ-33	WB	NJ-133	Int. 8	1.0	1.1	1.0	0.0	2.3	2.3	2.3			
↑	NJ-133	EB	CR-571	NJ-33	4.6	5.0	5.0	17.8	3.7	3.5	3.6			
↑	CR-571	EB	US-1	NJ-133	9.6	10.1	11.7	0.0	9.2	9.2	10.6			
	Northbound (US-1 @ I-295 to NJ Tpke Int. 9):													
	via US-1, NJ-18				64.1	43.5	61.3	#N/A	38.4	33.6	36.7	67%	29%	67%
	via US-1, CR-522, US-130, NJ-32, NJ Tpke				52.1	41.4	54.3	#N/A	40.5	37.6	39.7	29%	10%	37%
	via US-1, Scudders Mill/Dey, US-130, NJ-32, NJ Tpke				49	37.5	54.7	#N/A	37.9	34.4	36.9	29%	9%	48%
	via US-1, CR-571, NJ-33, NJ-133, NJ Tpke				48.6	42.8	52.4	#N/A	43.5	40.1	42	12%	7%	25%
	via I-295, I-195, NJ Tpke				50.4	44.1	49.5	#N/A	40.6	39.6	40.2	24%	11%	23%
	Southbound (NJ Tpke. Int. 9 to US-1 @ I-295):													
	via NJ-18, US-1				51.3	40.4	63.1	37.25	37.3	33.2	35.5	38%	22%	78%
	via NJ Tpke, NJ-32, US-130, CR-522, US-1				39.3	35.7	46.5	#N/A	40.1	37.3	38.7	-2%	-4%	20%
	via NJ Tpke, NJ-32, US-130, Scudders Mill/Dey, US-1				38.2	34.2	42.1	#N/A	37.6	34.3	36.1	2%	0%	17%
	via NJ Tpke, NJ-133, NJ-33, CR-571, US-1				44.8	38.4	40.6	#N/A	43.6	40.2	41.7	3%	-4%	-3%
	via NJ Tpke, I-195, I-295				51.3	41.5	53.3	#N/A	40.2	39.6	40.1	28%	5%	33%

4.2 Estimated Peak Hour Travel Times - 2001 & 2028 No Action

ESTIMATED PEAK HOUR TRAVEL TIMES (minutes)

FROM	TO	2001		2028 NO ACTION		CHANGE		% CHANGE	
		AM	PM	AM	PM	AM	PM	AM	PM
Princeton Junction	Princeton (University)	12.3	9.4	22.9	15.1	10.5	5.7	86%	61%
Princeton Junction	Plainsboro Center	18.2	9.8	30.3	12.4	12.1	2.6	66%	26%
Princeton Junction	South Brunswick Ctr.	23.8	26.8	41.8	38.2	18.0	11.4	76%	43%
Princeton Junction	Interchange 8A	22.3	20.9	35.7	30.4	13.4	9.5	60%	45%
Princeton Junction	Hightstown	19.1	21.1	21.4	29.0	2.3	8.0	12%	38%
Princeton (University)	Princeton Junction	8.5	14.8	13.1	22.4	4.6	7.6	54%	52%
Princeton (University)	Plainsboro Center	13.3	10.7	22.6	14.1	9.3	3.5	70%	33%
Princeton (University)	South Brunswick Ctr.	18.8	22.7	30.6	34.8	11.8	12.2	63%	54%
Princeton (University)	Interchange 8A	25.9	28.6	36.8	39.6	10.9	11.1	42%	39%
Princeton (University)	Hightstown	24.9	33.5	30.9	48.8	6.0	15.3	24%	46%
Plainsboro Center	Princeton Junction	10.1	15.2	15.3	25.2	5.3	10.0	52%	66%
Plainsboro Center	Princeton (University)	11.0	11.8	12.8	18.3	1.8	6.5	17%	55%
Plainsboro Center	South Brunswick Ctr.	16.3	23.8	21.4	36.6	5.0	12.8	31%	54%
Plainsboro Center	Interchange 8A	18.3	20.8	19.0	31.1	0.6	10.3	4%	50%
Plainsboro Center	Hightstown	21.4	27.2	25.0	44.9	3.5	17.7	16%	65%
South Brunswick Ctr.	Princeton Junction	28.5	27.0	49.7	36.3	21.2	9.3	74%	35%
South Brunswick Ctr.	Princeton (University)	24.4	18.9	48.5	27.3	24.2	8.4	99%	45%
South Brunswick Ctr.	Plainsboro Center	26.9	17.9	52.5	22.1	25.5	4.2	95%	23%
South Brunswick Ctr.	Interchange 8A	13.4	12.1	14.6	15.5	1.1	3.4	8%	28%
South Brunswick Ctr.	Hightstown	28.2	30.1	38.0	45.6	9.7	15.6	34%	52%
Interchange 8A	Princeton Junction	23.6	21.0	42.1	30.1	18.5	9.1	79%	43%
Interchange 8A	Princeton (University)	33.1	26.8	52.4	35.1	19.3	8.3	59%	31%
Interchange 8A	Plainsboro Center	32.8	18.0	47.5	20.8	14.7	2.8	45%	15%
Interchange 8A	South Brunswick Ctr.	19.5	10.8	20.2	15.4	0.6	4.5	3%	42%
Interchange 8A	Hightstown	20.3	23.4	30.4	38.0	10.1	14.6	50%	63%
Hightstown	Princeton Junction	23.6	17.9	43.9	20.2	20.4	2.3	86%	13%
Hightstown	Princeton (University)	33.9	24.9	64.3	32.0	30.4	7.0	90%	28%
Hightstown	Plainsboro Center	38.9	21.9	68.2	25.4	29.4	3.5	76%	16%
Hightstown	South Brunswick Ctr.	40.4	25.0	66.5	35.4	26.1	10.4	65%	42%
Hightstown	Interchange 8A	25.6	19.1	51.7	27.6	26.1	8.5	102%	44%
					Average:	13.1	8.5	54.6%	41.5%

4.3 Estimated Peak Hour Travel Times - No Build & Build Route 92

ESTIMATED 2028 PEAK HOUR TRAVEL TIMES (minutes)

		NO BUILD		WITH 92		CHANGE		% CHANGE	
FROM	TO	AM	PM	AM	PM	AM	PM	AM	PM
Princeton Junction	Princeton (University)	22.9	15.1	19.7	14.2	-3.2	-0.9	-14%	-6%
Princeton Junction	Plainsboro Center	30.3	12.4	27.5	11.8	-2.8	-0.6	-9%	-5%
Princeton Junction	South Brunswick Ctr.	41.8	38.2	37.0	32.5	-4.8	-5.7	-12%	-15%
Princeton Junction	Interchange 8A	35.7	30.4	40.1	28.9	4.4	-1.6	12%	-5%
Princeton Junction	Hightstown	21.4	29.0	20.4	26.8	-1.0	-2.2	-5%	-8%
Princeton (University)	Princeton Junction	13.1	22.4	12.0	20.1	-1.1	-2.4	-8%	-11%
Princeton (University)	Plainsboro Center	22.6	14.1	19.0	12.3	-3.6	-1.9	-16%	-13%
Princeton (University)	South Brunswick Ctr.	30.6	34.8	27.4	27.7	-3.2	-7.2	-11%	-21%
Princeton (University)	Interchange 8A	36.8	39.6	30.5	27.8	-6.3	-11.9	-17%	-30%
Princeton (University)	Hightstown	30.9	48.8	29.6	44.8	-1.4	-4.0	-4%	-8%
Plainsboro Center	Princeton Junction	15.3	25.2	12.7	21.8	-2.7	-3.3	-17%	-13%
Plainsboro Center	Princeton (University)	12.8	18.3	12.9	16.9	0.2	-1.3	1%	-7%
Plainsboro Center	South Brunswick Ctr.	21.4	36.6	20.4	28.4	-1.0	-8.2	-5%	-22%
Plainsboro Center	Interchange 8A	19.0	31.1	20.0	23.0	1.0	-8.1	5%	-26%
Plainsboro Center	Hightstown	25.0	44.9	24.2	38.6	-0.8	-6.2	-3%	-14%
South Brunswick Ctr.	Princeton Junction	49.7	36.3	38.2	33.8	-11.5	-2.5	-23%	-7%
South Brunswick Ctr.	Princeton (University)	48.5	27.3	32.6	23.8	-15.9	-3.5	-33%	-13%
South Brunswick Ctr.	Plainsboro Center	52.5	22.1	37.7	21.0	-14.8	-1.0	-28%	-5%
South Brunswick Ctr.	Interchange 8A	14.6	15.5	15.5	13.5	1.0	-2.0	7%	-13%
South Brunswick Ctr.	Hightstown	38.0	45.6	33.0	43.6	-5.0	-2.0	-13%	-4%
Interchange 8A	Princeton Junction	42.1	30.1	33.0	30.9	-9.1	0.8	-22%	3%
Interchange 8A	Princeton (University)	52.4	35.1	34.4	25.9	-18.0	-9.2	-34%	-26%
Interchange 8A	Plainsboro Center	47.5	20.8	34.4	19.1	-13.1	-1.7	-28%	-8%
Interchange 8A	South Brunswick Ctr.	20.2	15.4	15.9	13.3	-4.2	-2.1	-21%	-13%
Interchange 8A	Hightstown	30.4	38.0	27.8	39.1	-2.6	1.1	-9%	3%
Hightstown	Princeton Junction	43.9	20.2	39.3	20.6	-4.6	0.4	-11%	2%
Hightstown	Princeton (University)	64.3	32.0	57.2	31.7	-7.2	-0.3	-11%	-1%
Hightstown	Plainsboro Center	68.2	25.4	60.7	25.7	-7.5	0.4	-11%	1%
Hightstown	South Brunswick Ctr.	66.5	35.4	63.9	35.4	-2.6	0.0	-4%	0%
Hightstown	Interchange 8A	51.7	27.6	56.7	30.0	4.9	2.4	10%	9%
					Average:	-4.5	-2.8	-11.1%	-9.2%

4.4 Estimated Peak Hour Travel Times - No Build & Improved Route 1

ESTIMATED 2028 PEAK HOUR TRAVEL TIMES (minutes)

FROM	TO	NO BUILD		6-LANE ROUTE 1 W/SIGNALS		CHANGE		% CHANGE	
		AM	PM	AM	PM	AM	PM	AM	PM
Princeton Junction	Princeton (University)	22.9	15.1	21.1	14.8	-1.8	-0.3	-8%	-2%
Princeton Junction	Plainsboro Center	30.3	12.4	29.2	12.6	-1.1	0.2	-4%	2%
Princeton Junction	South Brunswick Ctr.	41.8	38.2	38.1	35.8	-3.7	-2.4	-9%	-6%
Princeton Junction	Interchange 8A	35.7	30.4	33.9	29.3	-1.8	-1.1	-5%	-4%
Princeton Junction	Hightstown	21.4	29.0	20.6	28.9	-0.8	-0.1	-4%	0%
Princeton (University)	Princeton Junction	13.1	22.4	12.1	21.7	-0.9	-0.7	-7%	-3%
Princeton (University)	Plainsboro Center	22.6	14.1	21.5	12.6	-1.0	-1.6	-5%	-11%
Princeton (University)	South Brunswick Ctr.	30.6	34.8	27.6	31.1	-3.1	-3.7	-10%	-11%
Princeton (University)	Interchange 8A	36.8	39.6	34.1	36.3	-2.7	-3.3	-7%	-8%
Princeton (University)	Hightstown	30.9	48.8	29.9	48.0	-1.0	-0.8	-3%	-2%
Plainsboro Center	Princeton Junction	15.3	25.2	14.4	24.2	-0.9	-1.0	-6%	-4%
Plainsboro Center	Princeton (University)	12.8	18.3	12.9	17.8	0.1	-0.5	1%	-3%
Plainsboro Center	South Brunswick Ctr.	21.4	36.6	19.2	32.2	-2.1	-4.4	-10%	-12%
Plainsboro Center	Interchange 8A	19.0	31.1	18.2	27.5	-0.8	-3.7	-4%	-12%
Plainsboro Center	Hightstown	25.0	44.9	24.8	42.2	-0.2	-2.7	-1%	-6%
South Brunswick Ctr.	Princeton Junction	49.7	36.3	44.5	35.9	-5.2	-0.4	-10%	-1%
South Brunswick Ctr.	Princeton (University)	48.5	27.3	40.4	24.9	-8.2	-2.4	-17%	-9%
South Brunswick Ctr.	Plainsboro Center	52.5	22.1	43.7	21.5	-8.7	-0.6	-17%	-2%
South Brunswick Ctr.	Interchange 8A	14.6	15.5	13.6	15.2	-1.0	-0.3	-7%	-2%
South Brunswick Ctr.	Hightstown	38.0	45.6	35.0	45.3	-3.0	-0.3	-8%	-1%
Interchange 8A	Princeton Junction	42.1	30.1	37.7	30.7	-4.4	0.6	-10%	2%
Interchange 8A	Princeton (University)	52.4	35.1	50.5	35.1	-1.9	0.0	-4%	0%
Interchange 8A	Plainsboro Center	47.5	20.8	43.1	21.0	-4.4	0.3	-9%	1%
Interchange 8A	South Brunswick Ctr.	20.2	15.4	19.6	14.7	-0.5	-0.7	-3%	-5%
Interchange 8A	Hightstown	30.4	38.0	28.2	38.2	-2.2	0.3	-7%	1%
Hightstown	Princeton Junction	43.9	20.2	43.6	20.0	-0.3	-0.2	-1%	-1%
Hightstown	Princeton (University)	64.3	32.0	61.1	31.6	-3.2	-0.4	-5%	-1%
Hightstown	Plainsboro Center	68.2	25.4	65.7	25.0	-2.5	-0.3	-4%	-1%
Hightstown	South Brunswick Ctr.	66.5	35.4	64.4	33.2	-2.1	-2.2	-3%	-6%
Hightstown	Interchange 8A	51.7	27.6	50.3	26.7	-1.4	-0.9	-3%	-3%
					Average:	-2.4	-1.1	-6.3%	-3.7%

4.5 Estimated Peak Hour Travel Times - No Build & 6-Lane Route 1 with No Signals

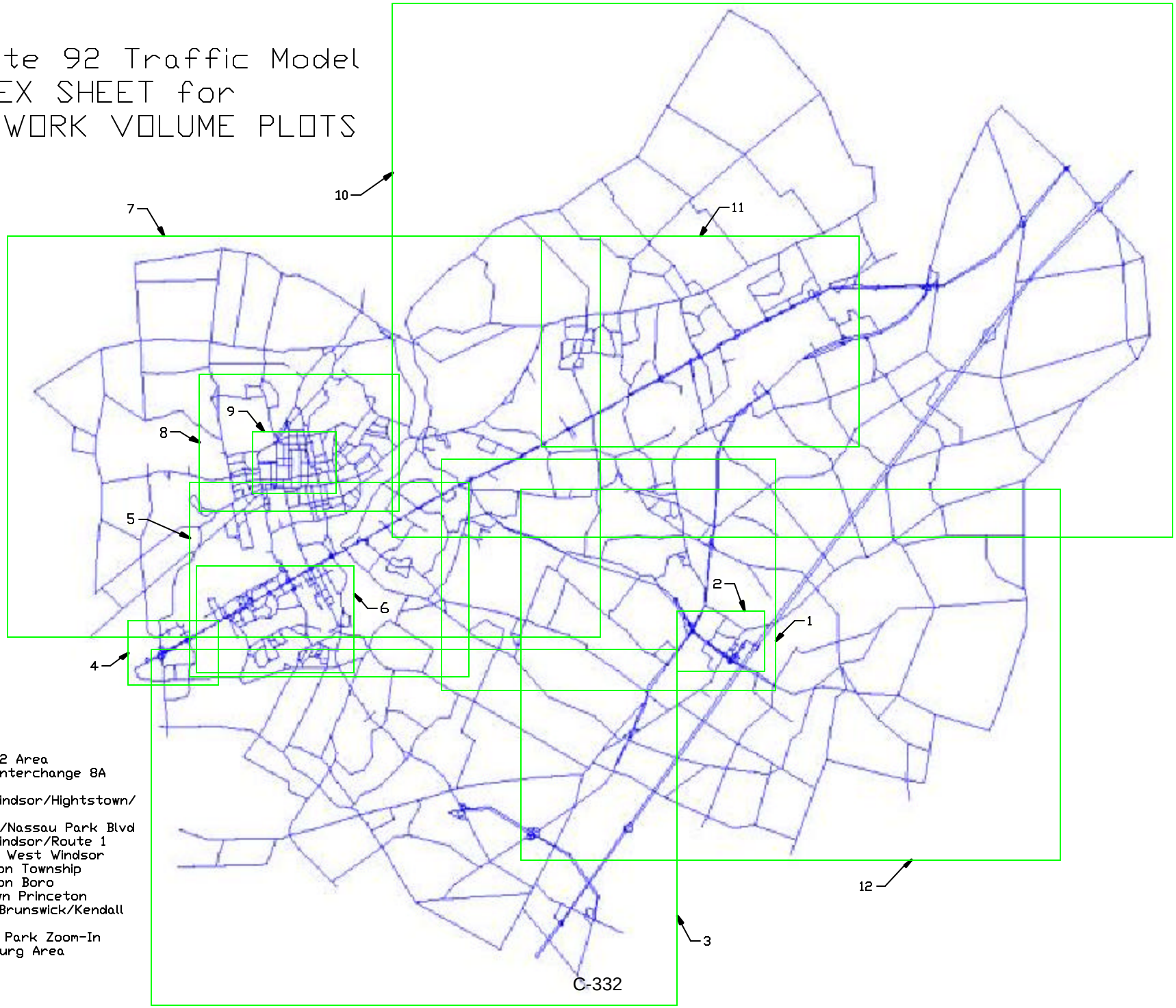
ESTIMATED 2028 PEAK HOUR TRAVEL TIMES (minutes)

FROM	TO	NO BUILD		IMPROVED ROUTE 1		CHANGE		% CHANGE	
		AM	PM	AM	PM	AM	PM	AM	PM
Princeton Junction	Princeton (University)	22.9	15.1	20.8	15.0	-2.0	-0.1	-9%	-1%
Princeton Junction	Plainsboro Center	30.3	12.4	27.7	13.1	-2.6	0.7	-9%	6%
Princeton Junction	South Brunswick Ctr.	41.8	38.2	38.5	35.6	-3.3	-2.7	-8%	-7%
Princeton Junction	Interchange 8A	35.7	30.4	33.9	29.2	-1.8	-1.2	-5%	-4%
Princeton Junction	Hightstown	21.4	29.0	21.3	29.0	-0.2	-0.1	-1%	0%
Princeton (University)	Princeton Junction	13.1	22.4	12.4	21.5	-0.7	-0.9	-5%	-4%
Princeton (University)	Plainsboro Center	22.6	14.1	21.8	12.7	-0.8	-1.5	-4%	-10%
Princeton (University)	South Brunswick Ctr.	30.6	34.8	28.1	31.7	-2.6	-3.1	-8%	-9%
Princeton (University)	Interchange 8A	36.8	39.6	33.0	35.6	-3.8	-4.0	-10%	-10%
Princeton (University)	Hightstown	30.9	48.8	30.1	48.2	-0.8	-0.6	-3%	-1%
Plainsboro Center	Princeton Junction	15.3	25.2	14.4	24.9	-1.0	-0.2	-6%	-1%
Plainsboro Center	Princeton (University)	12.8	18.3	13.3	18.4	0.5	0.2	4%	1%
Plainsboro Center	South Brunswick Ctr.	21.4	36.6	19.9	31.6	-1.5	-5.0	-7%	-14%
Plainsboro Center	Interchange 8A	19.0	31.1	18.0	26.8	-1.0	-4.3	-5%	-14%
Plainsboro Center	Hightstown	25.0	44.9	24.7	42.6	-0.2	-2.3	-1%	-5%
South Brunswick Ctr.	Princeton Junction	49.7	36.3	41.9	36.1	-7.8	-0.2	-16%	-1%
South Brunswick Ctr.	Princeton (University)	48.5	27.3	37.8	26.7	-10.8	-0.6	-22%	-2%
South Brunswick Ctr.	Plainsboro Center	52.5	22.1	43.4	21.8	-9.0	-0.3	-17%	-1%
South Brunswick Ctr.	Interchange 8A	14.6	15.5	13.4	14.7	-1.2	-0.8	-8%	-5%
South Brunswick Ctr.	Hightstown	38.0	45.6	34.0	44.5	-4.0	-1.1	-10%	-2%
Interchange 8A	Princeton Junction	42.1	30.1	35.9	30.6	-6.2	0.5	-15%	2%
Interchange 8A	Princeton (University)	52.4	35.1	49.8	35.4	-2.6	0.3	-5%	1%
Interchange 8A	Plainsboro Center	47.5	20.8	40.6	20.8	-6.9	0.0	-14%	0%
Interchange 8A	South Brunswick Ctr.	20.2	15.4	18.9	14.3	-1.2	-1.1	-6%	-7%
Interchange 8A	Hightstown	30.4	38.0	28.1	37.5	-2.4	-0.4	-8%	-1%
Hightstown	Princeton Junction	43.9	20.2	41.0	20.7	-3.0	0.5	-7%	3%
Hightstown	Princeton (University)	64.3	32.0	60.7	32.5	-3.6	0.5	-6%	2%
Hightstown	Plainsboro Center	68.2	25.4	63.5	25.9	-4.8	0.5	-7%	2%
Hightstown	South Brunswick Ctr.	66.5	35.4	62.3	33.1	-4.3	-2.3	-6%	-7%
Hightstown	Interchange 8A	51.7	27.6	48.8	26.7	-2.9	-0.9	-6%	-3%
					Average:	-3.1	-1.0	-7.7%	-3.1%

5.0 AM & PM Network Volumes

5.1 2001 AM Counted Volumes

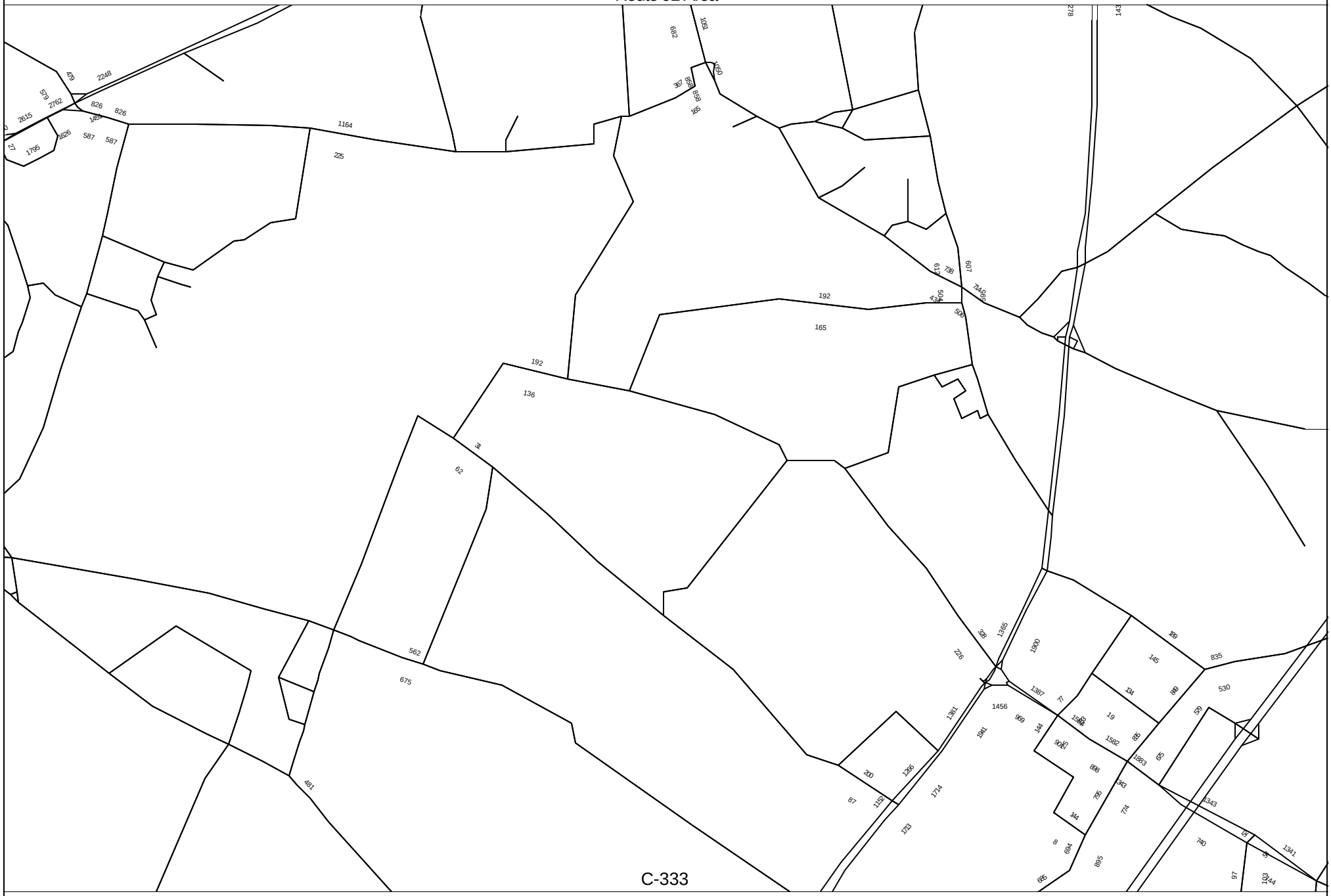
Route 92 Traffic Model
INDEX SHEET for
NETWORK VOLUME PLOTS



LEGEND

1. Route 92 Area
2. NJTPK Interchange 8A Zoom-In
3. West Windsor/Hightstown/ Cranbury
4. Route 1/Nassau Park Blvd
5. West Windsor/Route 1
6. Central West Windsor
7. Princeton Township
8. Princeton Boro
9. Downtown Princeton
10. North Brunswick/Kendall Park Area
11. Kendall Park Zoom-In
12. Jamesburg Area

2001 Existing - AM Counted Volumes
Route 92 Area



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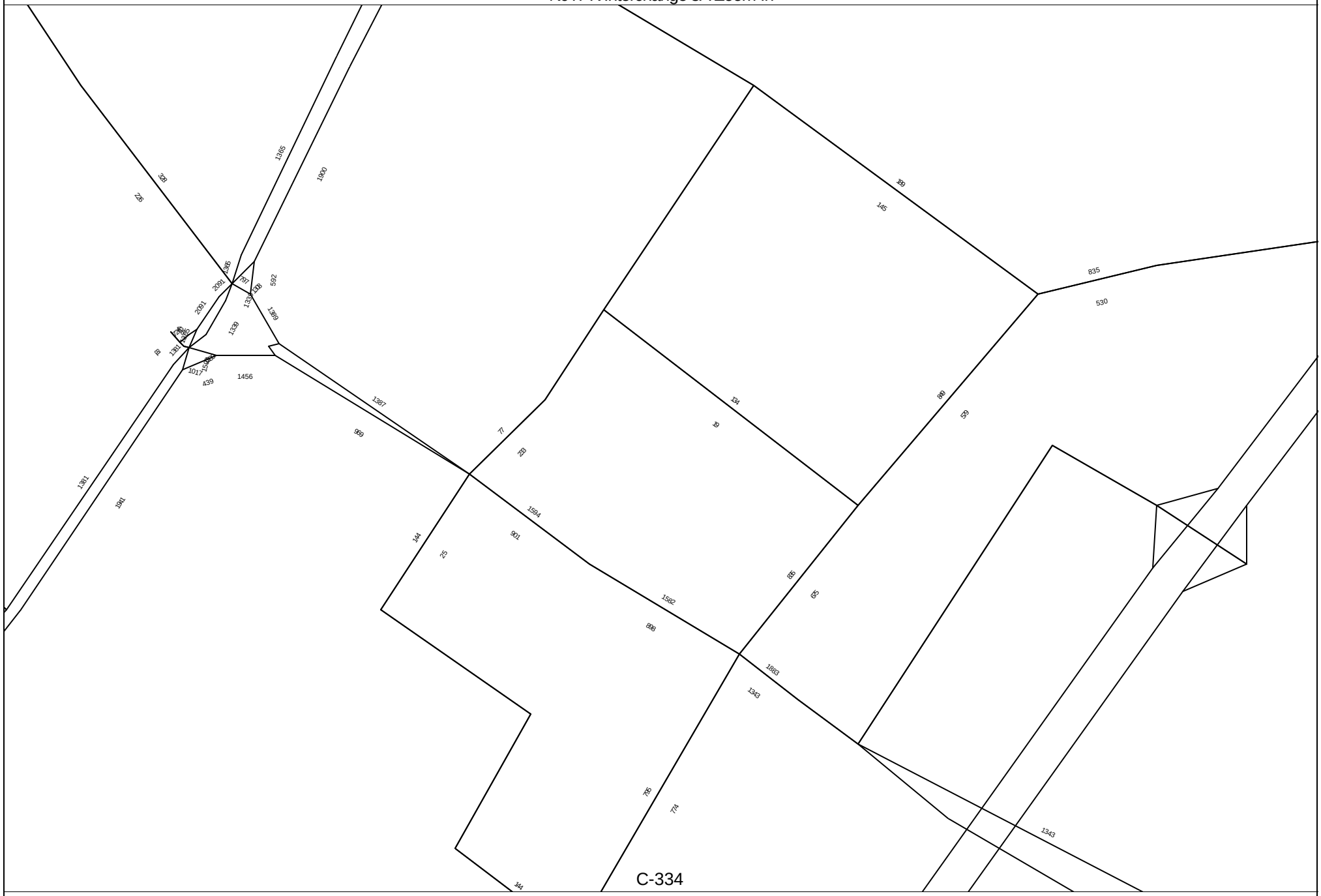
2001 Existing - AM Counted Volumes
NJTPK Interchange 8A Zoom-In



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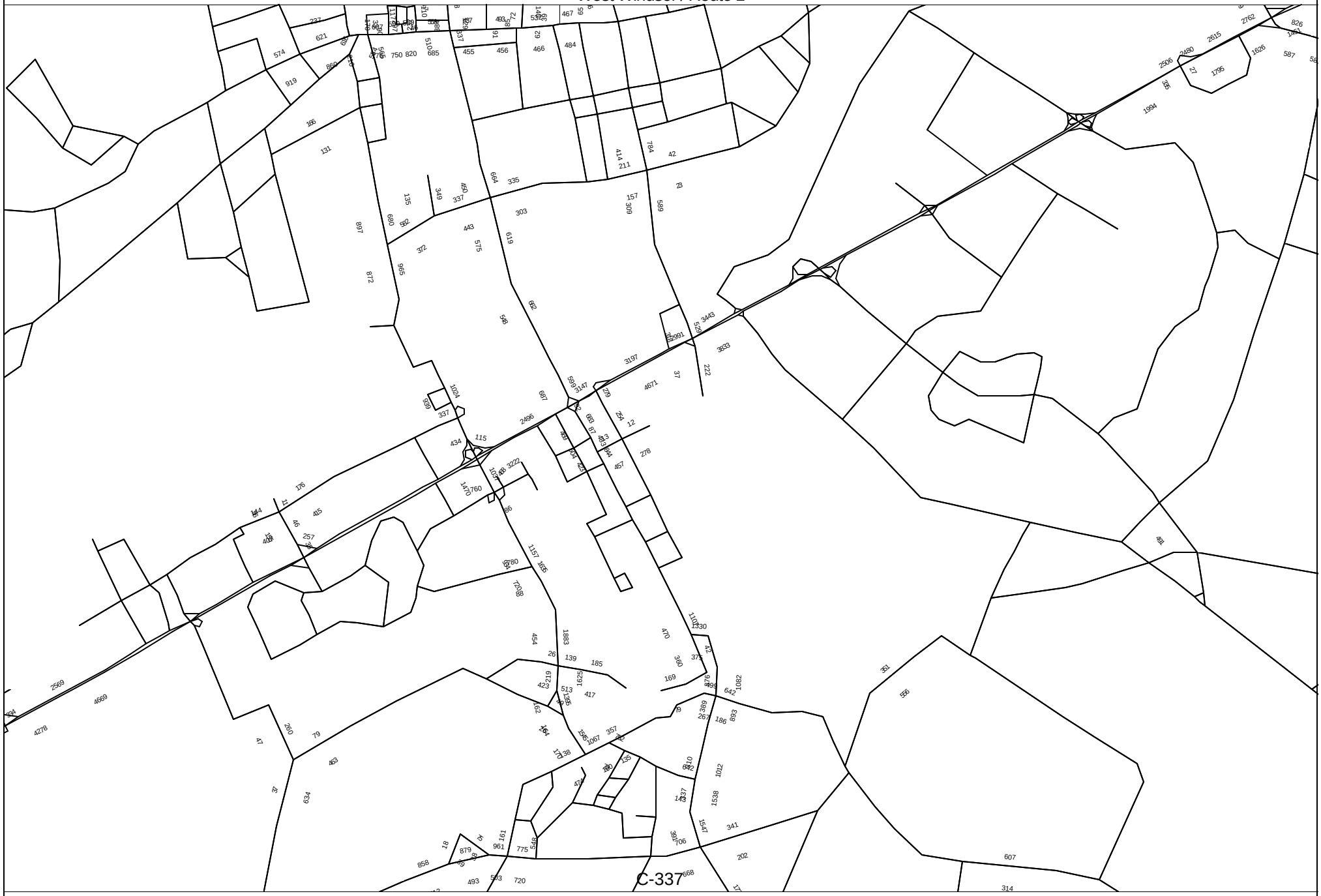
2001 Existing - AM Counted Volumes
West Windsor / Hightstown / Cranbury

TP+ software by Citilabs 1/30/03 17:06 Licensed to: Garmen Associates

2001 Existing - AM Counted Volumes
Route 1 / Nassau Park Blvd

TP+ software by Citilabs 1/30/03 17:06 Licensed to: Garmen Associates

2001 Existing - AM Counted Volumes
West Windsor / Route 1



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2001 Existing - AM Counted Volumes
Central West Windsor

TP+ software by Citilabs 1/30/03 17:06 Licensed to: Garmen Associates

2001 Existing - AM Counted Volumes
Princeton Township

TP+ software by Citilabs 1/30/03 17:06 Licensed to: Garmen Associates

2001 Existing - AM Counted Volumes
Princeton Boro

TP+ software by Citilabs 1/30/03 17:06 Licensed to: Garmen Associates

2001 Existing - AM Counted Volumes
Downtown Princeton

TP+ software by Citilabs 1/30/03 17:06 Licensed to: Garmen Associates

2001 Existing - AM Counted Volumes
North Brunswick / Kendall Park Area

TP+ software by Citilabs 1/30/03 17:06 Licensed to: Garmen Associates

2001 Existing - AM Counted Volumes
Kendall Park Zoom-In

TP+ software by Citilabs 1/30/03 17:06 Licensed to: Garmen Associates

2001 Existing - AM Counted Volumes
Jamesburg Area

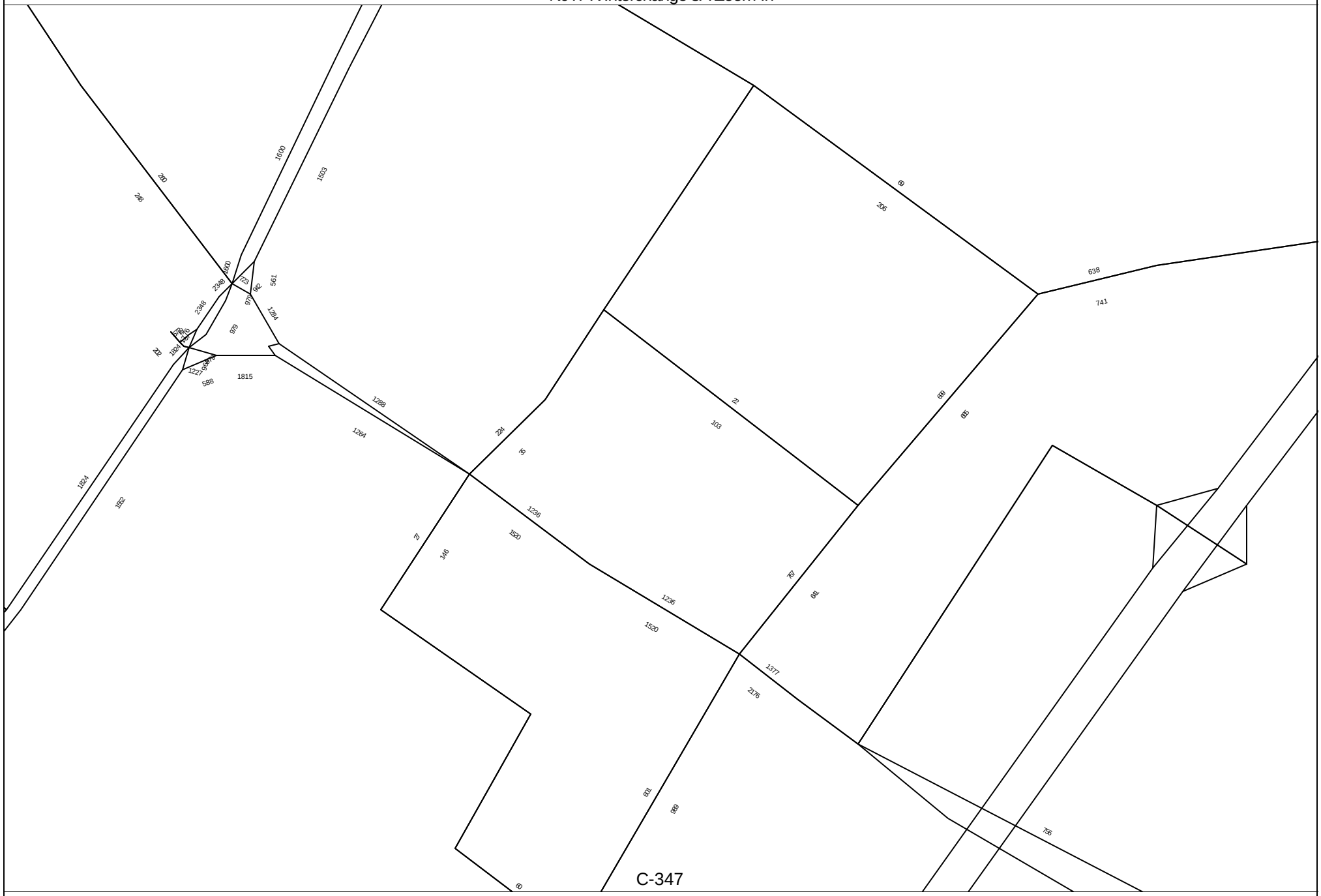
TP+ software by Citilabs 1/30/03 17:06 Licensed to: Garmen Associates

5.2 2001 PM Counted Volumes

2001 Existing - PM Counted Volumes
Route 92 Area

TP+ software by Citilabs 1/30/03 17:10 Licensed to: Garmen Associates

2001 Existing - PM Counted Volumes
NJTPK Interchange 8A Zoom-In



C-347

TP+ software by Citilabs 1/30/03 17:10 Licensed to: Garmen Associates

2001 Existing - PM Counted Volumes
West Windsor / Hightstown / Cranbury

TP+ software by Citilabs 1/30/03 17:10 Licensed to: Garmen Associates

2001 Existing - PM Counted Volumes
Route 1 / Nassau Park Blvd

TP+ software by Citilabs 1/30/03 17:10 Licensed to: Garmen Associates

2001 Existing - PM Counted Volumes
West Windsor / Route 1

C-350

TP+ software by Citilabs 1/30/03 17:10 Licensed to: Garmen Associates

2001 Existing - PM Counted Volumes
Central West Windsor

TP+ software by Citilabs 1/30/03 17:10 Licensed to: Garmen Associates

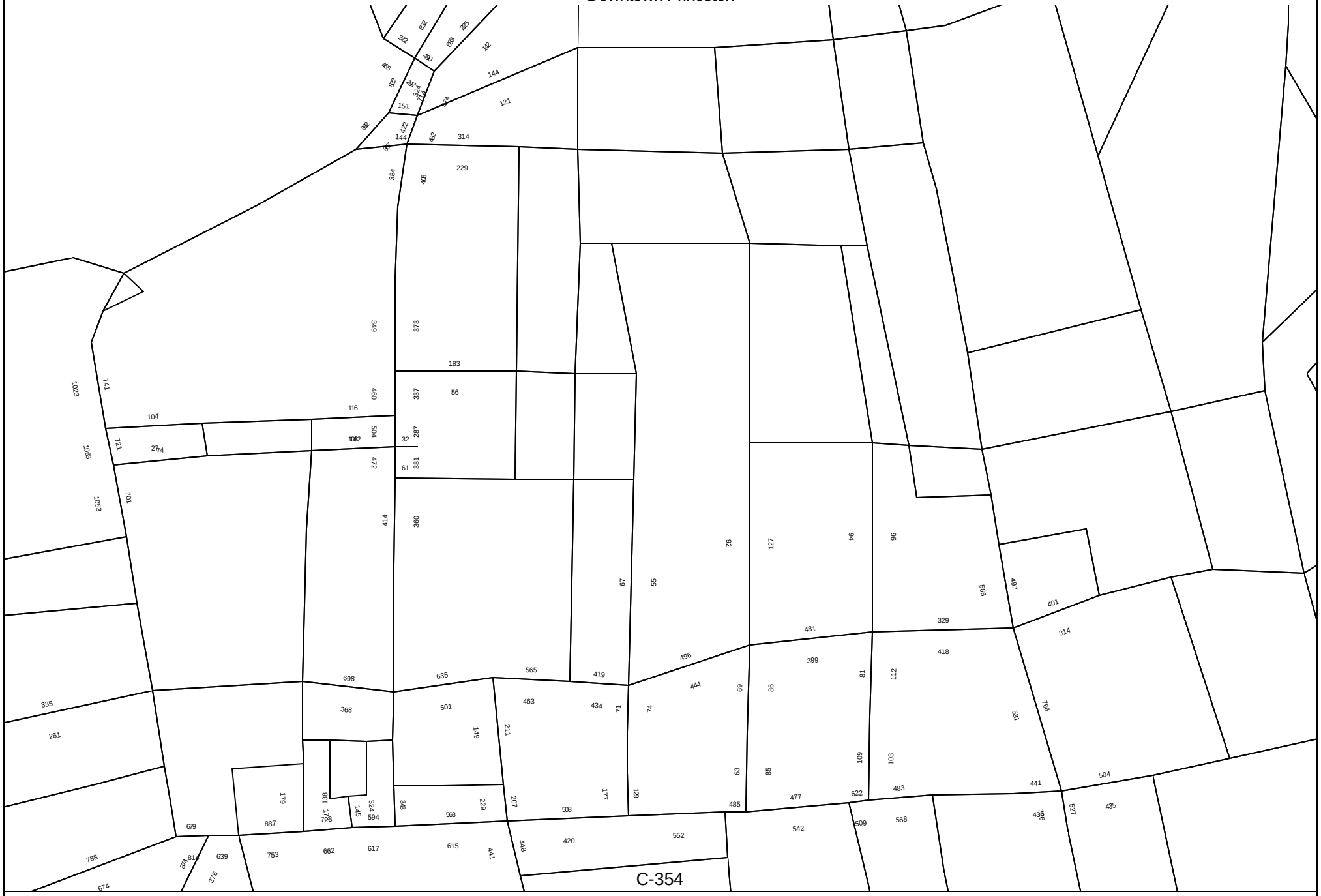
2001 Existing - PM Counted Volumes
Princeton Township

TP+ software by Citilabs 1/30/03 17:10 Licensed to: Garmen Associates

2001 Existing - PM Counted Volumes
Princeton Boro

TP+ software by Citilabs 1/30/03 17:10 Licensed to: Garmen Associates

2001 Existing - PM Counted Volumes
Downtown Princeton



TP+ software by Citilabs 1/30/03 17:11 Licensed to: Garmen Associates

2001 Existing - PM Counted Volumes
North Brunswick / Kendall Park Area

TP+ software by Citilabs 1/30/03 17:11 Licensed to: Garmen Associates

2001 Existing - PM Counted Volumes
Kendall Park Zoom-In

TP+ software by Citilabs 1/30/03 17:11 Licensed to: Garmen Associates

2001 Existing - PM Counted Volumes
Jamesburg Area

TP+ software by Citilabs 1/30/03 17:26 Licensed to: Garmen Associates

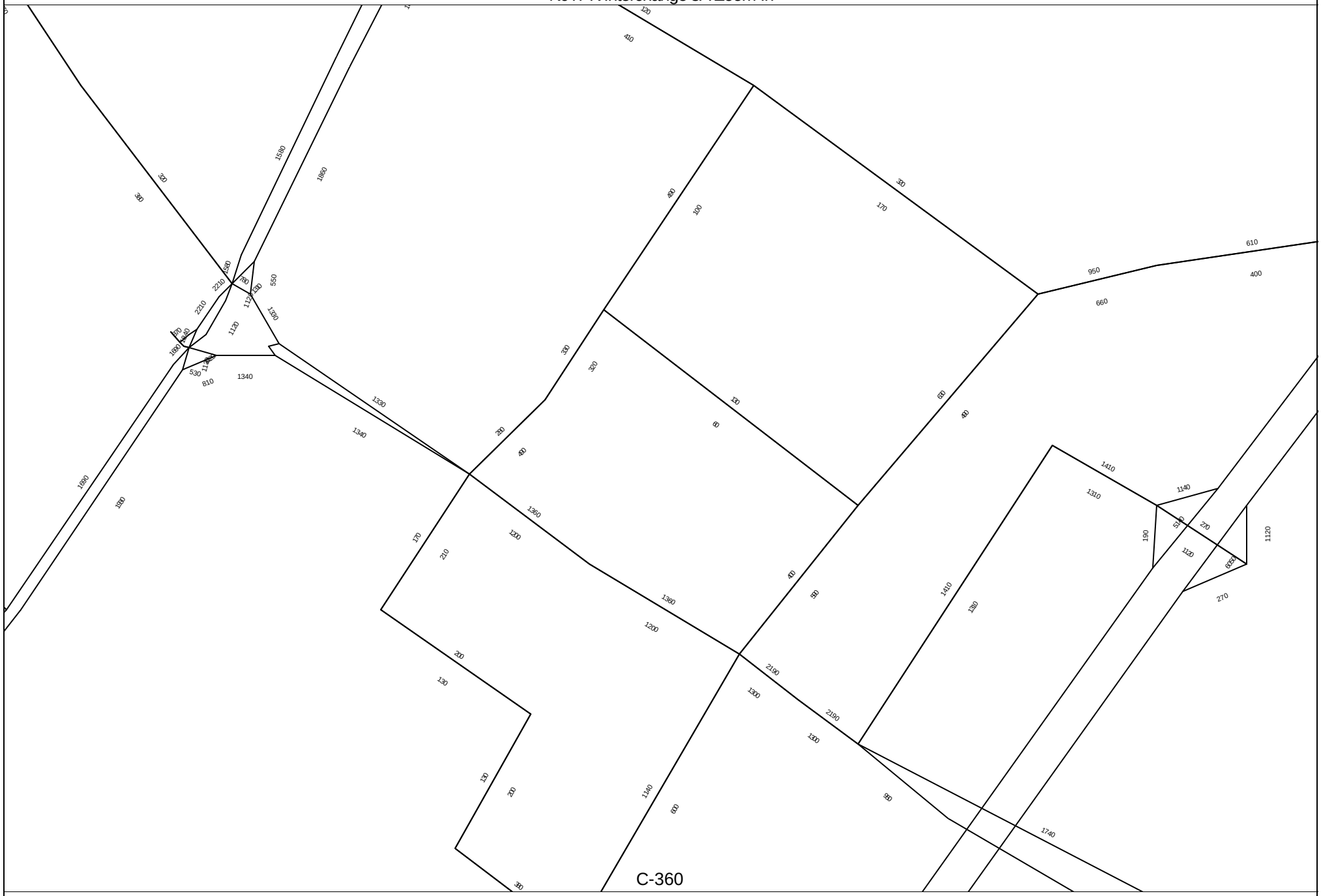
5.3 2001 AM Modeled Volumes

2001 - AM Modeled Volumes
Route 92 Area

C-359

TP+ software by Citilabs 1/31/03 09:25 Licensed to: Garmen Associates

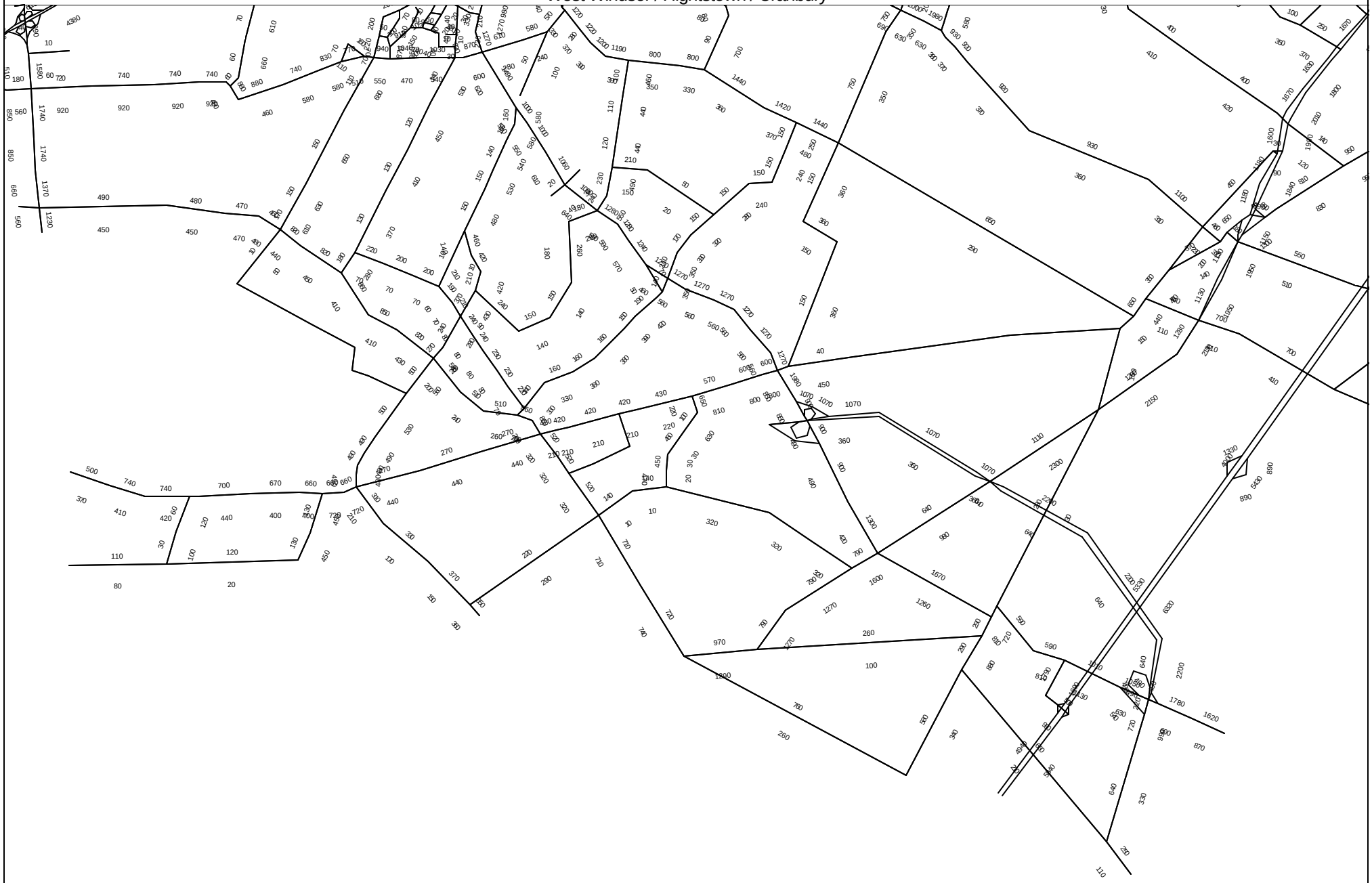
2001 - AM Modeled Volumes
NJTPK Interchange 8A Zoom-In



C-360

TP+ software by Citilabs 1/31/03 09:25 Licensed to: Garmen Associates

2001 - AM Modeled Volumes
West Windsor / Hightstown / Cranbury



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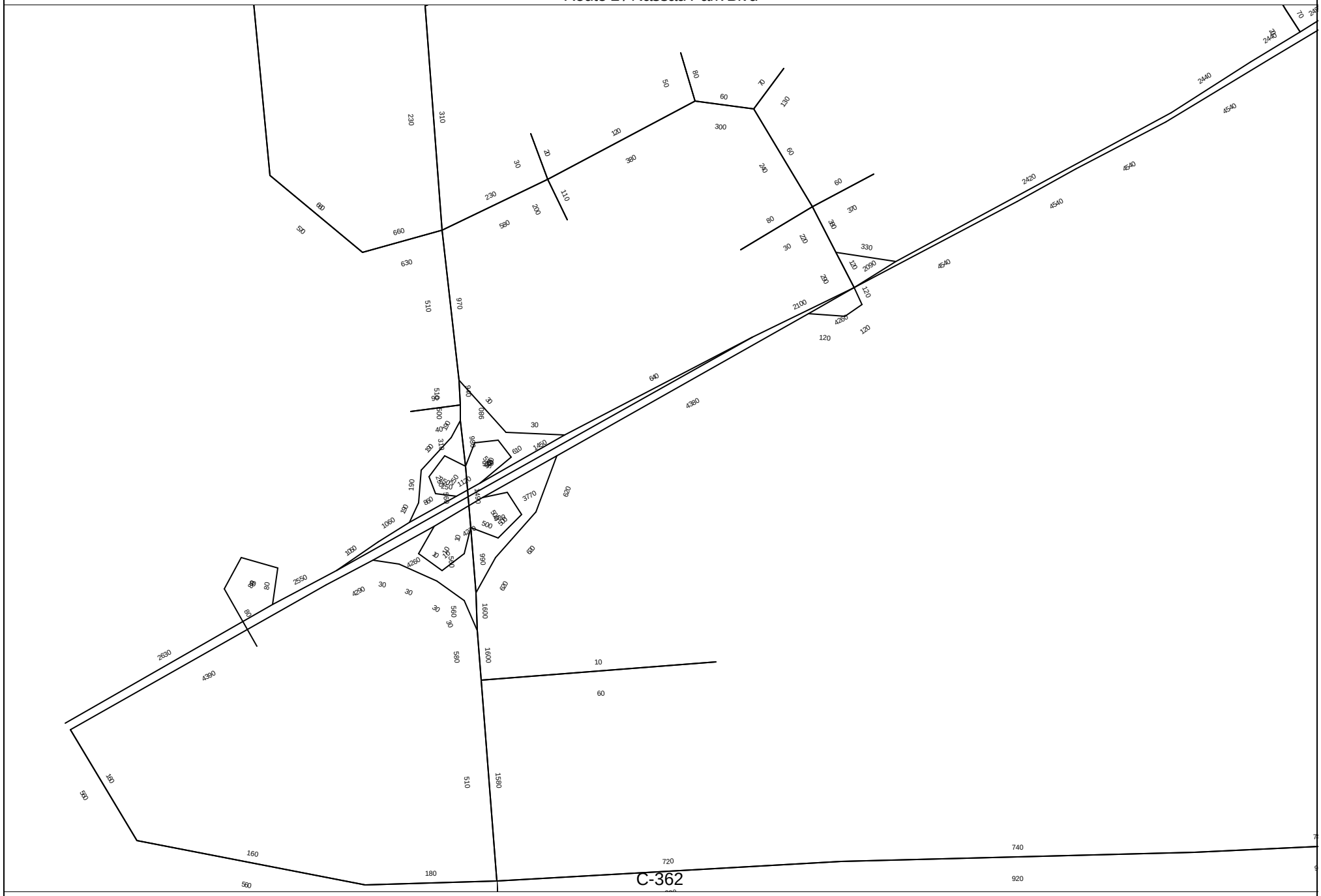
2001 - AM Modeled Volumes
Route 1 / Nassau Park Blvd



TP+ software by Citilabs 1/31/03 09:25 Licensed to: Garmen Associates

2001 - AM Modeled Volumes
West Windsor / Route 1

TP+ software by Citilabs 1/31/03 09:25 Licensed to: Garmen Associates

2001 - AM Modeled Volumes
Central West Windsor

TP+ software by Citilabs 1/31/03 09:25 Licensed to: Garmen Associates

2001 - AM Modeled Volumes
Princeton Township

TP+ software by Citilabs 1/31/03 09:25 Licensed to: Garmen Associates

2001 - AM Modeled Volumes
Princeton Boro

TP+ software by Citilabs 1/31/03 09:25 Licensed to: Garmen Associates

2001 - AM Modeled Volumes
Downtown Princeton

TP+ software by Citilabs 1/31/03 09:25 Licensed to: Garmen Associates

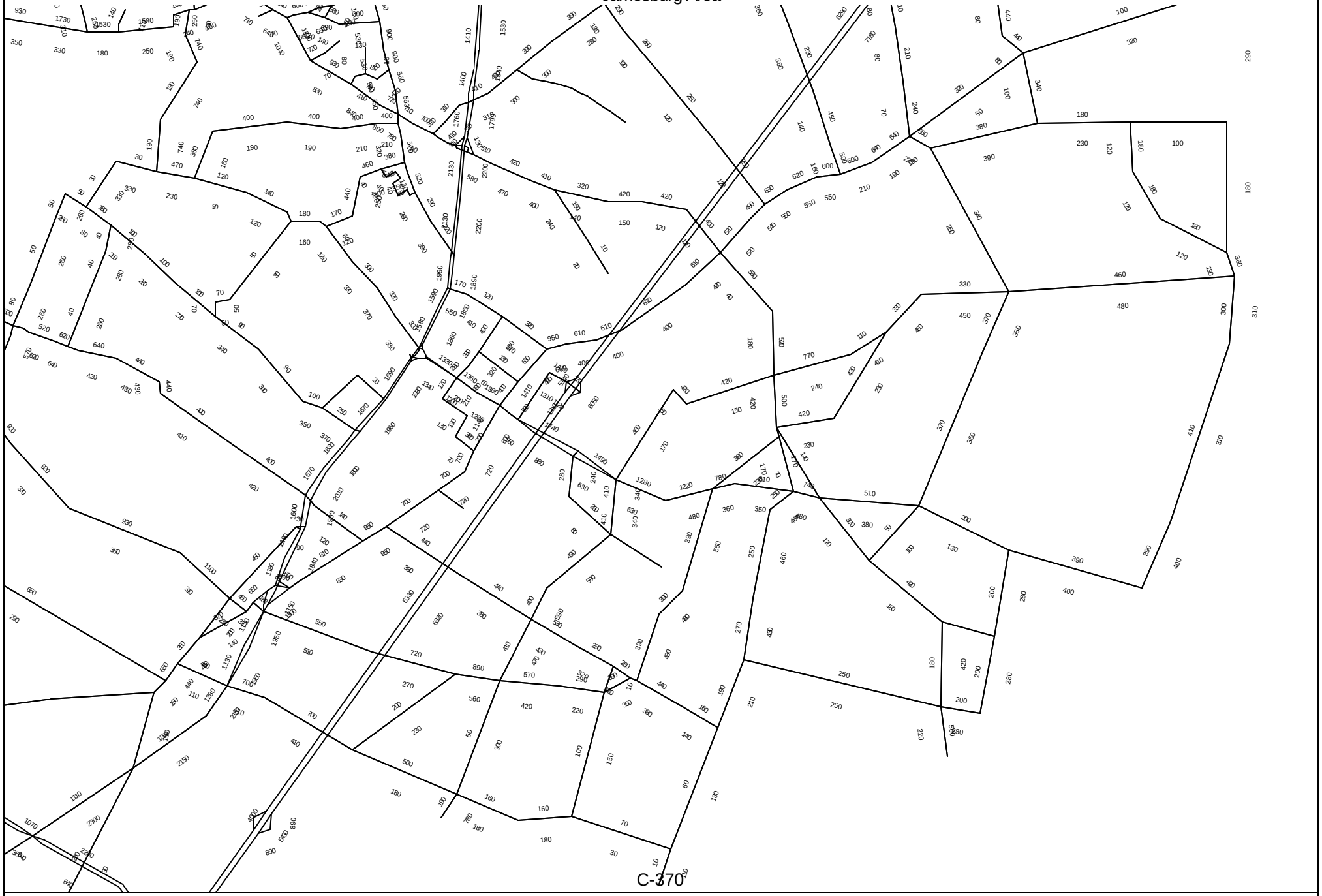
2001 - AM Modeled Volumes
North Brunswick / Kendall Park Area

TP+ software by Citilabs 1/31/03 09:25 Licensed to: Garmen Associates

2001 - AM Modeled Volumes
Kendall Park Zoom-In

TP+ software by Citilabs 1/31/03 09:25 Licensed to: Garmen Associates

2001 - AM Modeled Volumes
Jamesburg Area



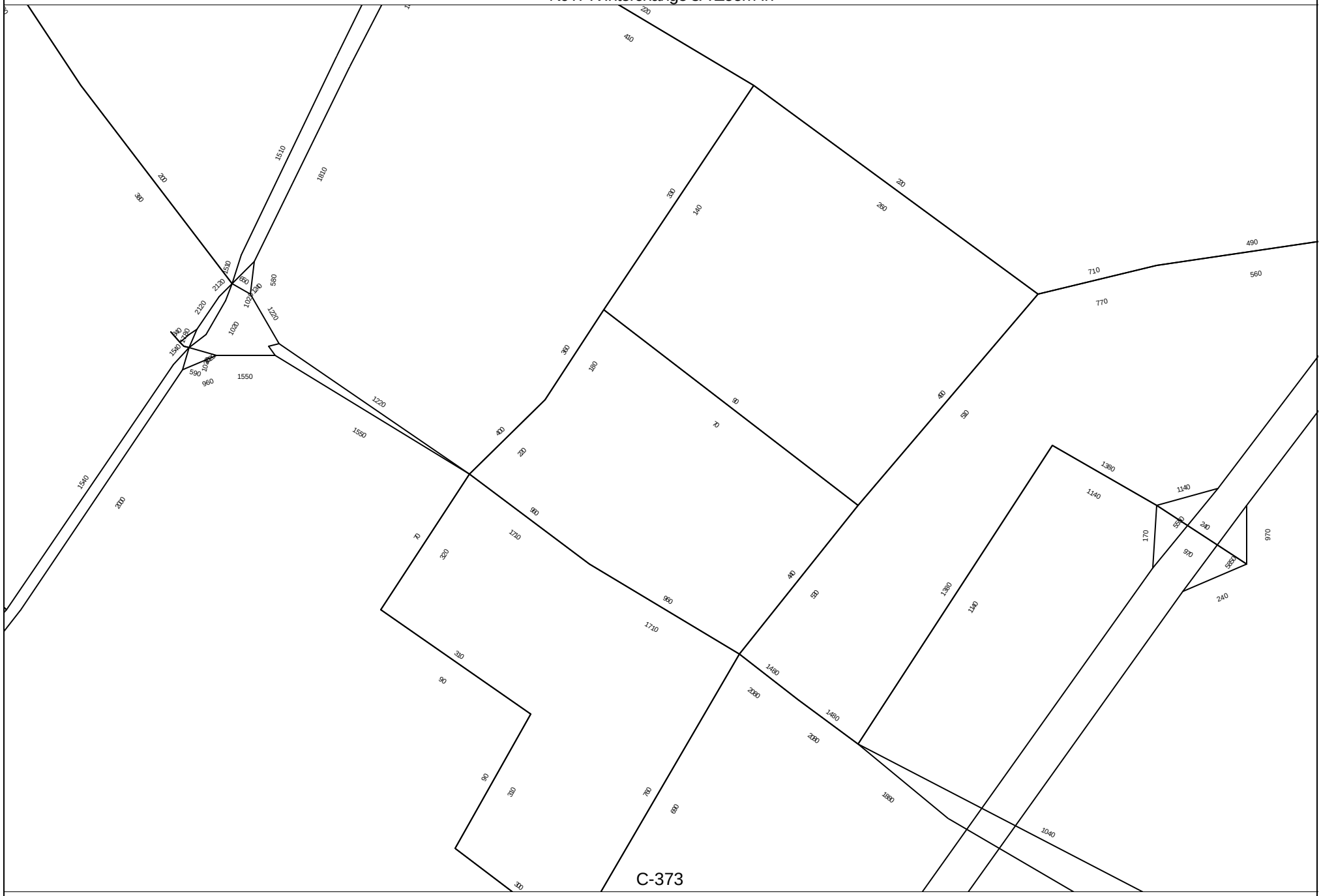
TP+ software by Citilabs 1/31/03 09:25 Licensed to: Garmen Associates

5.4 2001 PM Modeled Volumes

2001 - PM Modeled Volumes
Route 92 Area

TP+ software by Citilabs 1/31/03 09:22 Licensed to: Garmen Associates

2001 - PM Modeled Volumes
NJTPK Interchange 8A Zoom-In



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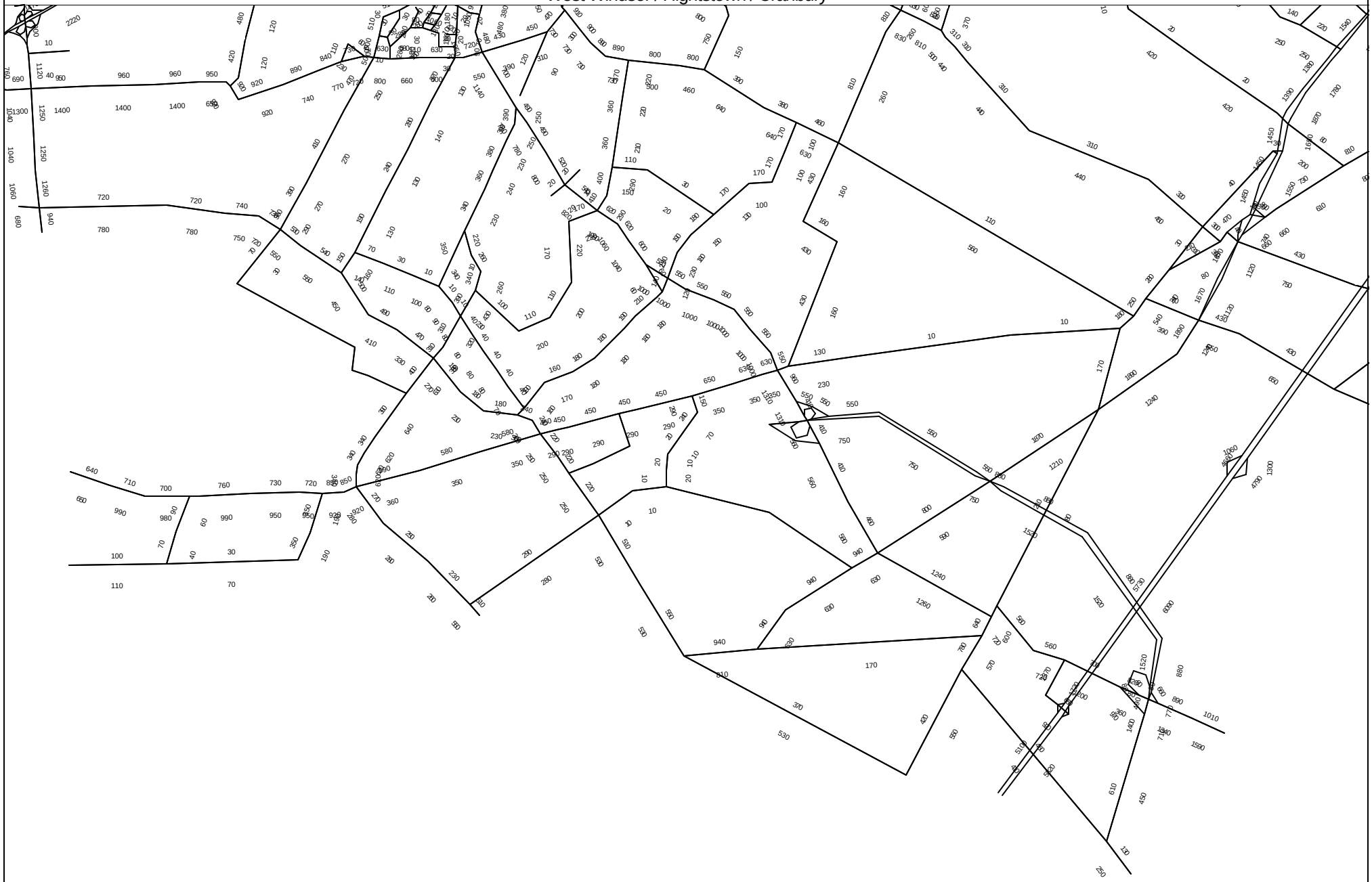
2001 - PM Modeled Volumes
West Windsor / Hightstown / Cranbury



TP+ software by Citilabs 1/31/03 09:22 Licensed to: Garmen Associates

2001 - PM Modeled Volumes
Route 1 / Nassau Park Blvd

TP+ software by Citilabs 1/31/03 09:23 Licensed to: Garmen Associates

2001 - PM Modeled Volumes
West Windsor / Route 1

TP+ software by Citilabs 1/31/03 09:23 Licensed to: Garmen Associates

2001 - PM Modeled Volumes
Central West Windsor

TP+ software by Citilabs 1/31/03 09:23 Licensed to: Garmen Associates

2001 - PM Modeled Volumes
Princeton Township

TP+ software by Citilabs 1/31/03 09:23 Licensed to: Garmen Associates

2001 - PM Modeled Volumes
Princeton Boro

TP+ software by Citilabs 1/31/03 09:23 Licensed to: Garmen Associates

2001 - PM Modeled Volumes
Downtown Princeton

TP+ software by Citilabs 1/31/03 09:23 Licensed to: Garmen Associates

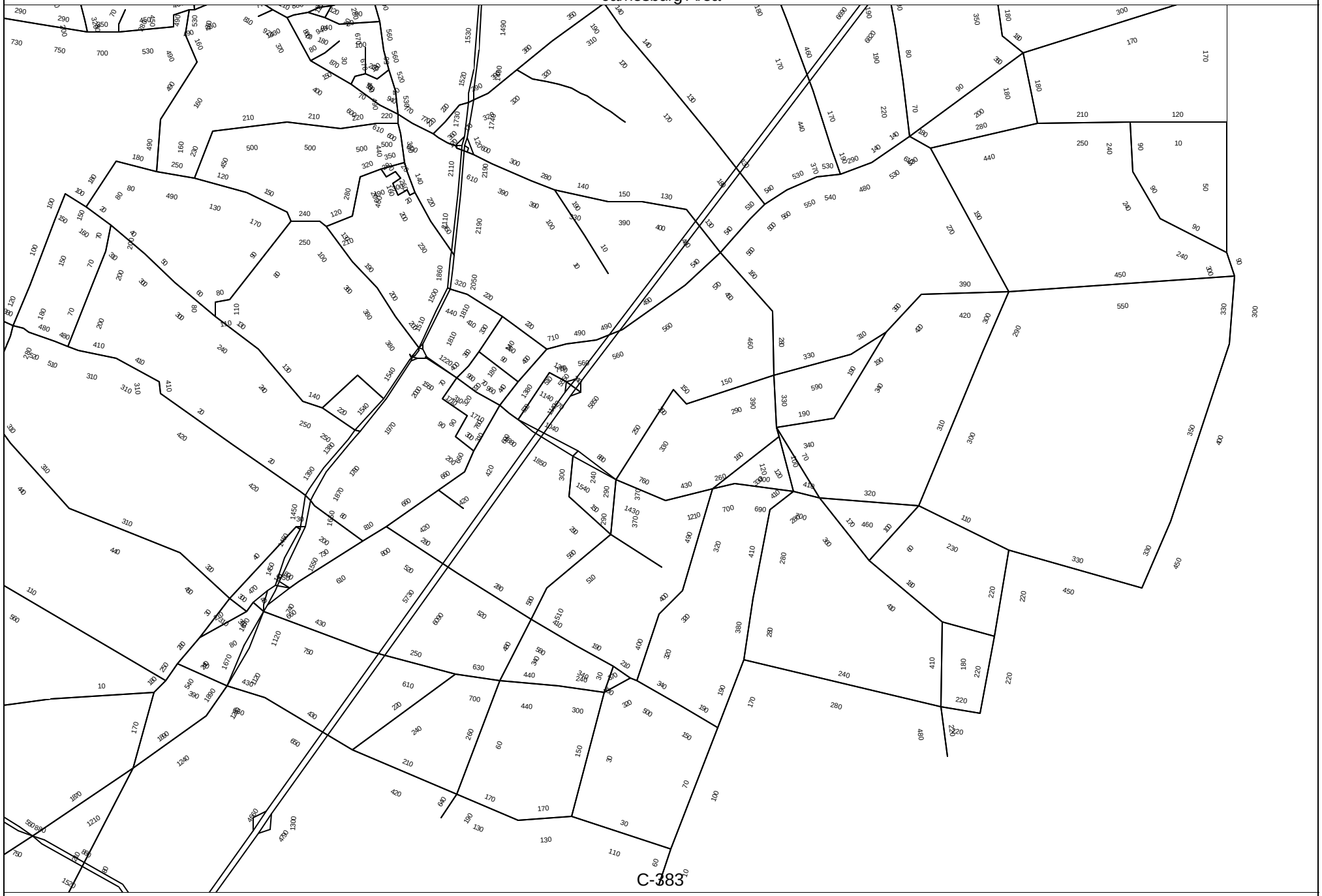
2001 - PM Modeled Volumes
North Brunswick / Kendall Park Area

TP+ software by Citilabs 1/31/03 09:23 Licensed to: Garmen Associates

2001 - PM Modeled Volumes
Kendall Park Zoom-In

TP+ software by Citilabs 1/31/03 09:23 Licensed to: Garmen Associates

2001 - PM Modeled Volumes
Jamesburg Area



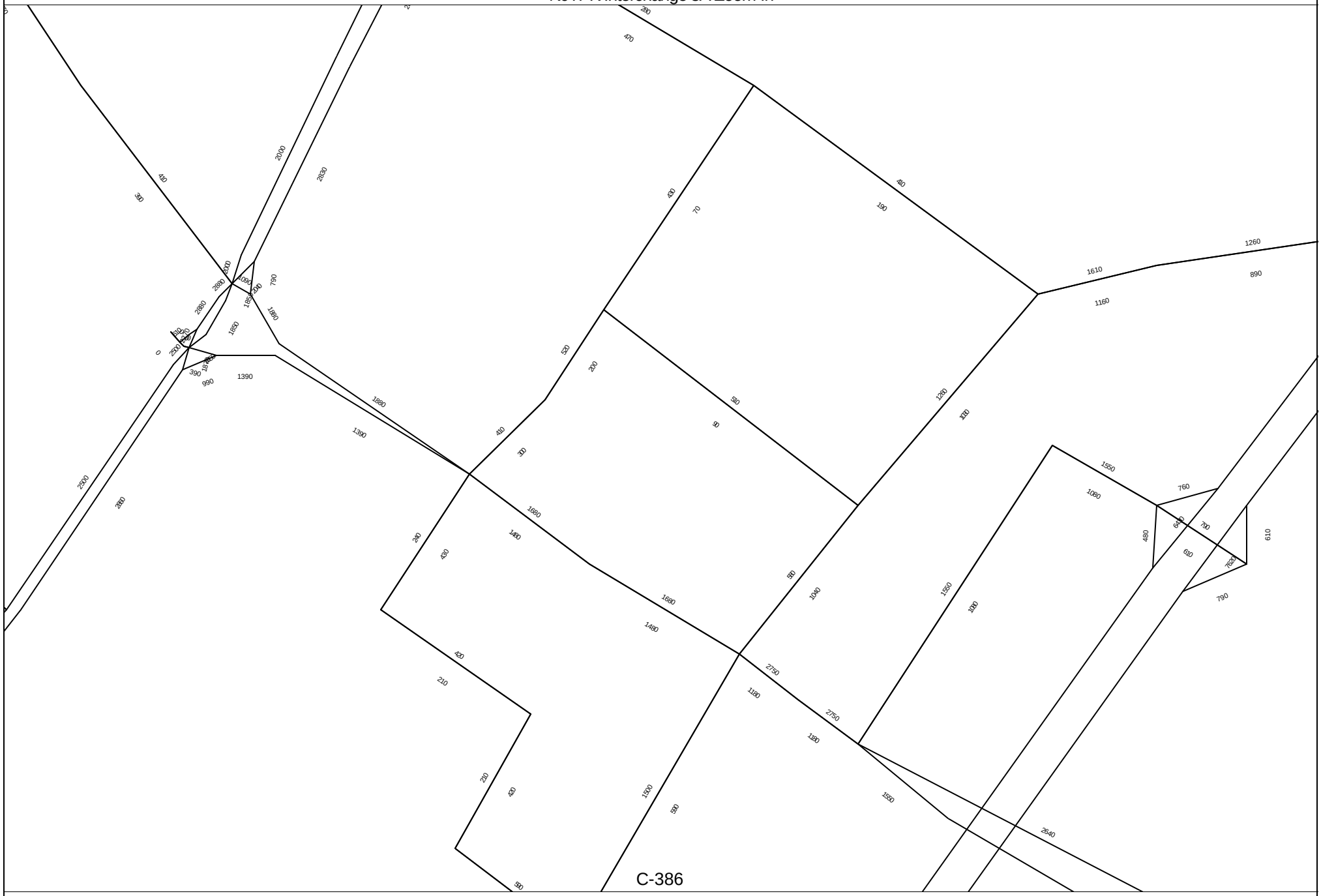
TP+ software by Citilabs 1/31/03 09:23 Licensed to: Garmen Associates

5.5 2028 AM No Build Volumes

2028 No Build - AM Projected Volumes
Route 92 Area

TP+ software by Citilabs 1/30/03 15:33 Licensed to: Garmen Associates

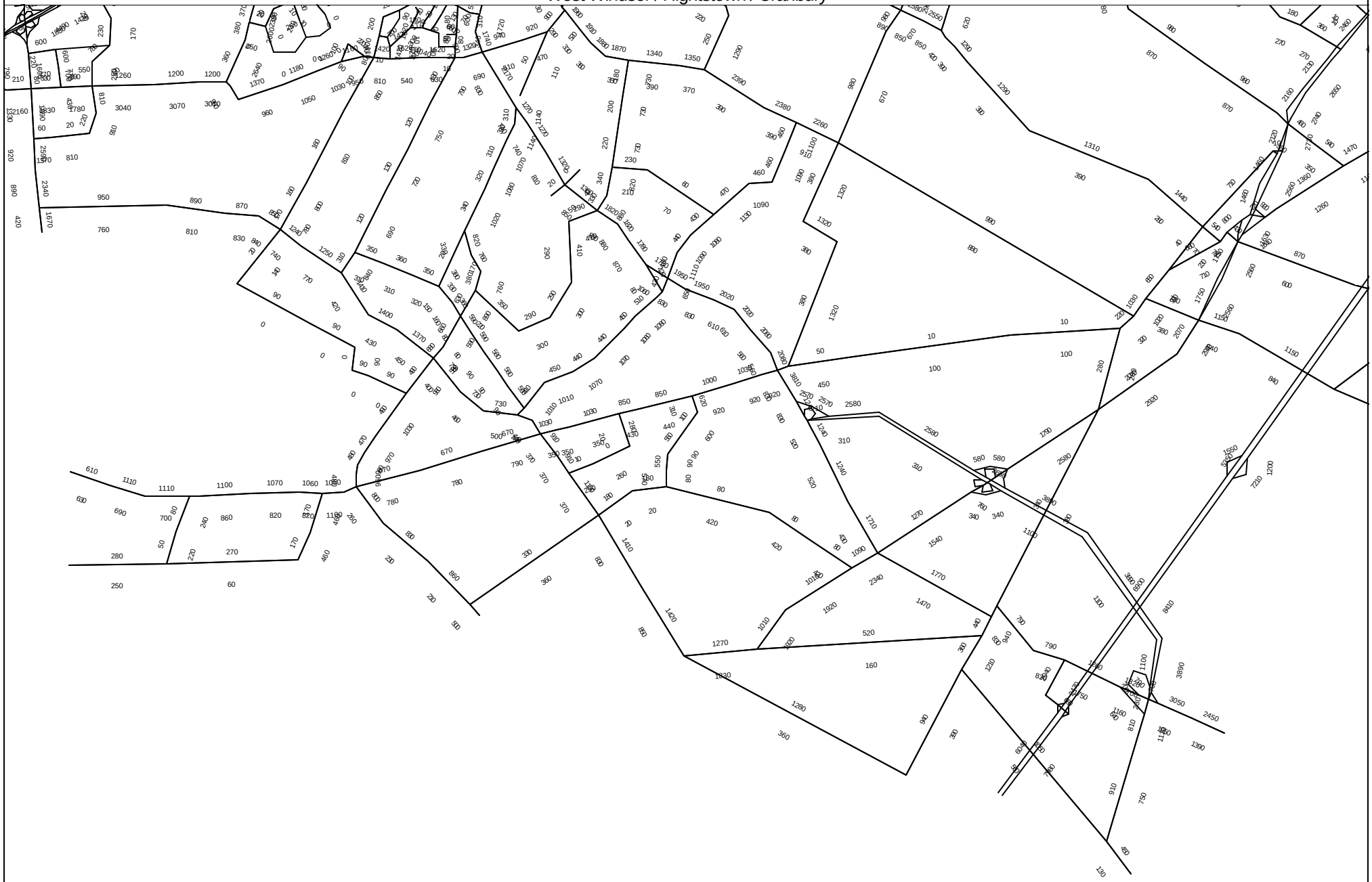
2028 No Build - AM Projected Volumes
NJTPK Interchange 8A Zoom-In



C-386

TP+ software by Citilabs 1/30/03 15:33 Licensed to: Garmen Associates

2028 No Build - AM Projected Volumes
West Windsor / Hightstown / Cranbury



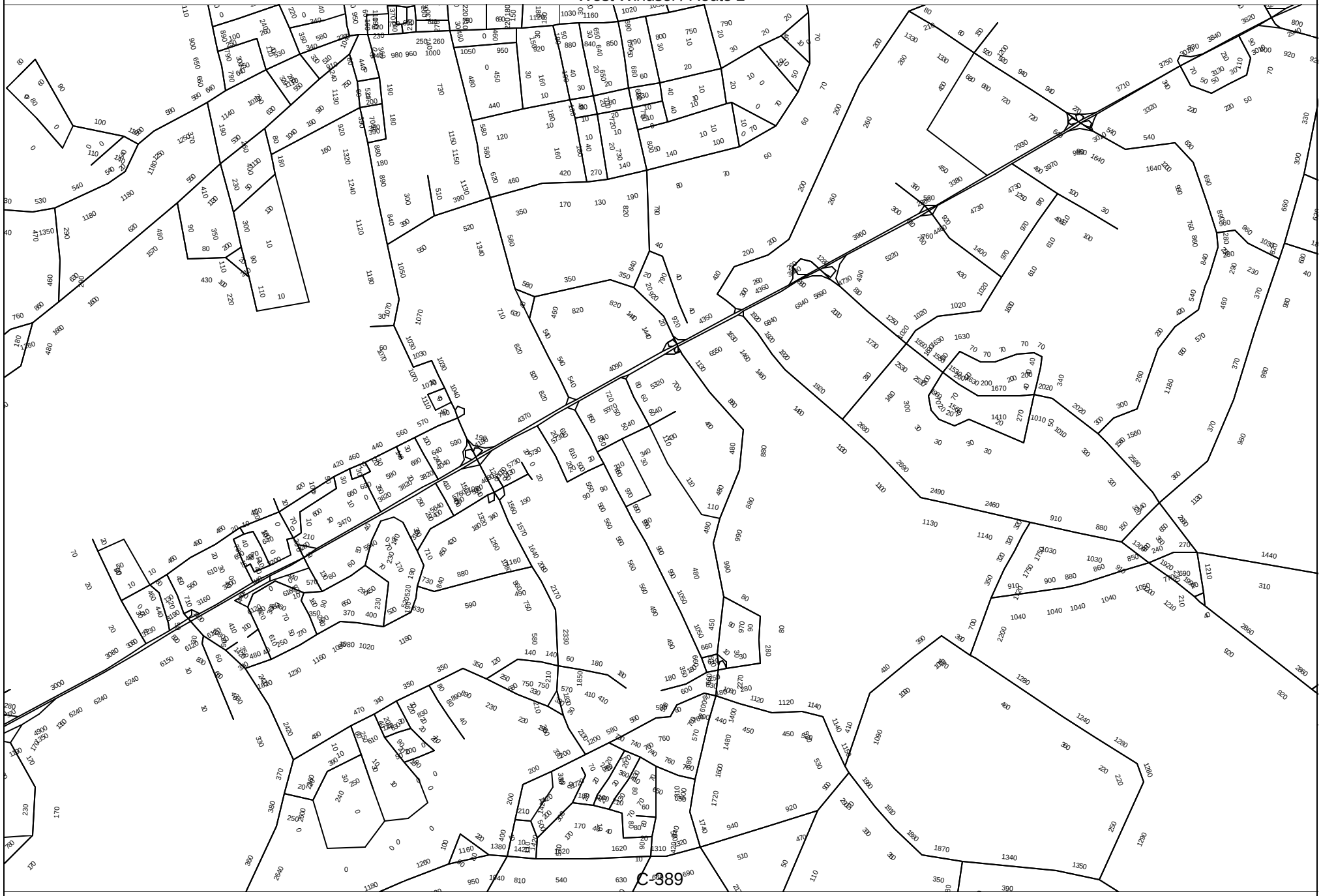
TP+ software by Citilabs 1/30/03 15:33 Licensed to: Garmen Associates

2028 No Build - AM Projected Volumes
Route 1 / Nassau Park Blvd

C-388

TP+ software by Citilabs 1/30/03 15:33 Licensed to: Garmen Associates

2028 No Build - AM Projected Volumes
West Windsor / Route 1



TP+ software by Citilabs 1/30/03 15:33 Licensed to: Garmen Associates

2028 No Build - AM Projected Volumes
Central West Windsor

TP+ software by Citilabs 1/30/03 15:33 Licensed to: Garmen Associates

2028 No Build - AM Projected Volumes
Princeton Township

TP+ software by Citilabs 1/30/03 15:33 Licensed to: Garmen Associates

2028 No Build - AM Projected Volumes
Princeton Boro

TP+ software by Citilabs 1/30/03 15:33 Licensed to: Garmen Associates

2028 No Build - AM Projected Volumes
Downtown Princeton

TP+ software by Citilabs 1/30/03 15:33 Licensed to: Garmen Associates

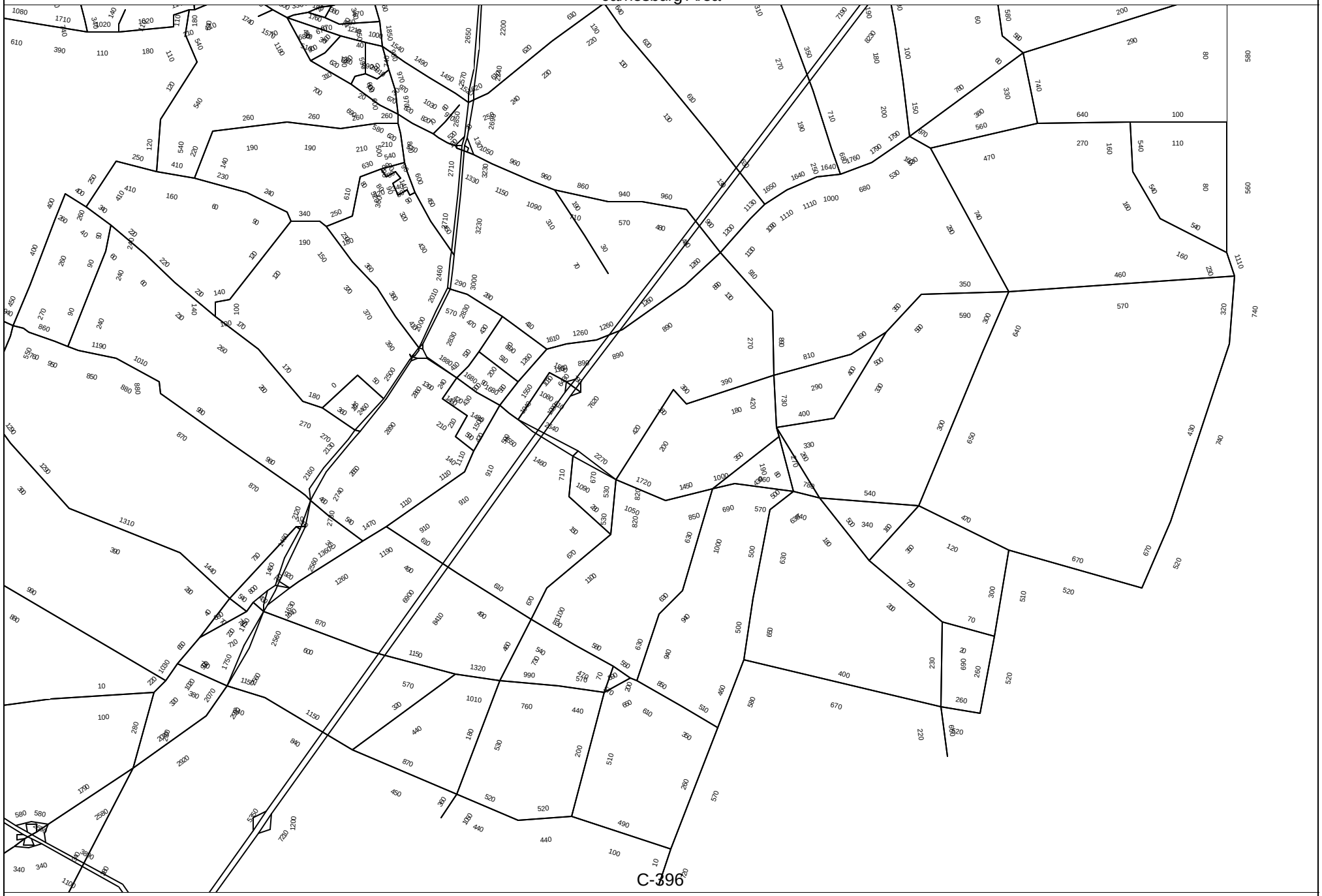
2028 No Build - AM Projected Volumes
North Brunswick / Kendall Park Area

TP+ software by Citilabs 1/30/03 15:33 Licensed to: Garmen Associates

2028 No Build - AM Projected Volumes
Kendall Park Zoom-In

TP+ software by Citilabs 1/30/03 15:33 Licensed to: Garmen Associates

2028 No Build - AM Projected Volumes
Jamesburg Area



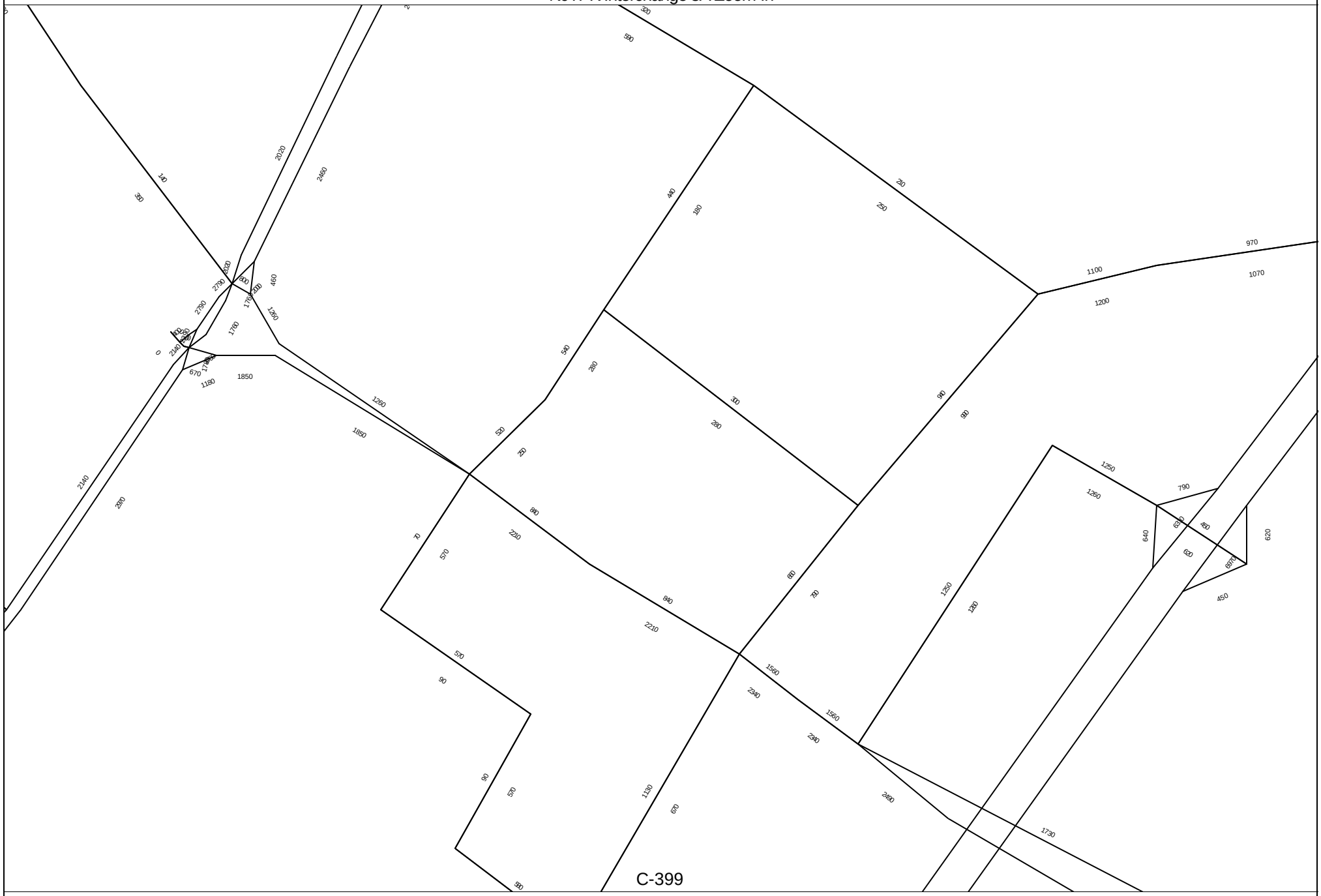
TP+ software by Citilabs 1/30/03 15:33 Licensed to: Garmen Associates

5.6 2028 PM No Build Volumes

2028 No Build - PM Projected Volumes
Route 92 Area

TP+ software by Citilabs 1/30/03 15:31 Licensed to: Garmen Associates

2028 No Build - PM Projected Volumes
NJTPK Interchange 8A Zoom-In



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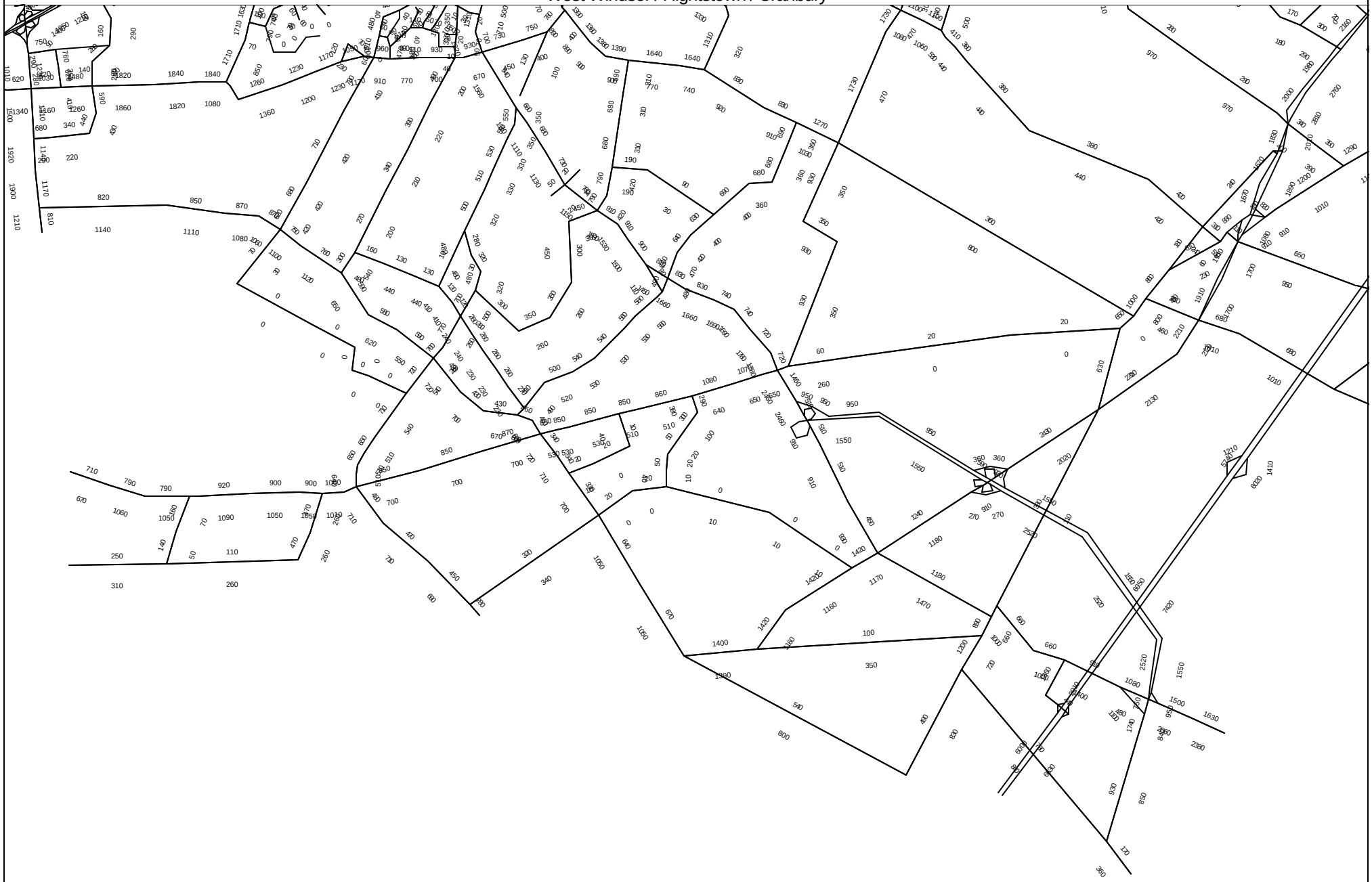
2028 No Build - PM Projected Volumes
West Windsor / Hightstown / Cranbury



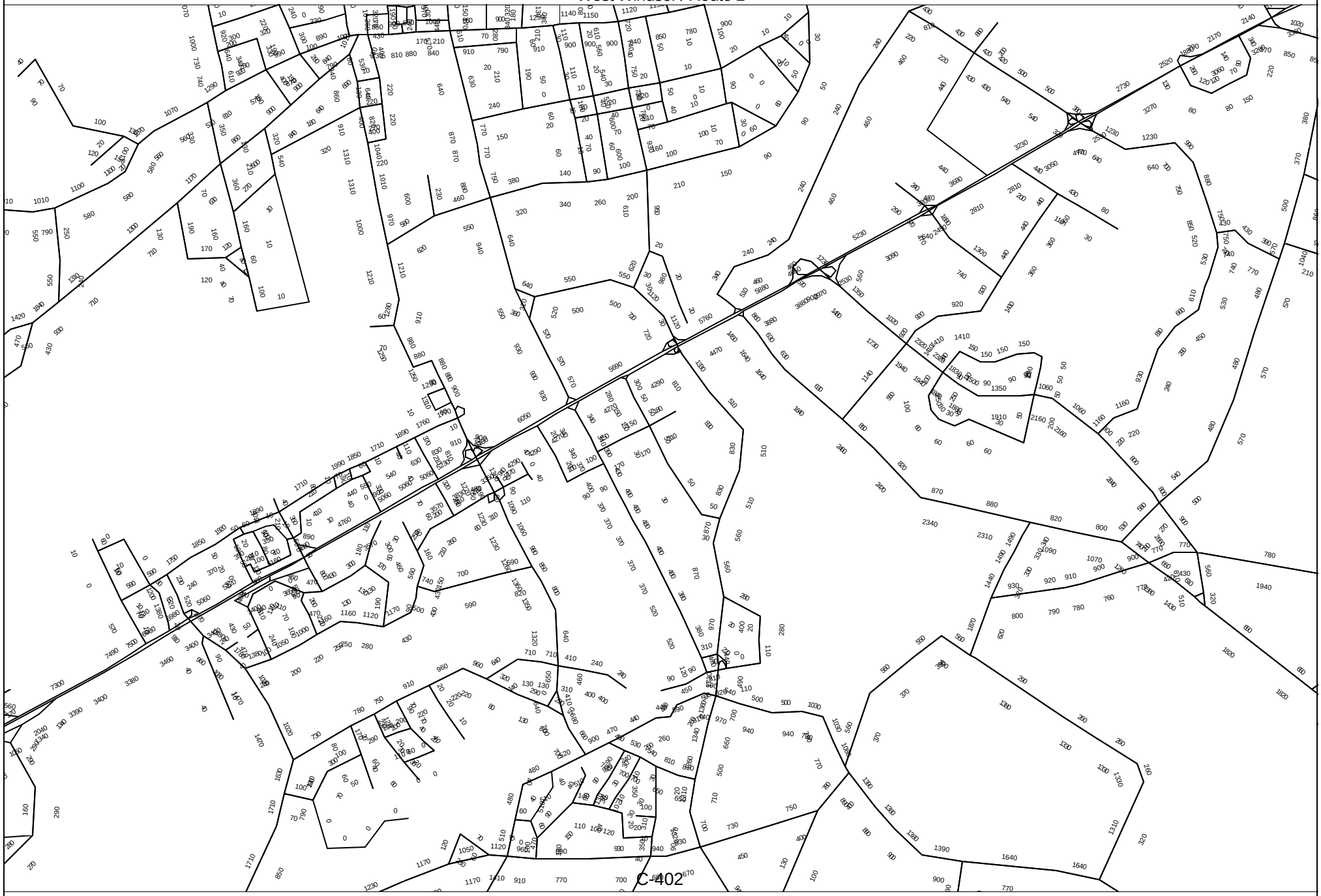
C-400

2028 No Build - PM Projected Volumes
Route 1 / Nassau Park Blvd

C-401

TP+ software by Citilabs 1/30/03 15:31 Licensed to: Garmen Associates

2028 No Build - PM Projected Volumes
West Windsor / Route 1



TP+ software by Citilabs 1/30/03 15:31 Licensed to: Garmen Associates

2028 No Build - PM Projected Volumes
Central West Windsor

TP+ software by Citilabs 1/30/03 15:31 Licensed to: Garmen Associates

2028 No Build - PM Projected Volumes
Princeton Township

TP+ software by Citilabs 1/30/03 15:31 Licensed to: Garmen Associates

2028 No Build - PM Projected Volumes
Princeton Boro

TP+ software by Citilabs 1/30/03 15:31 Licensed to: Garmen Associates

2028 No Build - PM Projected Volumes
Downtown Princeton

TP+ software by Citilabs 1/30/03 15:31 Licensed to: Garmen Associates

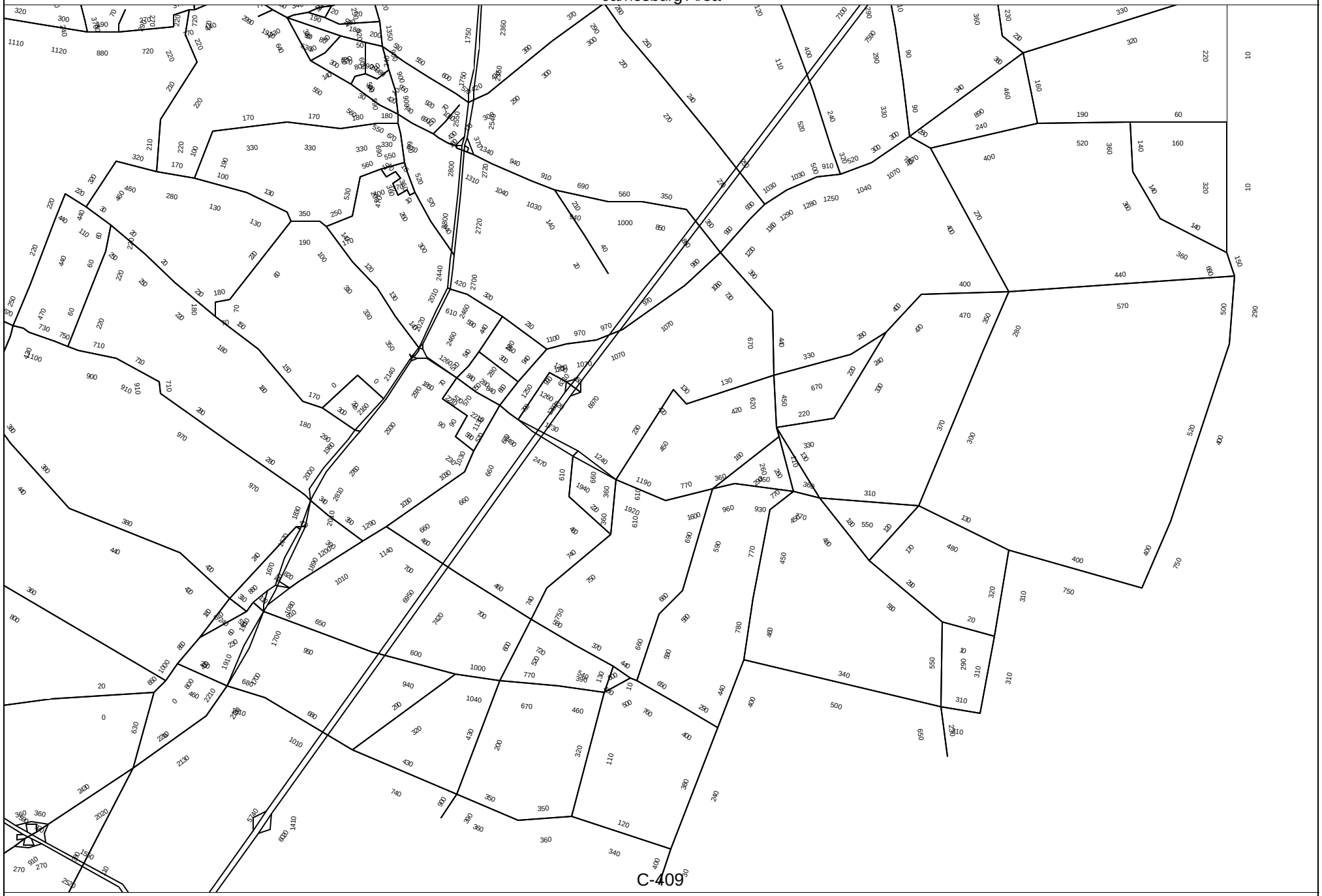
2028 No Build - PM Projected Volumes
North Brunswick / Kendall Park Area

TP+ software by Citilabs 1/30/03 15:31 Licensed to: Garmen Associates

2028 No Build - PM Projected Volumes
Kendall Park Zoom-In

TP+ software by Citilabs 1/30/03 15:31 Licensed to: Garmen Associates

2028 No Build - PM Projected Volumes
Jamesburg Area



TP+ software by Citilabs 1/30/03 15:31 Licensed to: Garmen Associates

5.7 2028 AM Build Route 92 Volumes

2028 Build Route 92 - AM Projected Volumes

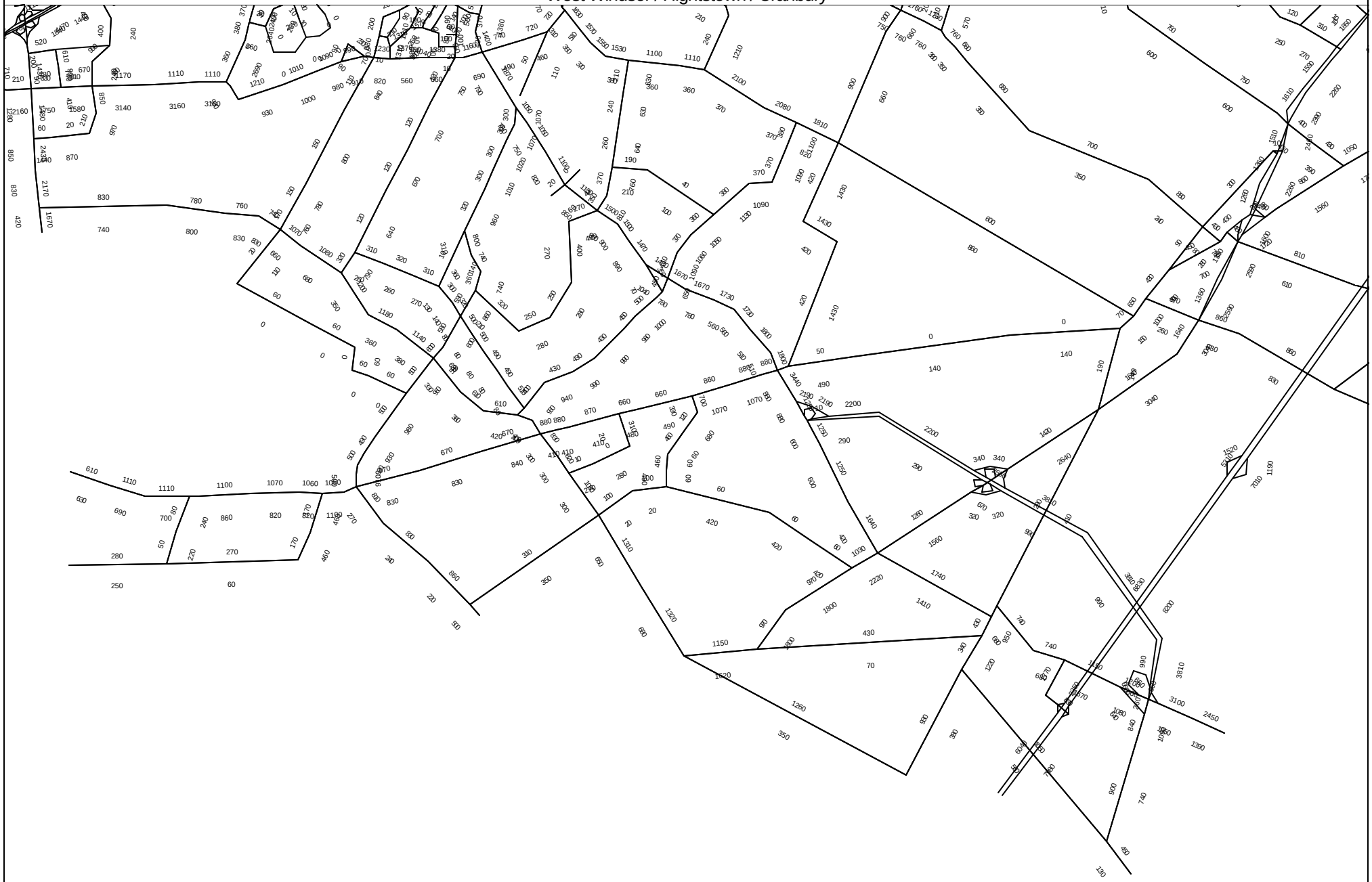
Route 92 Area

TP+ software by Citilabs 1/30/03 14:36 Licensed to: Garmen Associates

2028 Build Route 92 - AM Projected Volumes
NJTPK Interchange 8A Zoom-In

TP+ software by Citilabs 1/30/03 14:36 Licensed to: Garmen Associates

2028 Build Route 92 - AM Projected Volumes
West Windsor / Hightstown / Cranbury



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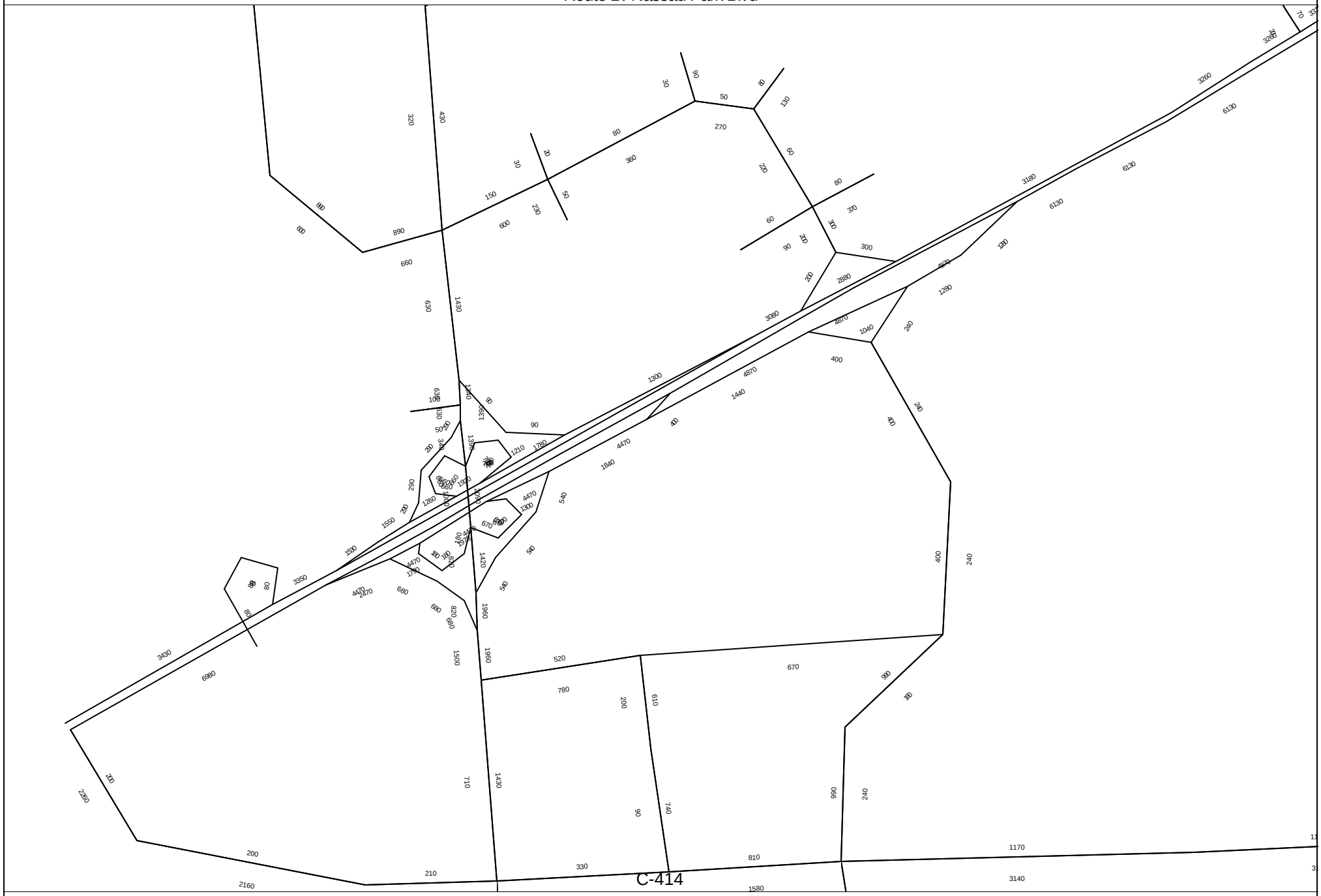
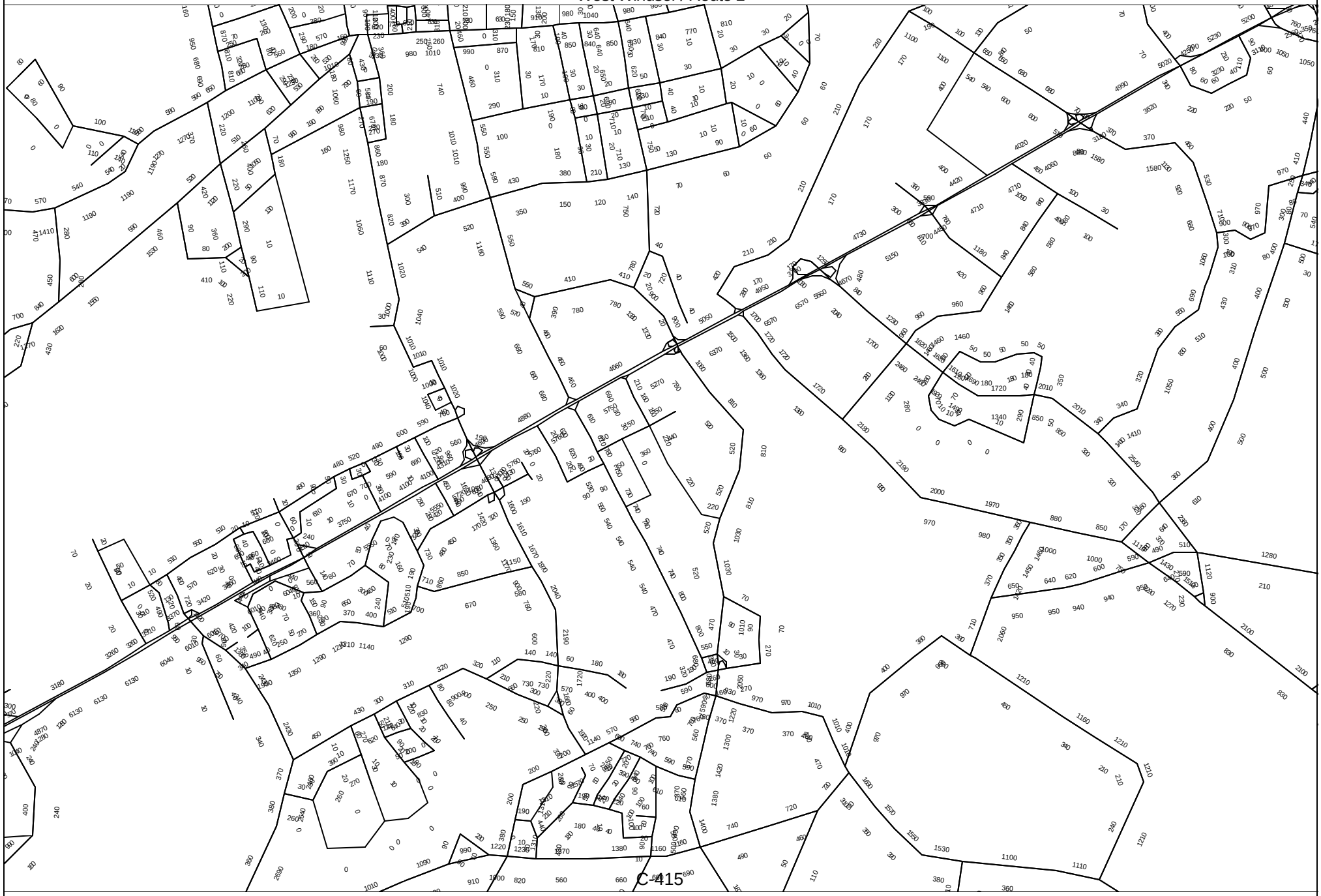
2028 Build Route 92 - AM Projected Volumes
Route 1 / Nassau Park Blvd



TP+ software by Citilabs 1/30/03 14:36 Licensed to: Garmen Associates

2028 Build Route 92 - AM Projected Volumes
West Windsor / Route 1



TP+ software by Citilabs 1/30/03 14:36 Licensed to: Garmen Associates

2028 Build Route 92 - AM Projected Volumes
Central West Windsor

TP+ software by Citilabs 1/30/03 14:36 Licensed to: Garmen Associates

2028 Build Route 92 - AM Projected Volumes
Princeton Township

TP+ software by Citilabs 1/30/03 14:36 Licensed to: Garmen Associates

2028 Build Route 92 - AM Projected Volumes
Princeton Boro

TP+ software by Citilabs 1/30/03 14:36 Licensed to: Garmen Associates

2028 Build Route 92 - AM Projected Volumes
Downtown Princeton

TP+ software by Citilabs 1/30/03 14:36 Licensed to: Garmen Associates

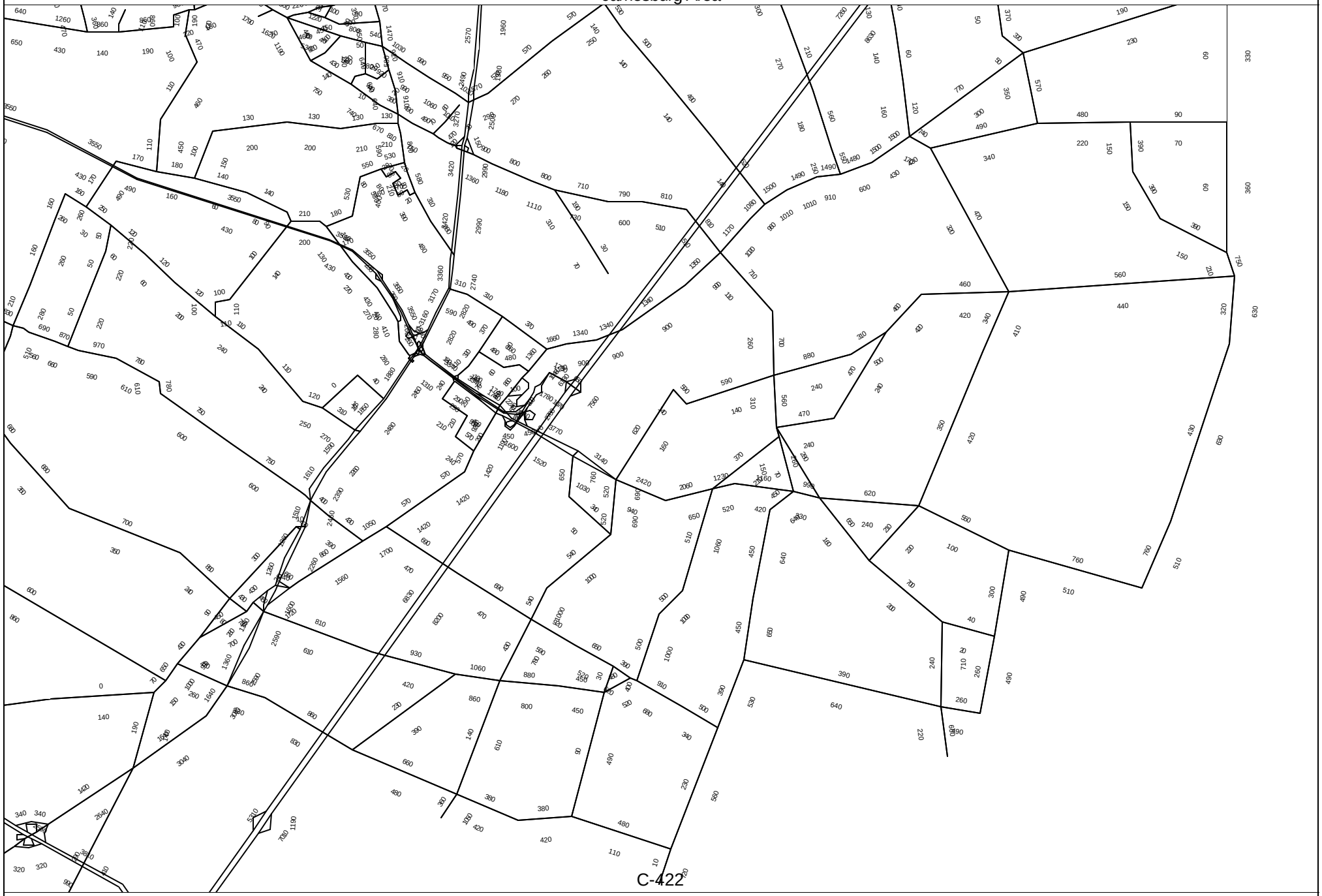
2028 Build Route 92 - AM Projected Volumes
North Brunswick / Kendall Park Area

TP+ software by Citilabs 1/30/03 14:36 Licensed to: Garmen Associates

2028 Build Route 92 - AM Projected Volumes
Kendall Park Zoom-In

TP+ software by Citilabs 1/30/03 14:36 Licensed to: Garmen Associates

2028 Build Route 92 - AM Projected Volumes
Jamesburg Area



TP+ software by Citilabs 1/30/03 14:36 Licensed to: Garmen Associates

5.8 2028 PM Build Route 92 Volumes

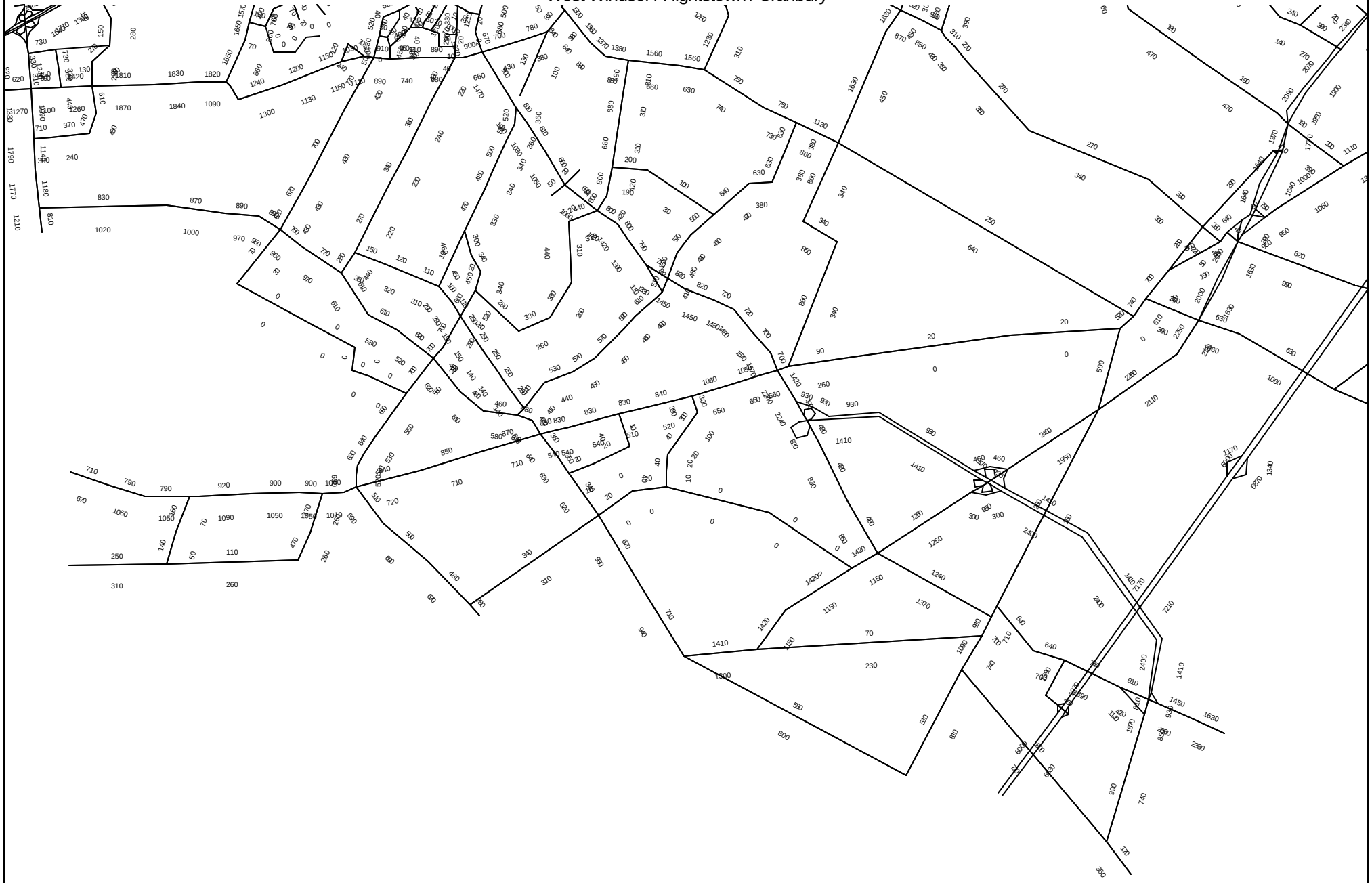
2028 Build Route 92 - PM Projected Volumes
Route 92 Area

TP+ software by Citilabs 1/30/03 14:39 Licensed to: Garmen Associates

2028 Build Route 92 - PM Projected Volumes
NJTPK Interchange 8A Zoom-In

TP+ software by Citilabs 1/30/03 14:39 Licensed to: Garmen Associates

2028 Build Route 92 - PM Projected Volumes
West Windsor / Hightstown / Cranbury



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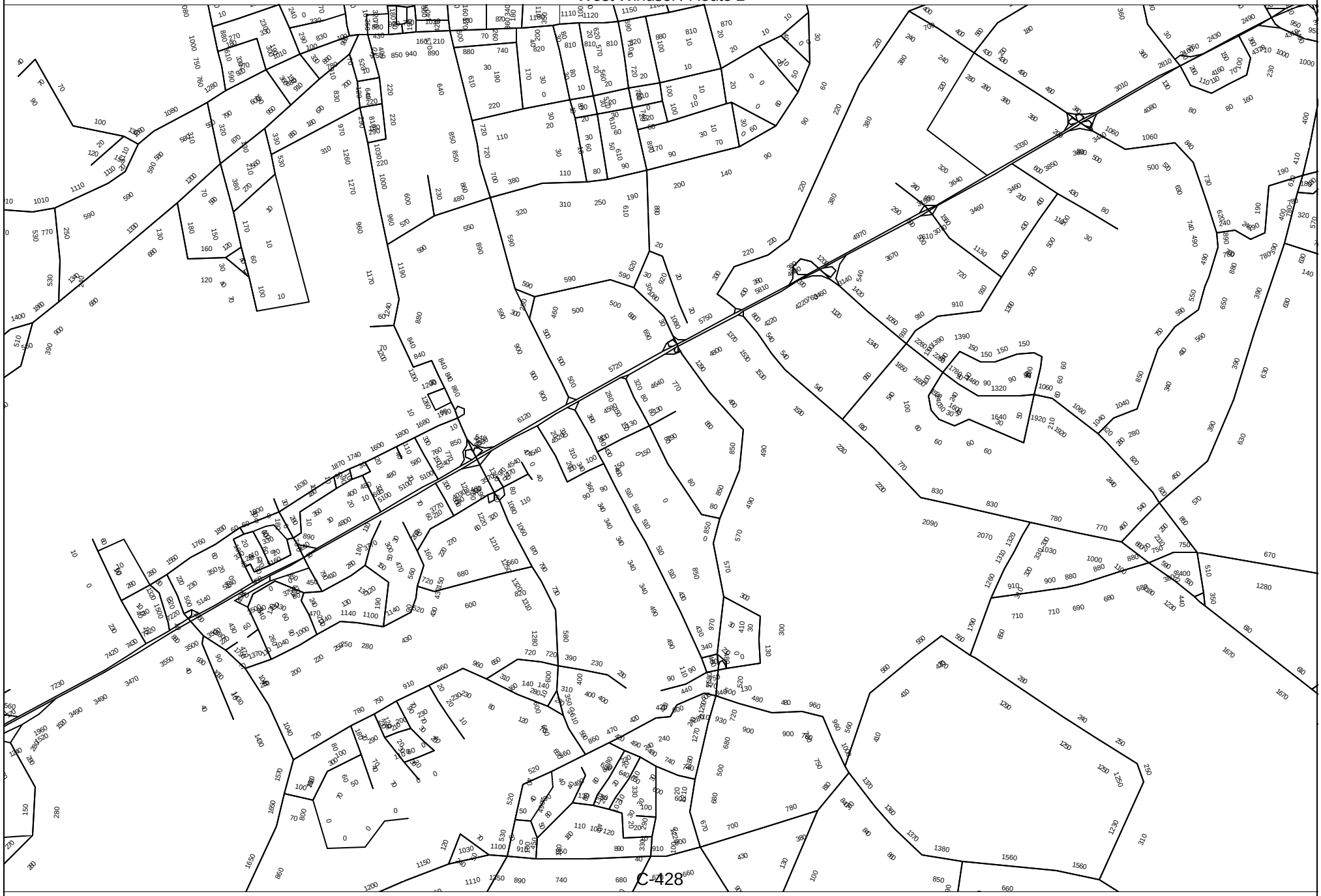
2028 Build Route 92 - PM Projected Volumes
Route 1 / Nassau Park Blvd

TP+ software by Citilabs 1/30/03 14:39 Licensed to: Garmen Associates

2028 Build Route 92 - PM Projected Volumes
West Windsor / Route 1



TP+ software by Citilabs 1/30/03 14:39 Licensed to: Garmen Associates

2028 Build Route 92 - PM Projected Volumes
Central West Windsor

TP+ software by Citilabs 1/30/03 14:39 Licensed to: Garmen Associates

2028 Build Route 92 - PM Projected Volumes
Princeton Township

TP+ software by Citilabs 1/30/03 14:39 Licensed to: Garmen Associates

2028 Build Route 92 - PM Projected Volumes
Princeton Boro

TP+ software by Citilabs 1/30/03 14:39 Licensed to: Garmen Associates

2028 Build Route 92 - PM Projected Volumes
Downtown Princeton

TP+ software by Citilabs 1/30/03 14:39 Licensed to: Garmen Associates

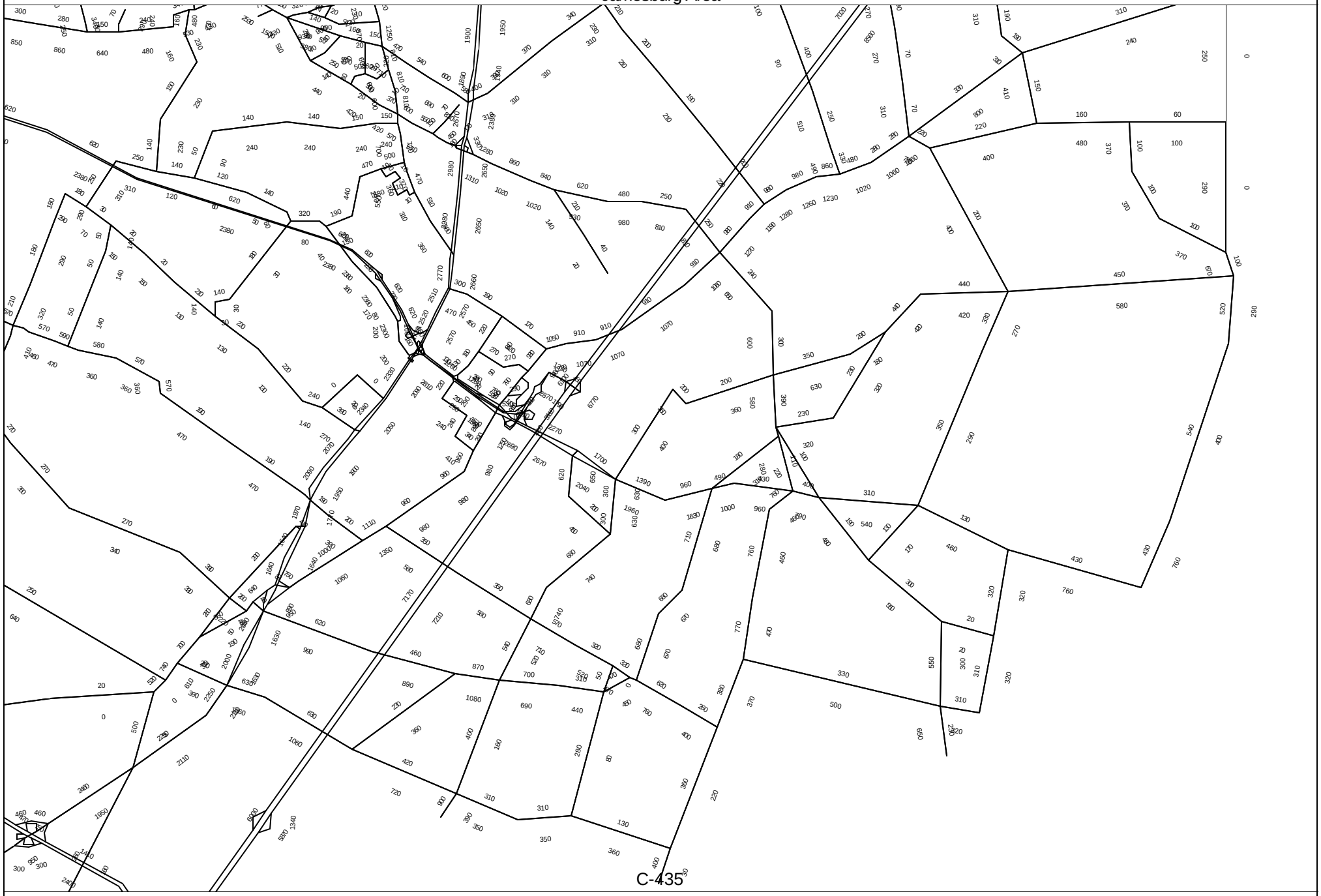
2028 Build Route 92 - PM Projected Volumes
North Brunswick / Kendall Park Area

TP+ software by Citilabs 1/30/03 14:39 Licensed to: Garmen Associates

2028 Build Route 92 - PM Projected Volumes
Kendall Park Zoom-In

TP+ software by Citilabs 1/30/03 14:39 Licensed to: Garmen Associates

2028 Build Route 92 - PM Projected Volumes
Jamesburg Area



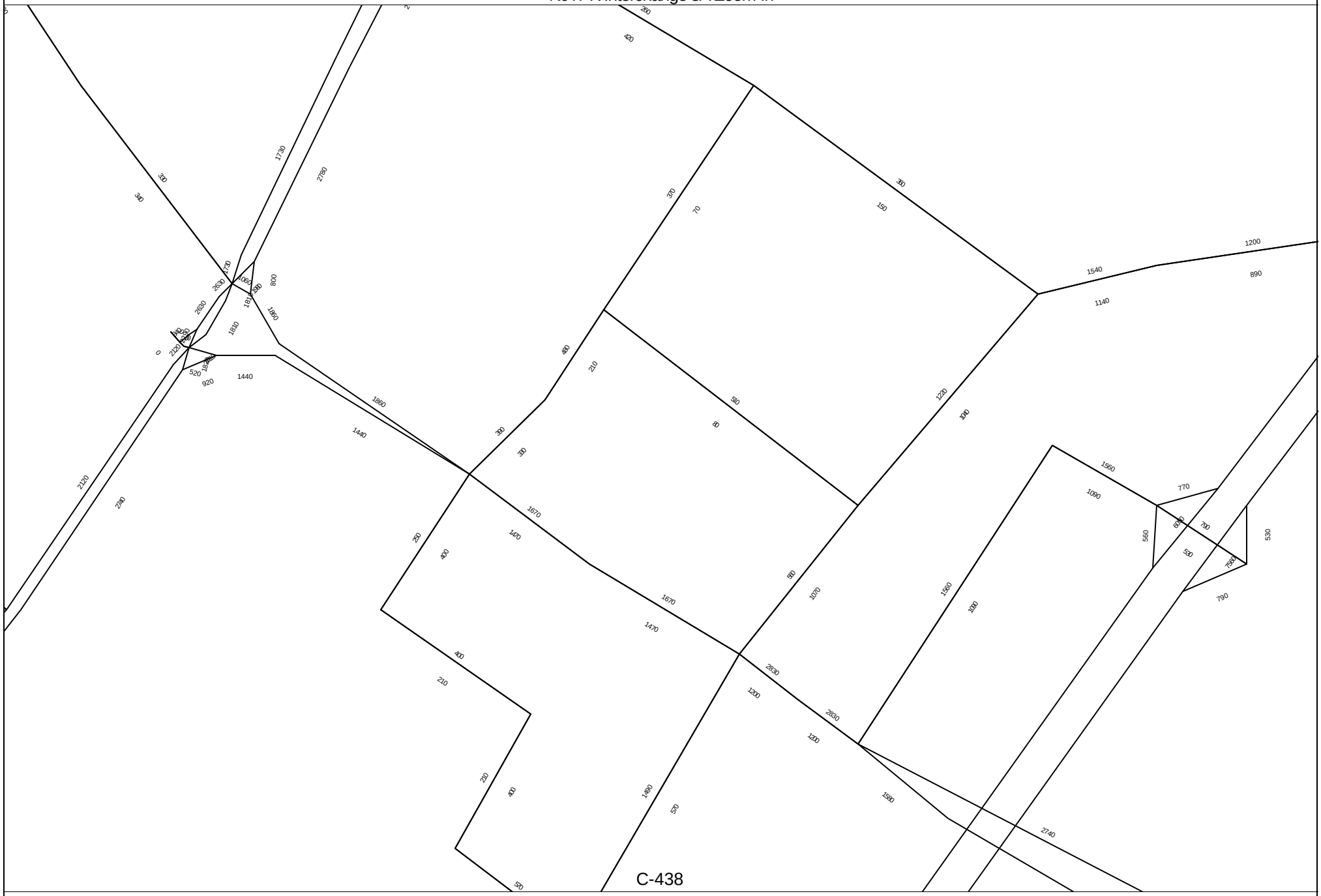
TP+ software by Citilabs 1/30/03 14:39 Licensed to: Garmen Associates

5.9 2028 AM Route 1 – 6 Lanes, No Signals Volumes

2028 Route 1 - 6 Lanes, No Signals - AM Projected Volumes
Route 92 Area

TP+ software by Citilabs 1/31/03 10:11 Licensed to: Garmen Associates

2028 Route 1 - 6 Lanes, No Signals - AM Projected Volumes
NJTPK Interchange 8A Zoom-In



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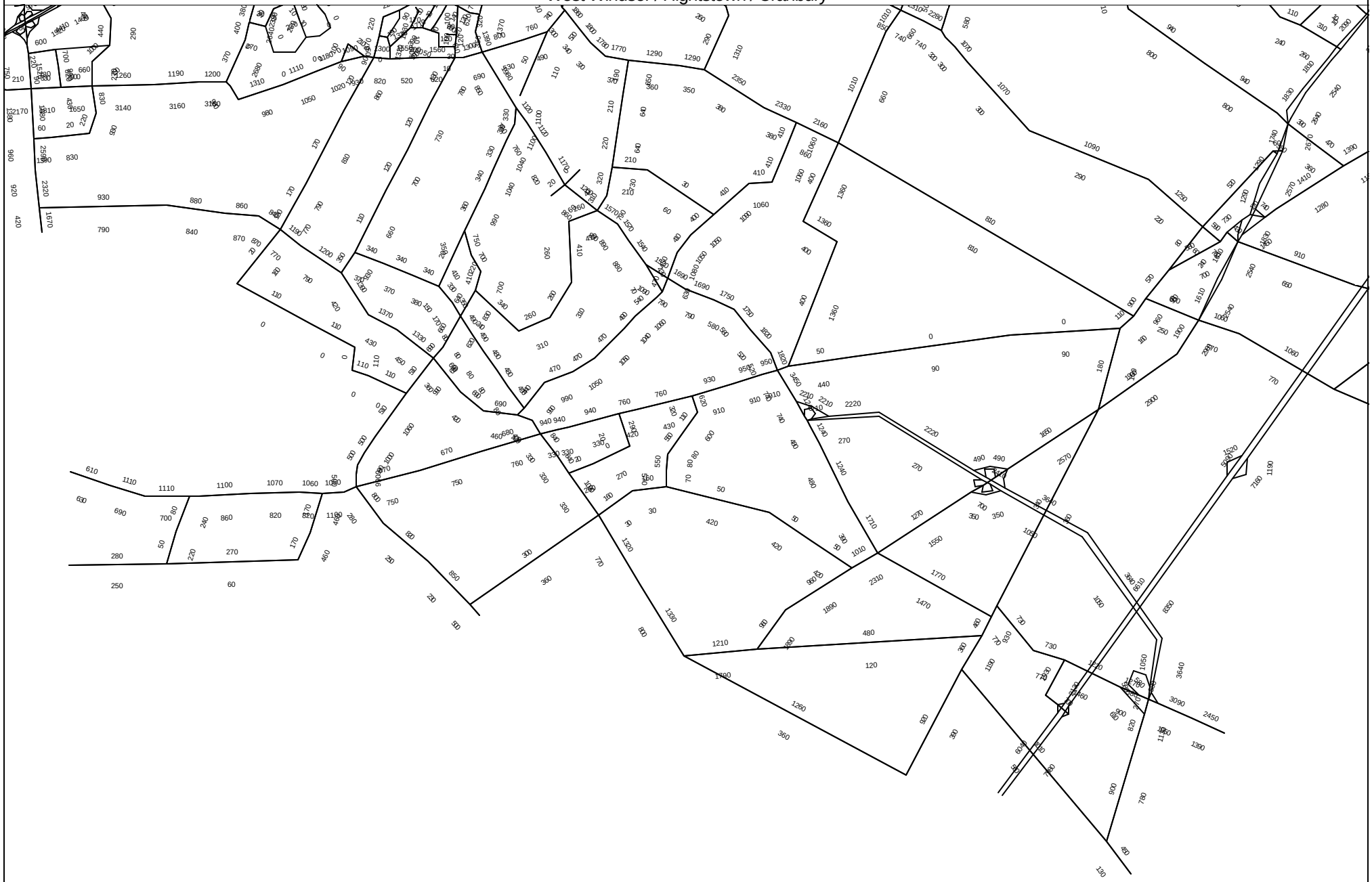
2028 Route 1 - 6 Lanes, No Signals - AM Projected Volumes
West Windsor / Hightstown / Cranbury



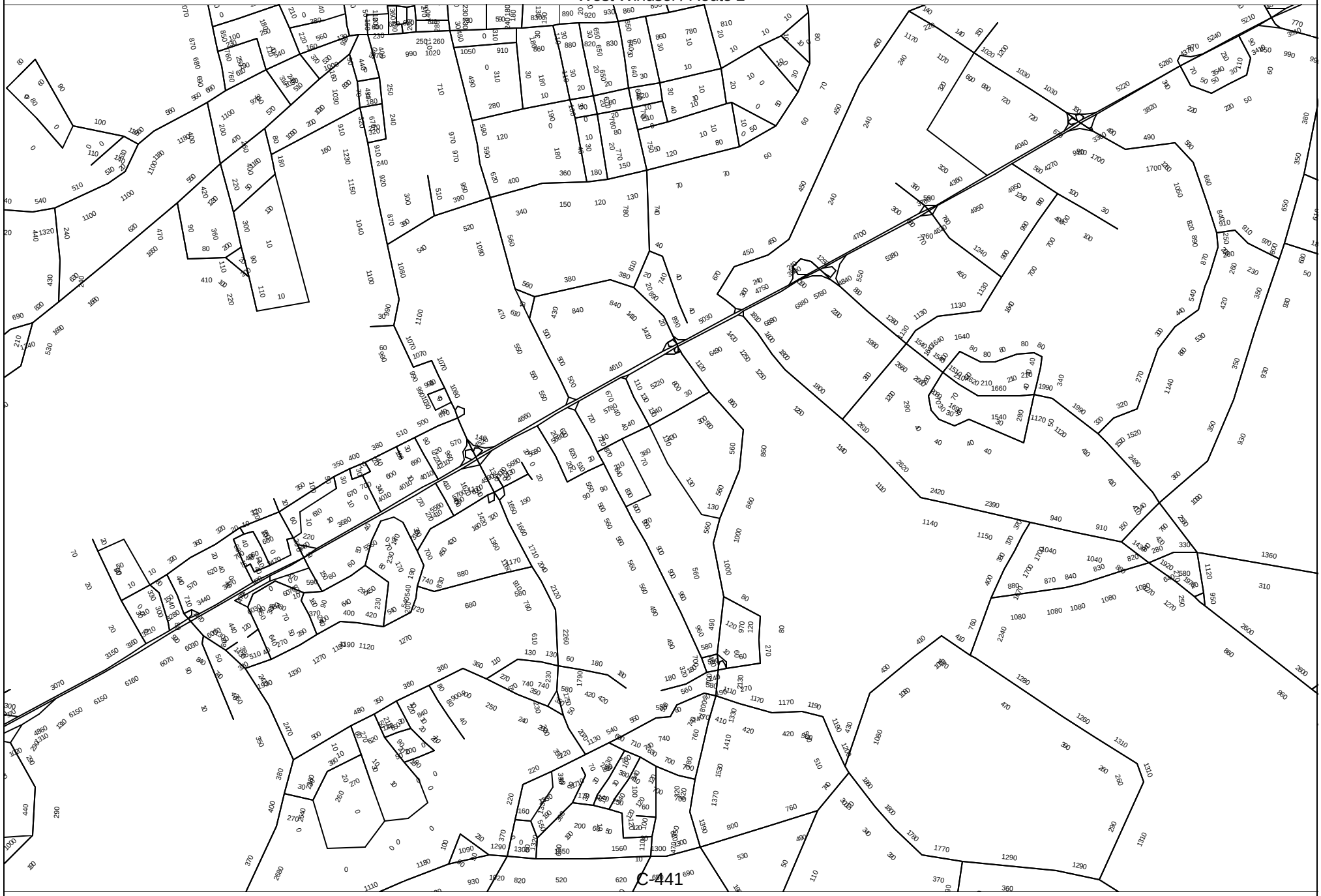
TP+ software by Citilabs 1/31/03 10:11 Licensed to: Garmen Associates

2028 Route 1 - 6 Lanes, No Signals - AM Projected Volumes
Route 1 / Nassau Park Blvd

TP+ software by Citilabs 1/31/03 10:11 Licensed to: Garmen Associates

2028 Route 1 - 6 Lanes, No Signals - AM Projected Volumes

West Windsor / Route 1



TP+ software by Citilabs 1/31/03 10:11 Licensed to: Garmen Associates

2028 Route 1 - 6 Lanes, No Signals - AM Projected Volumes
Central West Windsor

TP+ software by Citilabs 1/31/03 10:11 Licensed to: Garmen Associates

2028 Route 1 - 6 Lanes, No Signals - AM Projected Volumes
Princeton Township

TP+ software by Citilabs 1/31/03 10:11 Licensed to: Garmen Associates

2028 Route 1 - 6 Lanes, No Signals - AM Projected Volumes
Princeton Boro

TP+ software by Citilabs 1/31/03 10:11 Licensed to: Garmen Associates

2028 Route 1 - 6 Lanes, No Signals - AM Projected Volumes
Downtown Princeton

TP+ software by Citilabs 1/31/03 10:11 Licensed to: Garmen Associates

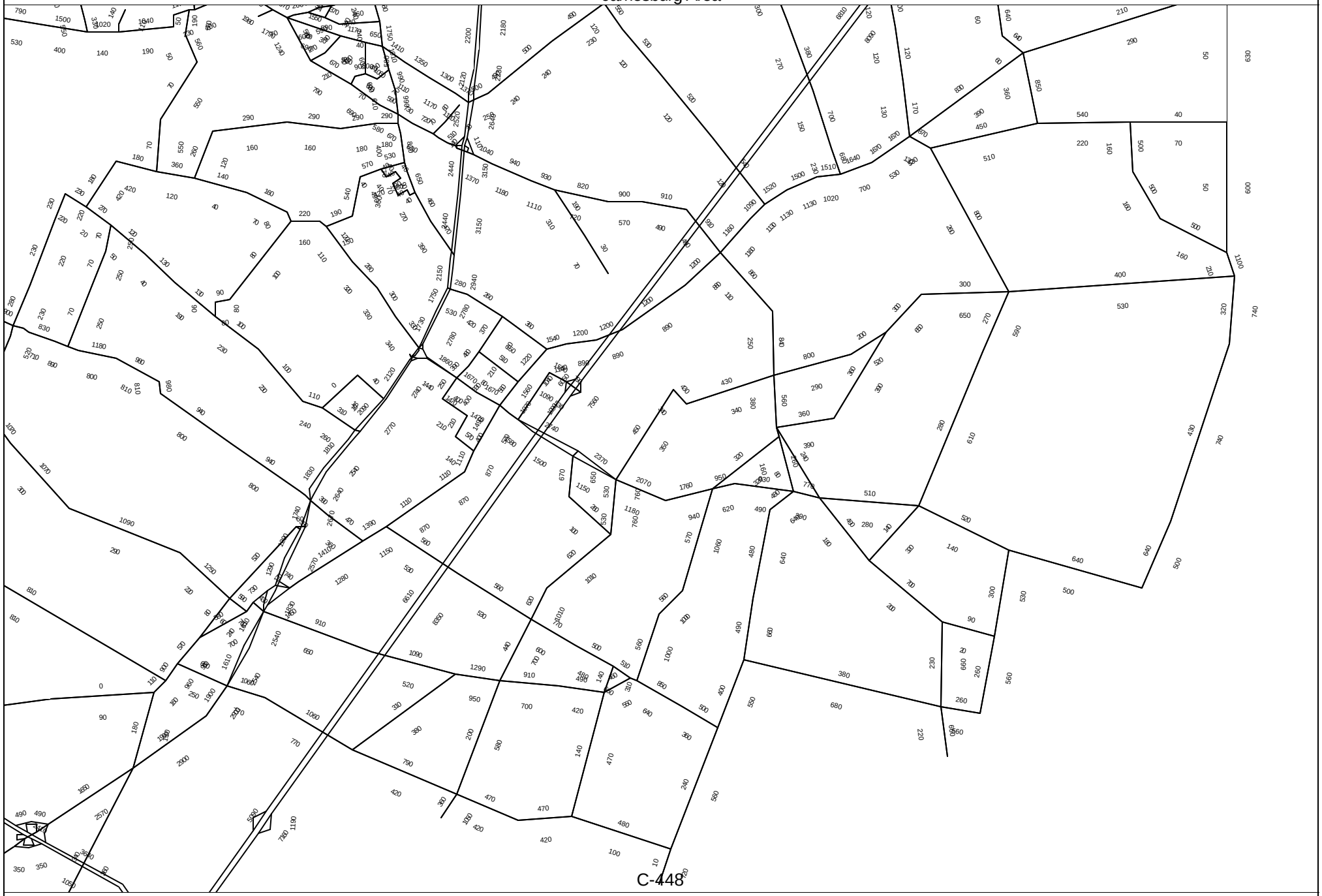
2028 Route 1 - 6 Lanes, No Signals - AM Projected Volumes
North Brunswick / Kendall Park Area

TP+ software by Citilabs 1/31/03 10:11 Licensed to: Garmen Associates

2028 Route 1 - 6 Lanes, No Signals - AM Projected Volumes
Kendall Park Zoom-In

TP+ software by Citilabs 1/31/03 10:11 Licensed to: Garmen Associates

2028 Route 1 - 6 Lanes, No Signals - AM Projected Volumes
Jamesburg Area



TP+ software by Citilabs 1/31/03 10:11 Licensed to: Garmen Associates

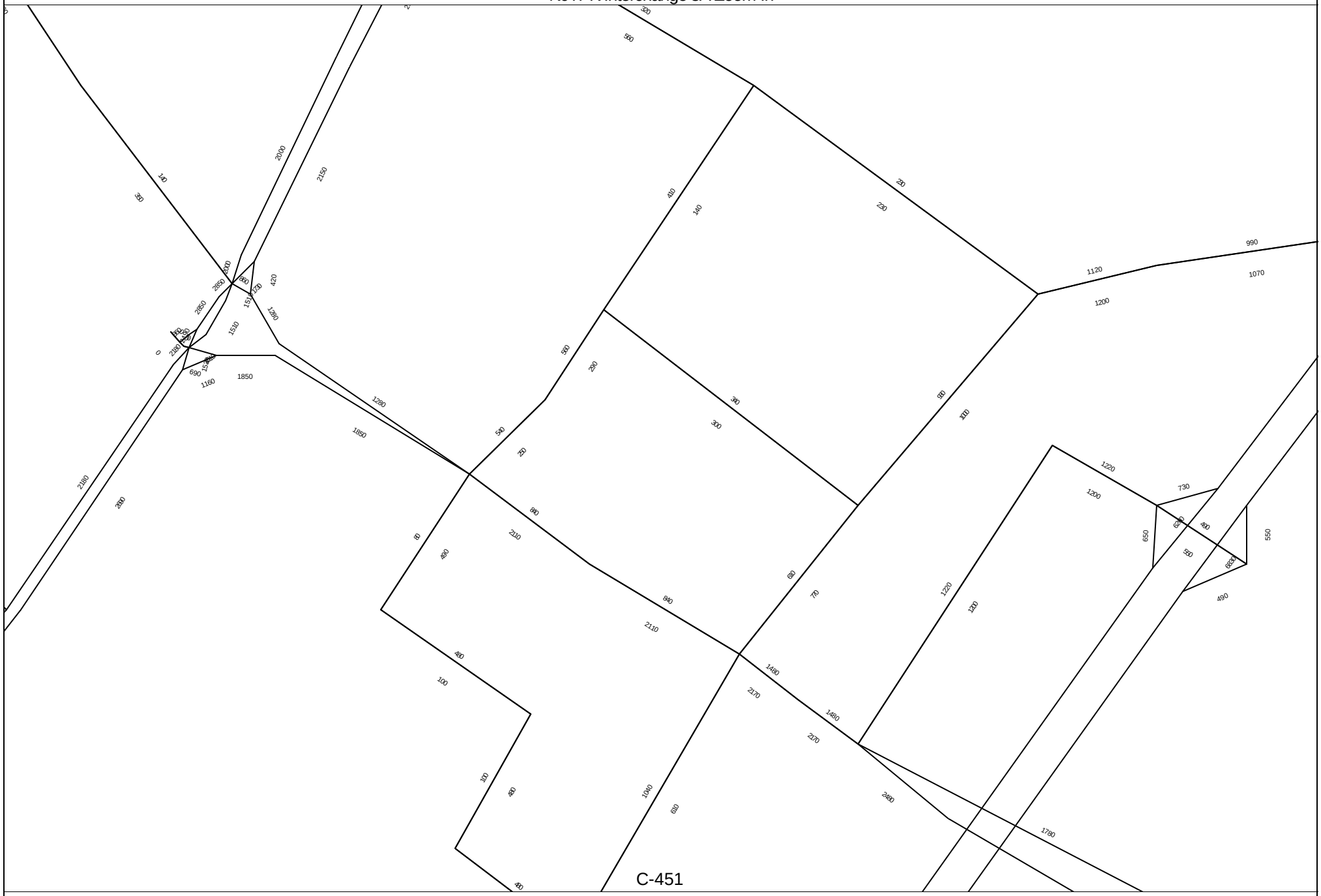
5.10 2028 PM Route 1 – 6 Lanes, No Signals Volumes

2028 Route 1 - 6 Lanes, No Signals - PM Projected Volumes
Route 92 Area

C-450

TP+ software by Citilabs 1/30/03 18:17 Licensed to: Garmen Associates

2028 Route 1 - 6 Lanes, No Signals - PM Projected Volumes
NJTPK Interchange 8A Zoom-In



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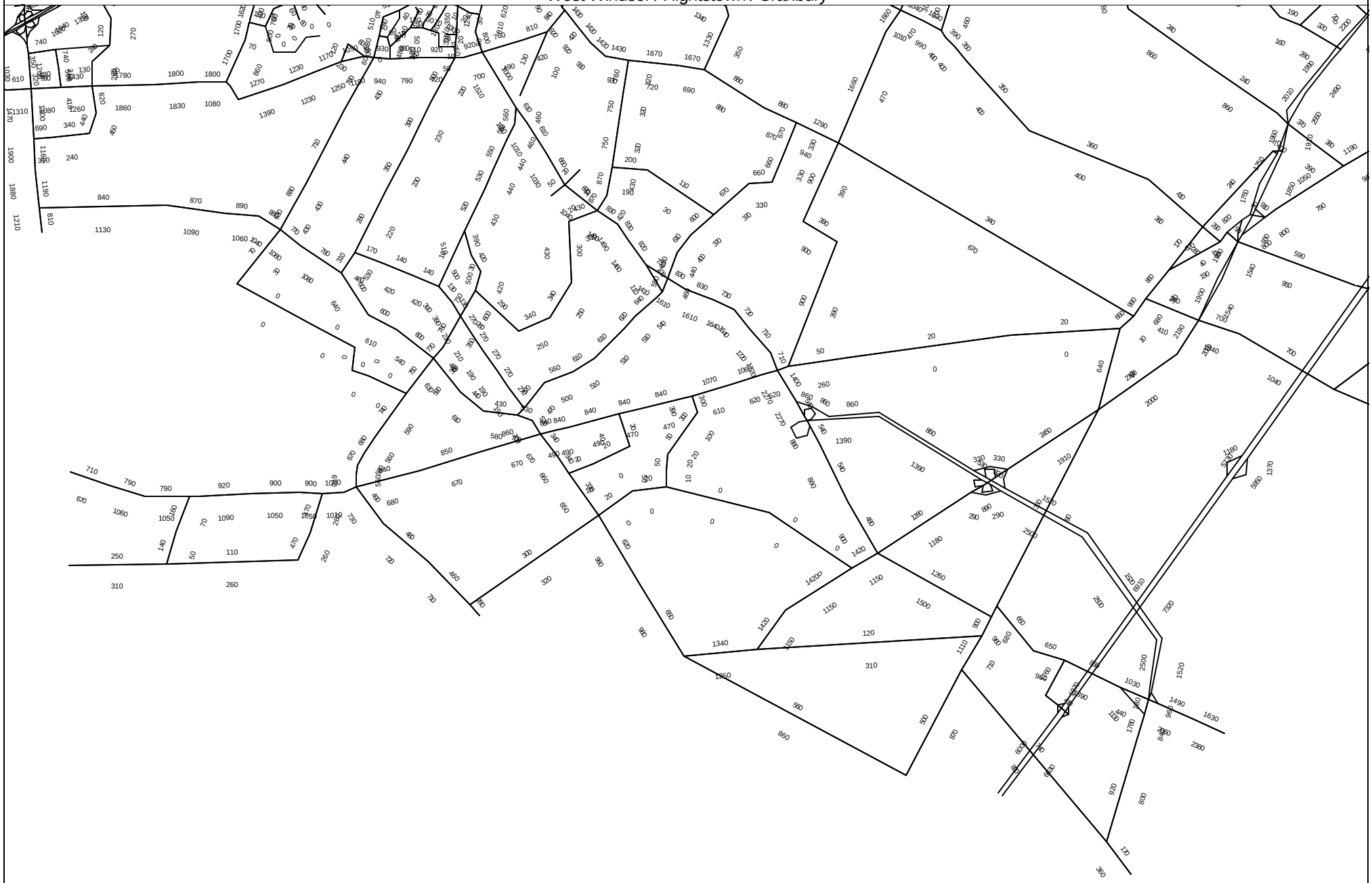
2028 Route 1 - 6 Lanes, No Signals - PM Projected Volumes
West Windsor / Hightstown / Cranbury



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2028 Route 1 - 6 Lanes, No Signals - PM Projected Volumes
Route 1 / Nassau Park Blvd

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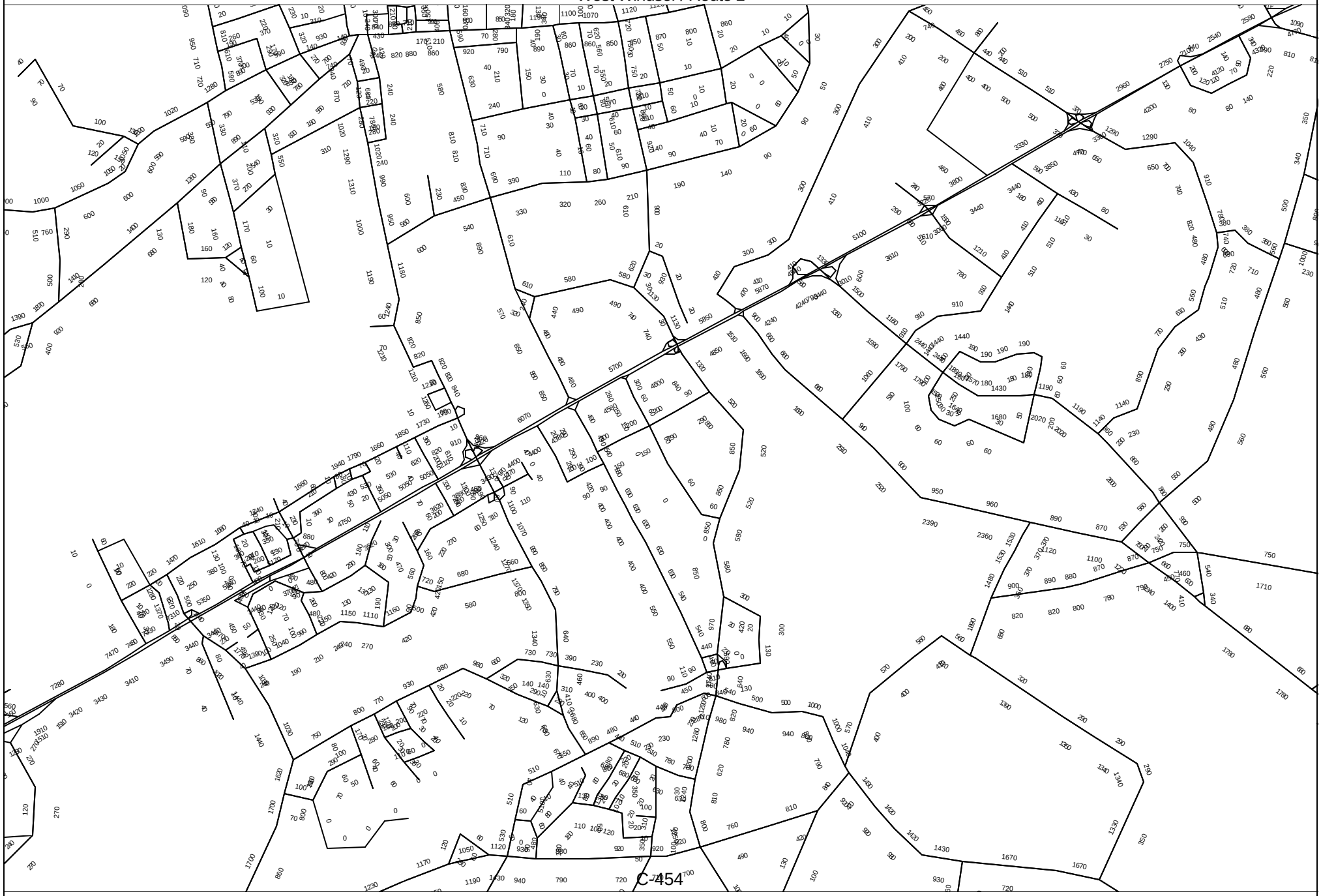
2028 Route 1 - 6 Lanes, No Signals - PM Projected Volumes

West Windsor / Route 1



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2028 Route 1 - 6 Lanes, No Signals - PM Projected Volumes
Central West Windsor

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2028 Route 1 - 6 Lanes, No Signals - PM Projected Volumes
Princeton Township

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2028 Route 1 - 6 Lanes, No Signals - PM Projected Volumes
Princeton Boro

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2028 Route 1 - 6 Lanes, No Signals - PM Projected Volumes
Downtown Princeton

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2028 Route 1 - 6 Lanes, No Signals - PM Projected Volumes
North Brunswick / Kendall Park Area

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2028 Route 1 - 6 Lanes, No Signals - PM Projected Volumes
Kendall Park Zoom-In

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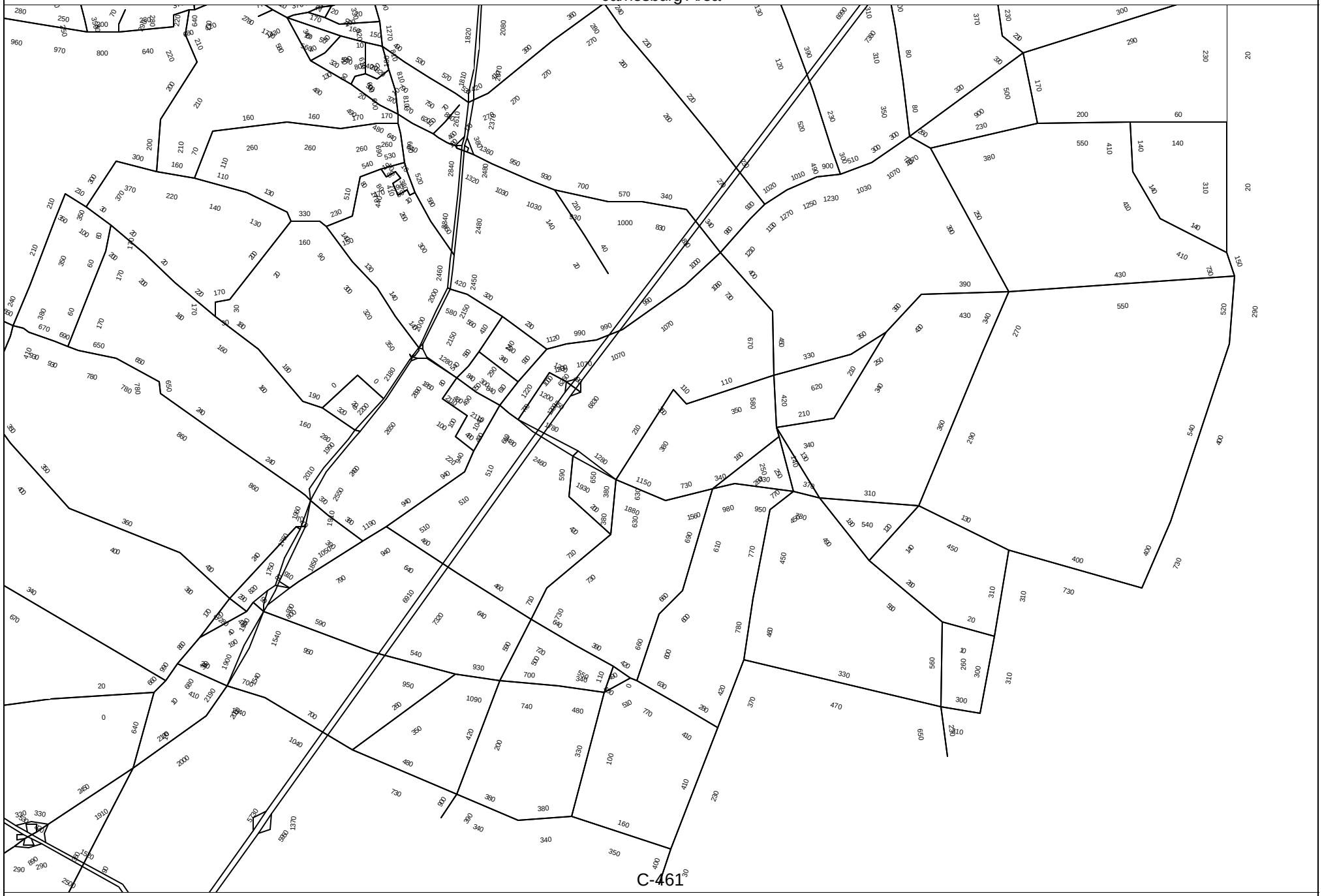
2028 Route 1 - 6 Lanes, No Signals - PM Projected Volumes
Jamesburg Area



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Appendix D
Noise

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Noise

1.0 Introduction

This technical report presents the results of the noise monitoring and modeling impact analysis for the Route 92 Environmental Impact Statement (EIS). The proposed project would be a four-lane wide highway that would extend from Route 1 to the New Jersey Turnpike Interchange 8A. Noise monitoring and modeling was conducted based on procedures presented in:

- New Jersey Turnpike Authority (NJTA), Policy for Construction of Sound Barriers, October 24, 1991;
- Federal Highway Administration (FHWA), *Highway Traffic Noise Analysis and Abatement Policy and Guidance, June 1995*; and
- New Jersey Department of Transportation (NJDOT) *Highway Traffic Noise Policy Technical Appendix, December 2000*.

Noise monitoring and detailed modeling was only conducted for the New Jersey Turnpike Authority's (NJTA) preferred alignment. This analysis was built upon the noise monitoring and modeling results from the *Proposed Route 92 Draft Environmental Impact Statement, April 1994 (Draft EIS)*. The purpose of this noise impact analysis was to assess the potential for sensitive receivers to be adversely affected by NJTA's preferred alignment, and if necessary, to evaluate the benefits of noise barriers.

For comparison purposes, a screening-level noise modeling analysis was conducted for two Route 1 improvement alternatives. Both alternatives include widening Route 1 from four to six lanes; however, one alternative assumes no realignment changes to the existing interchanges while the other alternative reduces the number of signalized intersections and redesigns five of the interchanges.

The following Route 92 traffic scenarios were evaluated in a quantitative noise impact analysis:

- Existing Year or Baseline Year (2002),
- Horizon Year (2028) EPA Modified No-Build;
- Horizon Year (2028) Route 1 Six Lane Improvement with Signalization
- Horizon Year (2028) Route 1 Six Lane Improvement without Signalization, and
- Horizon Year (2028) No-Build and Build.

In addition, a qualitative screening-level analysis of three sub-alternatives to the four-lane Route 92 alternative was conducted to determine how their transportation and environmental impacts might be different from the proposed four-lane Route 92.

These sub-alternatives, which are fundamentally modified designs and implementations of the currently proposed Route 92 project, include:

- Two-lane design for proposed Route 92
- Phased construction of proposed Route 92 (two-lane highway initially; demand-based expansion to four lanes at a later date);
- Four-lane Route 92 without the Perrine Road interchange

The noise descriptors and applicable noise impact criteria are described in Section 2. Section 3 presents the procedures and results for the existing noise monitoring program conducted along the Route 92 corridor. Section 4 describes the noise modeling procedures and presentation of modeling results, and proposed mitigation measures. Conclusions are presented in Section 5. FHWA reference documents used for this noise modeling analysis are presented in Section 6. Following the text, the noise modeling spreadsheets summarizing the results of the noise modeling analysis are presented.

2.0 Noise Descriptors and Criteria for Assessment

Noise is measured in decibels (dB) and is a measurement of sound pressure level. The human ear perceives sound, which is mechanical energy, as pressure on the ear. The sound pressure level is the logarithmic ratio of that sound pressure to a reference pressure, and is expressed in decibels. Environmental sounds are measured with the A-weighted scale of the sound level meter. The A scale simulates the frequency response of the human ear, by giving more weight to the middle frequency sounds, and less to the low and high frequency sounds. A-weighted sound levels are designated as dBA. **Figure 1** shows the range of sound levels for common indoor and outdoor activities, in dBA.

The impact of increasing or decreasing noise levels is presented in **Table 1.** For example, it shows that a change of 3 dBA is barely perceptible and that a 10-dBA increase or decrease would be perceived by someone to be doubling or halving of the noise.

Table 1
Decibel Changes, Loudness, and Energy Loss

Sound Level Change (dBA)	Relative Loudness	Acoustical Energy Loss (%)
0	Reference	0
-3	Barely Perceptible Change	50
-5	Readily Perceptible Change	67
-10	Half as Loud	90
-20	1/4 as Loud	99
-30	1/8 as Loud	99.9

Source: FHWA, Highway Traffic Noise Analysis and Abatement Policy and Guidance, June 1995.

COMMON OUTDOOR NOISES	Sound Pressure (uPa)	Sound Pressure (dB)	COMMON INDOOR NOISES
Jet Fly Over at 300 feet	6,324,555	110	Rock Band at 15 feet
Gas Lawn Mower at 3 feet	2,000,000	100	Inside Subway Train (New York)
Diesel Truck at 50 m	632,456	90	Food Blender at 3 feet
Noisy Urban Daytime	200,000	80	Garbage Disposal at 3 feet Shouting at 3 feet
Gas Lawn Mower at 100 feet Commercial Area	63,246	70	Vacuum Cleaner at 10 feet Normal Speech at 3 feet
	20,000	60	Large Business Office
Quiet Urban Daytime	6,325	50	Dishwasher Next Room
Quiet Urban Nighttime Quiet Suburban Nighttime	2,000	40	Small Theatre, Large Conference Room Library
Quiet Rural Nighttime	632	30	Bedroom at Night Concert Hall (Background)
	200	20	Broadcast and Recording Studio
	63	10	Threshold of Hearing
	20	0	

Source: FHWA, Noise Fundamentals Training Document, "Highway Noise Fundamentals," September 1980.

Figure 1
Common Indoor and Outdoor Noises

The applicable regulatory noise standard proposed for this roadway project is the FHWA noise abatement criteria (NAC) (23 CFR Part 772). The FHWA noise abatement criteria, presented in **Table 2**, are based on specific land use categories. There are two optional noise descriptors: the one-hour L_{10} and the one-hour L_{eq}. The L_{10} is the sound level that is exceeded 10 percent of the time (the 90th percentile) for the period under consideration. The L_{eq} is defined as the equivalent steady-state sound level, which in a stated period of time contains the same acoustic energy as the time-varying sound level during the same period (FHWA, *Federal-Aid Highway Program Manual, Volume 7, Chapter 7, Section 3, August 9, 1982*). The regulations specify using either one or the other, but not both to determine noise impacts. For this project, the one-hour L_{eq} noise level descriptor was used.

Table 2
FHWA Noise Abatement Criteria

Activity Category	L_{eq}(1hr) [1] (dBA)	Description of Activity Category
A	57 (exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve intended purpose.
B	67 (exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	52 (interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Note: [1] No single hourly average L_{eq} in a 24-hour day can exceed this value.
Source: *23 CFR Part 772.*

Land uses along the study area corridor are predominantly Activity Categories B and C. The FHWA noise standards indicate that noise mitigation must be considered when the Horizon-Year project levels approach or exceed the stated noise abatement criteria. In addition, the FHWA noise standards also require that noise mitigation must be considered when the Horizon-Year project levels "substantially" exceed existing noise levels. The NJTA noise policy only considers noise abatement measures for those residential dwellings (Activity Category B) subject to noise levels that exceed 67 dBA that are immediately adjacent to the Turnpike right-of-way. The NJTA noise policy does not address other Activity Categories or incremental noise impacts. The NJDOT policy defines "approach the noise abatement criteria" (23 CFR 772.5(g)) as 1 dBA below the NAC and defines "substantially" as a predicted incremental impact equal to or greater than 10 dBA over existing noise levels. For the purposes of this noise impact analysis, the criteria used to determine the need for noise mitigation are:

- FHWA NAC of 67 dBA and 72 dBA for Activity Categories B and C, and
- A predicted incremental noise level increase of 10 dBA or greater over existing noise levels.

3.0 Existing Noise Monitoring Program

The goals of the noise monitoring program were to capture representative samples of existing noise levels at sensitive receptor locations in the proposed Route 92 project area and to update the noise level data previously collected for the NJTA 1994 DEIS.

The data collection was conducted as outlined in the FHWA document *Measurement of Highway-Related Noise* (1996).

The following sections describe the measurement locations, noise monitoring procedures and equipment to be used for the field program and results of the noise monitoring program.

3.1 Noise Monitoring Location Selection

Three 15-minute data sets were collected at each of seven monitoring locations, as shown in **Figure 3-20** in Section 3 of the EIS (not in this appendix). **Table 3** lists these locations, and contains a brief rationale for the selection of each site. The locations are numbered starting from the east end of the corridor and heading west. This was accomplished by making successive "loops" through all the monitoring locations. Monitoring locations along the Route 92 corridor were selected near receivers that have land use categories that correspond to the most stringent FHWA noise criteria and that are located closest to the NJTA preferred alternative corridor. In addition, some of the monitoring locations are the same as those used in the 1994 DEIS. The purpose of selecting the same monitoring locations was to document any changes in ambient noise level conditions since 1986 and 1993.

Table 3
Monitoring Locations

Monitoring Location	Description	Selection Rationale
1	Route 32 commercial area between Exit 8A and Route 130	Represents commercial development area
2	West of Residence (84 Friendship Road)	Represents nearest residence near the proposed Route 92 and near a previous monitoring location
3	Residence east of Harmony Lane and north of Friendship Road	Represents residential area north of proposed Route 92
4	Residential area on Friendship Road (east of 273 Friendship Road)	Represents nearby residential area and current east/west Friendship Road traffic and was a previous monitoring location
5	End of Silvers Lane (Perrine Road residential subdivision)	Represents nearby residential area south of the proposed Route 92; previous monitoring location
6	Perrine Road residence	Represents a residence north of the proposed Route 92 and near the Perrine Road reroute
7	Boy Scout Council	Represents institutional area adjacent to Route 1; previous monitoring location

The land use category for each receptor was determined using aerial photographs and design plans and drawings. The monitoring locations are selected to represent residential and commercial areas along the proposed roadway corridor. These locations were selected so they can be evaluated in the noise impact analysis. Other

criteria used to select monitoring locations include: 1) placement of monitoring locations in area of frequent human use, 2) representation of residential and commercial areas along the corridor, and 3) collection of measurements near other existing noise sources.

3.2 Equipment

A Quest 1900 Type I Precision Sound Level Meter (SLM) was used to collect ambient noise level data. The sound level meter is factory calibrated. The Quest 1900 SLMs will collect 15-minute measurements at each monitoring location and was calibrated with a sound calibrator before the first reading of the day. At the end of each 15-minute monitoring period, the calibration was checked and end-calibration values were recorded on the field data sheets.

In addition to collecting noise data, the field crew noted general weather conditions: average temperature, wind speed and sky conditions at each monitoring location.

The sound level meter was equipped with a windscreen and placed on a tripod approximately five feet above ground, and not less than 10 feet away from any reflective surfaces at each monitoring location. In addition, the noise monitor was set up a minimum of 50 feet from the edge of the roadway.

A "random-incidence" microphone was used. This microphone is capable of capturing uniform weighted frequency and sound pressure levels for incoming sound from all directions simultaneously if aimed straight up (90° incidence to the sound field). The sound level meter was set for automatically timed integration mode at slow response.

3.3 Measurement Procedures

Field personnel conducted noise monitoring for three (3) time periods (i.e., 6:30 a.m. to 10:00 a.m., 10:00 a.m. to 1:30 p.m. and 3:00 p.m. to 7:00 p.m.) on October 24, 2002. The following data were gathered:

- Continuous energy equivalent A-weighted noise levels (L_{eq})
- Statistical noise levels (L_{90} and L_{10}).

The L_{90} noise level is the sound, in dBA, exceeded 90 percent of the time during the measurement period. The L_{90} is close to the lowest sound level observed during the measurement period. It is essentially the same as the residual sound level, which is the lowest sound level observed when there are no obvious nearby intermittent sources.

The L_{10} noise level is the sound, in dBA, exceeded 10 percent of the time during the measurement period. The L_{10} is close to the maximum sound level observed during the measurement period. The L_{10} is sometimes called the intrusive noise level because it is caused by occasional louder noises like passing motor vehicles.

Although the statistical noise levels (L_{90} and L_{10}) are required to compare with FHWA noise standards for this project, they were taken to provide a more complete picture of noise level distribution at each monitoring location.

Noise monitoring was conducted during fair weather conditions (i.e., dry weather and wind speeds less than 12 miles per hour). The crew, time, wind speed and direction, temperature and general weather conditions were noted at each site before each set of readings.

Dominant noise sources, and direction of dominant noise sources were documented. During noise monitoring if any unusual noise events should occur (e.g., lawn mower), monitoring was interrupted until the unusual noise event stops. Prolonged unusual noise events would require moving the monitoring location or sampling at different time period. These unusual noise events, and noise monitoring stop and start times were noted. For those monitoring locations beside existing roadways, during each 15-minute sample, traffic counts for five types of vehicle classifications (i.e., passenger vehicles, medium truck, heavy truck, bus and motorcycle) were collected at each monitoring location. All field notes, and noise level and traffic count data were recorded on data sheets.

3.4 Noise Monitoring Results

Noise monitoring was conducted during dry, cold and light wind conditions. The results of the noise monitoring program indicated that there was significant variation in ambient noise levels throughout the Route 92 corridor. The daytime L_{eq} noise levels along the corridor ranged from 48 dBA to 71 dBA. The peak L_{eq} noise levels did not exceed the 67 dBA NAC, except at Monitor Location 7 (Boy Scout Council). The lower noise levels were measured in areas away from major roadway arterials and the higher noise levels were measured in areas adjacent to major roadway arterials. This range of noise levels is typical for ambient conditions ranging from quiet residential to urban residential areas adjacent to major roadways. A summary of peak daytime L_{eq} noise levels used to represent existing conditions is presented in **Table 4**.

3.5 Existing and Future No-Build Conditions

Existing noise levels in the project study area were determined through the noise monitoring conducted in 2002 and noise-monitoring data used in the 1994 DEIS. Some of the 2002 noise monitoring locations were the same as those use in the 1994 DEIS. The 1994 DEIS used both noise monitoring data collected in 1993 and 1983 noise levels measured by NJDOT in 1982/1983. Since the 2002 noise monitoring results are similar to those used in the 1994 DEIS, they were used to represent existing conditions at locations where noise monitoring was not conducted in 2002, and to evaluate potential Horizon Year noise impacts.

Table 4
Noise Monitoring Results

Monitoring Location	Description	L_{eq} Noise Level (dBA)		
		Morning	Midday	Afternoon
1	Route 32 commercial area between Exit 8A and Route 130	65.9	65.1	62.1
2	West of Residence (84 Friendship Road)	63.2	56.5	60.7
3	Residential area east of Harmony Lane and north of Friendship Road	61.1	52.4	58.0
4	Residential area on Friendship Road (east of 273 Friendship Road)	60.5	58.4	59.4
5	End of Silvers Lane (Perrine Road residential subdivision)	--	47.8	49.7
6	Perrine Road residence	--	52.0	50.3
7	Boy Scout Council	71.0	--	69.2

Note: -- Noise level measurements were not taken at these times.

The Horizon Year (2028) No-Build alternatives were based on adjusting the existing noise levels by the logarithm of the ratio of 2028 transportation network traffic projections for each Horizon Year alternative to the existing traffic volume. The increase in traffic volume projected for each Horizon Year alternative, excluding the proposed Route 92 alternative, will increase noise levels by about 2 dBA. **Table 8** presents a summary of the Existing and Horizon Year No-Build noise conditions for comparison with predicted noise impacts for the Route 92 Preferred Alignment (See Section 4.3).

4.0 Noise Modeling Analysis

This section describes the noise modeling procedures used to evaluate the Horizon Year (2028) proposed Route 92 project potential traffic noise impacts. In addition, this section will also describe the noise modeling procedures for evaluating potential noise impacts for sensitive receivers that may be impacted by the widening US Route 1 to six lanes as part of the Route 1 six lane improvement alternatives (with and without signalization).

The results of the noise modeling and noise abatement measures evaluation, and the qualitative noise impact of the three Route 92 sub-alternatives are also included in this section.

4.1 STAMINA 2.0 Noise Modeling

4.1.1 Route 92 Preferred Alternative

The STAMINA 2.0/OPTIMA model was used to characterize noise conditions along the proposed Route 92 corridor because of the discovery by FHWA during the preparation of this EIS that the Traffic Noise Model (TNM) Version 2 has a bias to

over-predict highway traffic noise levels. As of October 10, 2002, the FHWA decided to delay the use of TNM because recent validation test results of the model indicated a general over-prediction in highway traffic noise levels when compared to field-measured data, which requires calibrating the model with field measurements to remove this over-prediction bias. Until the TNM software could be modified, FHWA recommended that State DOT and regional FHWA divisions decide whether projects should use STAMINA 2.0/OPTIMA or TNM (*J.M. Shrouds, Director, Office of Natural and Human Environment, Highway Traffic Noise – FHWA Traffic Noise Model Validation and Phase-In, October 10, 2002*). The New Jersey FHWA division recommended that STAMINA 2.0/OPTIMA be used for this project since the noise analysis was expected to be completed before the release of the corrected TNM (*Telephone Conversation between Marc Wallace, CDM and Jeanette Mar, FHWA New Jersey Division, October 25, 2002*). The Corp of Engineers also agreed that STAMINA 2.0/OPTIMA should be used for this EIS noise impact analysis based on the New Jersey FHWA division recommendation.

The STAMINA 2.0 highway noise model was used to characterize noise conditions along segments of the Route 92 corridor study area. Model input parameters include:

- length of road segments;
- receivers locations;
- grade adjustment;
- structure barrier effects;
- shielding factors;
- alpha factors (reflectiveness of surface);
- vehicle type;
- vehicles per hour; and
- vehicle speed.

The model calculates hourly L_{eq} noise levels for each receptor. Traffic data for the proposed Route 92 alternative, obtained from the traffic modeling analysis, were used in STAMINA 2.0. Each of these data requirements is described in detail in the following subsections.

Data Requirements

Vehicle Type

The program has the capability to handle up to eight vehicle types, but the program default is three acoustical source groups as defined in the *FHWA Highway Traffic Noise*

Prediction Model (1978). These default source groups are automobiles, medium trucks and heavy trucks, and their source heights are fixed at 0.0, 2.3 and 8.0 feet, respectively. The traffic engineer provided traffic data for these vehicle classifications for each roadway segment.

Vehicles per Hour
The STAMINA 2.0 model requires traffic flow in vehicles per hour. The traffic engineer provided peak hour traffic counts for each vehicle type for the Route 92 Alternative for 2028.

Vehicle Speed
The STAMINA 2.0 model accepts vehicle speeds between 30 and 65 mph, inclusive. The traffic projections for the Horizon Year included vehicle speeds for each roadway segment along proposed Route 92. Vehicle speeds ranged from less than 5 mph up to 53 mph. For those projected vehicle speeds less than 30 mph, the vehicle speeds were set to 30 mph.

Length of Road Segments
The STAMINA 2.0 model is capable of handling up to 30 roadways each with 14 segments. Route 92 and intersecting roadways were modeled as 73 roadways with over 300 roadway segments. Roadways were divided into these segments based on changes in roadway horizontal alignments, traffic data and traffic direction (northbound and southbound). Roadway coordinates were obtained from plans provide by the NJTA. Three separate model runs were setup to model the proposed Route 92 for the 2028 Horizon Year.

Grade Adjustment
Grade adjustments allow the model to adjust the noise emissions for heavy trucks going up or down steep grades. STAMINA 2.0 calculates roadway grades using the roadway coordinates that define each roadway segment. Increases in noise level emissions of +1 dB per percent grade increase caused by heavy trucks traversing steep grades are limited to roadway grades of 3 to 7 percent. It was determined, based on design plans, that the overall grade for Route 92 and associated interchanges was generally flat +/- 0 to 2 percent; therefore, no grade adjustments were used in STAMINA 2.0.

Receivers
The STAMINA 2.0 model allows up to 40 receivers to be used. Receivers representing sensitive land uses and receivers near each noise monitoring locations were modeled. Receptor locations represented residential and commercial areas within 200 feet of either side of the proposed Route 92. Twelve receivers were used to represent residences (Activity Category B) and 10 receivers were used to represent commercial development (Activity Category C) along the study area for a total of 22 receivers. Of these 22 receivers, 15 represent noise monitoring locations. **Table 5** presents a list of noise modeling receivers. **Figures 2 through 6** also show the location of each of the receivers along the Route 92 corridor.

Alpha Factor

The use of alpha factors allows the sound propagation rate between the source and the receiver to be changed depending on whether the surface is considered "hard" or "soft". Hard surfaces, such as parking lots, reflect sound. Soft surfaces, such as vegetated areas, absorb some sound energy. The majority of the ground surface between Route 92 and all receivers was characterized as being soft (i.e., vegetated cover). Therefore, the attenuation rate in the model was set to 4.5 dBA per doubling of distance from the roadway.

Shielding Factors

Shielding factors are used to represent additional noise attenuation between the roadway and the receptor, such as buildings, rows of houses, trees or other terrain features. The shielding factors considered in this analysis are presented **Table 6**. A shielding factor correction of 5 dBA was used in this STAMINA 2.0 modeling analysis for the residential receiver located on Silver Lane (R-9), where there is a row of trees.

4.1.2 Route 1 Improvement Alternative with Signalization

The widening of Route 1 from four lanes to six lanes would occur from Perrine Road north to George's Road for both Route 1 improvement alternatives. A travel lane would be added to both sides of Route 1. The Route 1 Improvement Alternative with Signalization would have no changes made to the 15 interchanges along this portion of Route 1, and the Route 1 Improvement Alternative without Signalization would eliminate signalization at 10 of the interchanges and would have five interchanges redesigned. These five interchanges would be:

- Route 1/Adams Lane/Cozzens Lane
- Route 1/Finnegan Lane
- Route 1/Beekman Road/Northumberland Road
- Route 1/New Road
- Route 1/Promenade Boulevard/Route 522

STAMINA 2.0 was used to estimate potential noise impacts for the five redesigned interchanges. The traffic engineer provided the necessary peak hour traffic volumes, vehicle speeds and interchange design information to be used in STAMINA 2.0. The

Table 5
Modeling Receivers

Model Receiver Id.	Monitoring Station Id.	Location Description
C-1	**1**	East of Commerce Dr./South of Rt. 32
C-2	--	West of CR-535/South of Rt. 32
C-3	--	West of CR-535/South of Rt. 32
C-4	--	East of Commerce Dr./South of Rt. 32
C-5	--	West of Herrod Blvd/North of Rt. 32
C-6	--	East of Herrod Blvd/North of Rt. 32
C-7	13	30 Friendship Road
R-13	**2**	West of 84 Friendship Rd.
R-1	12	39 Friendship Road
R-2	P25	84 Miller Road
R-3	9	80 Miller Road
R-4	**3**	194 Friendship Rd.
R-5	**4**	273 Friendship Rd.
R-6	--	287Friendship Road
R-7	--	307 Friendship Road
R-8	7	343 Friendship Road
R-9	**5**, 5	Silvers Lane Dead End
R-10	**6**	100 Perrine Rd.
R-11	**--**	South of Perrine Rd./West of Major Rd.
R-12	**7**, 3	Rt. 1 Boy Scout Council
R-14	--	177 Friendship Road
R-15	--	111 Perrine Road
R-16	--	60-74 Perrine Road
R-17	--	107 Friendship Road
C-9	P22	Tile Institute

Note: Bold values indicate 2002 monitoring locations.

Table 6
Shielding Factors

Types of Shields	Attenuation
Dense Woods	5 dBA for 30 meter depth of woods; Additional 5 dBA for additional 30 meter depth of woods; Maximum of 10 dBA.
Rows of Houses	3 dBA for 40 to 65 percent area; 5 dBA for 65 to 90 percent area; 1.5 dBA for each additional row; Maximum of 10 dBA.
Wall	20 dBA maximum
Earth Berm	23 dBA maximum

Source: Fundamentals and Abatement of Highway Traffic Noise, Report No. FHWA-881-8 EV-73-7976-1,USDOT, Federal Highway Administration, June 1973, Chapter 3.

purpose of this modeling analysis was to determine the distance of the 67-dBA-noise contour. Residential receivers identified near each interchange within the 67-dBA-noise contour were identified as potential impacted receivers.

4.2 FHWA Nomograph Modeling

The FHWA Nomograph Model is based on the FHWA *Highway Traffic Noise Prediction Model* (1978). The purpose of the nomograph modeling was to predict Horizon Year 2028 No-Build and Build noise levels for the Route 1 six lane improvements alternatives with and without signalization. Sixteen residential receivers were identified adjacent to the existing Route 1 alignment. The nomograph modeling was based on peak hour traffic modeling results for 2028 No-Build and the two Route 1 improvement alternatives. Distances from the center of Route 1 are entered into the model along with: 1) the speed of the vehicles for each vehicle category (automobile, medium truck, and heavy truck); 2) roadway grade; 3) shielding factors; 4) ground attenuation (soft or hard); and 5) barrier height, receptor height and barrier to receptor distance. For both Route 1 improvements alternatives a flat roadway grade (0 to 2 percent), no shielding factors, soft ground attenuation, and no barriers were entered into the model. **Table 7** presents the No-Build and Build traffic and vehicle speed data used in the nomograph model.

Table 7
Route 1 Improvement Alternatives
2028 Traffic and Vehicle Speed Data

Scenario	Auto	Truck		Vehicle Speed
		Medium	Heavy	
No-Build Southbound	3,085	60	70	26
No-Build Northbound	2,161	78	90	44
Build South Bound (Signalized)	4,240	81	94	32
Build Northbound (Signalized)	2,392	88	102	48
Build Southbound (Unsignalized)	5,105	97	112	19
Build Northbound (Unsignalized)	2,792	108	123	46

4.3 Modeling Results

4.3.1 Route 92 Existing and Future Modeling Alternatives

The noise modeling results are summarized in **Table 8**. This table presents a summary of the Existing, Horizon Year No-Build and Route 92 Preferred Alignment, and EPA Modified No-Build alternatives noise levels and compares them to the applicable FHWA noise abatement criteria (NAC). Under the Route 92 alternative, eight receivers would experience noise levels exceeding the applicable NAC. Two of the eight are commercial receivers at which the Activity Category C NAC of 72 dBA would be exceeded. Five of the eight receivers are residential receivers that would experience noise levels exceeding the applicable NAC of 67 dBA. One of the eight

Table 8
Summary of Noise Modeling Results (dBA)

Model Receiver Id.[1]	Monitoring Station Id.[2]	Location Description[3]	NAC	Peak Hour L_{eq} Noise Levels (dBA)[4]			
				Existing Year (2002)	EPA Modified No-Build (2028)	Horizon Year (2028) No-Action	Horizon Year (2028) Route 92
				Measured	Estimated	Estimated	Modeled
C-1	**1**	East of Commerce Dr. /South of Rt. 32	C	65.9	67.9	68.0	**72.5**
C-2	--	West of CR-535/South of Rt. 32	C	--	--	--	65.8
C-3	--	West of CR-535/South of Rt. 32	C	--	--	--	68.8
C-4	--	East of Commerce Dr. /South of Rt. 32	C	--	--	--	**73.7**
C-5	--	West of Herrod Blvd/North of Rt. 32	C	--	--	--	71.3
C-6	--	East of Herrod Blvd/North of Rt. 32	C	--	--	--	69.3
C-7	13	30 Friendship Road [ROW]	C	62.0	64.1	64.1	68.7
R-1	12	39 Friendship Road	B	**66.8**	**68.9**	**68.9**	59.3
R-13	**2**	West of 84 Friendship Rd.	B	63.2	65.3	65.3	**68.9**
R-2	P25	84 Miller Road	B	50.0	52.1	52.1	59.1
R-3	9	80 Miller Road	B	55.1	57.2	57.2	55.6
R-4	**3**	194 Friendship Rd.	B	61.1	63.2	63.2	61.7
R-5	**4**	273 Friendship Rd.	B	60.5	62.6	62.6	62.2
R-6	--	287 Friendship Road	B	--	--	--	**71.2**
R-7	--	307 Friendship Road	B	--	--	--	66.2
R-8	7	343 Friendship Road	B	65.2	**67.3**	**67.3**	59.3
R-9	**5**, 5	Silvers Ln. Dead End	B	49.7	51.8	51.8	55.3
R-10	**6**	100 Perrine Rd.	B	54.0	56.1	56.1	61.6
R-11	**--**	South of Perrine Rd./West of Major Rd.	B	--	--	--	59.5
R-12	**7**, 3	Rt. 1 Boy Scout Council [ROW]	B	**71.0**	**73.1**	**73.1**	**71.1**
R-14	**--**	177 Friendship Road	B	--	--	--	**68.6**
R-15	**--**	Perrine Road	B	--	--	--	66.5
R-16	**--**	Perrine Road	B	--	--	--	**68.8**
R-17	**--**	107 Friendship Road	B	--	--	--	**67.2**
C-9	P22	Tile Institute [ROW]	C	64.0	66.1	66.1	68.8
		No. of Receivers Impacted		2	3	3	8

[1]Receiver Id. represents both commercial (C) and residential (R) receivers based on the FHWA Noise Abatement Criteria description.
[2]Bold values indicate 2002 monitoring locations.
[3][ROW] indicates that the receiver would be located in the Route 92 right-of-way.
[4]Bold and shaded values indicate noise levels that exceed the 67 dBA and 72 dBA NAC.

receivers is an institutional receiver (R-12 in Table 8) at which the 67 dBA NAC would be exceeded. This receiver is inside the proposed Route 92 right-of-way (ROW). Properties located within the ROW would be purchased, and, therefore, are not considered to experience noise impacts under the Route 92 alternative.

The comparison of 2028 Route 92 Alternative projected traffic noise levels with existing and 2028 No-Build noise levels indicates that projected noise levels do not exceed the existing noise levels by 10 dBA or greater. The Route 92 alternative traffic noise levels would increase the 2028 No-Build and Existing noise levels by up to 7 to 9 dBA, respectively.

Under the EPA Modified No-Build alternative and the Horizon Year No-Action alternative, two residential receivers and one institutional receiver would be impacted by noise exceeding the applicable NAC in 2028. Under the Route 92 alternative, five residential receivers would be impacted in 2028. Under existing (2002) conditions, the applicable NAC is exceeded at one residential receiver and one institutional receiver.

Modeling spreadsheet outputs for the Route 92 alternative are included following Section 6.

4.3.2 Route 1 Signalized Intersection Alternative STAMINA Modeling Results

The STAMINA 2.0 modeling results for the five redesigned intersections indicated that for the Route 1/Adams Lane/Cozzens Lane interchange and the Route 1/Finnegan Lane interchange that the 67-dBA noise contour would extend approximately 300 feet from the center of the interchange on either side of Route 1. For the other redesigned interchanges (Route 1/Beekman Road/Northumberland Road, Route 1/New Road and Route1/Promenade Boulevard/Route 522) the 67-dBA-noise contour would extend approximately 200 feet from the center of each interchange on either side of Route 1. **Table 9** presents the number of potential residential receivers that would be within the 67-dBA-noise contour for each interchange based on aerial photography. Only one residential receiver would be impacted for three of these interchanges and none would be impacted at the other two interchanges. Since these are not new interchanges, but are only redesigned, the number of potential receivers that would be impacted compared to not redesigning these interchanges should be similar.

4.3.3 Route 1 Six Lane Improvement Alternatives

The nomograph modeling results indicated that during peak AM traffic conditions the No-Build Route 1 configuration the traffic volumes and speeds would generate noise level of 66 dBA or greater within approximately 150 feet from the center of Route 1 or approximately 150 feet from the edge of Route 1. The 16 residential receivers are within or close to 150 feet from the edge of Route 1. Therefore, these residences would most likely experience noise levels that would approach or exceed the 67 dBA NAC. The adding a lane of traffic to both sides of Route 1 would increase noise levels at 150 feet from the edge of Route 1 by approximately 2 dBA. This increase in noise level is considered barely perceptible. Both Route 1 improvement alternatives would generate a 67-dBA-noise level approximately 200 feet away. **Table 10** presents the modeling results for the Route 1 improvement alternatives.

Table 9
Route 1 (6 Lane) Improvements Alternatives
Horizon Year Modeling Results

Route 1 Redesigned Interchange	**Number of Residential Receivers within the 67-dBA Noise Contour**
Cozzens Lane/Adams Lane	0
Finnegan Lane	1
Beekman Road/Northumberland Road	1
New Road	1
Promenade Boulevard/Route 522	0

Table 10
Route 1 (6 Lane) Improvements Alternatives
Horizon Year Modeling Results

	One Hour L_{eq} Noise Levels (dBA)			
Scenario	**100 ft**	**150 ft**	**200 ft**	**300 ft**
2028 No-Build	69	66	65	62
2028 Build (Signalized)	71	68	67	64
2028 Build (Unsignalized)	71	68	67	64

4.3.4 Route 92 Sub-Alternatives

A qualitative noise impact analysis was conducted to assess the noise impacts of the three sub-alternatives compared to the four-lane Preferred Alternative based on peak hour traffic volumes provided by traffic engineer. The two-lane design alternative at full capacity would generate lower noise levels than the four-lane Preferred Alternative at each of the sensitive receptors because the edge of the roadway would be slightly further from the receptors and there would be an approximately 50-percent reduction in peak hour traffic volumes compared to the four-lane Preferred Alternative. It is anticipated that the reduction in peak hour noise levels would be "perceptible" to "substantial" (5-10 dBA according to FHWA guidance) for those sensitive receivers identified within the corridor area. By 2028, the traffic volumes for the two-lane alternative would be approximately 25 percent lower than proposed Route 92; therefore, peak hour noise levels would still be lower than the preferred alternative, but the difference in noise levels would be "perceptible" (about 5 dBA) and not "substantial" (about 10 dBA).

The four-lane Route 92 without Perrine Road interchange is expected to generate similar noise levels compared to the Preferred Alternative.

4.4 Route 92 Noise Abatement Measures

Although up to six Category B receivers would experience noise levels that equal or exceed the 67 dBA, only five were evaluated for noise abatement measures. The impacted residential receptors located outside the Route 92 ROW are R-6, R-13, R-14, R-16 and R-17. The Boy Scout Council (R-12) is located within the Route 92/Route 1 ROW; therefore, it would be taken by NJTA as part of the Route 92 project. For the commercial receivers (C-1 and C-4) that were predicted to have noise levels equal to or greater than 72 dBA, 23 CFR 722 states that NAC noise levels only apply to areas which have regular human use and do not apply to parking lots, industrial areas, and open spaces. Therefore, FHWA does not require evaluating noise abatement measures reducing exterior noise impacts for commercial land uses. In addition, barriers may not be suitable for commercial development, because they tend to block advertisement and visibility of the development from the street.

Noise abatement measures were evaluated based on procedures provided in FHWA, *Highway Traffic Noise Analysis and Abatement Policy and Guidance* (1995) and NJTA, *for Construction of Sound Barriers* (1991). These noise abatement measures included:

- Traffic management measures (e.g. traffic control devices and signing for prohibition of certain vehicles types, time-use restrictions for certain vehicle types, modified speed limits and exclusive land designations);
- Alteration of horizontal and vertical alignments;
- Acquisition of property rights (either in fee or lesser interest) for the construction of noise barriers;
- Construction of noise barriers (including landscaping for aesthetic purposes) whether within or outside the highway right-of-way;
- Noise insulation of public use or nonprofit institutional structures.

The NJTA traffic noise policy for construction of sound barriers establishes criteria for evaluating noise abatement barriers. These criteria include:

- Noise levels from the Turnpike must be projected to exceed an L_{eq} of 67 dBA at the exterior of the homes immediately adjacent to the Turnpike ROW;
- The Turnpike roadway itself must be at least twelve (12) feet closer to an existing home;
- A proposed barrier must be expected to cause a minimum reduction of four (4) dBA at the home(s);
- The cost of the proposed barrier must be less than $45,000 per dwelling unit to be protected;

- Construction of must be feasible from an engineering perspective in the opinion of the Turnpike Authority; and
- The height of the barrier shall not exceed twenty-six (26) feet, unless the Executive Director determines that extraordinary circumstances justify a higher barrier in a particular case.

The following subsections present the results of the noise abatement evaluation for the impacted receivers.

4.4.1 Traffic Management

In order to achieve a 5-dBA reduction, the speed limit would have to be reduced along designated portions of Route 92 by approximately 25 mph (typically there is about a 1 dBA reduction for every 5 mph reduction in speed). This measure was deemed infeasible, because it would adversely affect traffic flow along Route 92. Other approaches would require limiting truck traffic along Route 92 or restricting the hours truck traffic would be able to access Route 92. Both options are not feasible given that Route 92 would be a major throughway in this region and would be inconsistent with NJTA's goal of improving traffic flow in the Route 92 corridor.

4.4.2 Horizontal and Vertical Alignments

Adjusting the horizontal or vertical alignment of the Preferred Route 92 alignment is not considered a feasible option given that existing vertical alignment is relatively flat and that adjusting the horizontal alignment would require severely affect property owners adjacent to the corridor. In order to achieve a 5-dBA reduction, the road would have to moved approximately double the distance from where it is currently located from each affected receptor. For example, if a receptor were located 100 feet away from the edge of the proposed roadway, it would have to be adjusted another 100 feet away from its existing location.

4.4.3 Noise Insulation

There are no public institutions within the project study area outside the ROW, an investigation of sound insulation is not warranted.

4.4.4 Noise Barriers

Noise barriers are solid obstructions built between the highway and sensitive receivers along the highway. Effective noise barriers can reduce noise levels by 10 to 15 dBA. Barriers can be formed from earthen berms or from high vertical walls. Noise barriers do have limitations. These limitations include:

- To be effective, the barrier should extend four times as far in each direction as the distance from the receiver to the barrier.
- The barrier must be break the line of sight from the roadway to the receptor in order achieve a 5-dBA noise level reduction.

- Openings in noise walls for driveway connections or intersecting streets severely reduce the effectiveness of the barriers.

Noise barriers were evaluated for each of the impacted residential receivers (R-6, R-7, R13, R-14, R-16 and R-17). Initially, a barrier height of 10 feet was evaluated because it is the minimum height that was determine to achieve at least a 4-dBA noise level reduction for most of the receivers. A length of 600 feet erected at the ROW was evaluated to try and achieve the necessary 4-dBA-noise reduction at each receiver. However, a barrier of these dimensions did not meet the necessary 4-dBA-noise reduction for receivers R-16 and R-17, and therefore, a barrier height of 12 feet was evaluated. The additional 2-foot increase in barrier height did increase the noise reduction by an additional 1 dBA. However, both the 10-foot and 12-foot barrier heights would not meet the NJTA cost criteria of $45,000 per residential dwelling. Therefore, a sound barrier is not recommended for any of these locations. **Table 11** presents a summary of the barrier evaluation.

Table 11
Noise Barrier Evaluation

OPTIMA Modeling Results					Receptor Data	
Barrier Dimensions			Cost	Max. Insertion Loss	No. of Benefited	Cost/Receptor
height (ft)	length (ft)	area (ft2)	($)	(dB)	Receptors	($)
Receiver R-6 Sound Barrier						
10	600	6,000	120,000	7	1	120,000
Receiver R-13 Sound Barrier						
10	600	6,000	120,000	5	1	120,000
Receiver R-14 Sound Barrier						
10	600	6,000	120,000	5	1	120,000
Receiver R-16 Sound Barrier						
10	600	6,000	120,000	3	1	120,000
12	600	7,200	144,000	4	1	144,000
Receiver R-17 Sound Barrier						
10	600	6,000	120,000	3	1	120,000
12	600	7,200	144,000	4	1	144,000

Note: $20 per square foot of barrier was used as a cost estimation for evaluating cost effectiveness.

4.5 Construction Noise

Construction noise impacts were evaluated based on the steps specified in accordance with the FHWA Technical Advisory Memorandum *Analysis of Highway Construction Noise* (1984). Highway construction activities include both mobile and stationary equipment. Mobile equipment such as dozers, scrapers, graders, and haul trucks operate in cyclical manner in which a period of full power is followed by a period of reduced power. Stationary equipment falls into two categories: 1) equipment that operates at a fixed power, such as pumps, compressors and generators; and 2) impact equipment such as pile drivers, jack hammers and pavement breakers. The first group generates a constant background noise level where as the second group generators a much higher noise level, but over a very short time period (FHWA, *Special Report Highway Construction Noise: Measurement, Prediction and Mitigation*, 1987). **Table 12** presents typical maximum noise levels (L_{max}) measured at 50 feet from construction

equipment. Maximum noise levels range from 70 dBA for generators to 90 dBA for a mounted impact hammer at 50 feet away.

Table 12
Typical Construction Equipment Noise Levels

Equipment Category	L_{max} Level (dBA)
Backhoe	80
Chain Saw	85
Compactor	80
Compressors	80
Concrete Mix Truck	85
Concrete Pump	82
Concrete Saw	90
Crane (Mobile or Stationary)	85
Dozer	85
Front End Loader	80
Generator (25 kVA or less)	70
Generator (25 kVA or more)	82
Gradall	85
Grader	85
Jackhammer	85
Mounted Impact Hammer	90
Paver	85
Pneumatic Tools	85
Pumping Equipment	77
Scraper	85
Tractor	84
Vibrator (rollers)	80
All Other Equipment with Engines Larger than 5 HP	85

Source: Noise Control Engineering Journal, Construction Noise Control Program and Mitigation Strategy at the Central Artery Project, 2000 Sep-Oct.

Highway construction is completed in several different phases. These phases are:

- Mobilization
- Clearing and Grubbing
- Earthwork
- Foundations
- Base Preparation
- Paving and Cleanup

Each construction phase should generate short-term noise impacts for noise sensitive land uses adjacent to the proposed Route 92 construction activity. In general, construction noise impacts occur only during daytime working hours of 7:00 a.m. to 7:00 p.m., and should be highest during the clearing and earthwork phases of construction. The noisiest equipment would likely be earthmoving equipment, such as dozers, graders, scrapers and other heavy-duty diesel equipment. Noise levels

decrease by 6 dBA for every doubling of distance. It is anticipated that the daytime L_{max} noise levels would not exceed 80 dBA at 150 feet away and the daytime L_{eq} noise level would not exceed 75 dBA at 150 feet away.

The proposed Route 92 corridor is located in a mix of residential and commercial land uses; therefore, appropriate construction noise mitigation measures will be implemented. For those residential receivers located within the Route 92 right-of-way (ROW), the associated properties will either be purchased or relocated before significant construction begins. For those residential receivers located outside the Route 92 ROW, the following construction noise mitigation measures are recommended:

- Implement a Community Relations Program to inform the public of any potential noise impact and any measures that will be employed to reduce these impacts.
- Coordinate early with the roadway designers to reduce construction noise levels by sequencing construction activities appropriately and to locate noisier activities away from sensitive receivers.
- Ensure that all construction equipment will be equipped with exhaust mufflers, and will be maintained to minimize engine noise.
- Limit construction activities to Monday through Friday from 7 a.m. to 5 p.m.
- Use temporary barriers where it is feasible around any loud stationary equipment that could operate on a 24-hour basis near any sensitive populations.

5.0 Conclusions

The results of the noise monitoring and modeling analysis indicated that traffic noise impacts would occur for eight receivers for the Route 92 alternative. The projected exterior noise levels exceed the FHWA Noise Abatement Criteria for Activity Category B for 5 residences and Activity Category C for 2 commercial locations. The projected noise level increases at these impacted structures would be up to 9 dBA over existing conditions and to 7 dBA over Horizon Year No-Build conditions. The use of noise abatement measures for impacted residential structures are not feasible, as outlined in 23 CFR 772.13(c), and the use of noise barriers to protect the impacted residential structures outside the ROW are found to be ineffective and costly for the Route 92 project.

The comparison of the Route 1 improvement alternatives show that both alternatives would generate similar noise level conditions and that the increase in noise levels over the No-Build scenario would be approximately 2 dBA, which is considered to barely perceptible by humans.

Both two-lane Route 92 sub-alternatives would generated lower noise levels (5-10 dBA) that would be perceived by nearby sensitive receivers to be perceptible to substantial. The four-lane Route 92 without Perrine Road interchange is expected to generate similar noise levels compared to the Preferred Alternative.

6.0 References

FHWA, *Measurement of Highway-Related Noise, FHWA-PD-96-046 DOT-VNTSC-FHWA-96-5*, May 1996.

FHWA, *Highway Traffic Noise Analysis and Abatement Policy and Guidance*, June 1995.

FHWA, *Analysis of Highway Construction Noise, T6160.2*, March 13, 1984.

FHWA, Federal-Aid Highway Program Manual, Volume 7, Chapter 7, Section 3, August 9, 1982.

FHWA, *Procedures for Abatement of Highway Traffic Noise and Construction Noise, 23 CFR 772*, July 8, 1982.

FHWA, *Noise Barrier Cost Reduction Procedure STAMINA 2.0/OPTIMA User's Manual, PB82-218744*, April 1982.

FHWA, *Noise Fundamentals Training Document Highway Noise Measurement*, September 1980.

FHWA, *FHWA-RD 77-108 FHWA Highway Traffic Noise Prediction Model, FHWA-RD-77-108,* December 1978.

FHWA, *Fundamentals and Abatement of Highway Traffic Noise, Chapter 3, Report No. FHWA-881-8EV-73-7976-1*, June 1973.

New Jersey DOT, *Highway Traffic Noise Policy Technical Appendix*, December 2000.

NJTA, *Policy for Construction of Sound Barriers, October 24*, 1991.

Thalheimer, E., Noise Control Engineering Journal, *Construction Noise Control Program and Mitigation Strategy at the Central Artery Project*, pp. 157-165, 2000 Sep-Oct.

M. Wallace, *Telecommunication between Marc Wallace, CDM and Jeanette Mar, FHWA New Jersey Division*, October 25, 2002.

NOISE MONITORING DATA

New Jersey Turnpike Authority
Route 92 Environmental Impact Statement
Sound Level Monitoring
Thursday October 24, 2002

Monitoring Location	Start Time	End Time	Total Time	Leq	L10	L90	L max	L min	L50
Location 1 (Route 32 & Commerce Dr.)	7:13 AM	7:28 AM	15	65.9	68.2	58.1	87.2	55.2	63.9
	12:55 PM	1:10 PM	15	65.1	68.6	52.7	82.8	44.8	61.1
	3:10 PM	3:25 PM	15	62.1	65.4	53.2	72.5	45.0	60.3
Location 2 (West of 84 Friendship Rd.)	7:43 AM	7:58 AM	15	63.2	66.6	50.4	78.1	46.9	59.7
	12:23 PM	12:38 PM	15	56.5	60.3	38.9	78.4	35.0	45.0
	3:48 PM	4:03 PM	15	60.7	63.7	42.1	81.1	36.0	52.4

New Jersey Turnpike Authority
Route 92 Environmental Impact Statement
Sound Level Monitoring
Thursday October 24, 2002

Monitoring Location	Start Time	End Time	Total Time	Leq	L10	L90	L max	L min	L50
Location 3 (194 Friendship Rd.)	8:11 AM	8:26 AM	15	61.1	65.7	46.8	74.4	43.0	55.3
	12:00 PM	12:15 PM	15	52.4	54.3	35.0	72.3	32.8	40.5
	4:14 PM	4:29 PM	15	58.0	62.7	40.4	73.7	28.9	51.1
Location 4 (273 Friendship Rd.)	8:35 AM	8:50 AM	15	60.5	64.1	48.4	83.4	45.6	55.7
	11:30 AM	11:45 AM	15	58.4	62.2	40.1	77.2	36.0	48.4
	4:45 PM	5:00 PM	15	59.4	63.8	44.0	70.7	37.7	55.4

New Jersey Turnpike Authority
Route 92 Environmental Impact Statement
Sound Level Monitoring
Thursday October 24, 2002

Monitoring Location	Start Time	End Time	Total Time	Leq	L10	L90	L max	L min	L50
Location 5 (Silver Ln. dead end)	SKIPPED								
	10:08 AM	10:23 AM	15	47.8	53.1	35.9	64.0	33.1	39.4
	5:35 PM	5:50 PM	15	49.7	53.8	32.9	63.8	30.6	41.0
Location 6 (100 Perrine Rd.)	SKIPPED								
	10:22 AM	10:25 AM	2:45	54.0	58.2	42.5	65.1	39.3	50.1
	10:27 AM	10:40 AM	12:15	52.0	52.5	36.3	71.4	33.8	40.7
	6:03 PM	6:18 PM	15	50.3	53.8	36.9	66.6	32.7	43.0

New Jersey Turnpike Authority
Route 92 Environmental Impact Statement
Sound Level Monitoring
Thursday October 24, 2002

Monitoring Location	Start Time	End Time	Total Time	Leq	L10	L90	L max	L min	L50
Location 7 (Route 1, Boy Scout, NJ)	9:33 AM	9:48 AM	15	71.0	74.3	59.7	82.7	48.1	69.4
	SKIPPED								
	6:35 PM	6:50 PM	15	69.2	72.5	61.4	77.9	52.2	68.2

Round 1
Round 2
Round 3

ROUTE 92 ENVIRONMENTAL IMPACT STATEMENT (EIS)
TRAFFIC COUNT DATA

VEHICLE TYPE	TRAFFIC COUNTS	TOTAL
Automobile	[tally marks] + 1	531
Automobile		
Automobile		
Automobile		
Motorcycle		0
Motorcycle		
Motorcycle		
Motorcycle		
Light-Duty Trucks	[tally marks]	19
Light-Duty Trucks		
Light-Duty Trucks		
Light-Duty Trucks		
Heavy-Duty Trucks	[tally marks]	19
Heavy-Duty Trucks		
Heavy-Duty Trucks		
Heavy-Duty Trucks		
Buses	5	5
Buses		
Buses		
Buses		

Date 10-24-02

Time 0713 - 0728

Roadway ROUTE 32

Noise Monitoring Location 1

Average Travel Speed 45 - 50 mph

Field Personnel D. SAINT Louis, Amol DAXIKAR, Hank Boucher

ROUTE 92 ENVIRONMENTAL IMPACT STATEMENT (EIS)
TRAFFIC COUNT DATA

VEHICLE TYPE	TRAFFIC COUNTS	TOTAL
Automobile	[illegible]	
Automobile	[illegible]	134
Automobile		
Automobile		
Motorcycle		
Motorcycle		0
Motorcycle		
Motorcycle		
Light-Duty Trucks	||	
Light-Duty Trucks		2
Light-Duty Trucks		
Light-Duty Trucks		
Heavy-Duty Trucks	||	
Heavy-Duty Trucks		2
Heavy-Duty Trucks		
Heavy-Duty Trucks		
Buses	|||	
Buses		3
Buses		
Buses		

Date 10-24-02
Time 0743-0758
Roadway FRIENDSHIP RD
Noise Monitoring Location 2
Average Travel Speed ≈ 40 MPH
Field Personnel DANIELLE SAINT LOUIS, AMOL DAVIKAR, HANK BOUCHER

ROUTE 92 ENVIRONMENTAL IMPACT STATEMENT (EIS)
TRAFFIC COUNT DATA

VEHICLE TYPE	TRAFFIC COUNTS	TOTAL
Automobile	~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~	142
Automobile	~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ II	
Automobile		
Automobile		
Motorcycle	I	
Motorcycle		I
Motorcycle		
Motorcycle		
Light-Duty Trucks	III	
Light-Duty Trucks		3
Light-Duty Trucks		
Light-Duty Trucks		
Heavy-Duty Trucks	I	
Heavy-Duty Trucks		I
Heavy-Duty Trucks		
Heavy-Duty Trucks		
Buses	I	
Buses		1
Buses		
Buses		

Date	10-24-02
Time	0811 - 0826
Roadway	Friendship Rd
Noise Monitoring Location	3
Average Travel Speed	45-50 MPH
Field Personnel	Danielle Saint Louis, Amol Dani Khe, HANK BOUCHER

ROUTE 92 ENVIRONMENTAL IMPACT STATEMENT (EIS)
TRAFFIC COUNT DATA

VEHICLE TYPE	TRAFFIC COUNTS	TOTAL
Automobile		
Automobile		128
Automobile		
Automobile		
Motorcycle		
Motorcycle		0
Motorcycle		
Motorcycle		
Light-Duty Trucks	|	
Light-Duty Trucks		1
Light-Duty Trucks		
Light-Duty Trucks		
Heavy-Duty Trucks	|	
Heavy-Duty Trucks		1
Heavy-Duty Trucks		
Heavy-Duty Trucks		
Buses	|	1
Buses		
Buses		
Buses		

Date 10-24-02

Time 0835 -0840

Roadway Friendship Rd

Noise Monitoring Location 4

Average Travel Speed ≥40-45MPH

Field Personnel Danielle Saint Louis, Hank Boucher, Amol Daxikar

ROUTE 92 ENVIRONMENTAL IMPACT STATEMENT (EIS)
TRAFFIC COUNT DATA

VEHICLE TYPE	TRAFFIC COUNTS	TOTAL
Automobile	1+2	662
Automobile		
Automobile		
Automobile		
Motorcycle	0	0
Motorcycle		
Motorcycle		
Motorcycle		
Light-Duty Trucks		26
Light-Duty Trucks		
Light-Duty Trucks		
Light-Duty Trucks		
Heavy-Duty Trucks		36
Heavy-Duty Trucks		
Heavy-Duty Trucks		
Heavy-Duty Trucks		
Buses	1	1
Buses		
Buses		
Buses		

Date	10-24-02
Time	0933 - 0948
Roadway	ROUTE 1
Noise Monitoring Location	7
Average Travel Speed	≈ 50-60 MPH
Field Personnel	DANIELE SAINTLOUIS, AMOI DAXIKAR, HANK BOUCHER

ROUTE 92 ENVIRONMENTAL IMPACT STATEMENT (EIS)
TRAFFIC COUNT DATA

VEHICLE TYPE	TRAFFIC COUNTS	TOTAL
Automobile	////	4
Automobile		
Automobile		
Automobile		
Motorcycle		0
Motorcycle		
Motorcycle		
Motorcycle		
Light-Duty Trucks	///	3
Light-Duty Trucks		
Light-Duty Trucks		
Light-Duty Trucks		
Heavy-Duty Trucks		0
Heavy-Duty Trucks		
Heavy-Duty Trucks		
Heavy-Duty Trucks		
Buses		0
Buses		
Buses		
Buses		

Date	10-24-02
Time	1022 - 1025 (2m45s) 1027-1040 (12m 15s)
Roadway	PERRINE RD
Noise Monitoring Location	6
Average Travel Speed	≈ 20-25 MPH
Field Personnel	Danielle Saint-Louis, Amol Daxikar, Hank Bouchen

ROUTE 92 ENVIRONMENTAL IMPACT STATEMENT (EIS)
TRAFFIC COUNT DATA

VEHICLE TYPE	TRAFFIC COUNTS	TOTAL
Automobile	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 I	41
Automobile		
Automobile		
Automobile		
Motorcycle		
Motorcycle		0
Motorcycle		
Motorcycle		
Light-Duty Trucks	III	
Light-Duty Trucks		3
Light-Duty Trucks		
Light-Duty Trucks		
Heavy-Duty Trucks		
Heavy-Duty Trucks		0
Heavy-Duty Trucks		
Heavy-Duty Trucks		
Buses		
Buses		0
Buses		
Buses		

Date	10-24-02
Time	1130 - 1145
Roadway	Friendship Rd
Noise Monitoring Location	4
Average Travel Speed	≈ 40 MPH
Field Personnel	Danielle Smurlais, Amol Daxikar, Marc Boucher

ROUTE 92 ENVIRONMENTAL IMPACT STATEMENT (EIS)
TRAFFIC COUNT DATA

VEHICLE TYPE	TRAFFIC COUNTS	TOTAL
Automobile	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	
Automobile		30
Automobile		
Automobile		
Motorcycle		
Motorcycle		0
Motorcycle		
Motorcycle		
Light-Duty Trucks		
Light-Duty Trucks		0
Light-Duty Trucks		
Light-Duty Trucks		
Heavy-Duty Trucks		
Heavy-Duty Trucks		0
Heavy-Duty Trucks		
Heavy-Duty Trucks		
Buses		
Buses		0
Buses		
Buses		

Date	10-24-02
Time	1200 – 1215
Roadway	Friendship Rd.
Noise Monitoring Location	3
Average Travel Speed	≈ 45 MPH
Field Personnel	Danielle Saint Louis, Amol Dayalan

ROUTE 92 ENVIRONMENTAL IMPACT STATEMENT (EIS)
TRAFFIC COUNT DATA

VEHICLE TYPE	TRAFFIC COUNTS	TOTAL
Automobile	~~IIII IIII IIII IIII IIII IIII IIII~~	35
Automobile		
Automobile		
Automobile		
Motorcycle		
Motorcycle		0
Motorcycle		
Motorcycle		
Light-Duty Trucks	II	
Light-Duty Trucks		2
Light-Duty Trucks		
Light-Duty Trucks		
Heavy-Duty Trucks		
Heavy-Duty Trucks		0
Heavy-Duty Trucks		
Heavy-Duty Trucks		
Buses		
Buses		0
Buses		
Buses		

Date	10-24-02
Time	1222 - 1237
Roadway	FRIENDSHIP RD
Noise Monitoring Location	2
Average Travel Speed	45-50 mph
Field Personnel	Danielle Saint Louis, Amol Darikar

ROUTE 92 ENVIRONMENTAL IMPACT STATEMENT (EIS)
TRAFFIC COUNT DATA

VEHICLE TYPE	TRAFFIC COUNTS	TOTAL
Automobile	𝍸 𝍸 𝍸 𝍸 𝍸 + 7	257
Automobile		
Automobile		
Automobile		
Motorcycle		
Motorcycle		0
Motorcycle		
Motorcycle		
Light-Duty Trucks	𝍸 𝍸 𝍸	
Light-Duty Trucks		16
Light-Duty Trucks		
Light-Duty Trucks		
Heavy-Duty Trucks	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	
Heavy-Duty Trucks		40
Heavy-Duty Trucks		
Heavy-Duty Trucks		
Buses		
Buses		0
Buses		
Buses		

Date	10-24-02
Time	1255 - 1310
Roadway	Route 32
Noise Monitoring Location	1
Average Travel Speed	50 mph
Field Personnel	Danielle Saint Louis, Amol Daxikar

ROUTE 92 ENVIRONMENTAL IMPACT STATEMENT (EIS)
TRAFFIC COUNT DATA

VEHICLE TYPE	TRAFFIC COUNTS	TOTAL
Automobile		410
Automobile		
Automobile		
Automobile		
Motorcycle		0
Motorcycle		
Motorcycle		
Motorcycle		
Light-Duty Trucks		13
Light-Duty Trucks		
Light-Duty Trucks		
Light-Duty Trucks		
Heavy-Duty Trucks		44
Heavy-Duty Trucks		
Heavy-Duty Trucks		
Heavy-Duty Trucks		
Buses		3
Buses		
Buses		
Buses		

Date 10-24-02
Time 1510-1525
Roadway Route 32
Noise Monitoring Location 1
Average Travel Speed ≈ 50 MPH
Field Personnel Danielle Saint Louis, Amol Davikar

ROUTE 92 ENVIRONMENTAL IMPACT STATEMENT (EIS)
TRAFFIC COUNT DATA

VEHICLE TYPE	TRAFFIC COUNTS	TOTAL
Automobile	~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ I	61
Automobile		
Automobile		
Automobile		
Motorcycle		
Motorcycle		0
Motorcycle		
Motorcycle		
Light-Duty Trucks	IIII	
Light-Duty Trucks		4
Light-Duty Trucks		
Light-Duty Trucks		
Heavy-Duty Trucks		
Heavy-Duty Trucks		0
Heavy-Duty Trucks		
Heavy-Duty Trucks		
Buses		
Buses		0
Buses		
Buses		

Date	10-24-02
Time	1548-1603
Roadway	FRIENDSHIP RD
Noise Monitoring Location	2
Average Travel Speed	≈ 40-45 MPH
Field Personnel	Danielle Saint Louis, Amol Dave, Ivan

Plane @ 1 min in
10m 45s
13m 05s

directly overhead
— one in distance too

ROUTE 92 ENVIRONMENTAL IMPACT STATEMENT (EIS)
TRAFFIC COUNT DATA

VEHICLE TYPE	TRAFFIC COUNTS	TOTAL
Automobile	~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ I	81
Automobile		
Automobile		
Automobile		
Motorcycle	I	1
Motorcycle		
Motorcycle		
Motorcycle		
Light-Duty Trucks	III	3
Light-Duty Trucks		
Light-Duty Trucks		
Light-Duty Trucks		
Heavy-Duty Trucks		0
Heavy-Duty Trucks		
Heavy-Duty Trucks		
Heavy-Duty Trucks		
Buses	I	1
Buses		
Buses		
Buses		

Date: 10-24-02
Time: 1614 - 1629
Roadway: Friendship Rd
Noise Monitoring Location: 3
Average Travel Speed: ≈ 47MPH
Field Personnel: Danielle Saint Louis, Amol Oak Lee

plane indistance @ 6m 17s
overhead @ 9m 23s

ROUTE 92 ENVIRONMENTAL IMPACT STATEMENT (EIS)
TRAFFIC COUNT DATA

| = 1

VEHICLE TYPE	TRAFFIC COUNTS	TOTAL
Automobile		
Automobile		124
Automobile		
Automobile		
Motorcycle		
Motorcycle		
Motorcycle		
Motorcycle		
Light-Duty Trucks		
Light-Duty Trucks		
Light-Duty Trucks		
Light-Duty Trucks		
Heavy-Duty Trucks		
Heavy-Duty Trucks		
Heavy-Duty Trucks		
Heavy-Duty Trucks		
Buses		
Buses		
Buses		
Buses		

Date	10-24-02
Time	4:15 1645-1700
Roadway	Friendship Rd
Noise Monitoring Location	4
Average Travel Speed	≈45 MPH
Field Personnel	Danielle Saint Louis, Amol Davikar

ROUTE 92 ENVIRONMENTAL IMPACT STATEMENT (EIS)
TRAFFIC COUNT DATA

VEHICLE TYPE	TRAFFIC COUNTS	TOTAL
Automobile	~~IIII~~ ~~IIII~~	10
Automobile		
Automobile		
Automobile		
Motorcycle		
Motorcycle		
Motorcycle		
Motorcycle		
Light-Duty Trucks		
Light-Duty Trucks		
Light-Duty Trucks		
Light-Duty Trucks		
Heavy-Duty Trucks		
Heavy-Duty Trucks		
Heavy-Duty Trucks		
Heavy-Duty Trucks		
Buses		
Buses		
Buses		
Buses		

Date	10-24-02
Time	6:03 1803-1818
Roadway	PERLINE RD
Noise Monitoring Location	6
Average Travel Speed	30 mph
Field Personnel	Amol DAMKAR

~ 6 planes
~ 4 trains

10/25/2002 FRI 13:33 FAX CAMP DRESSER AND MCKEE 016/019

NOISE MODELING DATA

Route 92 Preferred Alternative
STAMINA Modeling Results

Route 92 EIS
STAMINA 2.0 Roadway/Receiver/Traffic Data

Parameter Names	Modeling Coordinates (ft)				Descriptions	AM Peak Hr. Traffic and Speeds				
						Future Year (2028)				
	X	Y	H	Z_0		Spd	CARS	Total Trucks	MT	HT
Route 92 (From Rt 1 to Rt 130)										
Roadway Description										
Rt 92 (Rt 1 to Perrine Rd. On/Offramp)										
92E1	2020730	558706	0		Eastbound traffic	53	333	41	19	22
92E2	2021810	557257	0							
92E4	2023959	556100	0							
92W1	2021134	558006	0		Westbound traffic	43.8	2612	161	75	86
92W2	2021855	557299	0							
92W4	2023900	556210	0							
Rt 92 (Perrine Rd On/Offramp to Rt 130 WB Onramp)										
92E4	2023959	556100	0		Eastbound traffic	53	369	59	27	32
92E7	2033317	555154	0							
92E8	2041864	555759	0							
92E9	2042873	555567	0							
92E10	2044689	554404	0							
92E11	2045715	553625	0							
92W4	2023900	556210	0		Westbound traffic	27.4	3378	176	81	95
92W7	2033317	555217	0							
92W8	2041861	555823	0							
92W9	2042894	555629	0							
92W10	2044727	554456	0							
92W11	2046159	553356	0							
130S92W5	2046176	553348	0							
Rt 92E (Rt 92/Friendship Offramp to Rt 130SB/Rt92E Onramp)										
'CARS'	361	53								
'MT'	26	53								
'HT'	31	53								
'L'/										
'92E11'	2045715	553625	0	0	Eastbound traffic	53	361	57	26	31
'130S92E4'	2046640	552883	0	0						
Rt 130SB (Rt 92 W Overpass to Friendship Onramp)										
'CARS'	1536	30								
'MT'	74	30								
'HT'	85	30								
'L'/										
'130 SFR1'	2047037	551978	0	0		2.7	1536	159	74	85
'130N1FR6'	2046689	550780	0	0						
'L'/										
Rt 130 N to Friendship Onramp (Segment 1)										
'CARS'	51	47								
'MT'	0	47								
'HT'	1	47								
'L'/										
'130N1FR1'	2046825	550887	0	0		46.9	51	1	0	1
'130N1FR2'	2047016	551044	0	0						
'130N1FR3'	2047139	550881	0	0						
'130N1FR4'	2046988	550728	0	0						
'130N1FR5'	2046796	550761	0	0						
'130N1FR6'	2046689	550780	0	0						
'L'/										
Rt 130 N to Friendship Onramp (Segment 2)										

Route 92 EIS
STAMINA 2.0 Roadway/Receiver/Traffic Data

Parameter Names	Modeling Coordinates (ft)				Descriptions	AM Peak Hr. Traffic and Speeds				
						Future Year (2028)				
	X	Y	H	Z_0		Spd	CARS	Total Trucks	MT	HT
'CARS'	599	30								
'MT'	12	30								
'HT'	14	30								
'L'/										
'130N2FR1'	2046485	550923	0	0		19.2	599	26	12	14
'130N2FR2'	2046588	551349	0	0						
'FR1'	2046547	551516	0	0						
'L'/										
Friendship Road (Segment 1)										
'CARS'	527	30								
'MT'	5	30								
'HT'	6	30								
'L'/										
'FR1'	2046547	551516	0	0		16.5	527	11	5	6
'FR2'	2046212	552146	0	0						
'L'/										
Friendship Road (Segment 2)										
'CARS'	535	30								
'MT'	5	30								
'HT'	6	30								
'L'/										
'FR2'	2046212	552146	0	0		16.1	535	11	5	6
'FR3'	2046087	552855	0	0						
'L'/										
Friendship Road (Segment 3)										
'CARS'	541	30								
'MT'	6	30								
'HT'	6	30								
'L'/										
'FR3'	2046087	552855	0	0		16.1	541	12	6	6
'FR4'	2045756	553279	0	0						
'L'/										
Friendship Road (Segment 4)										
'CARS'	512	30								
'MT'	6	30								
'HT'	6	30								
'L'/										
'FR4'	2045756	553279	0	0		16.1	512	12	6	6
'FR5'	2045642	553354	0	0						
'L'/										
Friendship Rd. (Rt 130 SB Friendship Rd. Onramp)										
'CARS'	357	30								
'MT'	9	30								
'HT'	11	30								
'L'/										
'130SFR1'	2047023	551962	0	0		4.5	357	20	9	11
'FR1'	2046547	551516	0	0						
'L'/										
Rt 92 East to Friendship Rd. Onramp										
'CARS'	18	45	0	0						
'MT'	1	45	0	0						
'HT'	1	45	0	0						
'L'/										

Route 92 EIS
STAMINA 2.0 Roadway/Receiver/Traffic Data

Parameter Names	Modeling Coordinates (ft)				Descriptions	AM Peak Hr. Traffic and Speeds Future Year (2028)				
	X	Y	H	Z_0		Spd	CARS	Total Trucks	MT	HT
'92E11'	2045715	553625	0	0		45	18	2	1	1
'92EFR1'	2046231	553103	0	0						
'92EFR2'	2046245	552932	0	0						
'FR3'	2046087	552855	0	0						
'L'/										
Rt 92 W Perrine Road Onramp										
'CARS'	766	30								
'MT'	7	30								
'HT'	8	30								
'L'/										
'92W4'	2023900	556210	0	0		0.4	766	15	7	8
'92WPON1'	2023521	556528	0	0						
'L'/										
Perrine Road to Rt 92 E Onramp)										
'CARS'	36	45								
'MT'	8	45								
'HT'	10	45								
'L'/										
'92EPOF1'	2023119	556280	0	0		44.9	36	18	8	10
'92E4'	2023954	556079	0	0						
'L'/										
Perrine Road (South of Rt 92 to Rt 92 E Onramp)										
'CARS'	637	30								
'MT'	4	30								
'HT'	5	30								
'L'/										
'PE-1'	2020866	554668	0	0						
'PE-2'	2021065	555111	0	0		25.7	637	9	4	5
'92EPOF1'	2023119	556280	0	0						
'L'/										
Perrine Road Overpass										
'CARS'	609	35								
'MT'	11	35								
'HT'	12	35								
'L'/										
'92EPOF1'	2023119	556280	0	0		35.1	609	23	11	12
'PE-3'	2023148	556346	15	0						
'PE-4'	2023311	556446	15	0						
'92WPON1'	2023521	556528	0	0						
'L'/										
Perrine Road (North of Rt 92 W to Perrine Rd N Onramp)										
'CARS'	404	38								
'MT'	13	38								
'HT'	15	38								
'L'/										
'92WPON1'	2023521	556528	0	0		37.7	404	28	13	15
'PE-5'	2023875	556678	0	0						
'PE-6'	2024646	556402	0	0						
'PE-7'	2025265	556844	0	0						
'L'/										
Rt 92W Route 1 North Onramp										
'CARS'	835	30								

Route 92 EIS
STAMINA 2.0 Roadway/Receiver/Traffic Data

Parameter Names	Modeling Coordinates (ft)				Descriptions	AM Peak Hr. Traffic and Speeds Future Year (2028)				
	X	Y	H	Z_0		Spd	CARS	Total Trucks	MT	HT
'MT'	20	30								
'HT'	24	30								
'L'/										
'92WR1N1'	2020744	558695	0	0		14.2	835	44	20	24
'92WR1N2'	2020670	559114	0	0						
'92WR1N3'	2020791	559490	0	0						
'L'/										
Route 1 North/Route 92 East Onramp										
'CARS'	307	30								
'MT'	18	30								
'HT'	21	30								
'L'/										
'R192E1'	2020173	558822	0	0		22.4	307	39	18	21
'R192E2'	2020489	558799	0	0						
'R192E3'	2021136	557993	0	0						
'L'/										
Route 92 West/Route 1 South Onramp										
'CARS'	1776	30								
'MT'	54	30								
'HT'	63	30								
'L'/										
'92W1'	2020462	559123	0	0		5.5	1776	117	54	63
'92WR1S1'	2020381	559249	0	0						
'92WR1S2'	2020221	559549	0	0						
'92WR1S3'	2020257	559857	0	0						
'92WR1S4'	2020457	559946	0	0						
'92WR1S5'	2020692	559791	0	0						
'92WR1S6'	2020624	559476	0	0						
'L'/										
Route 1 South/Route 92 East Onramp										
'CARS'	26	30								
'MT'	1	30								
'HT'	1	30								
'L'/										
'R1S92E1'	2021039	559920	0	0		25	26	2	1	1
'R1S92E2'	2020467	559980	0	0						
'R1S92E3'	2020172	559787	0	0						
'R1S92E4'	2020174	559536	0	0						
'R1S92E5'	2020335	559209	0	0						
'92E1'	2020418	559076	0	0						
'L'/										
Route 1 North to Rt 92 E Onramp										
'CARS'	2755	48								
'MT'	93	48								
'HT'	107	48								
'L'/										
'R1N1'	2019923	558581	0	0		47.6	2755	200	93	107
'R192E1'	2020173	558822	0	0						
'L'/										
Route 1 North to Rt 92W/Rt 1N Onramp										
'CARS'	2448	39								
'MT'	75	39								
'HT'	86	39								

Route 92 EIS
STAMINA 2.0 Roadway/Receiver/Traffic Data

Parameter Names	Modeling Coordinates (ft)				Descriptions	AM Peak Hr. Traffic and Speeds				
						Future Year (2028)				
	X	Y	H	Z_0		Spd	CARS	Total Trucks	MT	HT
'L'/										
'R192E1'	2020173	558822	0	0		39.2	2448	161	75	86
'R1N2'	2020374	559071	15	0						
'R1N3'	2020470	559177	15	0						
'92WR1N3'	2020791	559490	0	0						
'L'/										
Route 1 North from Rt 92W/Rt 1N										
'CARS'	3284	30								
'MT'	95	30								
'HT'	110	30								
'L'/										
'92WR1N3'	2020791	559490	0	0		19.5	3284	205	95	110
'R1N4'	2021673	560472	0	0						
'L'/										
Route 1 South to Rt 92 E Onramp										
'CARS'	3166	30								
'MT'	57	30								
'HT'	67	30								
'L'/										
'R1S1'	2021629	560507	0	0		23.8	3166	124	57	67
'R1S92E1'	2020173	558822	0	0						
'L'/										
Route 1 South to Rt 92W/Rt 1S Onramp										
'CARS'	3140	30								
'MT'	56	30								
'HT'	66	30								
'L'/										
'R1S92E1'	2020173	558822	0	0		24.4	3140	122	56	66
'92WR1S6'	2020624	559476	0	0						
'L'/										
Route 1 South from Rt 92W/Rt 1S										
'CARS'	4916	30								
'MT'	111	30								
'HT'	128	30								
'L'/										
'92WR1S6'	2020624	559476	0	0		20.5	4916	239	111	128
'R1S2'	2020430	559232	15	0						
'R1S3'	2020331	559136	15	0						
'R1S4'	2019916	558710	0	0						

Model Receiver Id.	Monitoring Station Id.[1]	Location Description	NAC	Peak Hour Leq Noise Levels (dBA)			
				Existing Year (2002)	EPA Modified No-Build	Horizon Year (2028) No-Build	Horizon Year (2028) Route 92
				Measured	Estimated	Estimated	Modeled
C-1	**1**	East of Commerce Dr. /South of Rt. 32	C	65.9	67.9	68.0	**72.5**
C-2	--	West of CR-535/South of Rt. 32	C	--	--	--	65.8
C-3	--	West of CR-535/South of Rt. 32	C	--	--	--	68.8
C-4	--	East of Commerce Dr. /South of Rt. 32	C	--	--	--	**73.7**
C-5	--	West of Herrod Blvd/North of Rt. 32	C	--	--	--	71.3
C-6	--	East of Herrod Blvd/North of Rt. 32	C	--	--	--	69.3
C-7	13	30 Friendship Road [ROW]	C	62.0	64.1	64.1	68.7
R-1	12	39 Friendship Road	B	**66.8**	**68.9**	**68.9**	59.3
R-13	**2**	West of 84 Friendship Rd.	B	63.2	65.3	65.3	**68.9**
R-2	P25	84 Miller Road	B	50.0	52.1	52.1	59.1
R-3	9	80 Miller Road	B	55.1	57.2	57.2	55.6
R-4	**3**	194 Friendship Rd.	B	61.1	63.2	63.2	61.7
R-5	**4**	273 Friendship Rd.	B	60.5	62.6	62.6	62.2
R-6	--	287 Friendship Road	B	--	--	--	**71.2**
R-7	--	307 Friendship Road	B	--	--	--	66.2
R-8	7	343 Friendship Road	B	65.2	**67.3**	**67.3**	59.3
R-9	**5**, 5	Silvers Ln. Dead End	B	49.7	51.8	51.8	55.3
R-10	**6**	100 Perrine Rd.	B	54.0	56.1	56.1	61.6
R-11	--	South of Perrine Rd./West of Major Rd.	B	--	--	--	59.5
R-12	**7**, 3	Rt. 1 Boy Scout Council [ROW]	B	**71.0**	**73.1**	**73.1**	**71.1**
R-14	--	177 Friendship Road	B	--	--	--	**68.6**
R-15	--	Perrine Road	B	--	--	--	66.5
R-16	--	Perrine Road	B	--	--	--	**68.8**
R-17	--	107 Friendship Road	B	--	--	--	**67.2**
C-9	P22	Tile Institute [ROW]	C	64.0	66.1	66.1	68.8
		No. of Receivers Impacted		2	3	3	8

[1]Bold values are 2002 monitoring locations.

Receiver Id. represent both commercial (C) and residential (R) receivers based on the FHWA Noise Abatement Criteria description.

Red highlighted values indicate an exceedance of the 67 dBA or 72 dBA NAC.

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S T A M I N A   P R O G R A M
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TRAFFIC NOISE PREDICTION MODEL
STAMINA 2.0/BCR - FHWA VER. 3 (3/83)
TOWNE, RICHARDS & CHAUDIERE PC VER. 1 (11/84)
Seattle - King County Health Dept.


(INPUT UNITS- ENGLISH , OUTPUT UNITS- ENGLISH )


NJTPA Preferred Route 92 Alignment
PROGRAM INITIALIZATION PARAMETERS

   HEIGHT    CODE       DESCRIPTION
    .00       1    RECEIVER HEIGHT ADJUSTMENT
   1.00       2    A-WEIGHTED SOUND LEVEL ONLY
    .00       3    HEIGHT ADJUSTMENT FOR PASSENGER CARS (CARS)
   8.00       4    HEIGHT ADJUSTMENT FOR HEAVY TRUCKS   (HT)
   2.30       5    HEIGHT ADJUSTMENT FOR MEDIUM TRUCKS  (MT)

ROADWAY  1    RT92 RT1 TO PERRINE RD ON/OFFRAMP EASTBOUND

            VEHICLE TYPE  VEHICLES/HOUR    SPEED
               CARS          333.        53.
               HT            22.         53.
               MT            19.         53.
             -----------COORDINATES-----------
                X          Y          Z    GRADE
R92E1            2020730.   558706.     0.    0
R92E2            2021810.   557257.     0.    0
R92E3            2023959.   556100.     0.    0

ROADWAY  2    RT92 RT1 TO PERRINE RD ON/OFFRAMP WESTBOUND

            VEHICLE TYPE  VEHICLES/HOUR    SPEED
               CARS          2612.       44.
               HT            86.         44.
               MT            75.         44.
             -----------COORDINATES-----------
                X          Y          Z    GRADE
R92W1            2021134.   558006.     0.    0
R92W2            2021855.   557299.     0.    0
R92W3            2023900.   556210.     0.    0

ROADWAY  3    RT92 PERRINE RD ON/OFFRAMP TO RT130 EASTBOUND

            VEHICLE TYPE  VEHICLES/HOUR    SPEED
               CARS          369.        53.
               HT            32.         53.
               MT            27.         53.
             -----------COORDINATES-----------
                X          Y          Z    GRADE
R92E4            2023959.   556100.     0.    0
R92E5            2033317.   555154.     0.    0
R92E6            2041864.   555759.     0.    0
R92E7            2042873.   555567.     0.    0
R92E8            2044689.   554404.     0.    0
R92E9            2045715.   553625.     0.    0

ROADWAY  4    RT92 PERRINE RD ON/OFFRAMP TO RT130 WESTBOUND

            VEHICLE TYPE  VEHICLES/HOUR    SPEED
               CARS          3378.       30.
               HT            95.         30.
               MT            81.         30.
             -----------COORDINATES-----------
                X          Y          Z    GRADE
```

R92W4	2023900.	556210.	0.	0
R92W5	2033317.	555217.	0.	0
R92W6	2041861.	555823.	0.	0
R92W7	2042894.	555629.	0.	0
R92W8	2044727.	554456.	0.	0
R92W9	2046159.	553356.	0.	0
R92W10	2046176.	553348.	0.	0

ROADWAY 5 Rt 92 East to Friendship Rd. Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	18.	45.
HT	1.	45.
MT	1.	45.

	----------COORDINATES----------			
	X	Y	Z	GRADE
92E11	2045715.	553625.	0.	0
92EFR1	2046231.	553103.	0.	0
92EFR2	2046245.	552932.	0.	0
FR3	2046087.	552855.	0.	0

ROADWAY 6 Rt 92 W Perrine Road Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	766.	30.
HT	8.	30.
MT	7.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
92W4	2023900.	556210.	0.	0
92WPON1	2023521.	556528.	0.	0

ROADWAY 7 Perrine Road to Rt 92 E Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	36.	45.
HT	10.	45.
MT	8.	45.

	----------COORDINATES----------			
	X	Y	Z	GRADE
92EPOF1	2023119.	556280.	0.	0
92E4	2023954.	556079.	0.	0

ROADWAY 8 Perrine Road South of Rt 92 to Rt 92 E Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	637.	30.
HT	5.	30.
MT	4.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
PE-1	2020866.	554668.	0.	0
PE-2	2021065.	555111.	0.	0
92EPOF1	2023119.	556280.	0.	0

ROADWAY 9 Perrine Road Overpass

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	609.	35.
HT	12.	35.
MT	11.	35.

	----------COORDINATES----------			
	X	Y	Z	GRADE
92EPOF1	2023119.	556280.	0.	0
PE-3	2023148.	556346.	15.	0
PE-4	2023311.	556446.	15.	0
92WPON1	2023521.	556528.	0.	0

ROADWAY 10 Perrine Road North of Rt 92 W to Perrine Rd N Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	404.	38.
HT	15.	38.
MT	13.	38.

	----------COORDINATES----------			
	X	Y	Z	GRADE
92WPON1	2023521.	556528.	0.	0
PE-5	2023875.	556678.	0.	0
PE-6	2024646.	556402.	0.	0
PE-7	2025265.	556844.	0.	0

ROADWAY 11 Rt 92W Route 1 North Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	835.	30.
HT	24.	30.
MT	20.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
92WR1N1	2020744.	558695.	0.	0
92WR1N2	2020670.	559114.	0.	0
92WR1N3	2020791.	559490.	0.	0

ROADWAY 12 Route 1 North/Route 92 East Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	307.	30.
HT	21.	30.
MT	18.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
R192E1	2020173.	558822.	0.	0
R192E2	2020489.	558799.	0.	0
R192E3	2021136.	557993.	0.	0

ROADWAY 13 Route 92 West/Route 1 South Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1776.	30.
HT	63.	30.
MT	54.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
92W1	2020462.	559123.	0.	0
92WR1S1	2020381.	559249.	0.	0
92WR1S2	2020221.	559549.	0.	0
92WR1S3	2020257.	559857.	0.	0
92WR1S4	2020457.	559946.	0.	0
92WR1S5	2020692.	559791.	0.	0
92WR1S6	2020624.	559476.	0.	0

ROADWAY 14 Route 1 South/Route 92 East Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	26.	30.
HT	1.	30.
MT	1.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
R1S92E1	2021039.	559920.	0.	0
R1S92E2	2020467.	559980.	0.	0
R1S92E3	2020172.	559787.	0.	0
R1S92E4	2020174.	559536.	0.	0
R1S92E5	2020335.	559209.	0.	0
92E1	2020418.	559076.	0.	0

ROADWAY 15 Route 1 North to Rt 92 E Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	2755.	48.
HT	107.	48.
MT	93.	48.

	----------COORDINATES----------			
	X	Y	Z	GRADE
R1N1	2019923.	558581.	0.	0
R192E1	2020173.	558822.	0.	0

ROADWAY 16 Route 1 North to Rt 92W/Rt 1N Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	2448.	39.
HT	86.	39.
MT	75.	39.

	----------COORDINATES----------			
	X	Y	Z	GRADE
R192E1	2020173.	558822.	0.	0
R1N2	2020374.	559071.	15.	0
R1N3	2020470.	559177.	15.	0
92WR1N3	2020791.	559490.	0.	0

ROADWAY 17 Route 1 North from Rt 92W/Rt 1N

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	3284.	30.
HT	110.	30.
MT	95.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
92WR1N3	2020791.	559490.	0.	0
R1N4	2021673.	560472.	0.	0

ROADWAY 18 Route 1 South to Rt 92 E Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	3166.	30.
HT	67.	30.
MT	57.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
R1S1	2021629.	560507.	0.	0
R1S92E1	2020173.	558822.	0.	0

ROADWAY 19 Route 1 South to Rt 92W/Rt 1S Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	3140.	30.
HT	66.	30.
MT	56.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
R1S92E1	2020173.	558822.	0.	0
92WR1S6	2020624.	559476.	0.	0

ROADWAY 20 Route 1 South from Rt 92W/Rt 1S

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	4916.	30.
HT	128.	30.
MT	111.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
92WR1S6	2020624.	559476.	0.	0
R1S2	2020430.	559232.	15.	0
R1S3	2020331.	559136.	15.	0
R1S4	2019916.	558710.	0.	0

ROADWAY 21 Rt 130SB (Rt 92 W Overpass to Friendship Onramp)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1536.	30.
HT	85.	30.
MT	74.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
130 SFR1	2047037.	551978.	0.	0
130N1FR6	2046689.	550780.	0.	0

ROADWAY 22 Rt 130 N to Friendship Onramp (Segment 1)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	51.	47.
HT	1.	47.
MT	0.	47.

	----------COORDINATES----------			
	X	Y	Z	GRADE
130N1FR1	2046825.	550887.	0.	0
130N1FR2	2047016.	551044.	0.	0
130N1FR3	2047139.	550881.	0.	0
130N1FR4	2046988.	550728.	0.	0
130N1FR5	2046796.	550761.	0.	0
130N1FR6	2046689.	550780.	0.	0

ROADWAY 23 Rt 130 N to Friendship Onramp (Segment 2)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	599.	30.
HT	14.	30.
MT	12.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
130N2FR1	2046485.	550923.	0.	0
130N2FR2	2046588.	551349.	0.	0
FR1	2046547.	551516.	0.	0

ROADWAY 24 Friendship Road (Segment 1)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	527.	30.
HT	6.	30.
MT	5.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
FR1	2046547.	551516.	0.	0
FR2	2046212.	552146.	0.	0

ROADWAY 25 Friendship Road (Segment 2)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	535.	30.
HT	6.	30.
MT	5.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
FR2	2046212.	552146.	0.	0
FR3	2046087.	552855.	0.	0

ROADWAY 26 Friendship Road (Segment 3)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	541.	30.
HT	6.	30.
MT	6.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
FR3	2046087.	552855.	0.	0
FR4	2045756.	553279.	0.	0

ROADWAY 27 Friendship Road (Segment 4)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	512.	30.
HT	6.	30.

	MT	6.	30.	
	----------COORDINATES----------			
	X	Y	Z	GRADE
FR4	2045756.	553279.	0.	0
FR5	2045642.	553354.	0.	0

ROADWAY 28 Friendship Rd. (Rt 130 SB Friendship Rd. Onramp)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	357.	30.
HT	11.	30.
MT	9.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
130SFR1	2047023.	551962.	0.	0
FR1	2046547.	551516.	0.	0

ROADWAY 29 Rt 92E (Rt 92/Friendship Offramp to Rt 130SB/Rt92E Onramp)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	361.	53.
HT	31.	53.
MT	26.	53.

	----------COORDINATES----------			
	X	Y	Z	GRADE
92E11	2045715.	553625.	0.	0
130S92E4	2046640.	552883.	0.	0

RtUS-1, Perrine, Friendship,& Miller Rds,& Asbury & Dye Residences

	----------COORDINATES----------		
	X	Y	Z
C9	2021099.	559549.	5.
R12	2020851.	559776.	5.
R16	2024581.	556298.	5.
R15	2025048.	556356.	5.
R4	2038163.	556399.	5.
R14	2038988.	555764.	5.
R13	2043482.	555031.	5.
R17	2042376.	555463.	5.

ALPHA FACTORS - RECEIVER ACROSS,ROADWAY DOWN

1 *	.0	.0	.0	.0	.0	.0	.0	.0
2 *	.0	.0	.0	.0	.0	.0	.0	.0
3 *	.0	.0	.0	.0	.0	.0	.0	.0
4 *	.0	.0	.0	.0	.0	.0	.0	.0
5 *	.0	.0	.0	.0	.0	.0	.0	.0
6 *	.0	.0	.0	.0	.0	.0	.0	.0
7 *	.0	.0	.0	.0	.0	.0	.0	.0
8 *	.0	.0	.0	.0	.0	.0	.0	.0
9 *	.0	.0	.0	.0	.0	.0	.0	.0
10 *	.0	.0	.0	.0	.0	.0	.0	.0
11 *	.0	.0	.0	.0	.0	.0	.0	.0
12 *	.0	.0	.0	.0	.0	.0	.0	.0
13 *	.0	.0	.0	.0	.0	.0	.0	.0
14 *	.0	.0	.0	.0	.0	.0	.0	.0
15 *	.0	.0	.0	.0	.0	.0	.0	.0
16 *	.0	.0	.0	.0	.0	.0	.0	.0
17 *	.0	.0	.0	.0	.0	.0	.0	.0
18 *	.0	.0	.0	.0	.0	.0	.0	.0
19 *	.0	.0	.0	.0	.0	.0	.0	.0
20 *	.0	.0	.0	.0	.0	.0	.0	.0
21 *	.0	.0	.0	.0	.0	.0	.0	.0
22 *	.0	.0	.0	.0	.0	.0	.0	.0
23 *	.0	.0	.0	.0	.0	.0	.0	.0
24 *	.0	.0	.0	.0	.0	.0	.0	.0
25 *	.0	.0	.0	.0	.0	.0	.0	.0
26 *	.0	.0	.0	.0	.0	.0	.0	.0
27 *	.0	.0	.0	.0	.0	.0	.0	.0
28 *	.0	.0	.0	.0	.0	.0	.0	.0
29 *	.0	.0	.0	.0	.0	.0	.0	.0

SHIELDING FACTORS - RECEIVER ACROSS,ROADWAY DOWN

```
 1 *  .5  .5  .5  .5  .5  .5  .5  .5
 2 *  .5  .5  .5  .5  .5  .5  .5  .5
 3 *  .5  .5  .5  .5  .5  .5  .5  .5
 4 *  .5  .5  .5  .5  .5  .5  .5  .5
 5 *  .5  .5  .5  .5  .5  .5  .5  .5
 6 *  .5  .5  .5  .5  .5  .5  .5  .5
 7 *  .5  .5  .5  .5  .5  .5  .5  .5
 8 *  .5  .5  .5  .5  .5  .5  .5  .5
 9 *  .5  .5  .5  .5  .5  .5  .5  .5
10 *  .5  .5  .5  .5  .5  .5  .5  .5
11 *  .5  .5  .5  .5  .5  .5  .5  .5
12 *  .5  .5  .5  .5  .5  .5  .5  .5
13 *  .5  .5  .5  .5  .5  .5  .5  .5
14 *  .5  .5  .5  .5  .5  .5  .5  .5
15 *  .5  .5  .5  .5  .5  .5  .5  .5
16 *  .5  .5  .5  .5  .5  .5  .5  .5
17 *  .5  .5  .5  .5  .5  .5  .5  .5
18 *  .5  .5  .5  .5  .5  .5  .5  .5
19 *  .5  .5  .5  .5  .5  .5  .5  .5
20 *  .5  .5  .5  .5  .5  .5  .5  .5
21 *  .5  .5  .5  .5  .5  .5  .5  .5
22 *  .5  .5  .5  .5  .5  .5  .5  .5
23 *  .5  .5  .5  .5  .5  .5  .5  .5
24 *  .5  .5  .5  .5  .5  .5  .5  .5
25 *  .5  .5  .5  .5  .5  .5  .5  .5
26 *  .5  .5  .5  .5  .5  .5  .5  .5
27 *  .5  .5  .5  .5  .5  .5  .5  .5
28 *  .5  .5  .5  .5  .5  .5  .5  .5
29 *  .5  .5  .5  .5  .5  .5  .5  .5


RECEIVER   LEQ(H)  L10
C9         68.8  71.3

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING  40.0 DBA

ROADWAY  SEGMENT

 1      1   2
      50.0 43.4
 2      1   2
      49.9 48.6
 3      1
      42.2
 4      1
      43.6
 11     1   2
      46.1 50.8
 12     1   2
      40.0 44.3
 13     1   2   3   4   5   6
      45.1 48.1 47.0 46.2 50.2 53.1
 15     1
      50.0
 16     1   2   3
      49.6 48.2 57.9
 17     1
      64.7
 18     1
      63.2
 19     1
      53.8
 20     1   2   3
      54.2 47.8 51.2


RECEIVER   LEQ(H)  L10
R12        71.1  73.8

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING  40.0 DBA

ROADWAY  SEGMENT

 1      1   2
      48.5 42.4
 2      1   2
      48.6 47.6
 3      1
      41.6
 4      1
      43.0
```

11 1 2
44.7 50.3
12 2
43.1
13 1 2 3 4 5 6
45.6 49.8 50.2 50.6 57.6 59.4
14 1
44.3
15 1
50.0
16 1 2 3
49.7 48.4 58.4
17 1
66.2
18 1
66.6
19 1
54.7
20 1 2 3
55.6 48.4 51.6

RECEIVER LEQ(H) L10
R16 68.8 71.9

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1 1 2
40.8 52.0
2 1 2
44.3 56.7
3 1
62.4
4 1
66.0
6 1
42.6
7 1
44.4
10 1 2 3
43.3 58.5 55.7

RECEIVER LEQ(H) L10
R15 66.5 69.3

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1 2
48.7
2 1 2
43.0 53.6
3 1
60.9
4 1
63.7
7 1
40.6
10 2 3
49.2 55.4

RECEIVER LEQ(H) L10
R4 60.8 63.1

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

3 1 2
40.9 56.6
4 1 2
42.1 58.2

RECEIVER LEQ(H) L10
R14 68.6 71.8

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

3	2	3	4	
	63.8	40.4	40.0	
4	1	2	3	4
	40.9	66.7	41.7	41.2

RECEIVER	LEQ(H)	L10
R13	68.9	72.5

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

3	2	3	4	5	
	48.3	50.5	66.0	47.1	
4	2	3	4	5	
	49.4	51.6	65.2	49.0	
29	1				
	41.5				

RECEIVER	LEQ(H)	L10
R17	67.2	70.6

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

3	2	3	4	5	
	54.3	63.1	54.6	42.2	
4	2	3	4	5	
	55.3	62.7	55.6	44.3	

□SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

3	2	3	4	5	
	48.3	50.5	66.0	47.1	
4	2	3	4	5	
	49.4	51.6	65.2	49.0	
29	1				
	41.5				

S T A M I N A P R O G R A M
****

TRAFFIC NOISE PREDICTION MODEL
STAMINA 2.0/BCR - FHWA VER. 3 (3/83)
TOWNE, RICHARDS & CHAUDIERE PC VER. 1 (11/84)
Seattle - King County Health Dept.

(INPUT UNITS- ENGLISH , OUTPUT UNITS- ENGLISH)

NJTPA Preferred Route 92 Alignment
PROGRAM INITIALIZATION PARAMETERS

HEIGHT	CODE	DESCRIPTION
.00	1	RECEIVER HEIGHT ADJUSTMENT
1.00	2	A-WEIGHTED SOUND LEVEL ONLY
.00	3	HEIGHT ADJUSTMENT FOR PASSENGER CARS (CARS)
8.00	4	HEIGHT ADJUSTMENT FOR HEAVY TRUCKS (HT)
2.30	5	HEIGHT ADJUSTMENT FOR MEDIUM TRUCKS (MT)

ROADWAY 1 Rt 92W (Rt 130SB/Rt92W Onramp to Rt 130N/Rt92WB Onramp)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1888.	52.
HT	40.	52.
MT	35.	52.

	COORDINATES			
	X	Y	Z	GRADE
130S92W5	2046176.	553348.	0.	0
130N92W5	2047381.	552359.	0.	0

ROADWAY 2 Rt 92 (Rt 130N/Rt 92 WB Ramp to Rt92W/Rt130N Onramp)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	2530.	46.
HT	69.	46.
MT	60.	46.

	COORDINATES			
	X	Y	Z	GRADE
130N92W5	2047381.	552359.	0.	0
92W130N1	2047932.	552008.	0.	0

ROADWAY 3 Rt 92E (Rt 130N/Rt 92 EB Ramp to CR535/Rt92E Onramp)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1094.	53.
HT	114.	53.
MT	98.	53.

	COORDINATES			
	X	Y	Z	GRADE
130N92E4	2047962.	551915.	0.	0
535-92E1	2050046.	551322.	0.	0

ROADWAY 4 Rt 92E (Rt 130N/Rt 92 WB Ramp to CR535/Rt92W Onramp)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	3187.	32.
HT	81.	32.
MT	70.	32.

	COORDINATES			
	X	Y	Z	GRADE
92W130N1	2047932.	552008.	0.	0
535-92W3	2049741.	551468.	0.	0

ROADWAY 5 Rt 130 SB to Rt 92 W Onramp (Segment 1)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1908.	30.
HT	72.	30.
MT	62.	30.

	COORDINATES			
	X	Y	Z	GRADE
130S92W1	2047526.	554054.	0.	0
130S92W2	2047317.	553684.	0.	0
130S92W3	2046920.	553441.	0.	0

ROADWAY 6 Rt 130 SB to Rt 92 W Onramp (Segment 2)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1490.	30.
HT	55.	30.
MT	47.	30.

	COORDINATES			
	X	Y	Z	GRADE
130S92W3	2046920.	553441.	0.	0
130S92W4	2046481.	553257.	0.	0
130S92W5	2046176.	553348.	0.	0

ROADWAY 7 Rt 130 SB to Rt 92 East Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	419.	30.
HT	18.	30.
MT	15.	30.

	COORDINATES			
	X	Y	Z	GRADE
130 S92W	2046920.	553441.	0.	0
130S92E1	2046593.	552688.	0.	0
130S92E2	2046341.	552651.	0.	0
130S92E3	2046395.	552945.	0.	0
130S92E4	2046640.	552883.	0.	0

ROADWAY 8 Route 92 West (Rt 92 Offramp/130N Onramp) Segment 1

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	657.	30.
HT	12.	30.
MT	11.	30.

	COORDINATES			
	X	Y	Z	GRADE
92W130N1	2047932.	552008.	0.	0
92W130N2	2047734.	552221.	0.	0
92W130N3	2047731.	552629.	0.	0

ROADWAY 9 Route 92 West (Rt 92 Offramp/130N Onramp) Segment 2

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	803.	30.
HT	32.	30.
MT	28.	30.

	COORDINATES			
	X	Y	Z	GRADE
92W130N3	2047731.	552629.	0.	0
92W130N4	2047584.	552959.	0.	0
92W130N5	2047500.	553627.	0.	0

ROADWAY 10 Rt 130N to Rt 92 E (Rt130/Rt92 Onramp East)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	398.	30.
HT	82.	30.
MT	70.	30.

	COORDINATES			
	X	Y	Z	GRADE
130N92E1	2046931.	551278.	0.	0
130N92E2	2047119.	551579.	0.	0
130N92E3	2047757.	551948.	0.	0

130N92E4	2047962.	551915.	0.	0

ROADWAY 11 Rt 130N to Rt 92 W (Rt 130/Rt 92 Onramp West)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	237.	30.
HT	11.	30.
MT	9.	30.

	COORDINATES			
	X	Y	Z	GRADE
130N92W1	2047248.	552570.	0.	0
130N92W2	2047455.	552768.	0.	0
130N92W3	2047696.	552629.	0.	0
130N92W4	2047655.	552400.	0.	0
130N92W5	2047381.	552359.	0.	0

ROADWAY 12 Rt 92 E to Rt 130N (Rt92/Rt 130N Onramp)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	74.	30.
HT	16.	30.
MT	14.	30.

	COORDINATES			
	X	Y	Z	GRADE
92E130N1	2047328.	552291.	0.	0
92E130N2	2047510.	552007.	0.	0
92E130N3	2047408.	551838.	0.	0
92E130N4	2047198.	551864.	0.	0
92E130N5	2047141.	552116.	0.	0

ROADWAY 13 Rt 92 W to Rt 130 S (Rt 92/Rt 130S Onramp)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	879.	30.
HT	40.	30.
MT	34.	30.

	COORDINATES			
	X	Y	Z	GRADE
92130S1	2046895.	552747.	0.	0
92130S2	2046747.	553063.	0.	0
92130S3	2046963.	553278.	0.	0
92130S4	2047204.	553192.	0.	0
92130S5	2047251.	552879.	0.	0

ROADWAY 14 Rt 130 N (From Friendship Rd. Onramp)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	2192.	38.
HT	253.	38.
MT	219.	38.

	COORDINATES			
	X	Y	Z	GRADE
130N1FR1	2046825.	550887.	0.	0
130N92E1	2046931.	551278.	0.	0

ROADWAY 15 Rt 130 Northbound (South of Rt 92)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1794.	46.
HT	172.	46.
MT	148.	46.

	COORDINATES			
	X	Y	Z	GRADE
130N92E1	2046931.	551278.	0.	0
130N1	2047195.	552390.	15.	0

ROADWAY 16 Rt 130 NB (Rt 92 Overpass)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1868.	45.

HT	177.	45.	
MT	153.	45.	

----------COORDINATES----------

	X	Y	Z	GRADE
130N1	2047195.	552390.	15.	0
130N2	2047216.	552483.	15.	0
130N92W1	2047248.	552570.	0.	0

ROADWAY 17 Rt 130 Northbound (North of Rt 92)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1631.	48.
HT	177.	48.
MT	153.	48.

----------COORDINATES----------

	X	Y	Z	GRADE
130N92W1	2047248.	552570.	0.	0
92W130N5	2047500.	553627.	0.	0

ROADWAY 18 Rt 130 Southbound (North of Rt 92)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1014.	50.
HT	57.	50.
MT	49.	50.

----------COORDINATES----------

	X	Y	Z	GRADE
130S1	2047544.	554049.	0.	0
130S2	2047174.	552520.	0.	0

ROADWAY 19 Rt 130 SB (Rt 92 Overpass/South of Rt 92)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1893.	47.
HT	96.	47.
MT	83.	47.

----------COORDINATES----------

	X	Y	Z	GRADE
130S2	2047174.	552520.	0.	0
130S3	2047151.	552426.	0.	0
130SFR1	2047037.	551978.	0.	0

ROADWAY 20 Rt 92 West (North Frontage from 535 Off Ramp to Herrod Blvd)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	133.	30.
HT	3.	30.
MT	3.	30.

----------COORDINATES----------

	X	Y	Z	GRADE
53592W2	2050539.	551314.	0.	0
92WFR1	2049139.	551662.	0.	0

ROADWAY 21 Rt 92 West (North Frontage Road from Herrod Blvd to Rt 130 N Onramp)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	146.	30.
HT	20.	30.
MT	18.	30.

----------COORDINATES----------

	X	Y	Z	GRADE
92WFR1	2049139.	551662.	0.	0
92WFR2	2047939.	551995.	0.	0
92W130N3	2047731.	552629.	0.	0

ROADWAY 22 Herrod Blvd (South of Rt 92

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	457.	30.
HT	37.	30.

MT	32.	30.	
----------COORDINATES----------			
X	Y	Z	GRADE
SHB-1	2048933.	551229.	0.	0
SHB-2	2049015.	551570.	0.	0

ROADWAY 23 Herrod Blvd (North of Rt 92)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	141.	30.
HT	22.	30.
MT	19.	30.

----------COORDINATES----------			
X	Y	Z	GRADE
NHB-1	2049051.	551690.	0.	0
NHB-2	2049167.	552072.	0.	0

ROADWAY 24 Rt 92 E South Frontage Road (Herrod Blvd to Rt92E/CR535 Onramp)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	235.	30.
HT	29.	30.
MT	25.	30.

----------COORDINATES----------			
X	Y	Z	GRADE
SHB-2	2049015.	551570.	0.	0
53592E2	2050615.	551139.	0.	0

ROADWAY 25 Rt 92E (Rt 130SB/Rt92E Onramp to Rt92E/Rt130N Onramp)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	696.	53.
HT	48.	53.
MT	42.	53.

----------COORDINATES----------			
X	Y	Z	GRADE
130N92E4	2046640.	552883.	0.	0
92E130N1	2047328.	552291.	0.	0

ROADWAY 26 Rt 92E (Rt92E/Rt130N Onramp to Herrod Blvd Onramp)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1094.	53.
HT	114.	53.
MT	98.	53.

----------COORDINATES----------			
X	Y	Z	GRADE
130N92E4	2047962.	551915.	0.	0
92E12	2048942.	551594.	0.	0

ROADWAY 27 Rt 92E (Herrod Blvd Onramp to Rt92E/CR-535 Onramp)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	871.	53.
HT	106.	53.
MT	92.	53.

----------COORDINATES----------			
X	Y	Z	GRADE
92E12	2048942.	551594.	0.	0
535-92E1	2050046.	551322.	0.	0

Route 130 and the NJTP 8A Interchange Area Receivers

----------COORDINATES----------			
X	Y	Z	
C1	2049875.	551204.	5.
C4	2049260.	551363.	5.
C5	2048808.	551987.	5.
C6	2049598.	551853.	5.
C7	2045184.	553582.	5.

R1 2045709. 553466. 5.

ALPHA FACTORS - RECEIVER ACROSS,ROADWAY DOWN

1 *	.0	.0	.0	.0	.0	.0
2 *	.0	.0	.0	.0	.0	.0
3 *	.0	.0	.0	.0	.0	.0
4 *	.0	.0	.0	.0	.0	.0
5 *	.0	.0	.0	.0	.0	.0
6 *	.0	.0	.0	.0	.0	.0
7 *	.0	.0	.0	.0	.0	.0
8 *	.0	.0	.0	.0	.0	.0
9 *	.0	.0	.0	.0	.0	.0
10 *	.0	.0	.0	.0	.0	.0
11 *	.0	.0	.0	.0	.0	.0
12 *	.0	.0	.0	.0	.0	.0
13 *	.0	.0	.0	.0	.0	.0
14 *	.0	.0	.0	.0	.0	.0
15 *	.0	.0	.0	.0	.0	.0
16 *	.0	.0	.0	.0	.0	.0
17 *	.0	.0	.0	.0	.0	.0
18 *	.0	.0	.0	.0	.0	.0
19 *	.0	.0	.0	.0	.0	.0
20 *	.0	.0	.0	.0	.0	.0
21 *	.0	.0	.0	.0	.0	.0
22 *	.0	.0	.0	.0	.0	.0
23 *	.0	.0	.0	.0	.0	.0
24 *	.0	.0	.0	.0	.0	.0
25 *	.0	.0	.0	.0	.0	.0
26 *	.0	.0	.0	.0	.0	.0
27 *	.0	.0	.0	.0	.0	.0

SHIELDING FACTORS - RECEIVER ACROSS,ROADWAY DOWN

1 *	.5	.5	.5	.5	.5	.5
2 *	.5	.5	.5	.5	.5	.5
3 *	.5	.5	.5	.5	.5	.5
4 *	.5	.5	.5	.5	.5	.5
5 *	.5	.5	.5	.5	.5	.5
6 *	.5	.5	.5	.5	.5	.5
7 *	.5	.5	.5	.5	.5	.5
8 *	.5	.5	.5	.5	.5	.5
9 *	.5	.5	.5	.5	.5	.5
10 *	.5	.5	.5	.5	.5	.5
11 *	.5	.5	.5	.5	.5	.5
12 *	.5	.5	.5	.5	.5	.5
13 *	.5	.5	.5	.5	.5	.5
14 *	.5	.5	.5	.5	.5	.5
15 *	.5	.5	.5	.5	.5	.5
16 *	.5	.5	.5	.5	.5	.5
17 *	.5	.5	.5	.5	.5	.5
18 *	.5	.5	.5	.5	.5	.5
19 *	.5	.5	.5	.5	.5	.5
20 *	.5	.5	.5	.5	.5	.5
21 *	.5	.5	.5	.5	.5	.5
22 *	.5	.5	.5	.5	.5	.5
23 *	.5	.5	.5	.5	.5	.5
24 *	.5	.5	.5	.5	.5	.5
25 *	.5	.5	.5	.5	.5	.5
26 *	.5	.5	.5	.5	.5	.5
27 *	.5	.5	.5	.5	.5	.5

RECEIVER	LEQ(H)	L10
C1	72.5	75.8

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1	1
	45.2
2	1
	45.5
3	1
	68.9
4	1
	58.6
10	2
	41.1

14 1
43.4
15 1
48.2
17 1
47.6
18 1
44.9
19 2
42.3
20 1
48.4
21 1
43.5
22 1
44.0
23 1
41.2
24 1
60.5
25 1
42.4
26 1
54.1
27 1
68.6

RECEIVER LEQ(H) L10
C4 73.7 76.8

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1 1
47.3
2 1
48.4
3 1
69.6
4 1
63.6
10 2 3
44.0 40.4
14 1
45.6
15 1
50.6
17 1
49.7
18 1
46.9
19 2
44.8
20 1
47.6
21 1
50.0
22 1
54.1
23 1
47.4
24 1
59.9
25 1
44.7
26 1
60.2
27 1
69.6

RECEIVER LEQ(H) L10
C5 71.3 73.8

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1 1
50.2

2 1
52.7
3 1
66.8
4 1
64.0
5 2
40.1
9 1 2
40.4 40.7
10 1 2 3
40.7 47.0 44.7
14 1
46.8
15 1
53.1
16 1 2
42.8 42.7
17 1
53.0
18 1
50.1
19 1 2
40.9 47.6
20 1
41.0
21 1 2
55.7 43.2
22 1
48.2
23 1
51.2
24 1
49.8
25 1
47.7
26 1
64.9
27 1
60.3

RECEIVER LEQ(H) L10
C6 69.3 71.9

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1 1
46.8
2 1
47.5
3 1
65.2
4 1
61.3
10 2
42.6
14 1
44.0
15 1
49.5
17 1
49.6
18 1
46.9
19 2
43.9
20 1
47.5
21 1
47.2
22 1
45.9
23 1
47.7
24 1
53.8
25 1
44.1
26 1

56.9
27 1
63.7

RECEIVER LEQ(H) L10
C7 59.5 61.3

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1 1
52.8
2 1
43.8
3 1
46.9
4 1
42.6
5 1 2
40.0 42.0
6 1 2
43.2 44.0
14 1
43.3
15 1
49.5
17 1
50.8
18 1
48.6
19 2
44.7
25 1
47.0
26 1
44.7
27 1
41.9

RECEIVER LEQ(H) L10
R1 62.6 64.8

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1 1
57.3
2 1
45.9
3 1
48.4
4 1
44.1
5 1 2
42.5 45.1
6 1 2
47.3 49.7
7 1 3
43.1 40.6
9 2
40.4
10 2
41.2
13 1 2
42.2 42.0
14 1
44.7
15 1
51.5
16 1 2
42.0 42.1
17 1
53.4
18 1
51.2
19 1 2
40.7 46.9
25 1

49.9
26 1
46.3
27 1
43.2

STAMINA PROGRAM
****

TRAFFIC NOISE PREDICTION MODEL
STAMINA 2.0/BCR - FHWA VER. 3 (3/83)
TOWNE, RICHARDS & CHAUDIERE PC VER. 1 (11/84)
Seattle - King County Health Dept.

(INPUT UNITS- ENGLISH , OUTPUT UNITS- ENGLISH)

NJTPA Preferred Route 92 Alignment
PROGRAM INITIALIZATION PARAMETERS

HEIGHT	CODE	DESCRIPTION
.00	1	RECEIVER HEIGHT ADJUSTMENT
1.00	2	A-WEIGHTED SOUND LEVEL ONLY
.00	3	HEIGHT ADJUSTMENT FOR PASSENGER CARS (CARS)
8.00	4	HEIGHT ADJUSTMENT FOR HEAVY TRUCKS (HT)
2.30	5	HEIGHT ADJUSTMENT FOR MEDIUM TRUCKS (MT)

ROADWAY 1 Rt 92W (CR-535 OnRamp to Rt 92W)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1631.	32.
HT	81.	32.
MT	70.	32.

	COORDINATES			
	X	Y	Z	GRADE
8A92W3	2051557.	551031.	0.	0
535-92W3	2051304.	551181.	0.	0

ROADWAY 2 Rt 92W (Rt 92W Onramp/ Interchange 8A OffRamp)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1938.	30.
HT	82.	30.
MT	70.	30.

	COORDINATES			
	X	Y	Z	GRADE
8AS-2	2052281.	551763.	0.	0
8A92W1	2052084.	551333.	0.	0
8A92W2	2051852.	551110.	15.	0
8A92W3	2051557.	551031.	15.	0

ROADWAY 3 Rt 92W (Rt 92W Onramp/ Interchange 8A OffRamp to CR535 Offramp)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1631.	52.
HT	59.	52.
MT	50.	52.

	COORDINATES			
	X	Y	Z	GRADE
8A92W3	2051557.	551031.	15.	0
53592W3	2051304.	551181.	0.	0

ROADWAY 4 Rt 92W (Rt 92W Onramp/ Interchange 8A OffRamp to CR535 Offramp)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1505.	30.
HT	17.	30.
MT	14.	30.

	COORDINATES			
	X	Y	Z	GRADE
92W8A1	2052648.	550703.	0.	0
92W8A2	2052306.	550996.	15.	0
5358AN8	2052341.	550992.	15.	0

ROADWAY 5 Rt 92 W (West of Interchange 8A)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	3712.	30.
HT	34.	30.
MT	29.	30.

	COORDINATES			
	X	Y	Z	GRADE
92W12	2052917.	550642.	0.	0
92W8A1	2052648.	550703.	0.	0

ROADWAY 6 Rt 92 West (Interchange 8A)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	2207.	30.
HT	17.	30.
MT	15.	30.

	COORDINATES			
	X	Y	Z	GRADE
92W8A1	2052648.	550703.	0.	0
53592W1	2051304.	551181.	0.	0
53592W2	2050539.	551314.	0.	0

ROADWAY 7 Rt 92 West (CR535 Offramp)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1688.	30.
HT	26.	30.
MT	23.	30.

	COORDINATES			
	X	Y	Z	GRADE
53592W3	2049741.	551468.	15.	0
53592W2	2050539.	551314.	0.	0
53592W1	2051304.	551181.	0.	0

ROADWAY 8 Rt 92 West (CR535 Onramp)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	2207.	30.
HT	17.	30.
MT	15.	30.

	COORDINATES			
	X	Y	Z	GRADE
535N92W1	2051944.	550925.	0.	0
535N92W2	2051410.	551174.	15.	0

ROADWAY 9 Rt 92E (Rt92E/CR-535 Onramp to Interchange 8A Onramp)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	0.	30.
HT	0.	30.
MT	0.	30.

	COORDINATES			
	X	Y	Z	GRADE
535-92E1	2050046.	551322.	0.	0
535-8AN1	2051452.	550986.	0.	0

ROADWAY 10 Rt92E/Interchange 8A Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	289.	30.
HT	89.	30.
MT	76.	30.

	COORDINATES			
	X	Y	Z	GRADE
535-8AN1	2051452.	550986.	0.	0
535-8AN2	2051914.	551097.	15.	0
535-8AN3	2052600.	551339.	15.	0
535-8AN4	2052854.	551169.	15.	0
535-8AN5	2052794.	550873.	15.	0

535-8AN6	2052455.	550848.	15.	0
535-8AN7	2052518.	550821.	15.	0
535-8AN8	2052341.	550992.	15.	0
535-8AN9	2052292.	551385.	0.	0

ROADWAY 11 Rt92E/CR535 Onramp to CR-535

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	818.	30.
HT	3.	30.
MT	3.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
53592E1	2050046.	551322.	0.	0
53592E2	2050615.	551139.	0.	0
53592E3	2051246.	550952.	0.	0
8AN-1	2051405.	550913.	0.	0

ROADWAY 12 Rt 92 E South Frontage Road (Interchange 8A Onramp to Interchange 8A/Rt92 E Onra

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	898.	30.
HT	89.	30.
MT	76.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
8AN-1	2051405.	550913.	0.	0
8A92E6	2052004.	550796.	0.	0

ROADWAY 13 Rt 92 E (Interchange 8A/Rt92 E Onramp to Rt 92E)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1548.	30.
HT	30.	30.
MT	25.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
8A92E6	2052004.	550796.	0.	0
92E13	2052884.	550543.	0.	0

ROADWAY 14 Interchange 8A (Onramp to 8A Toll)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	566.	30.
HT	107.	30.
MT	93.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
8AN-1	2051405.	550913.	0.	0
8AN-2	2051599.	550817.	0.	0
8AN-3	2051696.	550567.	0.	0
8AN-4	2051983.	550453.	0.	0
8AN-5	2052147.	550726.	15.	0
8AN-6	2052178.	550858.	15.	0
535-8AN8	2052341.	550992.	0.	0

ROADWAY 15 Interchange 8A Southbound

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	2588.	30.
HT	92.	30.
MT	79.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
8AS-1	2052552.	552969.	0.	0
8AS-2	2052281.	551763.	0.	0

ROADWAY 16 Interchange 8A SB (8A Onramp to Rt92 East)

VEHICLE TYPE VEHICLES/HOUR SPEED

CARS	650.	30.	
HT	10.	30.	
MT	9.	30.	

	----------COORDINATES----------			
	X	Y	Z	GRADE
8AS-2	2052281.	551763.	0.	0
8A92E-1	2052144.	550864.	15.	0
8A92E-2	2052124.	550731.	15.	0
8A92E-3	2052021.	550493.	0.	0
8A92E-4	2051720.	550587.	0.	0
8A92E-5	2051823.	550806.	0.	0
8A92E-6	2052004.	550796.	0.	0

ROADWAY 17 Interchange 8A SB (8A Onramp to Rt92 West)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1938.	30.
HT	82.	30.
MT	70.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
8AS-2	2052281.	551763.	0.	0
8A92W1	2052084.	551333.	0.	0
8A92W2	2051852.	551110.	0.	0
8A92W3	2051557.	551031.	0.	0

ROADWAY 18 CR535 (South of Rt 92)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1892.	30.
HT	117.	30.
MT	100.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
535S-1	2051140.	550333.	0.	0
535S-2	2051292.	550916.	15.	0

ROADWAY 19 CR535 (Rt 92 Overpass)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1939.	30.
HT	72.	30.
MT	62.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
535S-2	2051292.	550916.	15.	0
535N-1	2051347.	551153.	15.	0

ROADWAY 20 CR535 (North of Rt 92)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1564.	30.
HT	70.	30.
MT	60.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
535N-1	2051347.	551153.	15.	0
535N-2	2051447.	551474.	0.	0

Route 130 and the NJTP 8A Interchange Area Receivers

	----------COORDINATES----------		
	X	Y	Z
C1	2049875.	551204.	5.
C2	2050767.	550961.	5.
C3	2051083.	550931.	5.
C4	2049260.	551363.	5.
C5	2048808.	551987.	5.
C6	2049598.	551853.	5.

ALPHA FACTORS - RECEIVER ACROSS,ROADWAY DOWN

1 *	.0	.0	.0	.0	.0	.0
2 *	.0	.0	.0	.0	.0	.0
3 *	.0	.0	.0	.0	.0	.0
4 *	.0	.0	.0	.0	.0	.0
5 *	.0	.0	.0	.0	.0	.0
6 *	.0	.0	.0	.0	.0	.0
7 *	.0	.0	.0	.0	.0	.0
8 *	.0	.0	.0	.0	.0	.0
9 *	.0	.0	.0	.0	.0	.0
10 *	.0	.0	.0	.0	.0	.0
11 *	.0	.0	.0	.0	.0	.0
12 *	.0	.0	.0	.0	.0	.0
13 *	.0	.0	.0	.0	.0	.0
14 *	.0	.0	.0	.0	.0	.0
15 *	.0	.0	.0	.0	.0	.0
16 *	.0	.0	.0	.0	.0	.0
17 *	.0	.0	.0	.0	.0	.0
18 *	.0	.0	.0	.0	.0	.0
19 *	.0	.0	.0	.0	.0	.0
20 *	.0	.0	.0	.0	.0	.0

SHIELDING FACTORS - RECEIVER ACROSS,ROADWAY DOWN

1 *	.5	.5	.5	.5	.5	.5
2 *	.5	.5	.5	.5	.5	.5
3 *	.5	.5	.5	.5	.5	.5
4 *	.5	.5	.5	.5	.5	.5
5 *	.5	.5	.5	.5	.5	.5
6 *	.5	.5	.5	.5	.5	.5
7 *	.5	.5	.5	.5	.5	.5
8 *	.5	.5	.5	.5	.5	.5
9 *	.5	.5	.5	.5	.5	.5
10 *	.5	.5	.5	.5	.5	.5
11 *	.5	.5	.5	.5	.5	.5
12 *	.5	.5	.5	.5	.5	.5
13 *	.5	.5	.5	.5	.5	.5
14 *	.5	.5	.5	.5	.5	.5
15 *	.5	.5	.5	.5	.5	.5
16 *	.5	.5	.5	.5	.5	.5
17 *	.5	.5	.5	.5	.5	.5
18 *	.5	.5	.5	.5	.5	.5
19 *	.5	.5	.5	.5	.5	.5
20 *	.5	.5	.5	.5	.5	.5

RECEIVER	LEQ(H)	L10
C1	61.0	64.2

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1	1		
	42.8		
2	1	2	3
	40.6	40.0	41.1
3	1		
	46.1		
6	1	2	
	43.4	47.4	
7	1	2	
	57.8	47.7	
8	1		
	40.5		
10	1	2	
	42.6	41.8	
11	1	2	
	49.6	41.1	
12	1		
	43.9		
14	1	2	3
	40.8	40.7	40.2
15	1		
	43.8		
17	1	2	3
	40.6	40.0	41.1
18	1		
	47.3		
19	1		
	41.8		

20 1
42.5

RECEIVER LEQ(H) L10
C2 65.3 67.7

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1 1
50.5
2 1 2 3
44.7 45.2 47.4
3 1
53.8
6 1 2
49.7 56.1
7 1 2
51.2 56.3
8 1
47.1
10 1 2 5 7 8
49.2 46.4 40.8 40.4 43.0
11 1 2 3
48.5 55.9 40.5
12 1
50.6
13 1
43.7
14 1 2 3 4 5 6
48.4 47.3 45.8 44.4 40.3 41.7
15 1
46.6
16 1
40.1
17 1 2 3
44.7 45.1 47.4
18 1
56.0
19 1
50.6
20 1
49.5

RECEIVER LEQ(H) L10
C3 68.8 71.4

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1 1
55.4
2 1 2 3
46.6 47.8 51.2
3 1
58.7
4 1
40.8
5 1
40.1
6 1 2
53.6 56.3
7 1 2
47.9 56.5
8 1
51.0
10 1 2 3 4 5 7 8
53.4 48.7 41.3 40.8 42.6 42.4 45.0
11 1 2 3
43.4 59.3 48.3
12 1
55.0
13 1
45.9
14 1 2 3 4 5 6
53.6 51.0 48.6 46.8 42.7 44.0
15 1
47.7

16 1 4 5
42.2 40.6 41.0
17 1 2 3
46.6 47.8 51.2
18 1
61.8
19 1
57.6
20 1
53.3

RECEIVER LEQ(H) L10
C4 55.7 58.2

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

3 1
42.8
6 1 2
40.6 42.7
7 1 2
49.8 42.9
11 1
40.5
12 1
40.9
15 1
42.0
18 1
43.9

RECEIVER LEQ(H) L10
C5 52.9 54.8

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

3 1
40.4
7 1
44.5
15 1
40.9
18 1
41.1

RECEIVER LEQ(H) L10
C6 56.9 59.5

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1 1
40.5
3 1
43.8
6 1 2
41.5 44.0
7 1 2
51.7 44.3
10 1 2
40.5 40.4
11 1
41.5
12 1
41.6
15 1
43.4
18 1
44.2
20 1
40.4

RECEIVER LEQ(H) L10

C6 56.9 59.5

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 D

Route 92 Preferred Alternative OPTIMA Modeling Results

Table 1

SUMMARYOF NOISE BARRIER MODELING ANALYSIS

For Receptor R-6					Receptor Data	
Barrier Dimensions			Cost	Max. Insertion Loss	No.of Benefitted	Cost/Receptor
height (ft)	length (ft)	area (ft2)	($)	(dB)	Receptors	($)
10	600	6,000	120,000	7	1	120,000
12	600	7,200	144,000	7	1	144,000
16	600	9,600	192,000	8	1	192,000
18	600	10,800	216,000	8	1	216,000

Note: 1 The $20 per square-foot of barrier is used as a cost estimation for evaluating cost effectiveness.

Light shaded area indicates when a residential receiver benefits from a 4 dBA noise reduction.

Table 1

SUMMARYOF NOISE BARRIER MODELING ANALYSIS

For Receptor R-13					Receptor Data	
Barrier Dimensions			Cost	Max. Insertion Loss	No.of Benefitted	Cost/Receptor
height (ft)	length (ft)	area (ft2)	($)	(dB)	Receptors	($)
10	600	6,000	120,000	6	1	120,000
12	600	7,200	144,000	6	1	144,000
16	600	9,600	192,000	7	1	192,000
18	600	10,800	216,000	7	1	216,000

Note: 1 The $20 per square-foot of barrier is used as a cost estimation for evaluating cost effectiveness.

Light shaded area indicates when a residential receiver benefits from a 4 dBA noise reduction.

Table 1

SUMMARYOF NOISE BARRIER MODELING ANALYSIS

For Receptor R-14					Receptor Data	
Barrier Dimensions			Cost	Max. Insertion Loss	No.of Benefitted	Cost/Receptor
height (ft)	length (ft)	area (ft2)	($)	(dB)	Receptors	($)
10	600	6,000	120,000	5	1	120,000
12	600	7,200	144,000	6	1	144,000
16	600	9,600	192,000	7	1	192,000
18	600	10,800	216,000	8	1	216,000

For Receptor R-16					Receptor Data	
Barrier Dimensions			Cost	Max. Insertion Loss	No.of Benefitted	Cost/Receptor
height (ft)	length (ft)	area (ft2)	($)	(dB)	Receptors	($)
10	600	6,000	120,000	3	1	120,000
12	600	7,200	144,000	4	1	144,000
16	600	9,600	192,000	4	1	192,000
18	600	10,800	216,000	4	1	216,000

For Receptor R-17					Receptor Data	
Barrier Dimensions			Cost	Max. Insertion Loss	No.of Benefitted	Cost/Receptor
height (ft)	length (ft)	area (ft2)	($)	(dB)	Receptors	($)
10	600	6,000	120,000	3	1	120,000
12	600	7,200	144,000	4	1	144,000
16	600	9,600	192,000	4	1	192,000
18	600	10,800	216,000	4	1	216,000

Note: 1 The $20 per square-foot of barrier is used as a cost estimation for evaluating cost effectiveness.
NB: No Barrier
WB: With Barrier
Light shaded area indicates when a residential receiver benefits from a 4 dBA noise reduction.

NO BARRIER

STAMINA PROGRAM
****

TRAFFIC NOISE PREDICTION MODEL
STAMINA 2.0/BCR - FHWA VER. 3 (3/83)
TOWNE, RICHARDS & CHAUDIERE PC VER. 1 (11/84)
Seattle - King County Health Dept.

(INPUT UNITS- ENGLISH , OUTPUT UNITS- ENGLISH)

NJTPA Preferred Route 92 Alignment
PROGRAM INITIALIZATION PARAMETERS

HEIGHT	CODE	DESCRIPTION
.00	1	RECEIVER HEIGHT ADJUSTMENT
1.00	2	A-WEIGHTED SOUND LEVEL ONLY
.00	3	HEIGHT ADJUSTMENT FOR PASSENGER CARS (CARS)
8.00	4	HEIGHT ADJUSTMENT FOR HEAVY TRUCKS (HT)
2.30	5	HEIGHT ADJUSTMENT FOR MEDIUM TRUCKS (MT)

ROADWAY 1 RT92 RT1 TO PERRINE RD ON/OFFRAMP EASTBOUND

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	333.	53.
HT	22.	53.
MT	19.	53.

	----------COORDINATES----------			
	X	Y	Z	GRADE
R92E1	2020730.	558706.	0.	0
R92E2	2021810.	557257.	0.	0
R92E3	2023959.	556100.	0.	0

ROADWAY 2 RT92 RT1 TO PERRINE RD ON/OFFRAMP WESTBOUND

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	2612.	44.
HT	86.	44.
MT	75.	44.

	----------COORDINATES----------			
	X	Y	Z	GRADE
R92W1	2021134.	558006.	0.	0
R92W2	2021855.	557299.	0.	0
R92W3	2023900.	556210.	0.	0

ROADWAY 3 RT92 PERRINE RD ON/OFFRAMP TO RT130 EASTBOUND

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	369.	53.
HT	32.	53.
MT	27.	53.

	----------COORDINATES----------			
	X	Y	Z	GRADE
R92E4	2023959.	556100.	0.	0
R92E5	2033317.	555154.	0.	0
R92E6	2041864.	555759.	0.	0
R92E7	2042873.	555567.	0.	0
R92E8	2044689.	554404.	0.	0
R92E9	2045715.	553625.	0.	0

ROADWAY 4 RT92 PERRINE RD ON/OFFRAMP TO RT130 WESTBOUND

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	3378.	30.
HT	95.	30.
MT	81.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE

R92W4	2023900.	556210.	0.	0
R92W5	2033317.	555217.	0.	0
R92W6	2041861.	555823.	0.	0
R92W7	2042894.	555629.	0.	0
R92W8	2044727.	554456.	0.	0
R92W9	2046159.	553356.	0.	0
R92W10	2046176.	553348.	0.	0

ROADWAY 5 Rt 92 East to Friendship Rd. Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	18.	45.
HT	1.	45.
MT	1.	45.

----------COORDINATES----------				
	X	Y	Z	GRADE
92E11	2045715.	553625.	0.	0
92EFR1	2046231.	553103.	0.	0
92EFR2	2046245.	552932.	0.	0
FR3	2046087.	552855.	0.	0

ROADWAY 6 Rt 92 W Perrine Road Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	766.	30.
HT	8.	30.
MT	7.	30.

----------COORDINATES----------				
	X	Y	Z	GRADE
92W4	2023900.	556210.	0.	0
92WPON1	2023521.	556528.	0.	0

ROADWAY 7 Perrine Road to Rt 92 E Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	36.	45.
HT	10.	45.
MT	8.	45.

----------COORDINATES----------				
	X	Y	Z	GRADE
92EPOF1	2023119.	556280.	0.	0
92E4	2023954.	556079.	0.	0

ROADWAY 8 Perrine Road South of Rt 92 to Rt 92 E Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	637.	30.
HT	5.	30.
MT	4.	30.

----------COORDINATES----------				
	X	Y	Z	GRADE
PE-1	2020866.	554668.	0.	0
PE-2	2021065.	555111.	0.	0
92EPOF1	2023119.	556280.	0.	0

ROADWAY 9 Perrine Road Overpass

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	609.	35.
HT	12.	35.
MT	11.	35.

----------COORDINATES----------				
	X	Y	Z	GRADE
92EPOF1	2023119.	556280.	0.	0
PE-3	2023148.	556346.	15.	0
PE-4	2023311.	556446.	15.	0
92WPON1	2023521.	556528.	0.	0

ROADWAY 10 Perrine Road North of Rt 92 W to Perrine Rd N Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	404.	38.
HT	15.	38.
MT	13.	38.

	----------COORDINATES----------			
	X	Y	Z	GRADE
92WPON1	2023521.	556528.	0.	0
PE-5	2023875.	556678.	0.	0
PE-6	2024646.	556402.	0.	0
PE-7	2025265.	556844.	0.	0

ROADWAY 11 Rt 92W Route 1 North Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	835.	30.
HT	24.	30.
MT	20.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
92WR1N1	2020744.	558695.	0.	0
92WR1N2	2020670.	559114.	0.	0
92WR1N3	2020791.	559490.	0.	0

ROADWAY 12 Route 1 North/Route 92 East Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	307.	30.
HT	21.	30.
MT	18.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
R192E1	2020173.	558822.	0.	0
R192E2	2020489.	558799.	0.	0
R192E3	2021136.	557993.	0.	0

ROADWAY 13 Route 92 West/Route 1 South Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1776.	30.
HT	63.	30.
MT	54.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
92W1	2020462.	559123.	0.	0
92WR1S1	2020381.	559249.	0.	0
92WR1S2	2020221.	559549.	0.	0
92WR1S3	2020257.	559857.	0.	0
92WR1S4	2020457.	559946.	0.	0
92WR1S5	2020692.	559791.	0.	0
92WR1S6	2020624.	559476.	0.	0

ROADWAY 14 Route 1 South/Route 92 East Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	26.	30.
HT	1.	30.
MT	1.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
R1S92E1	2021039.	559920.	0.	0
R1S92E2	2020467.	559980.	0.	0
R1S92E3	2020172.	559787.	0.	0
R1S92E4	2020174.	559536.	0.	0
R1S92E5	2020335.	559209.	0.	0
92E1	2020418.	559076.	0.	0

ROADWAY 15 Route 1 North to Rt 92 E Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	2755.	48.
HT	107.	48.
MT	93.	48.

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            ------------COORDINATES------------
                X          Y          Z    GRADE
R1N1            2019923.   558581.      0.     0
R192E1          2020173.   558822.      0.     0
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ROADWAY 16 Route 1 North to Rt 92W/Rt 1N Onramp

```
            VEHICLE TYPE   VEHICLES/HOUR    SPEED
               CARS          2448.        39.
               HT            86.          39.
               MT            75.          39.
            ------------COORDINATES------------
                X          Y          Z    GRADE
R192E1          2020173.   558822.      0.     0
R1N2            2020374.   559071.     15.     0
R1N3            2020470.   559177.     15.     0
92WR1N3         2020791.   559490.      0.     0
```

ROADWAY 17 Route 1 North from Rt 92W/Rt 1N

```
            VEHICLE TYPE   VEHICLES/HOUR    SPEED
               CARS          3284.        30.
               HT            110.         30.
               MT            95.          30.
            ------------COORDINATES------------
                X          Y          Z    GRADE
92WR1N3         2020791.   559490.      0.     0
R1N4            2021673.   560472.      0.     0
```

ROADWAY 18 Route 1 South to Rt 92 E Onramp

```
            VEHICLE TYPE   VEHICLES/HOUR    SPEED
               CARS          3166.        30.
               HT            67.          30.
               MT            57.          30.
            ------------COORDINATES------------
                X          Y          Z    GRADE
R1S1            2021629.   560507.      0.     0
R1S92E1         2020173.   558822.      0.     0
```

ROADWAY 19 Route 1 South to Rt 92W/Rt 1S Onramp

```
            VEHICLE TYPE   VEHICLES/HOUR    SPEED
               CARS          3140.        30.
               HT            66.          30.
               MT            56.          30.
            ------------COORDINATES------------
                X          Y          Z    GRADE
R1S92E1         2020173.   558822.      0.     0
92WR1S6         2020624.   559476.      0.     0
```

ROADWAY 20 Route 1 South from Rt 92W/Rt 1S

```
            VEHICLE TYPE   VEHICLES/HOUR    SPEED
               CARS          4916.        30.
               HT            128.         30.
               MT            111.         30.
            ------------COORDINATES------------
                X          Y          Z    GRADE
92WR1S6         2020624.   559476.      0.     0
R1S2            2020430.   559232.     15.     0
R1S3            2020331.   559136.     15.     0
R1S4            2019916.   558710.      0.     0
```

ROADWAY 21 Rt 130SB (Rt 92 W Overpass to Friendship Onramp)

```
            VEHICLE TYPE   VEHICLES/HOUR    SPEED
               CARS          1536.        30.
               HT            85.          30.
               MT            74.          30.
```

	----------COORDINATES----------			
	X	Y	Z	GRADE
130 SFR1	2047037.	551978.	0.	0
130N1FR6	2046689.	550780.	0.	0

ROADWAY 22 Rt 130 N to Friendship Onramp (Segment 1)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	51.	47.
HT	1.	47.
MT	0.	47.

	----------COORDINATES----------			
	X	Y	Z	GRADE
130N1FR1	2046825.	550887.	0.	0
130N1FR2	2047016.	551044.	0.	0
130N1FR3	2047139.	550881.	0.	0
130N1FR4	2046988.	550728.	0.	0
130N1FR5	2046796.	550761.	0.	0
130N1FR6	2046689.	550780.	0.	0

ROADWAY 23 Rt 130 N to Friendship Onramp (Segment 2)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	599.	30.
HT	14.	30.
MT	12.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
130N2FR1	2046485.	550923.	0.	0
130N2FR2	2046588.	551349.	0.	0
FR1	2046547.	551516.	0.	0

ROADWAY 24 Friendship Road (Segment 1)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	527.	30.
HT	6.	30.
MT	5.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
FR1	2046547.	551516.	0.	0
FR2	2046212.	552146.	0.	0

ROADWAY 25 Friendship Road (Segment 2)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	535.	30.
HT	6.	30.
MT	5.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
FR2	2046212.	552146.	0.	0
FR3	2046087.	552855.	0.	0

ROADWAY 26 Friendship Road (Segment 3)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	541.	30.
HT	6.	30.
MT	6.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
FR3	2046087.	552855.	0.	0
FR4	2045756.	553279.	0.	0

ROADWAY 27 Friendship Road (Segment 4)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	512.	30.
HT	6.	30.

MT	6.	30.	
----------COORDINATES----------			
X	Y	Z	GRADE
FR4	2045756.	553279.	0. 0
FR5	2045642.	553354.	0. 0

ROADWAY 28 Friendship Rd. (Rt 130 SB Friendship Rd. Onramp)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	357.	30.
HT	11.	30.
MT	9.	30.

----------COORDINATES----------			
X	Y	Z	GRADE
130SFR1	2047023.	551962.	0. 0
FR1	2046547.	551516.	0. 0

ROADWAY 29 Rt 92E (Rt 92/Friendship Offramp to Rt 130SB/Rt92E Onramp)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	361.	53.
HT	31.	53.
MT	26.	53.

----------COORDINATES----------			
X	Y	Z	GRADE
92E11	2045715.	553625.	0. 0
130S92E4	2046640.	552883.	0. 0

RtUS-1, Perrine, Friendship,& Miller Rds,& Asbury & Dye Residences

----------COORDINATES----------			
X	Y	Z	
C9	2021099.	559549.	5.
R12	2020851.	559776.	5.
R16	2024581.	556298.	5.
R15	2025048.	556356.	5.
R4	2038163.	556399.	5.
R14	2038988.	555764.	5.
R13	2043482.	555031.	5.
R17	2042376.	555463.	5.

ALPHA FACTORS - RECEIVER ACROSS,ROADWAY DOWN

1 *	.0	.0	.0	.0	.0	.0	.0	.0	
2 *	.0	.0	.0	.0	.0	.0	.0	.0	
3 *	.0	.0	.0	.0	.0	.0	.0	.0	
4 *	.0	.0	.0	.0	.0	.0	.0	.0	
5 *	.0	.0	.0	.0	.0	.0	.0	.0	
6 *	.0	.0	.0	.0	.0	.0	.0	.0	
7 *	.0	.0	.0	.0	.0	.0	.0	.0	
8 *	.0	.0	.0	.0	.0	.0	.0	.0	
9 *	.0	.0	.0	.0	.0	.0	.0	.0	
10 *	.0	.0	.0	.0	.0	.0	.0	.0	
11 *	.0	.0	.0	.0	.0	.0	.0	.0	
12 *	.0	.0	.0	.0	.0	.0	.0	.0	
13 *	.0	.0	.0	.0	.0	.0	.0	.0	
14 *	.0	.0	.0	.0	.0	.0	.0	.0	
15 *	.0	.0	.0	.0	.0	.0	.0	.0	
16 *	.0	.0	.0	.0	.0	.0	.0	.0	
17 *	.0	.0	.0	.0	.0	.0	.0	.0	
18 *	.0	.0	.0	.0	.0	.0	.0	.0	
19 *	.0	.0	.0	.0	.0	.0	.0	.0	
20 *	.0	.0	.0	.0	.0	.0	.0	.0	
21 *	.0	.0	.0	.0	.0	.0	.0	.0	
22 *	.0	.0	.0	.0	.0	.0	.0	.0	
23 *	.0	.0	.0	.0	.0	.0	.0	.0	
24 *	.0	.0	.0	.0	.0	.0	.0	.0	
25 *	.0	.0	.0	.0	.0	.0	.0	.0	
26 *	.0	.0	.0	.0	.0	.0	.0	.0	
27 *	.0	.0	.0	.0	.0	.0	.0	.0	
28 *	.0	.0	.0	.0	.0	.0	.0	.0	
29 *	.0	.0	.0	.0	.0	.0	.0	.0	

SHIELDING FACTORS - RECEIVER ACROSS,ROADWAY DOWN

```
1 * .5 .5 .5 .5 .5 .5 .5 .5
2 * .5 .5 .5 .5 .5 .5 .5 .5
3 * .5 .5 .5 .5 .5 .5 .5 .5
4 * .5 .5 .5 .5 .5 .5 .5 .5
5 * .5 .5 .5 .5 .5 .5 .5 .5
6 * .5 .5 .5 .5 .5 .5 .5 .5
7 * .5 .5 .5 .5 .5 .5 .5 .5
8 * .5 .5 .5 .5 .5 .5 .5 .5
9 * .5 .5 .5 .5 .5 .5 .5 .5
10 * .5 .5 .5 .5 .5 .5 .5 .5
11 * .5 .5 .5 .5 .5 .5 .5 .5
12 * .5 .5 .5 .5 .5 .5 .5 .5
13 * .5 .5 .5 .5 .5 .5 .5 .5
14 * .5 .5 .5 .5 .5 .5 .5 .5
15 * .5 .5 .5 .5 .5 .5 .5 .5
16 * .5 .5 .5 .5 .5 .5 .5 .5
17 * .5 .5 .5 .5 .5 .5 .5 .5
18 * .5 .5 .5 .5 .5 .5 .5 .5
19 * .5 .5 .5 .5 .5 .5 .5 .5
20 * .5 .5 .5 .5 .5 .5 .5 .5
21 * .5 .5 .5 .5 .5 .5 .5 .5
22 * .5 .5 .5 .5 .5 .5 .5 .5
23 * .5 .5 .5 .5 .5 .5 .5 .5
24 * .5 .5 .5 .5 .5 .5 .5 .5
25 * .5 .5 .5 .5 .5 .5 .5 .5
26 * .5 .5 .5 .5 .5 .5 .5 .5
27 * .5 .5 .5 .5 .5 .5 .5 .5
28 * .5 .5 .5 .5 .5 .5 .5 .5
29 * .5 .5 .5 .5 .5 .5 .5 .5


RECEIVER   LEQ(H)  L10
C9         68.8  71.3

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING  40.0 DBA

ROADWAY  SEGMENT

 1      1   2
      50.0 43.4
 2      1   2
      49.9 48.6
 3      1
      42.2
 4      1
      43.6
 11     1   2
      46.1 50.8
 12     1   2
      40.0 44.3
 13     1   2   3   4   5   6
      45.1 48.1 47.0 46.2 50.2 53.1
 15     1
      50.0
 16     1   2   3
      49.6 48.2 57.9
 17     1
      64.7
 18     1
      63.2
 19     1
      53.8
 20     1   2   3
      54.2 47.8 51.2


RECEIVER   LEQ(H)  L10
R12        71.1  73.8

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING  40.0 DBA

ROADWAY  SEGMENT

 1      1   2
      48.5 42.4
 2      1   2
      48.6 47.6
 3      1
      41.6
 4      1
      43.0
```

11 1 2
44.7 50.3
12 2
43.1
13 1 2 3 4 5 6
45.6 49.8 50.2 50.6 57.6 59.4
14 1
44.3
15 1
50.0
16 1 2 3
49.7 48.4 58.4
17 1
66.2
18 1
66.6
19 1
54.7
20 1 2 3
55.6 48.4 51.6

RECEIVER LEQ(H) L10
R16 68.8 71.9

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1 1 2
40.8 52.0
2 1 2
44.3 56.7
3 1
62.4
4 1
66.0
6 1
42.6
7 1
44.4
10 1 2 3
43.3 58.5 55.7

RECEIVER LEQ(H) L10
R15 66.5 69.3

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1 2
48.7
2 1 2
43.0 53.6
3 1
60.9
4 1
63.7
7 1
40.6
10 2 3
49.2 55.4

RECEIVER LEQ(H) L10
R4 60.8 63.1

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

3 1 2
40.9 56.6
4 1 2
42.1 58.2

RECEIVER LEQ(H) L10
R14 68.6 71.8

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

3	2	3	4	
	63.8	40.4	40.0	
4	1	2	3	4
	40.9	66.7	41.7	41.2

RECEIVER	LEQ(H)	L10
R13	68.9	72.5

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

3	2	3	4	5	
	48.3	50.5	66.0	47.1	
4	2	3	4	5	
	49.4	51.6	65.2	49.0	
29	1				
	41.5				

RECEIVER	LEQ(H)	L10
R17	67.2	70.6

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

3	2	3	4	5	
	54.3	63.1	54.6	42.2	
4	2	3	4	5	
	55.3	62.7	55.6	44.3	

SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

3	2	3	4	5	
	48.3	50.5	66.0	47.1	
4	2	3	4	5	
	49.4	51.6	65.2	49.0	
29	1				
	41.5				

BARRIER

STAMINA PROGRAM
****

TRAFFIC NOISE PREDICTION MODEL
STAMINA 2.0/BCR - FHWA VER. 3 (3/83)
TOWNE, RICHARDS & CHAUDIERE PC VER. 1 (11/84)
Seattle - King County Health Dept.

(INPUT UNITS- ENGLISH , OUTPUT UNITS- ENGLISH)

NJTPA Preferred Route 92 Alignment
PROGRAM INITIALIZATION PARAMETERS

HEIGHT	CODE	DESCRIPTION
.00	1	RECEIVER HEIGHT ADJUSTMENT
1.00	2	A-WEIGHTED SOUND LEVEL ONLY
.00	3	HEIGHT ADJUSTMENT FOR PASSENGER CARS (CARS)
8.00	4	HEIGHT ADJUSTMENT FOR HEAVY TRUCKS (HT)
2.30	5	HEIGHT ADJUSTMENT FOR MEDIUM TRUCKS (MT)

ROADWAY 1 RT92 RT1 TO PERRINE RD ON/OFFRAMP EASTBOUND

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	333.	53.
HT	22.	53.
MT	19.	53.

	COORDINATES			
	X	Y	Z	GRADE
R92E1	2020730.	558706.	0.	0
R92E2	2021810.	557257.	0.	0
R92E3	2023959.	556100.	0.	0

ROADWAY 2 RT92 RT1 TO PERRINE RD ON/OFFRAMP WESTBOUND

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	2612.	44.
HT	86.	44.
MT	75.	44.

	COORDINATES			
	X	Y	Z	GRADE
R92W1	2021134.	558006.	0.	0
R92W2	2021855.	557299.	0.	0
R92W3	2023900.	556210.	0.	0

ROADWAY 3 RT92 PERRINE RD ON/OFFRAMP TO RT130 EASTBOUND

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	369.	53.
HT	32.	53.
MT	27.	53.

	COORDINATES			
	X	Y	Z	GRADE
R92E4	2023959.	556100.	0.	0
R92E5	2033317.	555154.	0.	0
R92E6	2041864.	555759.	0.	0
R92E7	2042873.	555567.	0.	0
R92E8	2044689.	554404.	0.	0
R92E9	2045715.	553625.	0.	0

ROADWAY 4 RT92 PERRINE RD ON/OFFRAMP TO RT130 WESTBOUND

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	3378.	30.
HT	95.	30.
MT	81.	30.

COORDINATES
X Y Z GRADE

R92W4	2023900.	556210.	0.	0
R92W5	2033317.	555217.	0.	0
R92W6	2041861.	555823.	0.	0
R92W7	2042894.	555629.	0.	0
R92W8	2044727.	554456.	0.	0
R92W9	2046159.	553356.	0.	0
R92W10	2046176.	553348.	0.	0

ROADWAY 5 Rt 92 East to Friendship Rd. Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	18.	45.
HT	1.	45.
MT	1.	45.

----------COORDINATES----------				
	X	Y	Z	GRADE
92E11	2045715.	553625.	0.	0
92EFR1	2046231.	553103.	0.	0
92EFR2	2046245.	552932.	0.	0
FR3	2046087.	552855.	0.	0

ROADWAY 6 Rt 92 W Perrine Road Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	766.	30.
HT	8.	30.
MT	7.	30.

----------COORDINATES----------				
	X	Y	Z	GRADE
92W4	2023900.	556210.	0.	0
92WPON1	2023521.	556528.	0.	0

ROADWAY 7 Perrine Road to Rt 92 E Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	36.	45.
HT	10.	45.
MT	8.	45.

----------COORDINATES----------				
	X	Y	Z	GRADE
92EPOF1	2023119.	556280.	0.	0
92E4	2023954.	556079.	0.	0

ROADWAY 8 Perrine Road South of Rt 92 to Rt 92 E Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	637.	30.
HT	5.	30.
MT	4.	30.

----------COORDINATES----------				
	X	Y	Z	GRADE
PE-1	2020866.	554668.	0.	0
PE-2	2021065.	555111.	0.	0
92EPOF1	2023119.	556280.	0.	0

ROADWAY 9 Perrine Road Overpass

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	609.	35.
HT	12.	35.
MT	11.	35.

----------COORDINATES----------				
	X	Y	Z	GRADE
92EPOF1	2023119.	556280.	0.	0
PE-3	2023148.	556346.	15.	0
PE-4	2023311.	556446.	15.	0
92WPON1	2023521.	556528.	0.	0

ROADWAY 10 Perrine Road North of Rt 92 W to Perrine Rd N Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	404.	38.
HT	15.	38.
MT	13.	38.

	----------COORDINATES----------			
	X	Y	Z	GRADE
92WPON1	2023521.	556528.	0.	0
PE-5	2023875.	556678.	0.	0
PE-6	2024646.	556402.	0.	0
PE-7	2025265.	556844.	0.	0

ROADWAY 11 Rt 92W Route 1 North Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	835.	30.
HT	24.	30.
MT	20.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
92WR1N1	2020744.	558695.	0.	0
92WR1N2	2020670.	559114.	0.	0
92WR1N3	2020791.	559490.	0.	0

ROADWAY 12 Route 1 North/Route 92 East Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	307.	30.
HT	21.	30.
MT	18.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
R192E1	2020173.	558822.	0.	0
R192E2	2020489.	558799.	0.	0
R192E3	2021136.	557993.	0.	0

ROADWAY 13 Route 92 West/Route 1 South Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1776.	30.
HT	63.	30.
MT	54.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
92W1	2020462.	559123.	0.	0
92WR1S1	2020381.	559249.	0.	0
92WR1S2	2020221.	559549.	0.	0
92WR1S3	2020257.	559857.	0.	0
92WR1S4	2020457.	559946.	0.	0
92WR1S5	2020692.	559791.	0.	0
92WR1S6	2020624.	559476.	0.	0

ROADWAY 14 Route 1 South/Route 92 East Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	26.	30.
HT	1.	30.
MT	1.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
R1S92E1	2021039.	559920.	0.	0
R1S92E2	2020467.	559980.	0.	0
R1S92E3	2020172.	559787.	0.	0
R1S92E4	2020174.	559536.	0.	0
R1S92E5	2020335.	559209.	0.	0
92E1	2020418.	559076.	0.	0

ROADWAY 15 Route 1 North to Rt 92 E Onramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	2755.	48.
HT	107.	48.
MT	93.	48.

```
              ------------COORDINATES-------------
                 X          Y          Z    GRADE
R1N1             2019923.    558581.        0.     0
R192E1            2020173.    558822.        0.     0
```

ROADWAY 16 Route 1 North to Rt 92W/Rt 1N Onramp

```
              VEHICLE TYPE   VEHICLES/HOUR    SPEED
                 CARS          2448.        39.
                 HT            86.        39.
                 MT            75.        39.
              ------------COORDINATES-------------
                 X          Y          Z    GRADE
R192E1            2020173.    558822.        0.     0
R1N2             2020374.    559071.       15.     0
R1N3             2020470.    559177.       15.     0
92WR1N3             2020791.    559490.        0.     0
```

ROADWAY 17 Route 1 North from Rt 92W/Rt 1N

```
              VEHICLE TYPE   VEHICLES/HOUR    SPEED
                 CARS          3284.        30.
                 HT            110.        30.
                 MT            95.        30.
              ------------COORDINATES-------------
                 X          Y          Z    GRADE
92WR1N3             2020791.    559490.        0.     0
R1N4             2021673.    560472.        0.     0
```

ROADWAY 18 Route 1 South to Rt 92 E Onramp

```
              VEHICLE TYPE   VEHICLES/HOUR    SPEED
                 CARS          3166.        30.
                 HT            67.        30.
                 MT            57.        30.
              ------------COORDINATES-------------
                 X          Y          Z    GRADE
R1S1             2021629.    560507.        0.     0
R1S92E1             2020173.    558822.        0.     0
```

ROADWAY 19 Route 1 South to Rt 92W/Rt 1S Onramp

```
              VEHICLE TYPE   VEHICLES/HOUR    SPEED
                 CARS          3140.        30.
                 HT            66.        30.
                 MT            56.        30.
              ------------COORDINATES-------------
                 X          Y          Z    GRADE
R1S92E1             2020173.    558822.        0.     0
92WR1S6             2020624.    559476.        0.     0
```

ROADWAY 20 Route 1 South from Rt 92W/Rt 1S

```
              VEHICLE TYPE   VEHICLES/HOUR    SPEED
                 CARS          4916.        30.
                 HT            128.        30.
                 MT            111.        30.
              ------------COORDINATES-------------
                 X          Y          Z    GRADE
92WR1S6             2020624.    559476.        0.     0
R1S2             2020430.    559232.       15.     0
R1S3             2020331.    559136.       15.     0
R1S4             2019916.    558710.        0.     0
```

ROADWAY 21 Rt 130SB (Rt 92 W Overpass to Friendship Onramp)

```
              VEHICLE TYPE   VEHICLES/HOUR    SPEED
                 CARS          1536.        30.
                 HT            85.        30.
                 MT            74.        30.
```

	----------COORDINATES----------			
	X	Y	Z	GRADE
30 SFR1	2047037.	551978.	0.	0
30N1FR6	2046689.	550780.	0.	0

ROADWAY 22 Rt 130 N to Friendship Onramp (Segment 1)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	51.	47.
HT	1.	47.
MT	0.	47.

	----------COORDINATES----------			
	X	Y	Z	GRADE
130N1FR1	2046825.	550887.	0.	0
130N1FR2	2047016.	551044.	0.	0
130N1FR3	2047139.	550881.	0.	0
130N1FR4	2046988.	550728.	0.	0
130N1FR5	2046796.	550761.	0.	0
130N1FR6	2046689.	550780.	0.	0

ROADWAY 23 Rt 130 N to Friendship Onramp (Segment 2)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	599.	30.
HT	14.	30.
MT	12.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
130N2FR1	2046485.	550923.	0.	0
130N2FR2	2046588.	551349.	0.	0
FR1	2046547.	551516.	0.	0

ROADWAY 24 Friendship Road (Segment 1)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	527.	30.
HT	6.	30.
MT	5.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
FR1	2046547.	551516.	0.	0
FR2	2046212.	552146.	0.	0

ROADWAY 25 Friendship Road (Segment 2)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	535.	30.
HT	6.	30.
MT	5.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
FR2	2046212.	552146.	0.	0
FR3	2046087.	552855.	0.	0

ROADWAY 26 Friendship Road (Segment 3)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	541.	30.
HT	6.	30.
MT	6.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
FR3	2046087.	552855.	0.	0
FR4	2045756.	553279.	0.	0

ROADWAY 27 Friendship Road (Segment 4)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	512.	30.
HT	6.	30.

```
                MT            6.       30.
              ------------COORDINATES-------------
                X          Y          Z    GRADE
FR4             2045756.    553279.        0.     0
FR5             2045642.    553354.        0.     0
```

ROADWAY 28 Friendship Rd. (Rt 130 SB Friendship Rd. Onramp)

```
             VEHICLE TYPE   VEHICLES/HOUR    SPEED
                CARS           357.       30.
                HT            11.       30.
                MT             9.       30.
              ------------COORDINATES-------------
                X          Y          Z    GRADE
130SFR1           2047023.    551962.        0.     0
FR1             2046547.    551516.        0.     0
```

ROADWAY 29 Rt 92E (Rt 92/Friendship Offramp to Rt 130SB/Rt92E Onramp)

```
             VEHICLE TYPE   VEHICLES/HOUR    SPEED
                CARS           361.       53.
                HT            31.       53.
                MT            26.       53.
              ------------COORDINATES-------------
                X          Y          Z    GRADE
92E11             2045715.    553625.        0.     0
130S92E4          2046640.    552883.        0.     0
```

BARRIER 1 TYPE(A) 107 Friendship Rd Barrier

```
        ---------COORDINATES----------
          X       Y       Z      Z0     DELZ       P
R17_1    2042240.  555685.     18.      0.      2.      2
R17_2    2042816.  555509.     18.      0.
```

BARRIER 2 TYPE(A) The Barrier for the Residence South and West of Friendship and Miller Roads, Res

```
        ---------COORDINATES----------
          X       Y       Z      Z0     DELZ       P
R14_1    2038699.  555661.     18.      0.      2.      2
R14_2    2039307.  555707.     18.      0.
```

BARRIER 3 TYPE(A) The Barrier for the Residence Between the Current and the Proposed Perrine Road

```
        ---------COORDINATES----------
          X       Y       Z      Z0     DELZ       P
R16_1    2024270.  556186.     18.      0.      2.      2
R16_2    2024882.  556186.     18.      0.
```

RtUS-1, Perrine, Friendship,& Miller Road Residences

```
              ------------COORDINATES-------------
                X          Y          Z
R14             2038988.    555764.        5.
R16             2024581.    556298.        5.
R17             2042376.    555463.        5.
```

ALPHA FACTORS - RECEIVER ACROSS,ROADWAY DOWN

```
 1 *  .0  .0  .0
 2 *  .0  .0  .0
 3 *  .0  .0  .0
 4 *  .0  .0  .0
 5 *  .0  .0  .0
 6 *  .0  .0  .0
 7 *  .0  .0  .0
 8 *  .0  .0  .0
 9 *  .0  .0  .0
10 *  .0  .0  .0
11 *  .0  .0  .0
12 *  .0  .0  .0
13 *  .0  .0  .0
```

14 * .0 .0 .0
15 * .0 .0 .0
16 * .0 .0 .0
17 * .0 .0 .0
18 * .0 .0 .0
19 * .0 .0 .0
20 * .0 .0 .0
21 * .0 .0 .0
22 * .0 .0 .0
23 * .0 .0 .0
24 * .0 .0 .0
25 * .0 .0 .0
26 * .0 .0 .0
27 * .0 .0 .0
28 * .0 .0 .0
29 * .0 .0 .0

SHIELDING FACTORS - RECEIVER ACROSS,ROADWAY DOWN

1 * .5 .5 .5
2 * .5 .5 .5
3 * .5 .5 .5
4 * .5 .5 .5
5 * .5 .5 .5
6 * .5 .5 .5
7 * .5 .5 .5
8 * .5 .5 .5
9 * .5 .5 .5
10 * .5 .5 .5
11 * .5 .5 .5
12 * .5 .5 .5
13 * .5 .5 .5
14 * .5 .5 .5
15 * .5 .5 .5
16 * .5 .5 .5
17 * .5 .5 .5
18 * .5 .5 .5
19 * .5 .5 .5
20 * .5 .5 .5
21 * .5 .5 .5
22 * .5 .5 .5
23 * .5 .5 .5
24 * .5 .5 .5
25 * .5 .5 .5
26 * .5 .5 .5
27 * .5 .5 .5
28 * .5 .5 .5
29 * .5 .5 .5

RECEIVER LEQ(H) L10
R14 61.0 63.5

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

3 2
56.1
4 1 2 3
40.9 59.0 40.9

RECEIVER LEQ(H) L10
R16 64.5 68.0

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1 1 2
40.8 52.0
2 1 2
44.3 56.7
3 1
53.8
4 1
58.5
6 1
42.6
7 1

44.4
10 1 2 3
43.3 58.5 55.7

RECEIVER LEQ(H) L10
R17 63.1 66.3

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

3 2 3 4 5
54.3 56.6 53.8 42.2
4 2 3 4 5
55.3 56.2 54.2 44.3
□.0
2 1 2
44.3 56.7
3 1
53.8
4 1
58.5
6 1
42.6
7 1
44.4
10 1 2 3
43.3 58.5 55.7

RECEIVER LEQ(H) L10
R17 63.1 66.3

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

3 2 3 4 5
54.3 56.6 53.8 42.2
4 2 3

Route 1 Unsignalized Intersection STAMINA Modeling Results

Receivers Within 67 dBA Distance

Intersection Description	Distance where 67 Dba is Estimated	Estimated Number of Receivers (1)
Adams/Cozzens Roads and Route 1	Within 300 feet from intersection	0
Route 1 and New Road	Within 200 feet from intersection	1
Route 1 and Beekman Road	Within 200 feet from intersection	1
Route 1 and Finnegans Lane	Within 300 feet from intersection	1
Route 1 and Promenade	Within 200 feet from intersection	0

(1) A residential receiver was determined to be any polygon less than or equal to 3,500 square feet in area and at a significant distance (300 feet) from any large structure (22,500 square feet).

Receiver I.D.[1]	Modeled Peak Hour L_{eq} Noise Levels (dBA)		
	Horizon Year (2028) Route 92		
	Adams/Cozzens Roads and Route 1	Route 1 and New Road	Route 1 and Beekman Road [2]
R-1-200	68.2	67.5	66.1
R-2-200	69.1	68.1	65.5
R-3-200	72.4	68.7	65.4
R-4-200	68.2	67.6	66.1
R-1-300	65.3	64.7	63.5
R-2-300	66.1	67.8	63.0
R-3-300	66.1	65.8	63.0
R-4-300	65.3	65.1	63.4
R-1-350	Na	63.9	Na
R-2-350	Na	65.3	Na
R-3-350	Na	64.7	Na
R-4-350	Na	65.2	Na
R-1-400	63.1	67.1	72.5
R-2-400	64.2	63.1	72.3
R-3-400	63.6	64.1	72.1
R-4-400	63.8	74.5	71.8
R-1-420	Na	66.1	Na
R-2-420	Na	62.5	Na
R-3-420	Na	64.0	Na
R-4-420	Na	67.9	Na
R-1-450	Na	62.7	Na
R-2-450	Na	61.8	Na
R-3-450	Na	64.8	Na
R-4-450	Na	64.0	Na
R-1-480	Na	61.4	Na
R-2-480	Na	61.1	Na
R-3-480	Na	68.6	Na
R-4-480	Na	62.4	Na
R-1-500	Na	60.8	Na
R-2-500	Na	60.7	Na
R-3-500	Na	71.9	Na
R-4-500	Na	61.6	Na
R-1-550	Na	59.7	Na
R-2-550	Na	59.7	Na
R-3-550	Na	62.9	Na
R-4-550	Na	60.3	Na
R-1-600	59.5	58.7	57.4
R-2-600	60.6	58.8	57.6
R-3-600	59.6	60.5	57.1
R-4-600	60.1	59.2	57.3

[1]Intersections were modeled with Route 1 aligned north/south and each subject intersection east/west such that receiver locations were modeled as shown in the illustration below, for example R-3-400 indicates location R-3 modeled approximately 400 feet from the intersection.

[2]The receivers at a distance 400 feet from the intersection were on the ramps causing the predicted dBA to be high.

Na = Not applicable

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S T A M I N A   P R O G R A M
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TRAFFIC NOISE PREDICTION MODEL
STAMINA 2.0/BCR - FHWA VER. 3 (3/83)
TOWNE, RICHARDS & CHAUDIERE PC VER. 1 (11/84)
Seattle - King County Health Dept.


(INPUT UNITS- ENGLISH , OUTPUT UNITS- ENGLISH )


NJTPA ADAMS-COZZENS ROUTE 1 @ 300 FOOT RECEPTORS
PROGRAM INITIALIZATION PARAMETERS

   HEIGHT    CODE        DESCRIPTION
     .00      1    RECEIVER HEIGHT ADJUSTMENT
    1.00      2    A-WEIGHTED SOUND LEVEL ONLY
     .00      3    HEIGHT ADJUSTMENT FOR PASSENGER CARS (CARS)
    8.00      4    HEIGHT ADJUSTMENT FOR HEAVY TRUCKS   (HT)
    2.30      5    HEIGHT ADJUSTMENT FOR MEDIUM TRUCKS  (MT)

ROADWAY  1    RT1 NRTH TO RT608 ON/OFFRAMP EAST/WEST-BOUND

            VEHICLE TYPE   VEHICLES/HOUR    SPEED
               CARS          662.        30.
               HT            3.        30.
               MT            1.        30.
             ------------COORDINATES-------------
                X          Y          Z    GRADE
R1N1                27.      -850.        0.     0
R1N608W1              250.       -10.        15.     0

ROADWAY  2    RT1 STH TO RT608 ON/OFFRAMP EAST/WEST-BOUND

            VEHICLE TYPE   VEHICLES/HOUR    SPEED
               CARS          226.        30.
               HT            4.        30.
               MT            2.        30.
             ------------COORDINATES-------------
                X          Y          Z    GRADE
R1S2               -27.      -350.        0.     0
R1S608E1             -300.      -550.        0.     0
R1S608E2             -700.      -400.        0.     0
R1S608E3             -975.       -10.        0.     0

ROADWAY  3    RT608 EAST TO RT1 ON/OFFRAMP SOUTH-BOUND

            VEHICLE TYPE   VEHICLES/HOUR    SPEED
               CARS          516.        30.
               HT            3.        30.
               MT            1.        30.
             ------------COORDINATES-------------
                X          Y          Z    GRADE
R1S608E3             -975.       -10.        0.     0
R1S608E2             -700.      -400.        0.     0
R1S608E1             -300.      -550.        0.     0
R1S3               -27.      -850.        0.     0

ROADWAY  4    RT608 WEST TO RT1 ON/OFFRAMP NORTH-BOUND

            VEHICLE TYPE   VEHICLES/HOUR    SPEED
               CARS          375.        30.
               HT            6.        30.
               MT            4.        30.
             ------------COORDINATES-------------
                X          Y          Z    GRADE
608W1               950.        0.        0.     0
608ER1N1             700.      450.        0.     0
```

608ER1N2	100.	550.	0.	0
R1N2	27.	950.	0.	0

ROADWAY 5 RT608 EAST SEGMENT (East/West-bound)

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1713.	40.
HT	12.	33.
MT	11.	33.

	X	Y	Z	GRADE
608W1	950.	0.	0.	0
608W2	225.	0.	15.	0

ROADWAY 6 RT608 OVERPASS WEST-BOUND

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1003.	30.
HT	8.	30.
MT	6.	30.

	X	Y	Z	GRADE
608W2	225.	0.	15.	0
608W3	-75.	50.	15.	0

ROADWAY 7 RT608 WEST SEGMENT WEST-BOUND

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	516.	30.
HT	3.	30.
MT	1.	30.

	X	Y	Z	GRADE
608W3	-75.	50.	15.	0
608W4	-900.	50.	0.	0
608W5	-1020.	600.	0.	0

ROADWAY 8 RT608 WEST SEGMENT EAST-BOUND

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	544.	30.
HT	3.	30.
MT	1.	30.

	X	Y	Z	GRADE
608E1	-1060.	600.	0.	0
608E2	-975.	0.	0.	0
608E3	-130.	0.	0.	0

ROADWAY 9 RT608 OVERPASS EAST-BOUND

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	683.	30.
HT	3.	30.
MT	2.	30.

	X	Y	Z	GRADE
608E3	-130.	0.	15.	0
R1N608W1	-250.	-10.	15.	0

ROADWAY 10 RT1 SOUTH-BOUND Prior to exit ramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	5092.	30.
HT	120.	30.
MT	102.	30.

	X	Y	Z	GRADE
R1S1	-27.	950.	0.	0
R1S2	-27.	-350.	0.	0

ROADWAY 11 RT1 SOUTH-BOUND between on/off ramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	4865.	30.
HT	117.	30.
MT	100.	30.

	COORDINATES			
	X	Y	Z	GRADE
R1S2	-27.	-350.	0.	0
R1S3	-27.	-850.	0.	0

ROADWAY 12 RT1 NORTH-BOUND between on/off ramp

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	2457.	49.
HT	159.	49.
MT	135.	49.

	COORDINATES			
	X	Y	Z	GRADE
R1N1	27.	-850.	0.	0
R1N2	27.	950.	0.	0

Receptors Near Adams Lane

	COORDINATES		
	X	Y	Z
R1	-300.	300.	5.
R2	300.	300.	5.
R3	300.	-300.	5.
R4	-300.	-300.	5.

ALPHA FACTORS - RECEIVER ACROSS,ROADWAY DOWN

1	*	.5	.5	.5	.5
2	*	.5	.5	.5	.5
3	*	.5	.5	.5	.5
4	*	.5	.5	.5	.5
5	*	.5	.5	.5	.5
6	*	.5	.5	.5	.5
7	*	.5	.5	.5	.5
8	*	.5	.5	.5	.5
9	*	.5	.5	.5	.5
10	*	.5	.5	.5	.5
11	*	.5	.5	.5	.5
12	*	.5	.5	.5	.5

SHIELDING FACTORS - RECEIVER ACROSS,ROADWAY DOWN

1	*	.0	.0	.0	.0
2	*	.0	.0	.0	.0
3	*	.0	.0	.0	.0
4	*	.0	.0	.0	.0
5	*	.0	.0	.0	.0
6	*	.0	.0	.0	.0
7	*	.0	.0	.0	.0
8	*	.0	.0	.0	.0
9	*	.0	.0	.0	.0
10	*	.0	.0	.0	.0
11	*	.0	.0	.0	.0
12	*	.0	.0	.0	.0

RECEIVER	LEQ(H)	L10
R1	65.3	67.8

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

5 1
44.0
6 1
42.7

7 1
47.1
8 2
45.5
10 1
60.2
11 1
46.3
12 1
63.2

RECEIVER LEQ(H) L10
R2 66.1 68.7

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1 1
41.6
4 1 2 3
40.3 48.7 40.6
5 1
52.8
6 1
45.2
10 1
58.9
11 1
46.1
12 1
64.6

RECEIVER LEQ(H) L10
R3 66.1 68.8

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1 1
53.5
5 1
52.8
6 1
44.3
10 1
56.9
11 1
54.7
12 1
64.5

RECEIVER LEQ(H) L10
R4 65.3 67.8

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1 1
43.1
2 1 2
45.9 44.6
3 2 3
46.1 42.3
5 1
44.0
6 1
41.6
7 1
44.2
8 2
45.5
10 1
58.3
11 1
56.1
12 1

63.2
□ 64.5

RECEIVER	LEQ(H)	L10
R4	65.3	67.8

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S T A M I N A   P R O G R A M
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TRAFFIC NOISE PREDICTION MODEL
STAMINA 2.0/BCR - FHWA VER. 3 (3/83)
TOWNE, RICHARDS & CHAUDIERE PC VER. 1 (11/84)
Seattle - King County Health Dept.


(INPUT UNITS- ENGLISH , OUTPUT UNITS- ENGLISH )


NJTPA NEW ROAD ROUTE 1 @ 200 FT RECEPTORS
PROGRAM INITIALIZATION PARAMETERS

  HE!GHT    CODE       DESCRIPTION
   .00       1   RECEIVER HEIGHT ADJUSTMENT
  1.00       2   A-WEIGHTED SOUND LEVEL ONLY
   .00       3   HEIGHT ADJUSTMENT FOR PASSENGER CARS (CARS)
  8.00       4   HEIGHT ADJUSTMENT FOR HEAVY TRUCKS   (HT)
  2.30       5   HEIGHT ADJUSTMENT FOR MEDIUM TRUCKS  (MT)


ROADWAY  1    RT1 NRTH TO NEW ROAD ON/OFFRAMP EAST/WEST-BOUND


            VEHICLE TYPE   VEHICLES/HOUR    SPEED
               CARS           520.        30.
               HT             16.         30.
               MT             14.         30.
             ------------COORDINATES-------------
                X          Y          Z    GRADE
NR1N1             27.      -900.       0.     0
NW2              650.      -360.       0.     0


ROADWAY  2    RT1 STH TO NEW ROAD ON/OFF RAMP EAST/WEST-BOUND


            VEHICLE TYPE   VEHICLES/HOUR    SPEED
               CARS           446.        30.
               HT             2.          30.
               MT             1.          30.
             ------------COORDINATES-------------
                X          Y          Z    GRADE
NR1S1            -27.       900.       0.     0
NW5             -725.        0.        0.     0


ROADWAY  3    NEW ROAD EAST TO RT1 ON/OFFRAMP SOUTH-BOUND


            VEHICLE TYPE   VEHICLES/HOUR    SPEED
               CARS           1115.       30.
               HT             9.          30.
               MT             7.          30.
             ------------COORDINATES-------------
                X          Y          Z    GRADE
BW5             -700.        0.        0.     0
NR1S2            -27.      -900.       0.     0


ROADWAY  4    NEW ROAD WEST TO RT1 ON/OFFRAMP NORTH-BOUND


            VEHICLE TYPE   VEHICLES/HOUR    SPEED
               CARS           494.        30.
               HT             5.          30.
               MT             4.          30.
             ------------COORDINATES-------------
                X          Y          Z    GRADE
NW2              650.      -360.       0.     0
NR1N2             27.       900.       0.     0


ROADWAY  5    NEW ROAD OVERPASS EAST/WEST-BOUND
```

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1242.	30.
HT	14.	30.
MT	12.	30.

	COORDINATES			
	X	Y	Z	GRADE
NW2	650.	-360.	0.	0
NW3	52.	-25.	15.	0
NW4	-63.	0.	15.	0
NW5	-725.	0.	0.	0

ROADWAY 6 RT1 SOUTH-BOUND BETWEEN ON/OFF RAMP

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	4219.	32.
HT	109.	32.
MT	92.	32.

	COORDINATES			
	X	Y	Z	GRADE
NR1S1	-27.	900.	0.	0
NR1S2	-27.	-900.	0.	0

ROADWAY 7 RT1 NORTH-BOUND BETWEEN ON/OFF RAMP

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1933.	50.
HT	111.	50.
MT	94.	50.

	COORDINATES			
	X	Y	Z	GRADE
NR1N1	27.	-900.	0.	0
NR1N2	27.	900.	0.	0

RECEPTORS NEAR NEW ROAD

	COORDINATES		
	X	Y	Z
R1	-200.	200.	5.
R2	200.	200.	5.
R3	200.	-200.	5.
R4	-200.	-200.	5.

ALPHA FACTORS - RECEIVER ACROSS,ROADWAY DOWN

1 * .5 .5 .5 .5
2 * .5 .5 .5 .5
3 * .5 .5 .5 .5
4 * .5 .5 .5 .5
5 * .5 .5 .5 .5
6 * .5 .5 .5 .5
7 * .5 .5 .5 .5

SHIELDING FACTORS - RECEIVER ACROSS,ROADWAY DOWN

1 * .0 .0 .0 .0
2 * .0 .0 .0 .0
3 * .0 .0 .0 .0
4 * .0 .0 .0 .0
5 * .0 .0 .0 .0
6 * .0 .0 .0 .0
7 * .0 .0 .0 .0

RECEIVER	LEQ(H)	L10
R1	67.5	70.3

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

2 1
45.7
3 1

44.7
4 1
43.0
5 1 2 3
45.1 45.1 53.4
6 1
63.7
7 1
64.7

RECEIVER LEQ(H) L10
R2 68.1 71.2

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1 1
40.4
3 1
40.9
4 1
52.2
5 1 2 3
49.8 44.7 45.6
6 1
61.8
7 1
66.6

RECEIVER LEQ(H) L10
R3 68.7 71.8

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1 1
46.6
3 1
44.2
4 1
46.3
5 1 2 3
60.7 45.5 45.6
6 1
61.8
7 1
66.6

RECEIVER LEQ(H) L10
R4 67.6 70.4

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1 1
42.0
3 1
50.8
4 1
40.3
5 1 2 3
47.1 45.7 53.4
6 1
63.7
7 1
64.7
□ 1
46.3
5 1 2 3
60.7 45.5 45.6
6 1
61.8
7 1
66.6

RECEIVER	LEQ(H)	L10
R4	67.6	70.4

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1 1
42.0
3 1
50.8
4 1

```
S T A M I N A   P R O G R A M
*****************************

TRAFFIC NOISE PREDICTION MODEL
STAMINA 2.0/BCR - FHWA VER. 3 (3/83)
TOWNE, RICHARDS & CHAUDIERE PC VER. 1 (11/84)
Seattle - King County Health Dept.


(INPUT UNITS- ENGLISH , OUTPUT UNITS- ENGLISH )


NJTPA BEEKMAN-NORTHUMBERLAND ROUTE 1 @ 200 FT RECEPTORS
PROGRAM INITIALIZATION PARAMETERS

   HEIGHT    CODE       DESCRIPTION
     .00      1    RECEIVER HEIGHT ADJUSTMENT
    1.00      2    A-WEIGHTED SOUND LEVEL ONLY
     .00      3    HEIGHT ADJUSTMENT FOR PASSENGER CARS (CARS)
    8.00      4    HEIGHT ADJUSTMENT FOR HEAVY TRUCKS   (HT)
    2.30      5    HEIGHT ADJUSTMENT FOR MEDIUM TRUCKS  (MT)


ROADWAY  1    RT1 NRTH TO NORTHUMBERLAND ON/OFFRAMP EAST/WEST-BOUND


            VEHICLE TYPE   VEHICLES/HOUR    SPEED
               CARS          664.        30.
               HT            5.        30.
               MT            3.        30.
             -----------COORDINATES------------
                X          Y         Z    GRADE
BR1N1             27.      -900.       0.     0
BW2              700.        0.       0.     0


ROADWAY  2    RT1 STH TO BEEKMAN ON/OFF RAMP EAST/WEST-BOUND


            VEHICLE TYPE   VEHICLES/HOUR    SPEED
               CARS          921.        30.
               HT            3.        30.
               MT            1.        30.
             -----------COORDINATES------------
                X          Y         Z    GRADE
BR1S1            -27.       900.       0.     0
BW5             -700.        0.       0.     0


ROADWAY  3    BEEKMAN EAST TO RT1 ON/OFFRAMP SOUTH-BOUND


            VEHICLE TYPE   VEHICLES/HOUR    SPEED
               CARS          679.        30.
               HT            4.        30.
               MT            2.        30.
             -----------COORDINATES------------
                X          Y         Z    GRADE
BW5             -700.        0.       0.     0
BR1S2            -27.      -900.       0.     0


ROADWAY  4    NORTHUMBERLAND WEST TO RT1 ON/OFFRAMP NORTH-BOUND


            VEHICLE TYPE   VEHICLES/HOUR    SPEED
               CARS          896.        30.
               HT            3.        30.
               MT            1.        30.
             -----------COORDINATES------------
                X          Y         Z    GRADE
BW2              700.        0.       0.     0
BR1N2             27.       900.       0.     0
```



```
ROADWAY  5    NORTHUMBERLAND EAST SEGMENT (EAST/WEST-BOUND)
```

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	878.	30.
HT	1.	30.
MT	1.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
BW1	1200.	1400.	0.	0
BW2	700.	0.	0.	0

ROADWAY 6 BEEKMAN OVERPASS EAST/WEST-BOUND

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1711.	30.
HT	6.	30.
MT	5.	30.

	----------COORDINATES----------			
	X	Y	Z	GRADE
BW2	700.	0.	0.	0
BW3	63.	0.	15.	0
BW4	-63.	0.	15.	0
BW5	-700.	0.	0.	0

ROADWAY 7 BEEKMAN WEST SEGMENT WEST-BOUND

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1293.	32.
HT	3.	32.
MT	1.	32.

	----------COORDINATES----------			
	X	Y	Z	GRADE
BW6	-1150.	0.	0.	0
BW5	-700.	0.	0.	0

ROADWAY 8 RT1 SOUTH-BOUND BETWEEN ON/OFF RAMP

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	3985.	36.
HT	108.	36.
MT	92.	36.

	----------COORDINATES----------			
	X	Y	Z	GRADE
BR1S1	-27.	900.	0.	0
BR1S2	-27.	-900.	0.	0

ROADWAY 9 RT1 NORTH-BOUND BETWEEN ON/OFF RAMP

VEHICLE TYPE	VEHICLES/HOUR	SPEED
CARS	1645.	49.
HT	6.	49.
MT	5.	49.

	----------COORDINATES----------			
	X	Y	Z	GRADE
BR1N1	27.	-900.	0.	0
BR1N2	27.	900.	0.	0

RECEPTORS NEAR BEEKMAN

	----------COORDINATES----------		
	X	Y	Z
R1	-200.	200.	5.
R2	200.	200.	5.
R3	200.	-200.	5.
R4	-200.	-200.	5.

ALPHA FACTORS - RECEIVER ACROSS,ROADWAY DOWN

1 * .5 .5 .5 .5
2 * .5 .5 .5 .5
3 * .5 .5 .5 .5
4 * .5 .5 .5 .5

5 * .5 .5 .5 .5
6 * .5 .5 .5 .5
7 * .5 .5 .5 .5
8 * .5 .5 .5 .5
9 * .5 .5 .5 .5

SHIELDING FACTORS - RECEIVER ACROSS,ROADWAY DOWN

1 * .0 .0 .0 .0
2 * .0 .0 .0 .0
3 * .0 .0 .0 .0
4 * .0 .0 .0 .0
5 * .0 .0 .0 .0
6 * .0 .0 .0 .0
7 * .0 .0 .0 .0
8 * .0 .0 .0 .0
9 * .0 .0 .0 .0

RECEIVER LEQ(H) L10
R1 66.1 69.0

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

2 1
48.8
3 1
42.0
4 1
42.1
6 1 2 3
45.3 45.3 53.1
8 1
64.6
9 1
59.0

RECEIVER LEQ(H) L10
R2 65.5 68.0

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1 1
42.2
2 1
42.2
4 1
48.7
5 1
41.2
6 1 2 3
53.1 45.3 45.3
8 1
62.7
9 1
60.9

RECEIVER LEQ(H) L10
R3 65.4 68.0

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1 1
48.4
3 1
41.5
4 1
42.5
6 1 2 3
53.1 45.3 45.3
8 1
62.7
9 1

60.9

RECEIVER	LEQ(H)	L10
R4	66.1	69.0

ROADWAY SEGMENT SOUND LEVEL CONTRIBUTIONS EXCEEDING 40.0 DBA

ROADWAY SEGMENT

1 1
41.8
2 1
42.6
3 1
48.1
6 1 2 3
45.3 45.3 53.1
8 1
64.6
9 1
59.0
□ 1
42.5
6 1

Appendix E
Route 92 Engineer's Reports

Note: This appendix was reproduced from the NJDEP LURP Stream Encroachment Permit Application (revised April 21, 1999). Refer to the permit application for the accompanying calculations.

Appendix A
New Jersey Turnpike Authority

Application for
Stream Encroachment Permit

Engineer's Report

Contract No. RT 92-1001
RT 92-1002
RT 92-1003

Section No. 1

Proposed Route 92
from Route U.S. 1 to Interchange 8A
of the New Jersey Turnpike
in
the Townships of
Plainsboro And South Brunswick
Middlesex County

October 30, 1996

Prepared By:
Goodkind & O'Dea, Inc.
60 Feronia Way
Rutherford, New Jersey 07070

George Soule, P.E., P.P.
NJ P.E. License No. 26993

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STREAM ENCROACHMENT PERMIT PLANS

TITLE SHEET
LEGEND SHEET
PLAN REFERENCE SHEETS
TYPICAL SECTIONS
PLANS
DETAILS
OUTLET PROFILES
STREAM PROFILES
ROADWAY PROFILES
STREAM CROSS SECTIONS
ROADWAY CROSS SECTIONS

1.0 INTRODUCTION

The New Jersey Turnpike Authority (NJTA) has retained Goodkind & O'Dea, Inc. (G&O) to perform final design for Section 1 of the Route 92 project. Route 92 is a proposed 6.7 mile long, four (4) lane highway which will connect the New Jersey Turnpike at Interchange 8A to U.S. Route 1. A location map is provided on the Title Sheet.

The required Stream Encroachment Permit Application for Section 1 includes the extension of an existing 72" x 44" corrugated metal arch pipe over the Tributary to Shallow Brook, the replacement of an existing 36" dia. CMP culvert over Tributary `A' along Route 130 with a 34" x 53" elliptical RCP culvert, the installation of nine (9) water quality/detention basins, three of which are located within the 100 year floodplain, and the construction of an outfall structure from a proposed basin within the 100-year floodplain of Devil's Brook. A review of hydrology and hydraulics for Devil's Brook is also required.

This report presents the supporting calculations for the Stream Encroachment Permit Application. The calculations include hydrologic and hydraulic calculations, 20% net fill calculations, and water quality/stormwater management calculations. This report provides supporting documentation for the proposed improvements shown on Plan Sheets 6 through 48.

2.0 PROPOSED IMPROVEMENTS

The proposed roadway drainage systems in Section 1 are as follows:

1. From the eastern limit of Section 1 (Toll Road) to the Tributary to Shallow Brook, the roadway drainage is collected by inlet and pipe systems. The roadway drainage is treated and detained by a total of four Proposed Water Quality/Detention Basins. Three of the basins are located within ramp infield areas and the fourth is located along the eastern overbank of the Tributary to Shallow Brook, within the 100-year floodplain. The basins discharge into existing pipe systems or water courses. The overland off-site flow will bypass the proposed basins and will discharge directly into the Tributary.

   Proposed Water Quality/Detention Basin Nos. 1A and 1C discharge into an existing pipe system which originates on the eastern side of the Turnpike Toll Road. This system intercepts offsite overland flow and ultimately discharges into the existing 72" x 44" corrugated metal arch pipe culvert. The roadway drainage from Ramp WTX and the southwest infield area will discharge into Basin No. 1A. Portions of Route 32, the Toll Road and Route 535 will discharge into Basin No. 1C.

A portion of eastbound Route 32 and Ramps WTL and WT will discharge into Basin No.1B. This basin discharges into a swale and pipe system, which ultimately flows into an existing detention basin along Cranbury-South River Road.

2. From the high point at Commerce Drive east to the Tributary to Shallow Brook, the roadway drainage is also collected by an inlet and pipe system. The roadway drainage is treated and detained by Proposed Water Quality/Detention Basin No. 1E located along the western overbank of the Tributary to Shallow Brook, within the 100-year floodplain. The basin discharges directly into the Tributary. The overland off-site flow will bypass the proposed basin and will discharge directly into the Tributary.

   The borings taken at the sites of the proposed basins east of Commerce Drive revealed no presence of groundwater at depths of up to 17 feet. Borings indicate sandy soils in this region.

3. Roadway drainage from the following locations will be collected in either existing or proposed inlet, pipe or swale systems and will discharge into the expanded Park-and-Ride detention basin (No. 1H):

   a. Route 92 - from 600 feet west of Commerce Drive to the high point at Route 130;

   b. Route 130 - from the high point on Route 130 to the intersection of Ramp SLE;

   c. Ramp WN.

   The groundwater at Basin No. 1H is at elevation 103.7.

4. From the Route 92 high point at Route 130 to Ramp NE and a portion of Ramp NE, the roadway drainage will be collected in an inlet and pipe system and discharge into Proposed Basin No. 1G. The groundwater at this location is at elevation 103.7.

5. From the Route 130 high point to approximately 1,200 feet north, Ramps ELN, SW, ES and a portion of Ramp NE, the roadway drainage will be collected in inlet, pipe and swale systems and discharge into Proposed Basin No. 1F. The groundwater at this location is at elevation 101.7.

6. From the Route 130 intersection with Ramp SLE to the Route 130 intersection with Friendship Road, the roadway drainage will be collected in inlet and pipe systems and discharge into Proposed Basin No. 1I.

7. The roadway drainage from Route 130 north of Proposed Basin No. 1F will be collected in the existing drainage pipes with inlets added at the new edge of pavement. The existing pipes discharge into the existing culvert at Devil's Brook.

8. The roadway drainage from Ramp NW will discharge directly into swales along the toe of the western embankment. The swales will be designed in accordance with NJAC 7:13-2.8. The roadway drainage from Ramp NW does not discharge into Basin 1F, due to capacity constraints of this basin.

9. The roadway drainage from Route 92 west of Ramp NE will discharge into swales along the embankment slopes. The swales will be designed in accordance with NJAC 7:13-2.8. When possible, the roadway drainage from this area will be piped to the proposed detention basin, west of the proposed Toll Plaza, within Section 2 of this project.

The proposed culvert/culvert extensions are as follows:

1. The existing Route 32 roadway will be widened by approximately 90 feet in the vicinity of the crossing over the Tributary to Shallow Brook. The existing drainage system consists of closed pipe systems originating along the north side of Route 32, a 72" x 44" metal arch pipe crossing under Route 32 and discharging through a headwall located in the embankment of eastbound Route 32, into the Tributary which flows south-westerly to Shallow Brook. The actual watercourse begins at the Route 32 headwall and continues downstream.

   The existing culvert will be extended with a culvert of the same dimensions and type to a new headwall located in the proposed embankment.

2. The existing Route 130 roadway will not be widened outside of the existing embankment in the vicinity of the crossing over Tributary `A'. However, approximately 300 feet west of Route 130, the proposed relocated Friendship Road will cross over Tributary `A'.

   The existing drainage system consists of a closed pipe system originating along Route 32, flowing south to Route 130, and ultimately discharging through a 36" diameter corrugated metal pipe, along the west side of Route 130 into Tributary `A'. The proposed system consists of a new 34" x 53" elliptical concrete pipe which will be installed along the east side of Route 130 and continue downstream to the west side of relocated Friendship Road.

3.0 EXISTING STREAMS

Drainage patterns for the existing conditions were determined by site investigations and review of the aerial topographic mapping. Points of interest (POI) were selected for analysis to assess the impact of the Route 92 project on existing watercourses. The selection of POI were based on locations where the proposed alignment crosses over the existing stream.

3.1 TRIBUTARY TO SHALLOW BROOK

This tributary is a non-delineated stream. In the vicinity of the proposed widening, the watercourse consists of a shallow channel with cultivated farm field overbanks. Approximately 560 feet downstream of the headwall at Route 32 the stream heads southward through parking lots via a deep grass-lined trapezoidal channel containing a concrete low flow channel. The drainage area is 180 acres.

Surveyed cross sections were taken from the upstream headwall at Route 32 to a point approximately 1,200 feet downstream. With these sections, an hydraulic analysis was performed using the HEC-2 program to determine the existing 100-year floodplain limits and floodway.

3.2 TRIBUTARY `A' TO SHALLOW BROOK

This tributary is also a non-delineated stream. Similar to the above stream, Tributary `A' consists of a shallow channel bisecting a cultivated farm field. The drainage area is 75 acres.

Surveyed cross sections were taken from the upstream headwall at Route 130 to a point approximately 800 feet downstream. The same procedure described above was used to determine the existing 100-year floodplain limits and floodway.

3.3 DEVIL'S BROOK

At the Route 130 crossing over Devil's Brook, this watercourse is a non-delineated stream. The existing culvert under Route 130 is a 4 ft. high x 5 ft. wide concrete box culvert. A ponding area is located on the east side of Route 130 at the upstream face of the culvert. The overbanks of the stream contain dense brush. The drainage area is 350 acres.

Surveyed cross sections were taken 500 ft. upstream and downstream of the Route 130 culvert and a HEC-2 model was prepared to determine the floodplain limits. Route 130 will not be modified or widened in this vicinity; however, a proposed outfall structure will be located on the west side of Route 130 within the floodplain.

4.0 PROPOSED CULVERTS

4.1 TRIBUTARY TO SHALLOW BROOK

A 140 foot extension of the existing 72" x 44" metal arch pipe is proposed over the Tributary to Shallow Brook. As this is an extension of an existing culvert, the skew to the roadway will be the same as the existing skew.

The peak flow for the 2, 10 and 100-year storm events for all stream crossings was calculated using the SCS TR-55 method

assuming fully developed conditions. The capacity of the existing system, under submerged (pressure) conditions, exceeds the 100-year peak flow.

The capacity of the proposed extended culvert also exceeded the 100-year peak flow under submerged conditions.

4.2 TRIBUTARY `A' TO SHALLOW BROOK

A 34" x 53" elliptical concrete pipe is proposed over Tributary `A'. This culvert would begin along the east side of Route 130, continue under relocated Friendship Road, and discharge into Tributary `A' along the west embankment of Friendship Road.

The capacity of the existing 36" dia. corrugated metal culvert is less than a 2-year storm. Although the current NJDEP criteria requires a 100-year storm event design for culverts with drainage areas over 50 acres (Note: Drainage area to Tributary `A' at Route 130 is 75 acres), sizing a culvert to convey the 100-year storm at this location was not considered a reasonable solution since the immediate upstream pipe was incapable of conveying even a 2-year storm. Based on the lack of definable watercourse and the existing 36" diameter trunk line along and under Route 130, a 34" x 53" elliptical concrete pipe has been selected for this crossing.

5.0 HYDROLOGY

For the floodplain delineation, standard hydrologic and hydraulic study methods were used in this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 2, 10, or 100 year period, as required by the NJDEP, have been selected as having special significance for floodplain management. These events, commonly termed the 2, 10, and 100-year floods, have a 50, 10, and 1 percent chance, respectively, of being equaled or exceeded during any year.

The recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increase when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual accedence) in any 50 year period is approximately 40 percent (4 in 10), and, for any 90 year period, the risk increases to approximately 60 percent (6 in 10).

Drainage areas and other hydrologic characteristics of the various streams and ditches were calculated at points where the proposed Route 92 alignment crosses over them. These locations were selected for cross culverts to convey stormwater run-off across the proposed alignment.

The hydrologic calculations were performed using the Soil Conservation Service Technical Release No. 55 Urban Hydrology for Small Watersheds (SCS TR-55) and the HEC-1 program.

The peak discharges were calculated assuming full development as required by the NJDEP. Developed conditions were based on the Existing Land Use Map prepared for the Middlesex County Planning Board.

Table 1 contains a summary of hydrologic information for each of the streams within the project limits.*

TABLE 1
SUMMARY OF DISCHARGES

Stream Name	Drainage Area (Acres)	Peak Discharge (CFS) 2 YR	10 YR	100 YR
Tributary to Shallow Brook	180	35	100	200
Tributary `A' to Shallow Brook	75	55	110	185
Devil's Brook	350	80	225	440

*Note: Only the proposed outfall from Basin 1F is located within the 100-year floodplain of Devil's Brook. The delineation and supporting computations are included for verification only.

6.0 HYDRAULICS

6.1 TRIBUTARY TO SHALLOW BROOK

A hydraulic analysis of the stream was performed using the HEC-2 computer program. Stream cross sections were field surveyed. Channel roughness factors (Manning's "n") used in the hydraulic analysis were assigned on the basis of the field inspection of floodplain areas. The approximate roughness values for the Tributary are as follows: Channel "n" (0.015-0.030) and Overbank "n" (0.060-0.080). All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Starting water surface elevations were obtained from the Shallow Brook backwater profiles as shown in the Flood Insurance Study (FIS).

The water surface profile was drawn showing computed water surface elevations for the 100-year storm. Table 2 provides a comparison of existing and proposed water surface elevations for the stream. These results indicate that the extension of the existing culvert and construction of Water Quality/Detention Basin Nos. 1D and 1E within the floodplain will have no adverse impact on the water surface profile of the Tributary.

TABLE 2

COMPARISON OF EXISTING AND PROPOSED WATER SURFACE ELEVATIONS (WSEL) FOR THE TRIBUTARY TO SHALLOW BROOK 100-YEAR FLOOD

STREAM STATION	LOCATION	EXISTING WSEL	PROPOSED WSEL	DIFFERENCE (ft.)
8+02		117.00	117.00	0.00
8+47	D.S. Face Parking Lot Culvert "A"	117.38	117.38	0.00
9+27	U.S. Face Parking Lot Culvert "A"	117.68	117.68	0.00
9+80		118.58	118.58	0.00
10+66		118.78	118.78	0.00
11+81		118.77	118.77	0.00
12+83		119.07	119.07	0.00
13+40		119.02	119.02	0.00
13+90	D.S. Face Parking Lot Culvert "B"	119.39	119.39	0.00
14+40	U.S. Face Parking Lot Culvert "B"	120.38	120.38	0.00
14+90		122.01	122.01	0.00
15+40		122.19	122.19	0.00
16+40		122.25	122.24	-0.01
17+40		122.27	122.26	-0.01
18+40		122.28	122.23	-0.05
18+59	D.S. Face Proposed 72"x44" Culvert Extension	----	122.53	----
18+90		122.08	----	----
19+40		122.65	----	----
20+00	D.S. Face Exist. 72"x44" Culvert Under Route 32	122.89	----	----

6.2 TRIBUTARY `A' TO SHALLOW BROOK

A hydraulic analysis of the stream was performed using the HEC-2 computer program. Stream cross sections were field surveyed. Channel roughness factors (Manning's "n") used in the hydraulic analysis were assigned on the basis of field inspection. The approximate roughness Values for Tributary `A' are as follows: Channel "n" (0.030) and overbank (0.10). Starting water surface elevations were obtained using the slope-area method (normal depth).

The water surface profile was drawn showing computed water surface elevations for the 100-year storm. Table 3 provides a comparison of existing and proposed water surface elevations for the stream. These results indicate that the installation of a new culvert under Route 130 and Friendship Road will have no adverse impact on the water surface profile of Tributary `A'.

TABLE 3

COMPARISON OF EXISTING AND PROPOSED WATER SURFACE ELEVATIONS (WSEL) FOR TRIBUTARY 'A' TO SHALLOW BROOK 100-YEAR FLOOD

STREAM STATION	LOCATION	EXISTING WSEL	PROPOSED WSEL	DIFFERENCE
22+23		107.31	107.31	0.00
23+24		107.78	107.78	0.00
24+23		108.32	108.32	0.00
25+22		109.05	109.05	0.00
26+20		109.43	109.43	0.00
27+13		109.77	----	----
27+22	D.S. Face Proposed Headwall	----	109.74	----
28+16		110.25	----	----
29+10		110.87	----	----
30+00	D.S. Face Existing 36" Dia. CMP Under Route 130	111.69	----	----

6.3 DEVIL'S BROOK

A hydraulic analysis of the stream was performed using the same method as the previous streams. Channel roughness factors used for the brook are as follows: Channel "n" (0.03) and Overbank "n" (0.080-0.120).

The resulting 100-year floodplain was delineated on the plan. The proposed outfall structure from Basin 1F is located within the 100-year floodplain.

7.0 WATER QUALITY

The water quality design storm is defined as either 1.25 inches of rainfall falling uniformly in two hours or the 1-year 24 hour storm using the SCS type III rainfall distribution in accordance with NJAC 7:13-2.8.

In order to provide water quality for the highway runoff, a total of nine (9) water quality/detention basins are proposed in Section 1 to provide water quality and stormwater management. Stormwater management is described in the next section.

The proposed contributory drainage area to each basin was calculated and the inflow hydrograph to each basin was determined using the criteria mentioned above. The volume of the water quality storm was calculated as the area under the resulting hydrograph.

The proposed basins were located and sized based on volume requirements, topographic constraints, right-of-way, and strategic locations at discharge points. The proposed outlet structures consist of a type double D2 or similar basin with a minimum 3" diameter orifice at the basin invert to pass the water quality storm. Since water quality treatment will occur within the proposed detention basin, the NJDEP also requires that no more than 90% of the total peak storage volume can be released over a 36 hour period (from the time of peak storage). In basins where the detention times could not be met, the minimum 3" diameter outlet orifice was used.

The resulting water quality storm hydrographs were routed through the proposed basins using either Haestad Methods Pond-2 Detention Pond Design and Analysis or the HEC-1 program (See Appendix D).

Table 4 contains a summary of water quality data for the basins in Section 1. These results indicate the following:

1. While Basin Nos. 1A, 1B, 1D, 1F, 1G and 1I provide sufficient storage volume so that outflow is restricted to the 3" diameter orifice, the basins are fully drained prior to the 36 hour detention period;

2. Basin Nos. 1C and 1H meet the water quality detention time requirements;

3. Due to site constraints, i.e. location between Eastbound Service Road, the Tributary to Shallow Brook, and adjacent commercial property, sufficient storage volume for Basin No. 1E could not be provided for the water quality storm. Therefore, in addition to the 3" dia. orifice, outflow will also discharge through the second stage (rectangular orifice) in the outlet structure.

4. All runoff from the proposed pavement is being treated by discharging into basins or swales. The existing Route 130 at the north end of the project is only being repaved. The existing drainage discharges directly into Devils Brook and no changes to the drainage are proposed.

TABLE 4

WATER QUALITY HYDROLOGIC & HYDRAULIC DATA

WATER QUALITY/ DETENTION BASIN NO.	DRAINAGE AREA (AC.)	PEAK INFLOW Q_{WQ} IN (CFS)	PEAK OUTFLOW Q_{WQ} OUT (CFS)	PEAK STAGE (ELEV.)
1A	7.7	4.0	0.4	135.77
1B	3.6	2.2	0.3	139.99
1C	8.8	8.2	0.5	133.45
1D	6.4	5.4	0.5	123.89
1E	5.9	6.3	6.3	123.92
1F	23.5	9.0	0.4	110.43
1G	4.4	6.0	0.4	110.69
1H	30	19	0.3	110.54
1I	8.0	6.0	0.3	110.53

8.0 STORMWATER MANAGEMENT

In accordance with the NJDEP, the engineering standards for stormwater management are as follows: The post-construction peak runoff rate for the 2-year storm event is 50% of the pre-construction peak runoff rate and the post-construction peak runoff rate for the 10 and 100-year storm events are 75% of the pre-project construction peak runoff rate.

In order to provide stormwater management, the proposed water quality/detention basins will be used for this purpose in addition to providing water quality treatment. Basically, above the peak stage of the water quality storm as shown in Table 4, a second stage will be provided in the outlet structure in the form of a rectangular orifice. As an emergency measure, assuming the basin is full and the first and second stage orifices are blocked, the design flow was designed to pass through the grates of the outlet structure.

The existing and proposed conditions peak flows for the 2, 10, and 100-year storms were calculated and the resulting inflow hydrographs for proposed conditions were computed using either the Modified Rational Method (for drainage areas up to 20 acres) or the SCS TR-55 method (see Appendix D for backup calculations).

The resulting inflow hydrographs were routed through each basin using either the Haestad Method Pond-2 Detention Pond Analysis program or the HEC-1 program. The results of these routings are shown in Table 5.

These results indicate the following:

1. All the basins meet stormwater management criteria as set forth in NJAC 7:13-2.8.

TABLE 5

STORMWATER MANAGEMENT DATA

Water Quality/ Detention Basin No.	Existing Peak Flow (cfs)			Maximum Allowable Peak Outflow (cfs)			Proposed Peak Inflow (cfs)			Proposed Conditions Peak Outflow(cfs)			Peak Stage (Elev.)		
	2	10	100	2	10	100	2	10	100	2	10	100	2	10	100
1A	8.8	10.5	16.4	4.4	7.9	12.3	12.0	18.0	25	0.3	0.3	0.4	135.13	135.37	135.55
1B	8.6	12	16	4.3	9.0	12.0	7.3	10	13	0.3	0.3	0.3	139.57	139.68	139.80
1C	3.0	4.1	5.6	1.5	3.1	4.2	23	30	43	0.4	0.4	0.4	132.58	132.82	133.20
1D	20	27	39	10.0	20	29	16	21	30	0.4	0.4	0.4	122.81	123.11	123.57
1E	17.0	22	31	8.0	16.5	23	19	25	34	0.5	6.7	14.6	123.46	123.94	124.34
1F	3.0	16.0	43	1.5	12.0	32	13	36	67	1.0	5	11	110.88	111.80	112.79
1G	7.0	15.0	26	3.5	11.2	19.5	7.0	13	20	1.0	2	5	110.91	110.28	111.67
1H	13	34	65	6.5	25	49	26	56	95	0.4	1.5	10.9	111.07	112.15	112.80
1I	--	--	--	--	--	--	9	19	32	0.7	3.3	7.7	110.76	111.22	111.74

9.0 SOIL EROSION AND SEDIMENT CONTROL

The proposed Route 92 project will be designed in accordance with the "Standards for Soil Erosion and Sediment Control in New Jersey", as directed by the Freehold Soil Conservation District, as well as applicable New Jersey Turnpike Authority and local erosion control regulations. Soil Erosion and Sediment Control Plan Certification will be obtained from the Freehold Soil Conservation District.

In locations where stormwater outfalls are proposed, rip-rap stone slope protection or other acceptable material will be used to control erosion.

During construction of the roadway, erosion control such as silt fence, inlet filters, and sediment basins will be employed to control erosion. The proposed water quality/detention basins will be used temporarily as necessary, as sedimentation basins. A temporary haul road shall be constructed within the proposed ROW to control erosion on local roadways during construction. Wheel cleaning blankets will be installed at points where construction traffic will enter onto local roadways or off the work zone.

Soil Erosion and Sediment Control calculations are included in Appendix E.

10.0 JUSTIFICATION FOR WAIVERS/EXEMPTIONS

10.1 20% NET FILL

The construction of the proposed highway requires placement of a considerable amount of fill within the floodplain. By using the cross section end area method, the total flood storage volume was calculated as 4,164 cubic yards within the proposed right-of-way.

By superimposing the typical section of the proposed roadway, the total fill was computed as 2,284 cubic yards within the flood fringe. The total cut was computed as 1,644 cubic yards.

The percentage of fill within the floodplain is 15% versus the allowable 20%. Therefore, an exemption from this requirement is not required. Calculations for the net fill quantities are included in Appendix C.

10.2 CULVERT AT TRIBUTARY 'A'

The existing 36" diameter corrugated metal pipe serves as the hydraulic control for this crossing. The existing pipe system originates to the north along Route 32 and intercepts flow from the industrial area detention basins. A culvert analysis was performed for this culvert and indicated that it was incapable of conveying even a 2-year storm. Any storm event in excess of a 2-year storm would surcharge the system and overtop the existing Route 130 roadway, ultimately discharging into Tributary `A'.

Although the current NJDEP guidelines require a 100-year storm event design for culverts with drainage areas over 50 acres, sizing a culvert to convey the 100-year storm at this location was not considered a reasonable solution since the immediate upstream pipe was incapable of conveying a 2-year storm. A 34" x 53" elliptical concrete pipe, has been selected for this site.

10.3 WATER QUALITY/DETENTION BASIN NO. 1E

Proposed Basin No. 6 is "landlocked" between the stream, adjacent commercial property, and the proposed eastbound Service Road. It is impossible to provide additional storage volume for this basin given the topographic constraints. While the basin does meet stormwater management criteria, it does not meet water quality detention criteria.

11.0 CONCLUSION

The proposed Route 92 project within Section 1 proposes to construct several improvements which require a Stream Encroachment Permit. They are as follows:

1. A 72" x 44" culvert extension over the Tributary to Shallow Brook.

2. The construction of two Water Quality/Detention Basins (Nos. 1D and 1E) within the floodplain of the Tributary to Shallow Brook including the outfalls from each basin (both 30" diameter RCCP).

3. The construction of relocated Friendship Road within the floodplain of Tributary `A' including construction of a 34" x 53"elliptical concrete pipe culvert under Route 130 and Friendship Road.

4. The construction of Water Quality/Detention Basin No. 1I within the Tributary `A' floodplain including the 24" diameter outlet pipe from the basin.

5. The construction of the outfall structure from Proposed Water Quality/Detention Basin No. 1F within the 100-year floodplain of Devil's Brook.

This report has presented the design calculations and commentary on how the design submitted was developed. The report also explains why several NJDEP design criteria could not be achieved. These requests are justified by the nature of the project and existing physical conditions.

APPENDIX B

NEW JERSEY TURNPIKE AUTHORITY

APPLICATION FOR
STREAM ENCROACHMENT PERMIT

ENGINEER'S REPORT

SECTION NO. 2

PROPOSED ROUTE 92
FROM ROUTE U.S. 1 TO INTERCHANGE 8A
OF THE NEW JERSEY TURNPIKE
IN
THE TOWNSHIPS OF
PLAINSBORO AND SOUTH BRUNSWICK
MIDDLESEX COUNTY

OCTOBER 30, 1996
REVISED FEBRUARY 21, 1997
REVISED APRIL 21, 1999

PREPARED BY:

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1.0 INTRODUCTION

The New Jersey Turnpike Authority (NJTA) has retained Boswell Engineering to perform final design for Section 2 of the Route 92 project. Route 92 is a proposed 6.7 mile long, four (4) lane highway which will connect the New Jersey Turnpike at Interchange 8A to U.S. Route 1. A location map is provided in Appendix 2E.

The regulated activities in the stream encroachment application for Section 2 include the construction of two (2) parallel 525' wide seven span bridges over Devil's Brook, and the construction of a 48" RCCP culvert at Sta. 544+20. Waivers from the 20% net fill requirement at three locations are also part of this application. Several stormwater outfalls from Route 92 directly to off road areas are proposed as part of this project.

This report presents supporting calculations for the Stream Encroachment Application as pertains to Design Section No. 2. The calculations include hydrologic and hydraulic calculations and 20% net fill calculations. The report also provides documentation in support of the request of the waiver from the 20% net fill requirement.

2.0 PROPOSED IMPROVEMENTS

2.1 GENERAL

The proposed roadway drainage system is as follows:

1. From Sta.434+50 (825' east of the Devil's Brook bridge) to the Section 1/Section 2 boundary at Sta. 592+00, the roadway drainage is collected by curbs and storm drains. This portion of the proposed roadway is serviced by five (5) detention basins and toe of slope ditches. The detention basins are situated near existing swales/ditches to facilitate the basin discharge. All but one of these ditches have drainage areas of less than fifty (50) acres. Retaining walls are also proposed between: 430+85 and 434+92.04 RT., 403+85 and 435+46.70 LT., 440+50.12 and 449+07.63 RT., and 451+00 and 455+28.55 RT., 531+70.42 and 539+45.17 RT., 531+96.51 and 547+46.93 LT., 542+11.86 and 546+33.86 Rt.

2. The remainder of Section 2 between Sta. 434+50 (including the Devil's Brook Bridge) and the Section 2/Section 3 limit at Amtrak were also designed with curbs and storm drains. Retaining walls were located on both sides of the roadway to reduce the impact on freshwater wetlands and reduce floodplain fill. The detention basin that was originally proposed for this section of the alignment was deleted to reduce the impact of the project on freshwater wetlands. It was determined that the construction of a detention basin in the wooded wetland area for this portion of Section 2 would have disturbed approximately two (2) acres of wetlands and would be environmentally counterproductive.

Based on the topography of the existing ground and the embankment that is proposed for Route 92, stormwater run-off from existing drainage areas will be interrupted by the proposed roadway. In these areas, cross culverts will be provided to pass the off-site run-off under proposed Route 92.

2.2 DETENTION BASINS

The roadway drainage system designed for the Route 92 project - Section 2 has incorporated the use of detention basins. The installation of impervious roadway pavements and embankment fills will increase the amount of runoff generated by the area. The purpose of the detention basin is to regulate the rate of runoff that is generated by the proposed highway in accordance with the Flood Hazard Area Control Act (N.J.S.A 13:1D-1 et seq.), hereafter referred to as "FHA".

As requested by the Authority, this office has investigated the use of detention basins that are in full conformance with the New Jersey Department of Environmental Protection (NJDEP) requirements and best management practices (BMP). In the initial stage, minimizing the amount of Right of Way (R.O.W.) acquisition for the basins was the priority. Following meetings between the Authority, Frederic R. Harris (Project Environmental Consultant), PS&S (NJTA General Environmental Consultant) and HNTB (NJTA General Engineering Consultant) and this office, we were requested to revise the detention basins to meet the current NJDEP requirements. This study would place conformance of the detention basins to NJDEP design standards ahead of R.O.W. acquisition costs.

The Route 92 project has been designed to meet the stormwater management and water quality requirements set forth by the NJDEP pursuant to the FHA (N.J.S.A. 7:13-2.8). These regulations require that the detention basin be designed to reduce the rate of runoff by 25% for the 10 and 100 year storms, and 50% for the 2 year storm. In addition, the detention basin must be designed to meet the one (1) year water quality storm requirement, namely to retain no less than 10% of the inflow runoff volume 18 hours past the peak outflow.

The design of the detention basins recognized that the proposed toe of slope ditches will not be tributary to the detention basins. This is due to the relatively flat topography of the area and the existence of regulated floodplains and wetlands within the alignment. It was also desired to avoid a detention basin involving more than 5 feet of embankment which would require a Class IV dam permit. These constraints resulted in the proposed embankment fills being undetained. In order to meet the NJDEP requirements, the detention basins were overdesigned for the roadway pavement areas to offset the impact of the undetained embankment runoff.

As stated earlier, the original detention basin designs were located entirely within the 300' R.O.W. that is proposed for Route 92. Only small, temporary construction easements would have then been required for the original detention basins. Based on a redesign to meet NJDEP requirements, the revised detention basin designs included in this study will require significant R.O.W. acquisition. The approximate amount of acquisition required is 13.7 acres with the following breakdown:

Detention Basin '2B':	2.0 Acres
Detention Basin '2C':	2.6 Acres
Detention Basin '2D':	3.4 Acres
Detention Basin '2E':	3.9 Acres
Detention Basin '2F':	1.8 Acres
Total:	13.7 Acres

Note: Detention Basin 'A' was deleted as discussed above. The hydrologic analysis for the detention basins was performed using the Soil Conservation Service TR-55 method to determine the hydrologic characteristics of the existing and proposed drainage areas. Curve numbers (CN) and times of concentration (Tc) were calculated using this method. For the existing conditions analysis, the area within the proposed Route 92 R.O.W. that drained to each detention basin location was determined. Based on these areas, the peak rates of runoff for the 2, 10, and 100 year storms were computed. For the proposed condition, this drainage area was separated into two subareas: (1) the subarea that drains into the detention basin and (2) the subarea that flows undetained beyond the proposed Route 92 R.O.W. Runoff calculations are presented in Appendix B.

The detention basins were designed and routed using the Army Corps of Engineers HEC-1 Flood Hydrograph Package computer program. A hydrograph was generated for the subarea that drains into the detention basin and routed through the basin. A hydrograph of the subarea that drains undetained from the embankment areas was also calculated. In order to assure conformance with the NJDEP requirements, a composite hydrograph of the routed outflow from the detention basin and the hydrograph from the undetained embankment areas was calculated. This composite hydrograph was then compared to the existing conditions runoff rate.

The proposed detention basins were designed with a multiple stage outlet structure to properly regulate storms of varying recurrence intervals. A low flow (water quality) orifice having a diameter of 3" was included at the bottom of pond elevation. For intermediate storms (10 year), a rectangular weir was provided at an elevation established by the routing analysis. At the top of the outlet structure, an 'E' inlet grate is provided for emergency overflows. In addition to the 'E' inlet grate, an emergency spillway is provided below the top of basin elevation. These outlets are provided for the 100 year storm and in the event that the lower level outlets become clogged. The emergency spillway is 10-20 feet and is different for each basin. A rip-rap low flow channel is provided to direct flows toward the outlet structure. The bottom of the basins have a cross slope of 1% to allow for proper drainage within the basins.

Using this method of analysis, the overall impact of the proposed roadway on drainage conditions can be determined. The HEC-1 calculations are presented in Appendix A with Table 1 summarizing the calculated peak flow rates.

The 25 year storm analysis was also included in the analysis since this storm is used in the pipe sizing calculations for the storm drains located in the low points on the project.

TABLE 1

Summary of Peak Rates of Runoff
Detention Basins 2B and 2E

Design Storms

		2 Yr. (cfs)	10 Yr. (cfs)	100 Yr. (cfs)
Existing	'2B'	12	25	41
	'2E'	5	11	18
Proposed Conditions	'2B'	6	11	18
	'2E'	2	4	7
% Reduction Achieved:	'2B'	50.0%	56.0%	56.1%
% Reduction Achieved:	'2E'	60.0%	63.6%	61.1%
% Reduction Required		50.0%	25.0%	25.0%

3.0 EXISTING STREAMS

Drainage patterns for the existing conditions were determined by site investigations and review of the aerial topographic mapping that was available. Points of interest (POI) were selected for analysis to assess the impact of Route 92 on the existing drainage system in the area. The selection of POI were based on natural features such as existing culverts on streams in the vicinity of the proposed alignment or at locations where the proposed alignment crosses over existing streams.

3.1 DEVIL'S BROOK

As part of this application, information regarding the location of the Devil's Brook floodway/floodplain limits was taken from available information provided in the preliminary design and NJDEP floodplain map panels for the project area. The stream's location and the presence of a floodway having a width of approximately 450 feet was incorporated into the preliminary design. This floodway width necessitated the original design of a bridge approximately 500 feet long to span the floodway as part of the stream encroachment application for the project.

This office began its field research and engineering design of the drainage system for Section 2. During these investigations, we observed field conditions that appeared to differ from what was depicted on the preliminary alignment plans and on the NJDEP map panels. Our initial field investigations indicated that the Devil's Brook had been diverted.

Evidence of this relocation included a demolished culvert at Turkey Island Road and a trapezoidal channel that has been excavated. This channel flows west from the demolished Turkey Island Road culvert and connects into the channel parallel to the Amtrak mainline. Aerial photographs circa 1970 indicate that this channelization work was performed before the NJDEP's flood study of the area. Based on our review of the existing study map panels and HEC-2 output data, it appears that the study was performed in the period between 1980 and 1984. This office has reviewed the existing NJDEP HEC-2 analysis which does not indicate the presence of the Turkey Island Road culvert or the channelization work. However, our subsequent analysis indicated that this diversion has little effect on the 100 Year flood plain.

Our initial approach to the hydraulic analysis needed for the Devil's Brook bridge was relatively straightforward. We have utilized the NJDEP HEC-2 analysis as the existing conditions model. We have modified the NJDEP HEC-2 analysis to model the proposed bridge.

3.2 CULVERT AT STA 544+20

The proposed Route 92 crosses over residential, wooded and farm property within Section 2. Wherever the proposed roadway obstructs drainage patterns, cross culverts have been provided to maintain existing drainage patterns. In order to provide for conveyance of the runoff that is generated from these areas, cross culverts are placed at the apparent low points. At several locations, no definable channel exists.

Based on the absence of a definable channel, this location should not be defined as a watercourse as outlined in Section 7:13-1.2 of the FHA. The culvert at Sta. 544+20 has a drainage area of 103.3 acres. This culvert has been sized to adequately equalize the flow that is generated by the area. The watershed area of this culvert is primarily forested wetlands and farmland. The available aerial topographic mapping and site visits indicate that in the area of the proposed culvert no definable channel exists. Approximately 490 feet downstream of the proposed culvert an existing 18" RCP culvert carries Friendship Road over this swale.

During the preliminary design, design calculations were prepared for this culvert as a perennial watercourse. The culvert sizes that were obtained as a result of the analysis did not correspond to observations made in the field. The analysis performed using the HEC-2 computer program indicated the need for a 12' x 5' reinforced concrete box culvert (RCBC) at this location. A culvert of this size located upstream of an existing 18" RCP culvert at Friendship Road that is functioning properly was not considered a reasonable solution. Based on the lack of definable watercourse and the existing 18" RCP culvert in Friendship Road, a 48" RCCP culvert has been selected for this culvert crossing. The proposed culvert shall provide for adequate conveyance of flow across the Route 92 alignment.

4.0 PROPOSED BRIDGES AND CULVERTS

4.1 DEVIL'S BROOK BRIDGE

Two (2) 525' seven span bridge structures for Route 92 eastbound and westbound are proposed over Devil's Brook.

Based on soil borings taken in the vicinity of the proposed bridge, the average anticipated subsurface profile is as follows:

Depth	Soil Stratum Description
0-2 ft.	Surficial Organic Deposit
2-5 ft.	Intermingled Clayey Silt and Silty Clay
5-30 ft.	Loose to Medium Dense Silt Sand
30-45 ft.	Red Brown Moderately Weathered, Closely Jointed Shale Bedrock

These results were taken from the preliminary foundation recommendation report prepared by PMK Group on April 4, 1996.

4.2 CROSS CULVERT AT STA. 544+20

The cross culverts on the project have been designed to convey flows that would otherwise be obstructed by the proposed roadway alignment. These culverts have been designed using the Rational or SCS method depending on their drainage area. More specifically, the rational method was used for areas up to 20 acres and the SCS method was used for larger drainage areas. The culverts have been designed to meet flows that presently exist. This design approach can be utilized since S. Brunswick Township enforces its stormwater management ordinance. The hydraulic analysis was performed using the Bureau of Public Roads, Hydraulic Engineering Circular No. 5, Hydraulic Charts for the Selection of Highway Culverts, December 1965. As part of the design, inlet and outlet control conditions were reviewed to properly determine the capacity of the proposed culverts.

These cross culverts will be sized to accommodate existing conditions. Middlesex County, South Brunswick and Plainsboro have stormwater management ordinances in effect, requiring all proposed developments to maintain and/or decrease run-off from their sites.

These culverts will be designed for either the 50 year or 100 year storm depending on their drainage area and the design standards applied. The NJDEP requires a 100 year design for culverts under its stream encroachment jurisdiction (a drainage area over 50 acres). The NJTA requires a 50 year design for

culverts having a drainage area less than 50 acres. Based on a delineation of the drainage area for each of the cross culverts, only one culvert (Sta. 544+20) has a drainage area of greater than fifty (50) acres. However, there is no defined channel at this culvert location. Approximately 500' downstream of the proposed culvert is the Friendship Road Culvert which is an 18" RCCP.

For this culvert, the rational method was used in the calculation of the flow for the existing channel at the Route 92 crossing. The hydrologic soil group for this area is soil group C. The flow was determined assuming full development of the drainage area into 2 acre lots with the existing wetlands areas remaining undeveloped. The drainage area for this culvert is 103.3 acres.

The drainage area for this culvert contains numerous depressions which will attenuate the peak rate of runoff. A reduced CN was used for a portion of the watershed to reflect the storage volumes which are present. A peak rate of runoff of 67 cfs was calculated for the 100 year storm.

The existing 18" RCP culvert at Friendship Road serves as a downstream control point. The drainage area of this culvert generates extremely low flows for the reasons discussed above. The culvert design provides for equalization flow across the proposed roadway embankment. The 48" RCCP culvert that is proposed at this location will provide for adequate conveyance of flow.

4.3 PROPOSED DETENTION BASIN '2B' OUTFALL TO DEVIL'S BROOK

The outfall from detention basin '2B' is a 18" RCCP pipe that will outlet to the Devil's Brook. The detention basin has been designed to meet NJDEP stormwater management regulations. Routing calculations for the detention basins are included in Appendix B.

4.4 PROPOSED DETENTION BASIN '2E' OUTFALL TO AN UNNAMED TRIBUTARY TO DEVIL'S BROOK

The outfall from detention basin '2E' is a 18" RCCP pipe that will outlet to the Devil's Brook. The detention basin has been designed to meet NJDEP stormwater management regulations. Routing calculations for the detention basins are included in Appendix B.

5.0 HYDROLOGY

For the flood delineation, standard hydrologic and hydraulic study methods were used in this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10, 50, 100, or 500 year period have been selected as having special significance for flood plain management and for flood insurance rates. These events, commonly termed the 10, 50, 100, and 500 year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. The flood hazard area flood (100 Year + 25%) was also included in the analysis.

The recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100 year flood (1 percent chance of annual exceedence) in any 50 year period is approximately 40 percent (4 in 10), and, for any 90 year period, the risk increases to approximately 60 percent (6 in 10). The analysis reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study.

Drainage areas and other hydrologic characteristics of the various streams and ditches were calculated at points where the proposed Route 92 alignment crosses over them. These locations were selected for cross culverts to convey stormwater run-off across the proposed alignment.

The hydrologic calculations were performed using the Soil Conservation Service Technical Release No. 55 Urban Hydrology for Small Watersheds (SCS TR-55). Run-off hydrographs were generated using the Army Corps of Engineers HEC-1 Flood Hydrograph Package and the SCS TR-55 characteristics.

The existing hydrologic analysis that was performed for the original Devil's Brook study was utilized in this study. Table 2 includes a summary of hydrologic information for each of the streams within the project limits.

TABLE 2

SUMMARY OF DISCHARGES

Flooding Source & Location	Drainage Area* (Sq. Mi).	Peak Discharge (cfs) 10 YR	50 YR	100 YR Flood Hazard	500 YR
DEVILS BROOK					
At the downstream corporate limits	4.24/4.37	290	505	630	788	1,020
At Culver Road	2.24/3.43	255	440	550	688	895
At Hay Press Road	0.80/1.70	240	415	525	656	855
Unnamed Tributary #1 at Sta. 544+20	0.16			67		
Unnamed Tributary #2 at Friendship Road	1.15			560		

* - 4.24/4.37 square miles represent drainage areas obtained from review of USGS maps vs. FEMA FIS.

6.0 HYDRAULICS

6.1 DEVIL'S BROOK

Cross section data, flood discharges, and values of Manning's 'n' were obtained from the existing state flood study.

Water surface elevations of floods of the selected recurrence intervals were computed using the HEC-2 computer program. Water surface profiles were drawn showing computed water surface elevations for floods of the recurrence intervals. Starting water surface elevations for the Devils Brook were obtained from the State Study for the Township of Plainsboro.

Channel roughness factors (Manning's "n") used in the hydraulic computations were assigned on the basis of the field inspection of flood plain areas. The approximate roughness values for the Devil's Brook are as follows: Channel "n" (0.040-0.045) Overbank "n" (0.080-0.120). All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD).

The existing low flow channel that flows parallel to Turkey Island Road will be extended as part of the bridge construction. A low berm set at the same elevation as Turkey Island Road will replicate existing hydraulic conditions in the area.

Table 3 provides a comparison of existing and proposed water surface elevations for the channel relocation. These results demonstrate that the construction of the proposed seven span, 525ft. bridges for the proposed Route 92 project will have no adverse impact on the water surface profile of the Devil's Brook.

Upon review of the existing and proposed conditions analysis of the Devil's Brook floodplain, it was observed that flood velocities in the project area are less than 0.5 feet per second (fps). These flood velocities approach zero and replicate a standing body of water.

6.2 CULVERT AT STA 544+20

A hydraulic analysis of the proposed culvert was performed using the Army Corps of Engineers HEC-2 computer program. Various culvert types were analyzed for hydraulic efficiency and to meet NJDEP requirements. The culvert size determined by the backwater analysis was a 12' x 5' box culvert. As indicated previously, a review of the existing field conditions indicated that the watershed did not justify the construction of a culvert this size. The presence of an existing 18" RCP culvert at Friendship Road approximately 490 feet downstream of the proposed culvert and a lack of flooding in this area, indicates that a 12' x 5'

box culvert is not necessary. No increase in runoff will be created by this project. In order to provide for an equalization of flow created by the 18" culvert at Friendship Road, a 48" RCCP culvert is proposed.

6.3 DETENTION BASIN '2B' AND '2E' OUTFALLS

The detention basins for this project were designed using the Army Corps of Engineers HEC-1 flood hydrograph package computer program. Runoff hydrographs generated were routed through the proposed basins and then combined with hydrographs for the undetained portions of the watershed.

Stage-discharge-storage relationships for the detention basins were developed and inserted into the HEC-1 program via the SE, SQ, and SV cards in each of the input files. The routing analysis indicates that the basins are large enough to regulate the 100-year storm and meet the one (1) year water quality storm requirements.

TABLE 3

COMPARISON OF EXISTING AND PROPOSED WATER SURFACE ELEVATIONS (WSEL) FOR THE DEVIL'S BROOK

FLOOD HAZARD FLOOD (100 Yr.+ 25%)

STATION	EXISTING	PROPOSED	DIFFERENCE
2830	83.99	83.99	0.00
2831	83.99	83.99	0.00
2832	83.99	83.99	0.00
2832.2 (D.S. Proposed Bridge)		84.02	0.03
2832.3 (U.S. Proposed Bridge)		84.02	0.03
2833	83.99	84.02	0.03
2834	83.99	84.02	0.03
2835	83.99	84.02	0.03

7.0 STABILITY ANALYSIS

Stability analyses have been performed for the retaining walls that are located within the project limits. These retaining walls are placed in locations to minimize wetlands disturbance and floodplain fill. The stability analyses are located in Appendix 2G of the report.

8.0 SOIL EROSION AND SEDIMENT CONTROL MEASURES

The proposed Route 92 project will be designed in accordance with the "Standards for Soil Erosion and Sediment Control in New Jersey," as directed by the Freehold Soil Conservation District as well as applicable New Jersey Turnpike Authority and local erosion control regulations. In locations where channel relocations or stormwater outfalls are proposed, rip-rap stone slope protection or other acceptable material will be used to control erosion.

At the Devil's Brook bridge crossing, a low berm is proposed to recreate the existing Turkey Island Road which is to be removed in this area. The low berm and low flow channel downstream will be lined with rip-rap. The relocated low flow channel will have an earth bottom and its side slope lined with embankment slope protection. This will allow vegetation to grow in the channel banks of the low flow channel.

During construction of the roadway, erosion controls such as silt fence, inlet filters, and sediment basins will be employed to control erosion. A temporary haul road shall be constructed within the proposed R.O.W. to control erosion on local roadways during construction. Wheel cleaning blankets will be installed at points where construction traffic will enter onto local roadways or off the work zone.

9.0 JUSTIFICATION FOR WAIVERS/EXEMPTIONS

9.1 20% NET FILL

Devil's Brook

The construction of the proposed highway in the Devils Brook watershed requires placement of a considerable amount of fill within the floodplain. Using the cross section end area method results in a total floodplain volume of 75,573 cubic yards within the proposed R.O.W. By superimposing the typical section of the proposed roadway the total fill was computed as 29,291 cubic yards within the flood fringe.

The percentage of fill within the Devils Brook floodplain is 30.8% versus the allowable 20%. Therefore, an exemption from this requirement is requested. Calculations for the net fill quantities are included in Appendix C.

This request is based on the fact that there is only a limited amount of right of way being acquired for the project. The NJTA is acquiring a 300' wide R.O.W. of which practically all will be used to construct the highway and its appurtenances. The NJTA does not possess surplus R.O.W. within the floodplain to meet the 20% net fill requirement. Due to the linear nature of the project, there is no undeveloped portion of the R.O.W available.

Without the installation of the proposed retaining walls, additional R.O.W. would have to be acquired from private property owners for use other than actual construction of the roadway. The amount of additional R.O.W. that would be required to meet the 20% net fill calculations would be 43.5 acres. The cost of property in the area of the project has been appraised to be $80,000 per acre for upland areas and $15,000 per acre for wetlands. Using the wetland figure above with 100% wetland areas to be acquired, the cost of compliance with the 20% net fill requirement would be $652,000. This acquisition figure is significant and does not include legal and engineering costs. It would also require that the NJTA condemn the 43.5 acres of land from private property owners in the area.

Other alternatives were investigated to reduce the amount of net fill that is proposed to be placed are the following:

1. Additional excavation within the watercourse.
2. Use of retaining walls, steeper slopes, and longer bridges in floodplain areas.

Additional excavation within the floodplain is not feasible due to the presence of wetlands that essentially overlaps the floodplain limits. Any additional disturbance to wetland areas to meet the 20% net fill requirements would be counterproductive from an environmental standpoint.

The proposed Route 92 presently has roadway embankment slopes of 2:1 (horizontal to vertical). The use of steeper side slopes (such as 1.5:1) to minimize the net fill would cause significant stability and maintenance problems, and additional construction costs. The difference in the toe of slope between a 1.5:1 and 2:1 slope would vary depending on the height of fill being placed for the roadway. This reduction in fill does not warrant the maintenance and construction costs that would be incurred to construct the slopes at steeper side sloes than presently proposed. The NJDEP does not presently accept slopes steeper than 2:1 for fill placed within the floodplain, thereby eliminating this option.

Although the use of retaining walls would cost more than the use of a steeper side slope and not eliminate all of the proposed fill in the floodplain, they have been included in the project to reduce wetland impacts and floodplain fill to the largest extent possible. Construction of reinforced concrete retaining walls on poor soils such as those encountered within the wetland areas will require significant over excavation to obtain stable soils. Retaining walls are proposed between Sta. 403+85 and 434+92.04 RT., and 403+85 and 435+46.70 LT., and 440+50.12 and 449+07.63 RT., and 451+00 and 455+28.55 RT., 531+70.42 and 539+45.17 RT., 531+96.51 and 547+46.93 LT., and 542+11.86 and 546+33.86 RT. The installation of retaining walls in this area will reduce the net floodplain fill to 23,291 cu. yd. or 30.8%. Prior to the inclusion of the retaining walls into the project, the net fill for this portion of Section 2 was 67%.

9.2 Unnamed Tributary to Devils Brook

The Route 92 alignment also encroaches into the floodplain of an Unnamed tributary to Devils Brook from Sta. 441+00 to Sta. 460+00 The existing floodplain volume within the proposed Right of Way is calculated to be 834,050 C.F. The proposed fill in this floodplain required by the construction of Route 92 is 379,850 cu.ft. This results in a net fill of 45.5% within the proposed

R.O.W. Prior to the addition of retaining walls and removal of the U-Turn, the net fill for this tributary's floodplain was 65.3%.

Culvert at Sta. 544+20

The proposed Route 92 alignment will encroach into the floodplain of a second unnamed tributary of the Devil's Brook at Sta. 544+20. The existing floodplain volume within the proposed NJTA Route 92 Right of Way has been calculated to be 85,700 cu. ft. The proposed fill required by the Route 92 embankment has been calculated to be 29,500 cu. ft. This fill volume results in a proposed 34.5% net fill where 20% is allowed. Prior to the inclusion of walls at this location, the net fill was 82.0%.

9.3 CULVERT AT STA 544+20

The existence of an 18" RCP culvert at Friendship Road serves as a hydraulic control for the area. In the vicinity of the proposed Route 92 culvert crossing, no detention basin channel exists. The downstream culvert serves as a constriction to flow. The Route 92 culvert that is proposed at this location shall provide for adequate conveyance of flow.

A standard backwater analysis was performed for this location. The results of this analysis called for the installation of a 12' x 5' box culvert. This result is not practical due to the presence of an 18" RCP culvert that appears to be operating properly less than 500' downstream.

Within the watershed, a large percentage of forested wetlands is present. Numerous depressions exist which attenuate the peak rate of runoff. Although a 100 year peak rate of 67 cfs runoff has been calculated, it is unlikely that it would ever be realized. This condition makes the selection of a 48" RCCP culvert to equalize the runoff generated a more prudent choice.

9.4 DETENTION BASINS '2B' AND '2E'

Both detention basins have been revised to meet the 2 year storm requirements for Subareas 'B' and 'E'. As shown in the HEC-1 output, the detention basin will greatly reduce the peak rate of runoff being generated by the roadway.

The design of detention basins 2B and 2E will meet the 1 year water quality requirement established by NJDEP. The peak rate of runoff from the detention basin will be reduced to 1 or 2 cfs. The remainder of the runoff hydrograph for the post development condition is generated by grassed roadway embankments.

9.5 STORMWATER MANAGEMENT BETWEEN AMTRAK AND DEVIL'S BROOK

A portion of the Route 92 project within Section 2 does not contain stormwater management facilities. This portion is located between the proposed Route 92 bridges over Amtrak and the Devil's Brook (Sta. 403+00 to Sta. 428+00). In this area, retaining walls are proposed to reduce the amount of wetlands disturbance. Due to the construction of retaining walls to minimize wetlands disturbance, it is proposed to allow for roadway runoff to drain directly into the wetland areas. This design does not allow for any reduction in the amount of runoff being generated from the project.

One of the questions raised by NJDEP at earlier meetings was why there are no provisions on the permit plans for detention between Devil's Brook and Amtrak. During the design development stage, Boswell Engineering considered several locations as possible detention basin sites. As you know, this entire area is within a floodplain and, with the exception of a small upland area, is predominantly forested wetlands. Additionally, the detention basin would be required to be constructed within the flood hazard area. As such, to account for the loss of flood storage, the basin would have to be much larger than if it was located outside the flood hazard area. Our preliminary calculations indicated that the area of disturbance for such a detention basin would be approximately one (1) acre.

A detention basin was not proposed in the upland field north of McCormack Lake due to the high quality wildlife habitat that this area supports. This upland field breaks up the forested wetland, thus creating habitat diversity. A wildlife survey was conducted which determined that this field, in association with McCormack Lake and the adjacent Devil's Brook wetlands, provide food and cover for migrating birds, particularly grassland birds. According to the wildlife survey report, the greatest diversity of species was observed in the upland fields. Therefore, it was for these environmental and engineering reasons why detention was not provided for this section of Route 92.

In an effort to disperse the roadway run-off and recharge the wetland areas, we propose providing roadway inlets every 400 feet and discharging at 12 locations, as shown on the revised plans.

The next question that was raised concerned the ditch that parallels the base of the retaining wall on the north and south side of Route 92, between Devil's Brook and Amtrak, and if it should be deleted. It was accurately noted during the meeting that the inclusion of such ditches may pose a greater environmental impact to the wetlands and groundwater levels than if the ditch was deleted.

We have reviewed this comment and have revised the plans to delete the ditches that were shown on the previous submittal. Due to the existing topography within this area being extremely flat, a ditch of sufficient width, pitch and depth would pose environmental impacts. The excessive width of the ditch would cause damage to plants and trees along the fringe of the limit of disturbance, which we are attempting to preserve. Also, the excavation of the ditch may act to lower the groundwater table within the wetland area, causing a drying out of certain wetland areas. The original purpose of the ditch was to provide for water quality and as a method of erosion control.

The last question raised for this area was how water quality is addressed. Water quality is addressed and provided for in our design by virtue of the fact that the one (1) year flow at each discharge point is minimal (1-2 cfs). Meeting the water quality requirements for the low run-off volumes is achieved by sheet flow into the wetland areas. This is an acceptable engineering and environmental application for achieving water quality. In accordance with soil erosion and sediment control standards, we are proposing rip-rap aprons at each of the stormwater outfalls. The dimensions of the rip-rap aprons and the rip-rap size (d50) are designed in accordance with Soil Erosion and Sediment Control Standards.

Based on the above, it was determined that the construction of a detention basin in the wooded wetland area for this portion of Section 2 would have disturbed approximately two (2) acres of wetlands and would be environmentally counterproductive.

10.0 CONCLUSION

The proposed Route 92 project within Section 2 proposes to construct several improvements which require a stream encroachment permit. They include the following:

1. Two (2) 525' span bridges carrying Route 92 Eastbound and Westbound over the Devil's Brook.

2. Fill in excess of 20% within the Devil's Brook floodplain.

3. Fill in excess of 20% within Devil's Brook unnamed tributary #1 floodplain.

4. Fill in excess of 20% within Devil's Brook unnamed tributary #2 floodplain.

5. A 18" RCCP stormwater outfall to the Devil's Brook from Detention Basin '2B'.

6. A 18" RCCP stormwater outfall to the Devil's Brook tributary from Detention Basin '2E'.

7. Construction of a 48" RCCP culvert at Sta 544+20.

This report has presented design calculations and commentary on how the design submitted was developed. The report also explains why several NJDEP design criteria could not be achieved. These requests are justified by the nature of the project and existing physical conditions.

This report has discussed the various factors that have influenced the request for an exemption from the 20% net fill requirement for this project. The information provided has discussed the design considerations and alternatives to the proposed design and their effectiveness. Based on this information, the alternatives to the proposed design either have excessive cost, substandard engineering design, or minimal impact on the 20% net fill requirement due to the constraints associated with this project.

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APPENDIX C

NEW JERSEY TURNPIKE AUTHORITY
APPLICATION FOR
STREAM ENCROACHMENT PERMIT

ENGINEER'S REPORT

PROPOSED ROUTE 92
FROM ROUTE U.S 1 TO INTERCHANGE 8A
IN
THE TOWNSHIPS OF
PLAINSBORO, SOUTH BRUNSWICK, AND MONROE
MIDDLESEX COUNTY

SECTION NO. 3
CONTRACTS RT92-3001, RT92-3002 AND RT92-3003

Prepared by:

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October 1996
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1.0 INTRODUCTION

The proposed Route 92 consists of construction of a new 6.7 mile long four lane roadway to connect existing New Jersey Turnpike Interchange 8A to U. S. Route 1 in South Brunswick Township, Middlesex County, New Jersey. Section 3 is the portion of the roadway from the Route U.S. 1 interchange to the east side of the AMTRAK rail line. This section includes a grade separated interchange at U.S. Route 1 including connecting ramps, a grade separated crossing of Route 92 over Ridge Road, the relocation of Perrine Road, a grade separated crossing of Perrine Road over Route 92 including connecting ramps, and a grade separated crossing of Route 92 over AMTRAK. The alignment of Section 3 of Route 92 crosses portions of two major watersheds, Devil's Brook on the east end and Heathcote Brook on the west end.

Activities to be performed as part of the Route 92 construction that require a stream encroachment permit include installation of any facility within fifty feet of a watercourse with a drainage area of fifty acres or more. Specific activities that require a stream encroachment permit are indicated in section 2.0 Proposed Improvements of this report.

The impacts of the proposed construction are described in section 4.0 Proposed Bridges and Culverts, 5.0 Floodplain Impacts, 6.0 Hydrology, and 7.0 Hydraulics of this report respectively.

The stream encroachment activities addressed in this report are shown on plan sheets 121 through 182 inclusive.

The Report was revised on February 20, 1997 to include proposed retaining walls within the floodplain of the Tributary to Devils Brook to minimize wetland impacts and to include the revisions at Campus Drive which resulted in the elimination of SMB 3D and no fill placed within the floodplain of Heathcote Brook.

The Report and Permit Plans have been revised April, 1999 to include the following:

1) The elimination of the ultimate installation of a third lane in the median (less impervious surfaces) which results in the need to revise hydrologic and hydraulic computations.

2) Revised hydraulic and net-fill computations at the Tributary to Devils Brook as a result of a reduced roadway width (elimination of grassed median) and reducing fill in the existing pond.

3) Revised grading of SMB-B.

4) New wall on east (upstream) side of U.S. Route 1 crossing and revised drainage at approx. station 147 to 148.

5) Elimination of the proposed storm sewer replacement outfall to Heathcote Brook at the U.S. Route 1 crossing of Heathcote Brook floodplain.

6) Revised discharge location of the Access Road A outfall.

2.0 PROPOSED IMPROVEMENTS

2.1 General

Review of the available topographic maps indicates that the Route 92, Section 3 alignment crosses two major watersheds, Devil's Brook on the east end and Heathcote Brook on the west end. The watershed limits are shown on the Watershed Basin Divide Plan. An existing natural depression is located at the eastern end of the Heathcote Brook watershed, adjacent to the western limit of the Devil's Brook watershed.

The design attempted to comply with the appropriate requirements of the Flood Hazard Area Control Act Rules, N.J.A.C. 7:13-1.1 et seq. March 20, 1995 and Regulations for the Review Zone of the Delaware and Raritan Canal State Park, N.J.A.C. 7:45-1.1 et seq. February 1994. Detailed descriptions of the design procedures and ability to provide compliance with these requirements are presented throughout this report.

The proposed roadway construction includes installation of a complete roadway drainage system, crossings of two watercourses including the associated fill, filling a portion of the existing depression, installing outfalls from several stormwater management basins (SMB's) to the floodplain of Heathcote Brook. Each of these elements is described in the following sub-sections

2.2 Roadway Drainage System

Runoff from the roadway will be collected and conveyed to various discharge locations in a combination of gutters, swales, ditches and pipes. The existing watershed boundary established the portion of the roadway runoff that is discharged to the Tributary to Devil's Brook on the east and the Tributary to Heathcote Brook or to Heathcote Brook on the west. Compliance with the stormwater management requirements of both the New Jersey Department of Environmental Protection (NJDEP) and the Delaware and Raritan Canal Commission (D&RCC) is achieved by routing the runoff through SMB's before discharging to watercourses. The drainage design was prepared to collect and convey the runoff to the SMB's from a pavement area equal to the aggregate new impervious area resulting from the proposed construction.

2.3 Watercourse Crossings

Two existing watercourses that drain fifty or more acres are crossed by the proposed Route 92, Section 3 alignment. These include the crossing of a Tributary to Devil's Brook on the east end of the project and the U.S. Route 1 and Ridge Road crossings of a Tributary to Heathcote Brook on the west end of the project. The crossing of the Tributary to Devil's Brook requires the construction of a new bridge including retaining walls to minimize wetland impacts. The U.S. Route 1 and Ridge Road crossings require replacement of the existing culverts. The fill associated with these installations is considered part of the work included in the stream encroachment permit. Detailed discussion of these installations is presented in Section 4.0 Bridges and Culverts of this report.

2.4 Filling the Existing Depression

The existing depression at the east end of the Heathcote Brook watershed, located between approximately Station 350 and Station 360 is not considered a watercourse because there is no defined path that conveys surface runoff. The storage volume in the depression is adequate to contain the entire 100-year runoff from the area that contributes runoff to it.

2.5 Fill in Floodplain

Fill placed in the floodplain of the Tributary to Devil's Brook and the floodplain of the Tributary to Heathcote Brook is considered included in the stream encroachment permit for the applicable bridge or culvert construction.

2.6 Storm Water Management Basins & Outfalls to Regulated Waterways

SMB's are provided at various locations along the project corridor to provide compliance with the NJDEP engineering and environmental standards for stormwater management stated in N.J.A.C. 7:13-2.8 and the D&RCC requirements stated in N.J.A.C. 7:45-5.0. Roadway runoff from a total pavement area equal to the new pavement area resulting from the Route 92 construction is routed through the SMB system constructed for the Route 92 project to provide compliance with the stated water quality requirements. Attenuation of the runoff conveyed to the SMB's provides the required water quality control.

Primary SMB design parameters include the following:

1) The bottom of the basin is approximately 4 feet above the measured GWT elevation. Small portions near the outlet are 3 feet above the GWT. Ground water table (GWT) elevations were measured in observation wells installed in selected soil borings between March 1, 1996 and June 13, 1996. The locations of the observation wells, summary of GWT readings, and the GWT profile are contained in Appendix E.

2) Side slopes of the basin are one vertical on three horizontal.

3) The minimum bottom slope of the basin is 1.0 %.

4) A triangular shaped riprap lined low flow channel six inches deep and having a six foot top width and a slope of 1 % is provided in all basins with a bottom slope of less than 2%.

5) Maximum embankment height is limited to five feet or less measured between the elevation of the emergency spillway and the toe of slope.

6) A stone covered maintenance road 12 feet wide with maximum 8.0 % profile grade is provided in all basins that are more than five feet deep.

7) The top of the embankment for berms around SMB's is 10 feet wide.

8) Minimum freeboard of 0.5 feet for the 100-year discharge is provided where possible.

9) The emergency spillway provides for release of the runoff if the controlled outlet facility fails to operate properly. The outlet structure consists of a reinforced concrete structure with a 3" orifice opening in the bottom as required to provide water quality control. A weir notch in the wall set above the elevation of the 1-year water quality runoff and at the maximum elevation required to provide the required attenuation allows excess runoff to exit the basin. The grate on the top of the outlet structure functions as the primary emergency spillway. A secondary emergency spillway is provided by allowing the excess runoff to flow over a portion of the embankment with a top elevation equal to or above the elevation of the primary emergency spillway and below the elevation of the top of the embankment. The secondary emergency spillway will be protected with the installation of open cell concrete blocks that provide the required stability while allowing grass to cover the area. This protection is placed across the entire width of the secondary emergency spillway opening, down the embankment slope and at least ten feet beyond the toe of slope.

Specific SMB outfalls to regulated waterways that require a stream encroachment permit are indicated in the following section.

2.7 Specific Items that Require a Stream Encroachment Permit

Specific elements of the Route 92, Section 3 project that require a stream encroachment permit are indicated relative to the watercourse which they impact as follows:

A. Tributary to Devils's Brook Activities

1. Route 92 bridge crossing a portion of the floodplain for the Tributary to Devil's Brook on the west side of the AMTRAK railroad.

2. Storm sewer outfall located on the west side of the Tributary to Devil's Brook floodplain south of the Route 92 crossing.

3. Installation of retaining walls to minimize wetland and transition area impacts.

B. Tributary to Heathcote Brook Activities

1. The existing U.S. Route 1 and Ridge Road crossings of a Tributary to Heathcote Brook are to be replaced.

2. Ramp B crossing

3. The outlet from SMB 3A, located in the east portion of the area between Ridge Road, Route 92, and U.S. Route 1, which accepts roadway runoff from a portion of U.S. Route 1, Ridge Road, and Route 92 discharges to the floodplain of a Tributary to Heathcote Brook.

4. The existing water main in the vicinity of Ramp B, on the west side of U.S. Route 1, is to be replaced. The relocation extends across the entire floodplain.

5. The existing fiber optic line on the west side of U.S. Route 1 is to be relocated below the proposed culvert crossing. The relocation extends across the entire floodplain.

6. The existing water main crossing of the existing culvert in Ridge Road is to be replaced below the proposed culvert crossing. The relocation extends across the entire floodplain, which extends along Ridge Road on both sides of U.S. Route 1.

7. The existing gas main in Ridge Road is to be relocated for its entire length in the floodplain, which extends along Ridge Road on both sides of U.S. Route 1. The relocation includes the crossing below the proposed Ridge Road culvert and the gas main in U.S. Route 1 south of Ridge Road.

8. The proposed underground electric facilities on both sides of U.S. Route 1 in the vicinity of the Route 92 and Ramps ES and NE overpass extend into a portion of the floodplain.

9. The proposed telephone/cable TV facilities on both sides of U.S. Route 1 extend across the entire floodplain.

10. The proposed telephone/cable TV facilities on the north side of Ridge Road extend across the entire floodplain.

11. Relocation of the sanitary sewer force main on the east side of U.S. Route 1 extends across the entire floodplain.

12. Relocation of the existing gas main on the east side of U.S. Route 1 extends across the entire floodplain.

C. Heathcote Brook Activities

1. The drainage and outfall pipe from Access Road A discharges to the Heathcote Brook floodplain.

2. The existing water main is to be relocated in the portion of the floodplain south of the U.S. Route 1 crossing.

3. The existing sanitary sewer is to be relocated in the portion of the floodplain south of the U.S. Route 1 crossing.

4. The existing gas main is to be relocted in the portion of the floodplain south of the U.S. Route 1 crossing.

Additional discussion regarding these activities in the Tributary to Heathcote Brook watershed is presented in Section 4.0 Proposed Bridges and Culverts of this report. Additional discussion regarding these activities in the Heathcote Brook watershed is presented in Section 5.0 Floodplain Impacts of this report.

3.0 EXISTING STREAMS

The proposed Route 92, Section 3 project impacts three existing waterways that drain fifty or more acres. These include:

A. A Tributary to Devil's Brook on the east end of the project which requires a new bridge crossing including retaining walls.

B. A Tributary to Heathcote Brook on the west end of the project which requires replacement of the culvert crossings of U.S. Route 1 and Ridge Road and several SMB outfalls

C. Heathcote Brook, which is impacted by a pipe outlet from Campus Driveway.

Areas contributing runoff to the point of interest on each watercourse were delineated on the available topographic maps. The primary topographic map used for this purpose was the mapping prepared from aerial photographs specifically for the Route 92 design at a scale of one inch equals thirty feet with a one foot contour interval. This mapping was supplemented by the available corridor mapping prepared from aerial photographs at a scale of one inch equals one hundred feet with a two foot contour interval. Delineation beyond the limits of this mapping was based on the USGS Hightstown quadrangle. The contributing area delineation was confirmed by field observation.

Existing ground cover and development were determined from existing aerial photographs and the Hightstown quadrangle USGS topographic map. The results were supplemented and confirmed by field observation.

Information regarding each of these watercourses is presented in the following narrative:

3.1 Tributary to Devil's Brook

The total drainage area that contributes runoff to the Tributary to Devil's Brook at the location of the Route 92, Section 3 crossing is 506 acres. The majority of the drainage area is used as agricultural fields. Single family residential development occupies the remainder of the drainage area. The Tributary to Devil's Brook channel is a relatively narrow and shallow ditch adjacent and parallel to the AMTRAK railroad. The bottom is unlined soil and the banks are covered with vegetation. A 54 inch diameter concrete pipe crossing of the Tributary to Devil's Brook is provided for the dirt road located approximately 1000 feet north of the Route 92 alignment.

3.2 Tributary to Heathcote Brook

The total drainage area that contributes runoff to the Tributary to Heathcote Brook upstream of the Ridge Road crossing is 102 acres and 140 acres at the downstream outlet location west of U.S. Route 1. The majority of the drainage area upstream of the Ridge Road crossing is used as agricultural fields. The drainage

area downstream of the Ridge Road crossing is primarily developed for commercial and industrial uses. Immediately upstream of the Ridge Road crossing, the runoff traverses a broad and flat farm field with no defined watercourse. The existing Ridge Road crossing consists of a fifteen inch diameter pipe. Between Ridge Road and U.S. Route 1, the runoff is conveyed in a narrow open channel with a soil bottom and vegetated sides. A small portion of the 100-year runoff that crosses U.S. Route 1 is contained in the existing 21/24 inch diameter pipes. The remainder of the runoff proceeds overland across U.S. Route 1 and west along Ridge Road in sheet flow to the low point where it proceeds overland toward the northwest, ultimately reaching Heathcote Brook. The existing and proposed regulatory floodplain from upstream of U.S. Route 1 to downstream of Ridge Road is contained within existing right-of-way (ROW) of the New Jersey Department of Transportation (NJDOT). The limited capacity of the existing fifteen inch diameter crossing of Ridge Road and small height of cover over the pipe causes runoff that exceeds the culvert capacity to breach the roadway at approximately elevation 90. The excess runoff proceeds along Ridge Road and overland, ultimately returning to the Tributary to Heathcote Brook upstream of the U.S. Route 1 crossing.

The existing regulatory floodplain upstream of Ridge Road extends beyond the Middlesex County Route 522 ROW. The proposed regulatory floodplain upstream of Ridge Road is contained within ROW to be obtained for the Route 92 project.

3.3 Heathcote Brook

Detailed hydraulic studies prepared by the NJDEP for Heathcote Brook were used to identify the impacts of the Route 92 project. Therefore, additional data regarding the drainage area, character of the drainage basin and channel conditions was not collected for this watercourse.

4.0 PROPOSED BRIDGES AND CULVERTS

The crossing of the Tributary to Devil's Brook requires the construction of a new bridge. The U.S. Route 1 and Ridge Road crossings require replacement of the existing culverts.

The proposed crossings required for the Route 92, Section 3 construction were designed to provide compliance with the provisions of N.J.A.C. 7:13-2.16, Bridges and Culverts. Each of these proposed crossings and the associated impacts on the respective floodplains are described separately in the following narrative.

4.1 Tributary to Devils's Brook

The crossing consists of a bridge that also crosses the AMTRAK railroad and a portion of the Devil's Brook floodplain east of AMTRAK. The bridge consists of five spans with a total length between the full height vertical abutments of 520 feet. Two piers, roadway fill and the proposed retaining walls are located within the floodplain of Devil's Brook on the east side of AMTRAK. The technical documentation required for the stream encroachment permit for piers 3 and 4, the abutment and the fill placed in the Devil's Brook floodplain by the proposed bridge is addressed in the documentation prepared for Route 92, Section 2. The technical documentation required for the stream encroachment permit for piers 1 and 2, the abutment, the retaining walls, and the fill placed in the Tributary to Devil's Brook floodplain and the deck of the proposed bridge is presented in this report. The impacts to the Tributary to Devil's Brook resulting from the proposed bridge include hydraulic impacts and fill impacts. Each of these impacts is discussed in the following narrative.

4.1.1 Hydraulic Impacts

Hydraulic computations were performed for the existing and proposed condition as described in Section 7.0 Hydraulics of this report. The proposed construction includes the following elements that impact the hydraulics:

A. Installation of two piers, the west abutment, and retaining walls in the floodplain.

B. Installation of the roadway fill in the floodplain

C. Installation of riprap lining in the Tributary to Devil's Brook channel and on the over banks.

The proposed installation yields an increase in the water surface elevation not exceeding 0.20 as indicated in the summary tables presented in Section 7.0, Hydraulics.

4.1.2 Fill Impacts

The existing flood fringe volume within the Route 92, Section 3 ROW is 0.90 Ac-ft. The fill placed in the floodplain by the proposed construction is 0.33 Ac-ft. This represents 37 percent of the existing floodplain storage volume which exceeds the allowable twenty percent. Justification for an exemption to the net fill limitation in accordance with N.J.A.C. 7:13-2.8(a)5 is presented in Section 10.0, Justification for Waivers/Exemptions.

4.2 Tributary to Heathcote Brook

Proposed construction that impacts the floodplain of the Tributary to Heathcote Brook includes replacement of the existing culvert crossings at Ridge Road and at U.S. Route 1, and raising the U.S. Route 1 profile.

The Ridge Road crossing revision consists of replacing the existing fifteen inch diameter pipe with a 2' high by 8' wide concrete box culvert. The U.S. Route 1 crossing revision consists of replacing the existing 21/24 inch crossing with pipes of various sizes and a portion of open channel. The proposed system includes the following:

A. 126 linear feet of 34" x 53" horizontal elliptical pipe from the upstream side of U.S. Route 1.

B. 240 linear feet of open grass lined channel in the infield area between U.S. Route 1 and Ramp B, having a bottom width of 20 linear feet

C. 197 linear feet of twin 29" X 45" horizontal elliptical pipes under Ramp B.

D. 17 linear feet of 48" x 76" horizontal elliptical pipe to the outlet.

The pipe system was designed to contain the proposed 100-year runoff without overtopping the roadway in accordance with the criteria of the NJDOT. The excess runoff resulting from the regulatory flood will proceed over the roadway and overland following the same path as the runoff currently follows.

The profile revision of U.S. Route 1 includes the installation of fill to raise the roadway profile in the vicinity of the Ridge Road intersection. The revised roadway profile provides the sight distance required for safety as required by current NJDOT design criteria. The higher roadway profile yields an increase in the water surface elevation for the regulatory runoff at the upstream side of the U.S. Route 1 crossing. However, installation of the proposed U.S. Route 1 crossing and the proposed 2' high by 8' wide box culvert crossing of Ridge Road and the upstream ditch relocation causes the regulatory flood to be contained within public right-of-way, most of which will be acquired by the NJTA for this project.

The proposed culvert dimensions, both for the Ridge Road and the U.S. Route 1 crossings are substantially larger than the existing dimensions. However the intent of N.J.A.C. 7:13-2.16 has been satisfied by providing an installation that avoids an increase in the water surface elevation upstream of the proposed Ridge Road

culvert at the applicant's property line and also avoids an increase in the peak runoff downstream of the proposed culvert as demonstrated in the HEC-1 model of the area.

The impacts to the Tributary to Heathcote Brook resulting from the proposed culvert replacements, SMB installation, and roadway profile revision include hydrologic impacts, hydraulic impacts, fill impacts and utility impacts. Each of these impacts is discussed in the following narrative.

4.2.1 Hydrologic Impacts

The existing regulatory flood runoff and the proposed regulatory flood runoff at several locations resulting from the installation of three SMB's in the watershed are summarized in the following table:

LOCATION	REGULATORY FLOOD RUNOFF (CFS)		
	Existing	Proposed	Difference*
Upstream of Ridge Road	128	130	2
Upstream of U.S. Route 1 **	227	74	-153

* Proposed Regulatory Runoff Minus Existing Regulatory Runoff
** Outflow from HEC-1 Routing Computations

A discussion of the hydrologic computations is presented in Section 6.0, Hydrology of this report.

The SMB's were also designed to address the water quality requirements of both the NJDEP as stated in N.J.A.C. 7:13-2.8 and the D&RCC as stated in N.J.A.C. 45:5. A discussion of the hydrologic computations, particularly the flood routing calculations, is presented in Section 6.0, Hydrology of this report. The three SMB outlet pipes that discharge upstream of the replaced culvert for the U.S. Route 1 crossing are considered minor elements of the stream encroachment permit for the culvert replacement. The inflow and outflow rates for the three SMB's that discharge to the Tributary to Heathcote Brook are summarized in tables contained in Section 6.0, Hydrology of this report.

4.2.2 Hydraulic Impacts

The existing and proposed water surface elevations for the regulatory flood runoff at several locations along the flow path for the Tributary to Heathcote Brook are summarized in the following table:

LOCATION	WATER SURFACE ELEVATION FOR REGULATORY FLOOD		
	Existing	Proposed	Difference*
Upstream of Ridge Road	90.00	90.00	0.0
Upstream of U.S. Route 1	87.56	89.38	1.82

* Proposed Minus Existing

The higher roadway crown line at the barrier curb opening in the U.S. Route 1 and Ridge Road intersection yields a water surface elevation for the proposed condition that impacts the upstream water surface elevation. The area between U.S. Route 1 and Ridge Road functions as a natural detention basin. Therefore, the water surface elevation for this portion of the tributary to Heathcote Brook was established by the HEC-1 flood routing computations. HEC-2 water surface elevation computations were not performed for this reach. The existing fifteen inch diameter crossing of Ridge Road has limited capacity. The excess runoff breaches Ridge Road at approximately elevation 90.0 and proceeds overland, returning to the Tributary to Heathcote Brook upstream of the U.S. Route 1 crossing. The proposed regulatory floodplain upstream of U.S. Route 1 is contained within ROW to be obtained for the Route 92 project.

4.2.3 Fill Impacts

The hydrologic and hydraulic computations indicate that the proposed construction does not increase the discharge at the downstream limit and the increase in the water surface elevation at the upstream construction limit is contained within ROW acquired for the project. The intent of N.J.A.C. 7:13-2.14 to limit the fill placed by a proposed activity is to avoid reducing existing floodplain storage volume that would yield increased runoff downstream. The proposed construction at the U.S. Route 1 and Ridge Road intersection includes installation of several SMB's to avoid increasing runoff at the downstream limit of the construction. Compliance with this requirement is demonstrated in the tables contained in Section 6.0, Hydrology. The HEC-1 flood routing computations upstream of U.S. Route 1 for the proposed condition considers the fill introduced by the construction as indicated by the lower stage-storage curve than for the existing condition. The intent of the net fill limitation has been satisfied. Therefore, the existing and proposed floodways and flood fringe storage volume have not been determined.

4.2.4 Utility Impacts

The utility relocations in the floodplain of the Tributary to Heathcote Brook necessitated by the proposed roadway construction as described in Section 2.7 of this report require a stream encroachment permit. All proposed utility installations in the floodplain will be constructed in accordance with the requirements of N.J.A.C. 7:13-2.10. Each of these utility relocations is considered a minor element of the major stream encroachment permit for the culvert replacements in U.S. Route 1 and in Ridge Road.

5.0 FLOODPLAIN IMPACTS

Proposed construction that impacts the floodplain of Heathcote Brook includes the installation of a storm sewer outfall which accepts runoff from a portion of the existing parking lot of Princeton Executive Campus (Block 98, Lot 2.03) and Access Road A, relocation of the existing water main on the northbound side of U.S. Route 1, and relocation of the existing sanitary sewer located on the northbound side of U.S. Route 1. The impacts on the Heathcote Brook floodplain resulting from the proposed construction include hydraulic impacts, net fill impacts, utility impacts, and other impacts. Each of these impacts is discussed in the following narrative.

5.1 Hydraulic Impacts

The NJDEP prepared hydraulic computations and flood profiles for the Heathcote Brook floodplain study. The proposed relocation of the existing Campus Driveway to the north is located outside the limits of the Heathcote Brook floodplain. Therefore, computations to document the hydraulic impact are not required.

Installation of the outfall from the existing parking lot and the Campus Driveway has no hydraulic impact.

5.2 Fill Impacts

Installation of Access Road A and outfall does not introduce any additional fill in the floodplain.

5.3 Other Impacts

The proposed Access Road A on the north side of Block 98, Lot 2.03 replaces the existing driveway currently located on the south side of the subject property. The pavement from the existing driveway will be removed as shown on the plans. The existing pavement removed (0.35 acres) is more than the new impervious area (0.27 acres) introduced by the construction of the new driveway. The runoff from Access Road A will be discharged to the existing stormwater management basin that accepts runoff from the parking lot and existing access road before discharging to the Heathcote Brook floodplain. Therefore, the engineering and environmental requirements of N.J.A.C. 7:13-2.8 and N.J.A.C. 7:45.5 are satisfied. The outfall located in the Heathcote Brook floodplain is a minor permit element that does not impact the hydraulics or introduce any fill in the floodplain.

The utility relocations in the floodplain of Heathcote Brook necessitated by the proposed roadway construction as described in Section 2.7 of this report require a stream encroachment permit. All proposed utility installations in the floodplain will be constructed in accordance with the requirements of N.J.A.C. 7:13-2.10. Each of these utility relocations is considered a minor element of the major stream encroachment permit for the project.

6.0 HYDROLOGY

Peak runoff for various return frequencies, including the 1-, 2-, 10-, 25-, 50-, and 100-year recurrence interval were computed in accordance with Soil Conservation Service Type III distribution using the U. S. Army Corps of Engineers HEC-1 software. The runoff was computed for several conditions including proposed conditions, which included the proposed Route 92 project construction and existing conditions. The regulatory flood was also computed in accordance with the procedures in N.J.A.C. 7:13-2.3 for the watercourses that drain more than fifty acres and require a stream encroachment permit for the proposed construction.

Times of concentration were determined in accordance with the procedures in Soil Conservation Service Technical Release No.55. Areas contributing runoff to each point of interest were delineated on the available topographic maps. The primary topographic map used for this purpose was the mapping prepared from aerial photographs specifically for the design at a scale of one inch equals thirty feet with a one foot contour interval. This mapping was supplemented by the available corridor mapping prepared from aerial photographs at a scale of one inch equals one hundred feet with a two foot contour interval. Delineation beyond the limits of this mapping was based on the USGS Hightstown quadrangle. The contributing area delineation was confirmed by field observation. Curve numbers for use in the hydrology calculation were based on the Middlesex County Soil Survey and existing ground cover as indicated on existing aerial photographs supplemented by field observation. Ultimate development runoff rates were computed based on the current zoning requirements of both South Brunswick Township and Plainsboro Township.

Hydrology was computed at the following locations:

A. Tributary to Devil's Brook at the Route 92, Section 3 Crossing

B. Several locations of the Tributary to Heathcote Brook in the vicinity of the U.S. Route 1 and Ridge Road intersection

C. Outfall locations of the proposed SMB's that discharge to the Tributary of Heathcote Brook are as follows:

   1. SMB 3A, the east portion of the area between Route 92, U.S. Route 1, and Ridge Road

   2. SMB 3B, the west portion of the area between Route 92, U.S. Route 1, and Ridge Road

   3. SMB 3C, the infield area between U.S. Route 1, Ramp A, and Ridge Road.

The hydrologic computations for each area evaluated, including tables summarizing the results, are discussed in the following narrative.

6.1 Tributary to Devils' Brook

The drainage area of the Tributary to Devil's Brook at the Route 92 crossing exceeds fifty acres. The floodplain delineation required to satisfy the requirements of N.J.A.C. 7:13-2.4 was based on the regulatory flood.

The drainage area contributing to the downstream side of the Route 92 crossing of the Tributary to Devil's Brook was divided into two sub areas for the HEC-1 computations. The runoff from the sub-area contributing to the existing pond was routed through the pond and combined with the runoff from the remainder of the contributing area. The hydrologic computations revealed that the existing pond has limited impact on the regulatory runoff. Therefore, the regulatory runoff computed for the existing condition of 940 cfs was also used to compute the hydraulics for the proposed condition. The hydrologic evaluation of the existing condition was for the existing configuration of the watercourse. The hydrologic evaluation for the proposed condition for the watercourse was for the condition with the proposed Route 92 bridge installed including the riprap in the channel and on the over bank.

6.2 Tributary to Heathcote Brook

The drainage area of the Tributary to Heathcote Brook at both the Ridge Road and U.S. Route 1 crossings exceeds fifty acres. Hydrologic computations included the regulatory runoff computed in accordance with the procedures stated in N.J.A.C. 7:13-2.4.

Specific elements that impact the existing and proposed hydrology are discussed in the following narrative.

6.2.1 Hydrology for Existing Conditions

The drainage area of the Tributary to Heathcote Brook at the U.S. Route 1 crossing includes five existing SMB's, including one natural detention basin as indicated below.

A. A natural detention basin, commonly referred to as the farm pond, upstream of the existing Schalk's Crossing Road culvert.

B. One basin constructed for development (Novatel) on the northbound side of U.S. Route 1 south of Ridge Road.

C. Three basins constructed for development on the southbound side of U.S. Route 1 south of Ridge Road (Holiday Inn and bank).

Hydrologic evaluation of these existing SMB's was performed to determine the existing runoff rates and the impact of the Route 92 construction. Hydrologic data available for three of the four constructed basins was used to develop a separate sub-area for each of them. Peak outflow from the remaining constructed basin was determined assuming that the basin outflow was limited to the pre-development rate from the site.

The outline of the sub-areas used in the HEC-1 model is shown with the hydrologic computations in Appendix A. The results of the hydrologic computations are summarized in Section 6.2.3, Summary of Hydrologic Computations.

6.2.2 Hydrology for Proposed Conditions

The proposed condition hydrology is a modification of the existing condition hydrology to include the proposed Route 92 construction. This includes revising the runoff factors to reflect the proposed pavement. The HEC-1 model was also revised to include routing through the SMB's installed for the Route 92 project. The three proposed stormwater management basins that discharge runoff to the Tributary to Heathcote Brook provide compliance with the engineering and environmental requirements of N.J.A.C. 7:13-2.8 include:

A. SMB 3A, the east portion of the area between Route 92, U.S. Route 1, and Ridge Road.

B. SMB 3B, the west portion of the area between Route 92, U.S. Route 1, and Ridge Road.

C. SMB 3C, the infield area between U.S. Route 1, Ramp A, and Ridge Road.

The outline of the sub-areas used in the HEC-1 model is shown with the hydrologic computations in Appendix A. The results of the hydrologic computations are summarized in Section 6.2.3, Summary of Hydrologic Computations.

6.2.3 Summary of Hydrologic Computations

A. Hydrology of Tributary to Heathcote Brook

The sub-areas built into the HEC-1 model allow determination of the hydrology at the following locations along the Tributary to Heathcote Brook.

1. Upstream of Ridge Road

2. Upstream of U.S. Route 1

3. At the Outfall Location

The results of the HEC-1 model are summarized in the following tables.

Tributary to Heathcote Brook
Upstream of Ridge Road

	Peak Runoff - Tributary to Heathcote Brook (cubic feet per second)					
Recurrence Interval	2-Year	10-Year	25-Year	50-Year	100-Year	Regulatory
Existing Condition	12	41	53	58	72	128
Proposed Condition	7	30	42	48	65	130

The computations are presented in Appendix A

Tributary to Heathcote Brook
Upstream of U.S. Route 1*

	Peak Runoff - Tributary to Heathcote Brook (cubic feet per second)					
Recurrence Interval	2-Year	10-Year	25-Year	50-Year	100-Year	Regulatory
Existing Condition	9	50	76	88	118	227
Proposed Condition	10	26	32	34	39	74

* Outflow from HEC-1 Routing Computations.

The computations are presented in Appendix A

Tributary to Heathcote Brook
at the Outfall Location

	Peak Runoff - Tributary to Heathcote Brook (cubic feet per second)					
Recurrence Interval	2-Year	10-Year	25-Year	50-Year	100-Year	Regulatory
Existing Condition	31	66	100	116	155	293
Proposed Condition	25	56	70	78	93	107

The computations are presented in Appendix A

Although the SMB's installed in the Tributary to Heathcote Brook Tributary watershed substantially reduce the peak runoff for the proposed condition, compliance with the engineering standards for stormwater management for the 10-year runoff cannot be achieved. Justification for an exemption is presented in Section 10.0 of this report.

B. Proposed Stormwater Management Basins

The results of the flood routing computations for the proposed SMB's are summarized in the following tables.

SMB 3A HEC-1 Routing Computations Summary

	Peak Runoff Discharged to Tributary to Heathcote Brook (cubic feet per second)					
Recurrence Interval	1-Year	2-Year	10-Year	25-Year	50-Year	100-Year
Peak Inflow	16	20	37	46	49	59
Peak Outflow	0.5	0.5	2	4	5	7
Water Surface Elevation	92.17	92.56	93.62	93.94	94.09	94.45

The outlet system includes the following elements:

3" orifice with invert elevation 89.0
1.2' wide weir at elevation 93.0
Top of Grate of Outlet Structure at Elevation 94.5
Top of Berm at Elevation 95.5

SMB 3B HEC-1 Routing Computations Summary

	Peak Runoff Discharged to Tributary to Heathcote Brook (cubic feet per second)					
Recurrence Interval	1-Year	2-Year	10-Year	25-Year	50-Year	100-Year
Peak Inflow	4	6	13	16	17	21
Peak Outflow	0.5	0.5	0.5	0.5	0.5	1
Water Surface Elevation	88.66	89.0	90.21	90.70	90.93	91.47

The outlet system includes the following elements:

3" orifice with invert elevation 86.5
Top of Grate of Outlet Structure at Elevation 92.0
10 foot wide emergency spillway crest at elevation 93.0
Top of Berm at Elevation 94.0
See Note 1.

SMB 3C HEC-1 Routing Computations Summary

	Peak Runoff Discharged to Tributary to Heathcote Brook (cubic feet per second)					
Recurrence Interval	1-Year	2-Year	10-Year	25-Year	50-Year	100-Year
Peak Inflow	9	15	27	32	35	41
Peak Outflow	0.5	0.5	2	3	4	8
Water Surface Elevation	89.59	90.05	91.21	91.37	91.47	91.74

The outlet system includes the following elements:

3" orifice with invert elevation 86.5
4' wide weir at elevation 91.0
Top of Grate of Outlet Structure at Elevation 91.75
Top of Berm at Elevation 92.5
See Note 1.

Note 1: "Tide Flex" check valve provided at SMB 3B and 3C to prevent the 100-year w.s. from the Tributary to Heathcote Brook from backing up into the basins and reducing available storage volume.

7.0 HYDRAULICS

Water surface elevations were computed for the portions of the Tributary to Devil's Brook and the Tributary to Heathcote Brook impacted by the proposed construction. The computations performed for each watercourse are explained in the following narrative.

7.1 Tributary to Devil's Brook

Water surface elevations were computed for existing and proposed conditions for the peak regulatory runoff rates evaluated for the portion of the Tributary to Devil's Brook in the vicinity of the proposed Route 92 alignment. The procedures used in the assessment of existing and proposed conditions are presented in the following narrative.

7.1.1 Hydraulics of the Existing Condition

Channel geometry was determined by field survey. Over bank geometry was determined from topographic maps prepared for this project from aerial photographs specifically developed for the design at a scale of one inch equals thirty feet with a one foot contour interval. The cross-section layout is shown on the stream encroachment plans for the Tributary to Devil's Brook area. The computations were performed using HEC-2 software. The existing and proposed floodways were computed using the equal conveyance reduction option in the HEC-2 software. The water surface elevations for the regulatory runoff (100-Year runoff with ultimate development) and for the floodway are summarized in the following table.

Hydraulic Computation Results
For Existing Conditions
for the Regulatory Flood

Cross-Section	Water Surface Elevation (ft)			Width	
	Floodplain	Floodway	Difference	Floodplain	Floodway
100	80.49	80.69	0.20	432	307
300	81.22	81.35	0.13	511	391
400	81.37	81.50	0.13	493	361
450	81.44	81.57	0.13	533	437
500	81.57	81.69	0.12	493	259
550	81.73	81.84	0.11	403	263
600	81.92	82.03	0.12	466	304
650	82.05	82.16	0.11	412	282

Cross-Section	Water Surface Elevation (ft.)			Width	
	Floodplain	Floodway	Difference	Floodplain	Floodway
700	82.15	82.26	0.11	430	253
750	82.25	82.36	0.11	452	227
800	82.38	82.48	0.10	342	212
900	82.78	82.88	0.10	361	211

The computations are presented in Appendix B.

7.1.2 Hydraulics of the Proposed Condition

Water surface elevations were computed with the proposed bridge configuration, including retaining walls, superimposed on the hydraulic (HEC-2) model prepared to compute the water surface elevations for the existing channel and over banks. The bridge configuration was selected to limit the hydraulic impact to less than 0.20 feet along the entire length of the hydraulic model. The proposed bridge construction includes installation of riprap lining in the channel and on the west over banks. The west over bank friction factors were revised accordingly for the computation of the proposed hydraulics. The over bank friction factors for the existing and proposed conditions are 0.10 and 0.04 respectively. The reduction in friction factor in the vicinity of the proposed bridge yields a lower water surface elevation and narrower floodplain and floodway than required for the existing condition. The procedures used for the proposed condition, particularly to establish the friction factors to be used in the computation and the resultant floodplain and floodway widths were determined acceptable to NJDEP as stated in a telephone conversation on April 3, 1996. The memorandum of this discussion is included in Appendix E.

The results of the computations are summarized in the following table.

Hydraulic Computation Results
For Proposed Conditions
for the Regulatory Flood

Cross-Section	Water Surface Elevation (ft.)			Width	
	Floodplain	Floodway	Difference	Floodplain	Floodway
100	80.49	80.69	0.20	432	307
300	81.22	81.35	0.13	511	391
400	81.37	81.50	0.14	493	362
450	81.45	81.58	0.13	404	269

Cross-Section	Water Surface Elevation (ft.)			Width	
	Floodplain	Floodway	Difference	Floodplain	Floodway
500	81.40	81.55	0.16	163	108
550	81.63	81.77	0.14	143	95
600	81.80	81.95	0.14	161	122
650	81.83	81.97	0.14	381	245
700	81.98	82.12	0.13	388	222
750	82.11	82.24	0.13	450	227
800	82.28	82.39	0.11	328	212
900	82.74	82.85	0.10	356	207

The computations are presented in Appendix B.

The computed water surface elevations for existing and proposed conditions for both the floodplain and the floodway are virtually the same as indicated in the following table.

Comparison of Hydraulic Computation Results
For Existing and Proposed Conditions
for the Regulatory Flood

Cross-Section	Floodplain Water Surface Elevation (ft)		
	Existing	Proposed	Difference*
100	80.49	80.49	0.00
300	81.22	81.22	0.00
400	81.37	81.37	0.00
450	81.44	81.45	0.01
500	81.57	81.40	-0.17
550	81.73	81.63	-0.10
600	81.92	81.80	-0.03
650	82.05	81.83	-0.12

Cross-Section	Floodplain Water Surface Elevation (ft)		
	Existing	Proposed	Difference*
700	82.15	81.98	-0.17
750	82.25	82.11	-0.14
800	82.38	82.28	-0.1
900	82.78	82.74	-0.04

* Proposed minus existing

The existing and proposed floodplain and floodway delineations are shown on the plans.

7.2 Tributary to Heathcote Brook

Water surface elevations were evaluated for the portion of the Tributary to Heathcote Brook from the location of the outfall to upstream of the Ridge Road crossing. The evaluation for the existing condition was performed for the regulatory runoff. The NJDOT requested that the proposed culvert crossing provide conveyance of the 100-year runoff for existing development, without ultimate development in the watershed and without overtopping the roadway. Therefore, the evaluation for the proposed condition was performed for the existing 100-year runoff and the regulatory runoff, both with the proposed Route 92 SMB's.

Procedures used in the assessment of existing and proposed conditions are presented in the following narrative.

7.2.1 Hydraulics of the Existing Condition

The evaluation for the existing condition was performed for the existing fifteen inch diameter crossing of Ridge Road and the 16/24 inch diameter crossing of U.S. Route 1. The existing 16/24 inch diameter U.S. Route 1 crossing conveys a small portion, approximately 15 cfs, of the regulatory runoff. The remainder of the regulatory runoff breaches the northbound U.S. Route 1 edge of road and proceeds southward to the opening in the barrier curb at the Ridge Road intersection. The runoff proceeds in weir flow over the U.S. Route 1 crown line and west along Ridge Road and in sheet flow overland toward the north, ultimately reaching Heathcote Brook.

The capacity of the existing 16/24 inch diameter crossing of U.S. Route 1, approximately 15 cfs, was computed for the upstream water surface elevation that breaches the U.S. Route 1 edge of road. The remainder of the regulatory runoff was considered to continue along U. S. Route 1 and cross the crown line at the opening in the barrier curb in the Ridge Road intersection. Weir flow computations were performed

at the barrier curb opening to determine the required flow depth of 1.2' and resultant water surface elevation of 87.76 at the U.S. Route 1 crown line.

Water surface elevations cannot be established for the sheet flow in Ridge Road downstream of the U.S. Route 1 crown line. The floodplain limits for the sheet flow in Ridge Road downstream of the U.S. Route 1 crown line were approximated for illustrative purposes based on evaluation of existing topography.

The water surface elevation upstream of the U.S. Route 1 crossing was established as computed in the HEC-1 routing computations.

The capacity of the existing fifteen inch diameter crossing of Ridge Road is limited by the existing Ridge Road topography. Runoff that causes the headwater to exceed elevation 90.0 breaches the roadway and proceeds overland toward U.S. Route 1. This runoff re-enters the existing channel between U.S. Route 1 and Ridge Road upstream of the U.S. Route 1 crossing.

7.2.2 Hydraulics of the Proposed Condition

A. NJDOT Design

The existing conveyance system for the Tributary to Heathcote Brook is to be replaced with a new system that follows the existing flow pattern for the regulatory runoff. The proposed construction is described in Section 4.0, Proposed Bridges and Culverts, of this report. The proposed conveyance system for the Tributary to Heathcote Brook was designed to provide conveyance for the 100-year (not regulatory) runoff for the proposed condition, which includes the Route 92 improvements, without overtopping the roadway, as requested by the NJDOT. The starting water surface elevation at the outlet end of the pipe used for the hydraulic computations was established at the normal depth elevation in the pipe at that point. Hydraulic losses, including entrance and exit losses at head walls, structural losses, and friction losses were computed to establish the water surface elevations along the proposed conveyance system. The results are summarized in the following table.

Water Surface Elevations at Selected Locations Along the Proposed U.S. Route 1 Conveyance System

LOCATION	WATER SURFACE ELEVATION for 100-Year Runoff	
	Existing Condition	Proposed Condition
Upstream of Ramp B Crossing	N/A	83.99
Upstream of U.S. Route 1 Crossing	87.76	87.50
Upstream of Ridge Road Crossing	90.0	90.0

B. Regulatory Runoff Evaluation

The proposed U.S. Route 1 crossing conveys the 100-year runoff of 50 cfs with a headwater elevation of 89.38. The remaining 24 cfs of the 74 cfs regulatory runoff proceeds overland following the existing flow path and is conveyed across U.S Route 1 at the break in the barrier curb in the Ridge Road intersection. The proposed U.S. Route 1 crown line elevation in the vicinity of the barrier curb opening is higher than the existing crown line elevation at this location. Weir flow computations contained in the HEC-1 model were performed at the barrier curb opening for the 24 cfs excess runoff to determine the required flow depth of 0.56' and resultant water surface elevation of 89.38 at the U.S. Route 1 crown line as compared to the elevation for the existing condition of 88.14. The proposed Ridge Road crossing provides conveyance of the 100-year existing runoff with a headwater elevation of 90.0. The results of the hydraulic computations are summarized in the following table.

Water Surface Elevations at Selected Locations Along the Proposed U.S. Route 1 Conveyance System

LOCATION	WATER SURFACE ELEVATION 100 Regulatory Runoff	
	Existing Condition	Proposed Condition
Upstream of Ramp B Crossing	N/A	84.83
Upstream of U.S. Route 1 Crossing	88.14	89.38
Upstream of Ridge Road Crossing	90.0	90.0

8.0 STABILITY ANALYSIS

The headwalls at the proposed open channel portion downstream of U.S. Route 1 and upstream of Ramp B, at the outlet of the U.S. Route 1 crossing, and retaining walls on the upstream side of the U.S. Route 1 crossing and in the floodplain of the Tributary to Heathcote Brook retain more than four feet of fill. Stability analysis for these structures and walls are contained in Appendix G.

9.0 SOIL EROSION AND SEDIMENT CONTROL MEASURES

The Route 92 project is designed in accordance with the "Standards for Soil Erosion and Sediment Control in New Jersey". Certification will be obtained from the Freehold Soil Conservation District.

The primary soil erosion and sediment control items provided in the Route 92 project include: conduit outlet protection at all storm sewer outlets as required, channel stabilization with either grass or riprap, storm sewer inlet protection, sediment barrier, and stabilized construction entrances. Conduit outlet protection computations for outfalls within floodplains are included in Appendix C. The outfall on the south side of Route 92 located at approx. Sta. 396+50 discharges to an existing pond. Therefore, COP calculations are not required. The specific locations and dimensions of all the soil erosion and sediment control items included in the Route 92 project will be shown on the plans submitted to the Freehold Soil Conservation District for certification.

10.0 JUSTIFICATION FOR WAIVERS/EXEMPTIONS

The Route 92 design attempted to comply with all the requirements of the Flood Hazard Area Control Act Rules, N.J.A.C. 7:13-1.1 et. seq. March 20, 1995 and Regulations for the Review Zone of the Delaware and Raritan Canal State Park, N.J.A.C. 7:45-1.1 et. seq. February 1994 where possible. However, the limited ROW available occasionally precluded the ability to provide complete compliance. Specific elements for which total compliance could not be achieved include

A. Standards for Fill Within the Floodplain (7:13-2.14) for the proposed bridge installation at the Tributary to Devil's Brook

B. Stormwater Management Discharge Reduction (7:13-2.8) at the U.S. Route 1 crossing of the Tributary to Heathcote Brook.

Justification for an exemption from strict compliance with these requirements is presented in the following narrative.

10.1 Fill Within Floodplain of the Tributary to Devil's Brook

Approximately 0.90 ac-ft of existing flood fringe storage volume is available within the proposed Route 92, 300 foot wide ROW. NJDEP regulations state that only 20% of the existing flood fringe storage may be filled. Allowable fill represents approximately 0.18 ac-ft (20% of 0.90 ac-ft). The proposed fill in the flood fringe within the ROW is approximately 0.33 ac-ft, which is 37% of the existing flood fringe storage volume. The proposed fill is based on the full height vertical abutment located at Sta. 397+77 (WB baseline), reduced roadway width of 85 feet (91 feet to outside of walls) and retaining walls installed on both sides of the roadway from the bridge to approximately Sta. 392+00. Approximately 0.77 ac-ft of additional flood fringe storage volume is required to comply with the allowable 20% net fill rule in accordance with N.J.A.C. 7:2.14. Alternatives considered to satisfy fill limitation include:

A. Excavation to restore the lost flood fringe storage volume.

B. Extending the proposed bridge to span more of the flood fringe and reduce the fill volume.

C. Acquiring enough property rights so that the fill introduced in the flood fringe by the project occupies less than 20% of the total flood fringe storage volume on the applicants property.

Each of these alternatives is discussed in the following narrative.

10.1.1 Excavation to Restore the Lost Flood Fringe Storage Volume

The feasibility of providing an excavated basin (low area) on the south side of Route 92 outside the wetland area and above groundwater levels was investigated. The bottom of the basin was set at the ground water table elevation, which yields the maximum possible storage volume. The basin was located west of the fifty

foot wide wetland transition area. The maximum storage that can be achieved in the basin, with the bottom set at the ground water elevation and using a bottom slope of 1%, is approximately 0.25 acre-ft, which represents approximately 76% of the total storage volume to offset proposed fill. However, installation of a fill mitigation basin includes the following problems:

A pipe slope of 0.65% is required to drain the basin to the Tributary to Devil's Brook. Based on the existing ground elevation in this area, the proposed pipe would not have adequate cover through the wetlands. The outlet pipe would have to be located under the roadway embankment slope to provide adequate cover and to minimize filling in the wetlands.

Unusually high GWT elevations may create a situation where there is essentially no effective storage within the basin, especially during the 100-year storm event when the ground will be saturated. It is also noted that setting the bottom of the basin at the groundwater elevation (best case scenario) and using a minimum bottom slope creates a situation where the basin bottoms could be perpetually wet due to capillary action of the groundwater. A wet basin bottom creates safety concerns, maintenance and potential mosquito problems. Raising the bottom elevation of the basins to eliminate this potential problem would virtually eliminate any available storage.

Approximately 1.0 acre of ROW would need to be purchased at a price of approximately $80,000 to provide the area required for installation of the storage basins. The construction cost would increase this amount. This alternative, which provides only part of the storage volume required for compliance, does not appear to be cost effective and also causes several potential problems. Extrapolating the data generated by this study to provide the total required storage volume suggests that more than approximately 1.5 acres at a cost of $120,000 would be required. This expenditure and associated loss of land for development seems unreasonable.

10.1.2 Extend the Proposed Bridge to Span the Flood Fringe

The fill placed in the flood fringe could be reduced by increasing the span length of the proposed bridge. An additional span length of approximately 400 linear feet would be required to span the flood fringe. This would require several additional spans and a resultant additional construction cost of approximately $5,000,000 plus continual maintenance costs for the life of the bridge. This additional cost does not seem warranted.

10.1.3 Acquire Adequate Property Rights

The fill limitation is relative to the total flood fringe storage volume within the applicant's property. Acquiring adequate property rights on either side of the proposed ROW within the existing flood fringe area to increase the available existing flood fringe storage volume increases the magnitude of the 20% fill volume allowed within the applicants property.

This alternative would require an additional storage volume of approximately 0.77 ac-ft (0.77 x 20% = 0.15 ac-ft required) to be purchased to offset the proposed fill and satisfy the 20 % net fill rule. The available storage volume of approximately 1.12 ac-ft. was determined by the average end area of the floodplain fringe shown on the HEC-2 cross-sections outside the proposed property rights. The evaluation indicates that a 1.5 acre surface area of only flood fringe area would be required. Purchasing this approximately 200 foot strip (between ROW and HEC-2 Section 800) would isolate the remainder of the property between the AMTRAK ROW and the eastern edge of the property acquired for net fill mitigation. This isolation can be avoided by either buying only an easement for the flood fringe area, allowing access easements across the flood fringe acquisition, or purchasing the remaining parcel of approximately 5 acres. The ROW required is all located in existing wetlands and is expected to cost approximately $15,000 per acre. This yields a cost of between $23,000 and $75,000. This alternative requires the purchase of excessive property rights and does not seem to be cost effective.

10.2 Stormwater Management for the Tributary to Heathcote Brook

The peak runoff reduction at the outfall of the proposed storm sewer system for the U. S. Route 1 and Ridge Road crossings of the Tributary to Heathcote Brook does not achieve the reduction required by N.J.A.C. 7:13-2.8 for the 10-year runoff. Approximately 96 acres of the total 140 acre area contributing to the Tributary to Heathcote Brook at the outfall location is from offsite areas. The intent of the requirements of N.J.A.C. 7:13-2.8 is not to control runoff from offsite properties. The NJTA and the proposed SMB's should only be required to over attenuate runoff from project specific areas. The regulations require a 50% reduction for the existing 2-year runoff, and a 25% reduction for the existing 10- and 100-year runoff. Therefore, the allowable flow was based on over attenuation of only the onsite portion of the total area to the downstream discharge location. The three SMB's installed within the proposed Route 92 ROW control the runoff from the new impervious area created by the project and provide the maximum attenuation possible. The proposed SMB's provide the attenuation necessary to avoid an increase in the peak runoff at the outlet end of the system. The results are indicated in the following table:

Tributary to Heathcote Brook
at the Outfall Location

	Peak Runoff - Tributary to Heathcote Brook (cubic feet per second)		
Recurrence Interval	2-Year	10-Year	100-Year
Existing Condition	31	66	155
Allowable Flow [1]	26	50.5	118
Proposed Condition	25	56	93

[1] Allowable Flow based on the following:

Offsite area	=	96 acres
Onsite area	=	44 acres
Total area	=	140 acres

2 year,	31	x	96/140	+	31	x	44/140 (.50)	=	26 cfs
10 year,	66	x	96/140	+	66	x	44/140 (.25)	=	50.5 cfs
100 year,	155	x	96/140	+	155	x	44/140 (.25)	=	118 cfs

Additional over attenuation to provide compliance with the requirements of N.J.A.C. 7:13-2.8 for the 10 year storm would require the installation of additional SMB's beyond the proposed ROW.

Therefore, the exemption allowed in accordance with N.J.A.C. 7:13-2.8(a)5 is requested for the 10-year storm.

11.0 CONCLUSION

Route 92 was designed considering the requirements of N.J.A.C 7:13-1.1 et seq. Specific activities associated with the Route 92 construction for each watercourse impacted include:

A. Tributary to Devil's Brook

A bridge over the Tributary to Devil's Brook, including the associated roadway fill,a storm sewer outfall, riprap, and retaining walls to minimize wetland impacts.

B. Tributary to Heathcote Brook

1. Replacement of the existing eighteen inch diameter crossing of Ridge Road with a 2 foot high by 8 foot wide box culvert and associated channel adjustment, fill, headwalls and conduit outlet protection.

2. Replacement of the existing twenty-one inch diameter crossing of U.S. Route 1 with a thirty-four inch high by fifty three inch wide elliptical pipe and associated channel adjustment, fill, headwalls and conduit outlet protection

3. Installation of a grass lined channel downstream of the U.S. Route 1 crossing

4. Installation of two twenty-nine inch high by forty-five inch wide elliptical pipes under Ramp B and associated headwalls.

5. Installation of a forty-eight inch high by seventy-six inch wide elliptical pipe outlet toward Heathcote Brook including associated channel modification, headwalls and conduit outlet protection.

6. Installation of headwalls and outlet pipes from three stormwater management basins.

7. Installation of water mains, fiber optic line, electric, telephone/cable TV, sanitary sewer, and gas lines within the floodplain.

C. Heathcote Brook

1. Installation of an outfall collecting runoff from Access Road A and existing parking lot.

2. Installation of a water main, sanitary sewer, and gas line within the floodplain.

The proposed construction complies with the appropriate requirements of the Flood Hazard Area Control Act Rules, N.J.A.C. 7:13-1.1 et seq. March 20, 1995 except in areas where limited right-of-way precluded the

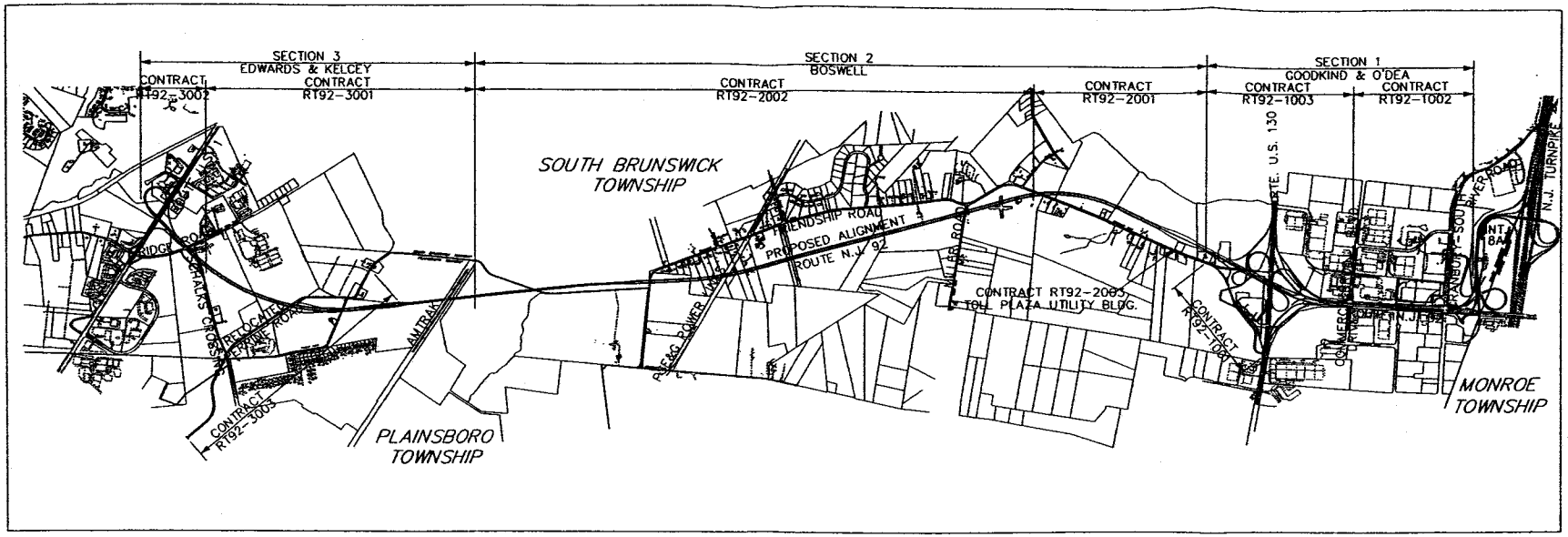
ability to provide complete compliance. Specific elements for which total compliance could not be achieved include:

A. Standards for Fill Within the Floodplain (7:13-2.14) for the proposed bridge installation at the Tributary to Devil's Brook

B. Stormwater Management Discharge Reduction (7:13-2.8) at the U.S. Route 1 crossing of the Tributary to Heathcote Brook.

Justification for an exemption to these requirements is presented in Section 10.1 on page 3-28 and Section 10.2 on page 3-30 respectively of this report.

ROUTE 92



NOTE:
ONLY SECTIONS 1, 2, AND 3 CONTAIN REGULATED ACTIVITIES UNDER THE FLOOD HAZARD AREA CONTROL ACT RULES.

SOURCE: HNTB Corporation

NEW JERSEY TURNPIKE AUTHORITY
PROPOSED ROUTE 92
STREAM ENCROACHMENT PERMIT

REGULATED DESIGN SECTIONS

Frederic R. Harris, Inc.
485 Route 1 South, Bldg. B
Iselin, New Jersey 08830

SCALE: 1"=2600'±
DATE: APRIL 1999
Figure 3.2

X-REFS: 92FRMT-B
LAST EDIT: 04/15/99 12:43 PM
PROJECT: 3150-03 FILE NAME: G:\3150\03\FWP\FIG1-3 1 of 1 WORKSTATION: CADD 08

Appendix F
Project Correspondence

DMJM HARRIS

CONTACT MEMO

Date: December 15, 2004
Contacted: Mr. Mike Valent
Affiliation: NJDEP Division of Fish and Wildlife
By: Eileen Flarity-Loftus
Regarding: Bald eagle foraging habitat near Route 92 alignment
cc: File

Mr. Valent advised that the latest version (Version 2.0) of New Jersey Landscape Project Mapping available to the public on NJDEP's website does not show McCormack Lake and surrounding emergent wetlands as foraging habitat for a pair of nesting bald eagles. This is because this pair of bald eagles has recently established a nest near Carnegie Lake in Princeton and hence, their foraging habitat is not shown on Version 2.0 of the Landscape Project mapping. As long as this nest remains active, this pair's foraging habitat will be included in the next released version of Landscape Project mapping.

State of New Jersey

James E. McGreevey
Governor

Department of Environmental Protection
Division of Parks and Forestry
Office of Natural Lands Management
Natural Heritage Program
P.O. Box 404
Trenton, NJ 08625-0404
Tel. #609-984-1339
Fax. #609-984-1427

Bradley M. Campbell
Commissioner

December 3, 2002

Kalsoum Abbasi
CDM
Raritan Plaza 1, Raritan Center
Edison, NJ 08818-3142

Re: Route 92

Dear Ms. Abbasi:

Thank you for your data request regarding rare species information for the above referenced project site in South Brunswick Township, Middlesex County.

The Natural Heritage Data Base has records for occurrences of *Ranunculus pusillus var. pusillus* and *Sagittaria australis* that may be on the site, and for *Anax longpipes, Elatine americana, Eupatorium Altissimum, Gentiana saponaria var. saponaria, Myriophyllum tenellum, Utricularia gibba, Viola brittoniana var. brittoniana* and *Isoetes riparia var. riparia* that may be in the immediate vicinity of the site. The attached lists provide more information about these occurrences. **Because some species are sensitive to disturbance or sought by collectors, this information is provided to you on the condition that no specific locational data are released to the general public. This is not intended to preclude your submission of this information to regulatory agencies from which you are seeking permits.**

The Landscape Project (Version 1.0) shows that suitable habitat patches of emergent wetland, forest, grassland and forested wetland occur on the project site, and has records for bobolink, savannah sparrow and wood turtle in habitat patches that are on the project site. The attached list provides more information about those records that are also in the Natural Heritage Data Base.

Also attached is a list of rare species and natural communities that have been documented from Middlesex County. This county list can be used as a master species list for directing further inventory work. If suitable habitat is present at the project site, these species have potential to be present. If you have questions concerning the wildlife records or wildlife species mentioned in this response, we recommend you contact the Division of Fish and Wildlife, Endangered and Nongame Species Program.

PLEASE SEE THE ATTACHED 'CAUTIONS AND RESTRICTIONS ON NHP DATA'.

New Jersey is an Equal Opportunity Employer
Recycled Paper

Thank you for consulting the Natural Heritage Program. The attached invoice details the payment due for processing this data request. Feel free to contact us again regarding any future data requests.

Sincerely,

Herbert A. Lord

Herbert A. Lord
Data Request Specialist

cc: Thomas F. Breden
Lawrence Niles
NHP File No. 02-4007435

United States Department of the Interior
FISH AND WILDLIFE SERVICE

New Jersey Field Office
927 North Main Street, Building D
Pleasantville, New Jersey 08232
Tel: 609-646-9310
Fax: 609-646-0352
http://njfieldoffice.fws.gov

IN REPLY REFER TO:
ES-02/776

NOV 13 2002

Kalsoum Abbasi, Environmental Engineer
CDM
Raritan Plaza I, Raritan Center
Edison, New Jersey 08818-3142

Reference: Threatened and endangered species review within the vicinity of the proposed Route 92 highway construction project located within South Brunswick, Monroe, and Plainsboro Townships, Middlesex County, New Jersey.

The U.S. Fish and Wildlife Service (Service) has reviewed the proposed project(s) pursuant to the Endangered Species Act (ESA) (87 Stat. 884; 16 U.S.C. 1531 *et seq.*) to ensure the protection of federally listed and proposed endangered and threatened species. The following comments do not address all Service concerns for fish and wildlife and do not preclude separate review and comment afforded by other applicable environmental legislation.

Endangered species and their habitats are protected by Section 7(a)(2) of the ESA, which requires federal agencies, in consultation with the Service, to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of listed species or result in destruction or adverse modification of critical habitat. An assessment of potential direct, indirect, and cumulative impacts is required for all federal actions that may affect listed species.

Potentially suitable habitat for the **bog turtle (*Clemmys muhlenbergii*)** (federally listed as threatened) occurs on or in the vicinity of the proposed project site(s). In New Jersey, bog turtles inhabit open, wet meadows and bogs with standing or slow-moving shallow water over a mucky substrate, emergent and scrub/shrub wetlands, spring-fed fens, and forested wetlands that contain emergent or scrub/shrub wetlands.

To assist you in determining potential impacts of the proposed project(s) on the bog turtle, more detailed information regarding the species and its habitat is enclosed. If any wetlands as described above will be disturbed, or if materials will be discharged into or upstream of such wetlands, the Service requests a **habitat survey** of the project area(s) by a qualified herpetologist (see attached list of recognized qualified bog turtle surveyors) to determine presence or absence of bog turtle habitat. If the survey documents the presence of bog turtles, or habitat, within the project area(s), an assessment of potential project impacts must also be completed. Project construction or implementation must not commence until the survey results and assessment of impacts have been forwarded to this office to determine if consultation under Section 7 of the ESA is required between the federal action agency and the Service. If you have any questions or require further assistance regarding threatened or endangered species, please contact the Reviewing Biologist at (609) 646-9310. Please refer to the above document control number in correspondence.

Reviewing Biologist: Lisa Sollecito ext. 47

Authorizing Supervisor: J.L.C.

Enclosures:
- Survey guidance and list of recognized qualified surveyors
- Current summaries of federally listed and candidate species in New Jersey
- Addresses for additional information on candidate and State-listed species
- Permit requirements for activities in wetlands

No part of this response should be used out of context and if reproduced, should appear in its entirety.

SPECIES REFERRALS TO OTHER AGENCIES

_____ **MARINE SPECIES/ENVIRONMENT**

☐ The proposed project is located in or may affect the following marine or estuarine environment:
☐ The following federally listed marine species occurs in the vicinity of the project site:

The Service provides the enclosed determination with respect to federally listed or proposed threatened or endangered flora and fauna under Service jurisdiction only. Principal responsibility for threatened and endangered marine species is vested with the National Marine Fisheries Services (NMFS). Therefore, the NMFS must be contacted to fulfill consultation requirements pursuant to Section 7(a)(2) of the Endangered Species Act:

National Marine Fisheries Service
Habitat and Protected Resources Division
Sandy Hook Laboratory
Highlands, New Jersey 07732
(732) 872-3023

_____ **OTHER SPECIES OF CONCERN**

Plants

There is a known occurrence of the following plant species in the vicinity of the project site:

☐ State-listed as endangered:
☐ plant species of concern in New Jersey:

The Service recommends that:

☐ project proponents contact the New Jersey Natural Heritage Program (address also enclosed) for recommendations to avoid adverse effects to rare or State-endangered plant species.
☐ a qualified botanist survey the project site for the presence or absence of the above species. Any field surveys should be coordinated with the New Jersey Natural Heritage Program.

Animals

There is a known occurrence of the following animal species in the vicinity of the project site:

☐ State-listed as endangered:
☒ State-listed as threatened: **Cooper's hawk (*Accipiter cooperii*), savannah sparrow (*Passerculus sandwichensis*), and wood turtle (*Clemmys insculpta*)**
☐ animal species of concern in New Jersey:

The Service recommends that:

☐ project proponents contact the New Jersey Endangered and Nongame Species Program (address also enclosed) for recommendations to avoid adverse effects to rare or State-listed animal species.
☒ a qualified biologist survey the project site for the presence or absence of the above species. Any field surveys should be coordinated with the New Jersey Endangered and Nongame Species Program

_____ **COMMENTS**

James E. McGreevey
Governor

State of New Jersey
Department of Environmental Protection
Land Use Regulation Program
P.O. Box 439, Trenton, NJ 08625-0439
Fax # (609) 777-3656
www.state.nj.us/dep/landuse

Bradley M. Campbell
Commissioner

OCT 16 2002

Timothy M. Hand
DMJM & HARRIS, Inc.
485-B U.S. Route One South
Iselin, New Jersey 08830

OCT 22 2002
DMJM HARRIS

RE: Letter of Interpretation/Line Verification Reissuance
File No.: 0000-02-0030.1FWW020001
Applicant: New Jersey Turnpike Authority
Block: various; Lot: various
Monroe, South Brunswick and Plainsboro Townships
Middlesex County

Dear Mr. Hand:

The New Jersey Department of Environmental Protection issued a Letter of Interpretation for the referenced site on August 27, 1997. You have requested that the Letter of Interpretation be reissued in accordance with the requirements at N.J.A.C. 7:7A-3.7.

In accordance with agreements between the State of New Jersey Department of Environmental Protection, the U.S. Army Corps of Engineers Philadelphia and New York Districts, and the U.S. Environmental Protection Agency, the NJDEP, Land Use Regulation Program is the lead agency for establishing the extent of State and Federally regulated wetlands and waters. The USEPA and/or USACOE retain the right to reevaluate and modify the jurisdictional determination at any time should the information prove to be incomplete or inaccurate.

Based upon the information submitted, the Land Use Regulation Program has determined that **the wetlands and waters boundary line(s) as shown on the plan map entitled: "NEW JERSEY TURNPIKE AUTHORITY, NEW JERSEY TURNPIKE ROUTE 92, WETLAND DELINEATION BOUNDARY MAP", dated October 1995, sheets 1, 3-6, 11-15, 17 and 18 last revised May 10, 1996, sheets 9, 10, and 13 last revised September 25, 1996, sheets 7 and 8 last revised July 22, 1997, and sheets 2, 16, and 19 last revised October 13, 1997, and prepared by Frederic R Harris, Inc., is accurate as shown.**

Therefore the term of the original Letter of Interpretation is hereby extended to August 27, 2007, which is five years from the expiration of the original Letter of Interpretation.

Any activities regulated under the Freshwater Wetlands Protection Act proposed within the wetlands or transition areas or the deposition of any fill material into any water area, will

require a permit from this office unless exempted under the Freshwater Wetlands Protection Act, N.J.S.A. 13:9B-1 et seq., and implementing rules, N.J.A.C. 7:7A.

The freshwater wetlands and waters boundary line(s), as determined in this letter, must be shown on any future site development plans. The line(s) should be labeled with the above LURP file number and the following note:

"Freshwater Wetlands/Waters Boundary Line as verified by NJDEP."

In addition, the Department has determined that the resource classification of wetlands is as follows:

Swales and ditches of ordinary resource value

Sheet 2- PEM (6) and the wetlands delineated by flags XX1-XX3 and XX19-XX21

Sheet 3- PEM (8)

Sheet 10- drainage ditch (50) and the wetlands delineated by flags H-17 to H-22

Sheet 15- swale (72)

Sheet 19- PEM (89-93) and the ditch delineated by flags DE5 to DE27

Detention basins of ordinary resource value

Sheet 3- PEM (7)

Sheet 18- PEM (81)

Isolated wetlands of ordinary resource value

Sheet 18- PEM (79), (82-85)

Sheet 19-PEM (88)

State open waters

Sheet 8- POW (28)

Sheet 10-POW (47)

Sheet 17- POW/Retention Basin (76) and (77)

The remainder of wetlands within the project limit are Intermediate resource value and the standard transition area or buffer required adjacent to these wetlands is 50 feet. In addition, the wetlands delineated by lines D, E, F, J, and K on sheet 1, labeled PEM (34) on sheet 9, PFO1/PSSI (41), on sheet 10, PEM/PSSI (60) on sheet 13, PEM (66) on sheet 14 are isolated. Wetlands of ordinary resource value and State Open waters do not require a wetland buffer.

This classification may affect the requirements for an Individual Wetlands Permit (see N.J.A.C. 7:7A-), the types of Statewide General Permits available for the wetlands portion of this property (see N.J.A.C. 7:7A-5) and the modification available through a transition area waiver (see N.J.A.C. 7:7A-6). Please refer to the Freshwater Wetlands Protection Act (N.J.S.A. 13:9B-1 et seq.) and implementing rules for additional information.

It should be noted that this determination of wetlands classification is based on the best information presently available to the Department. The classification is subject to change if this information is no longer accurate, or as additional information is made available to the Department, including, but not limited to, information supplied by the applicant.

This letter in no way legalizes any fill which may have been placed, or other regulated activities which may have occurred on-site. Also this determination does not affect your responsibility to obtain any local, State, or Federal permits which may be required.

In accordance with N.J.A.C. 7:7A-1.7, any person who is aggrieved by this decision may request a hearing within 30 days of the decision date by writing to: New Jersey Department of Environmental Protection, Office of Legal Affairs, Attention: Adjudicatory Hearing Requests, CN 402, Trenton, NJ 08625-0402. This request must include a completed copy of the Administrative Hearing Request Checklist.

Please contact Susan Butler of our staff at (609) 633-6754 or by e-mail at Susan.Butler@dep.state.nj.us should you have any questions regarding this letter. Be sure to indicate the Program's file number in all communication.

Sincerely,

Christopher Jones
Section Chief
Bureau of Inland Regulation

c: Monroe, South Brunswick and Plainsboro Township Clerk
Monroe, South Brunswick and Plainsboro Township Construction Official

New Jersey Turnpike Authority

ADMINISTRATION BUILDING P.O. BOX 1121 NEW BRUNSWICK, NEW JERSEY 08903
TELEPHONE (732) 247-0900

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EXECUTIVE DIRECTOR

November 10, 1999

Mr. Joseph J. Seebode, Chief
Regulatory Branch
U. S. Army Corps of Engineers – New York District
Jacob K. Javits Federal Building
New York, New York 10278-0090

Re: Route 92

Dear Mr. Seebode:

Following recent discussions with you and your staff regarding the renewed usage of the 1987 *Corps of Engineers Wetlands Delineation Manual* (1987 Manual) by the United States Army Corps of Engineers (USACE), the New Jersey Turnpike Authority (NJTA) has revisited the wetland delineation for the Route 92 project. The Route 92 wetlands were originally delineated for a New Jersey Department of Environmental Protection (NJDEP) Letter of Interpretation (LOI). NJDEP regulations require usage of the 1989 Interagency *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* (1989 Manual). With the transfer of jurisdiction from the NJDEP to the USACE, coupled with the differences in wetlands delineation methodologies between the 1987 Manual and the 1989 Manual, it became apparent that the delineation of wetlands in some of the agricultural fields would differ.

Consequently, a field visit was conducted on Tuesday, October 5, 1999 to evaluate the USACE jurisdictional wetland boundary at three site locations pursuant to the 1987 Manual. These three areas were delineated as wetlands, based on the previous delineation conducted during the NJDEP LOI process, on the plans included in the NJTA's January 1999 USACE Section 404 permit application for Route 92. In attendance were representatives from the USACE (Jim Haggerty, Craig Spitz and Roberto Barbosa), the U. S. Environmental Protection Agency (Bob Montgomery), the NJTA (Bob Grimm) and Frederic R. Harris, Inc. (FRH - Christine Tiernan, Eileen Flarity-Loftus and Ann Reed). The three sites visited include an existing pasture located approximately 1,600 feet west of the 90 degree turn in Friendship Road; a portion of a cultivated soybean/corn field located west of and adjacent to the 90 degree turn in Friendship Road; and a portion of a cultivated corn field located on the south side of Friendship Road east of Miller Road. The location of these three sites is shown on the attached map.

Website address http://www.state.nj.us/turnpike

As a result of the field visit and reevaluation pursuant to the 1987 Manual, the NJTA finds that two of these sites meet the definition of prior converted cropland and are not wetlands pursuant to the 1987 Manual. The third site meets the definition of farmed wetland and should continue to be classified as a wetland pursuant to the 1987 Manual.

Site #1 - Pasture Field West of Friendship Road

This pasture has been manipulated and cropped to the extent that it no longer exhibits important wetland values (i.e., flood control, water quality enhancement, aquatic diversity). According to the current property owner, this pasture is planted with a clover mix and has been used to harvest hay for more than 100 years. The property owner is not aware of any man-made hydrological alterations to this land, although that doesn't preclude such alterations from having occurred prior to his ownership. Based on the NJTA's studies of the site, as well as conversations with the property owner, it is the conclusion of FRH that this area is not inundated for more than 14 consecutive days during the growing season. Moreover, it is FRH's conclusion that this area would not revert to wetlands if left uncropped. For these reasons, this area meets the definition of a prior converted cropland, as defined by the Soil Conservation Service (SCS) in Section 512.15 of the National Food Security Act Manual (NFSAM, August 1988).

In addition, analysis of the three required wetland parameters (hydrophytic vegetation, hydric soils and hydrology) is as follows:

- The hydrophytic vegetation criterion is not met. Dominant vegetation includes milkweed (*Asclepias syriaca*, NL), curly dock (*Rumex crispus*, FACU), and creeping thistle (*Cirsium arvense*, FACU), as listed on the original field data forms for this location (attached, Plot Nos. S3 and S4), which are not hydrophytic species.

- Hydric soils (i.e., low chroma soils with mottling) were observed at or below 12 inches. According to the Munsell Soil Charts, the matrix color was 10 YR 4/1 and the mottle colors were 10 YR 6/6 and 10 YR 5/1. Hydric soils, pursuant to the 1987 Manual, must be within 12 inches of the surface; therefore, compliance with this criterion is marginal at this location.

- At least one primary indicator of wetland hydrology (i.e., observed inundation, observed soil saturation, water marks, drift lines, sediment deposits, drainage patterns) or two secondary indicators of wetland hydrology (i.e., abundant oxidized root channels, water stained leaves, positive FAC neutral test, soil survey data) must be observed to satisfy the hydrology parameter for a wetland determination. No primary indicators were observed in the pasture. Only one secondary indicator was observed in the western portion of the pasture. The western portion of the pasture is mapped as Fallsington loam (Fb), a hydric soil, on the soil survey for Middlesex County. The eastern portion of the pasture is mapped as Woodstown loam (WIA) on the soil survey, which is not a hydric soil.

The 1987 Manual requires that oxidized root channels in the upper 12 inches must be present in abundance to be considered a secondary indicator. During a supplemental field visit by FRH on November 2, 1999, additional soil borings were taken (attached, Data Forms SA1 and SA2). Although oxidized root channels were observed in spot locations, they were not observed in abundance; therefore, they are not considered a secondary indicator in this pasture. Since the western portion of the pasture has no primary indicators and only one secondary indicator, and the eastern portion of the pasture has no primary or secondary indicators, the pasture does not satisfy the hydrology parameter for a wetland determination.

The wetland boundary maps originally submitted to the NJDEP for an LOI did not identify this area as a wetland. Accordingly, the original field data form submitted with the Wetlands Delineation Report (FRH, 1995) confirms that this area does not meet the wetland criteria, as no standing water, soil saturation or other wetland hydrology indicators were observed (attached, Plot No. S3).

This pasture should be classified as prior converted cropland and, therefore, not under USACE jurisdiction. Further, this pasture has been altered to such an extent that it does not meet the definition of a wetland pursuant to the 1987 Manual, since all three parameters are not met. Demapping of this area results in a 1.24-acre reduction in wetlands to be permanently filled by the construction of Route 92, and a 0.39-acre reduction in temporary wetlands impact.

Site #2 - Soybean/Corn Field West of Bend in Friendship Road

This field has been manipulated to the extent that it no longer exhibits any important wetland values. According to the current property owner, this area underwent vegetative and hydrological alteration. The vegetative alteration consisted of cropping the land. This area has been farmed since the mid-18th century and is currently rotated between soybean and corn. The hydrological alteration consisted of relocating an existing intermittent stream south, to achieve a straight course through the adjacent field. This stream relocation included the spreading of the spoils from the relocation over the soybean/corn field. Hence, this resulted in moving the stream further away from the area in question and elevating the soybean/corn field, resulting in hydrological alteration. These substantial modifications lead to the conclusion that this area would not revert to wetland if left uncropped. For these reasons, this area meets the definition of a prior converted cropland, as defined by the SCS in Section 512.15 of the NFSAM.

In addition, analysis of the three required wetland parameters is as follows:

- The hydrophytic vegetation criterion is not met. Dominant vegetation consists of soybean (*Glycine max*), which is not listed on the *National List of Plant Species That Occur in Wetlands: Northeast (Region 1)*, 1988; therefore, it is not a hydrophytic plant species.

Subdominant species observed include common cocklebur (*Xanthium chinense*, NL), stinging nettle (*Urtica dioica*, FACU), creeping thistle, curly dock and pokeweed (*Phytolacca americana,* FACU+), which are upland, non-hydrophytic species.

- Hydric soils were observed within 12 inches of the ground surface; therefore, the hydric soil criterion is met. According to the Munsell Soil Color Charts, the matrix soil color at this location was 10 YR 4/1 with mottle colors of 10 YR 5/4 and 10 YR 6/2.

- No primary or secondary indicators of wetland hydrology were observed in this location; therefore, the hydrology parameter for a wetland determination is not met.

This field should be classified as prior converted cropland and, therefore, not under USACE jurisdiction. Further, this field does not meet the definition of a wetland pursuant to the 1987 Manual, since all three parameters are not met. Demapping of this area results in a 0.39-acre reduction in wetlands to be permanently filled by the construction of Route 92, and a 0.02-acre reduction in temporary wetlands impact.

Site #3 - Corn Field East of Miller Road

This field has been farmed for many years (prior to 1985) and has been manipulated to the extent that it no longer exhibits any wetland values; however, this field is bisected by an intermittent watercourse that, during flooding events, could lead to inundation for more than 14 consecutive days during the growing season. It is uncertain if this area would revert back to wetlands if left alone for several years. These facts lead to a designation of this area as farmed wetland.

In addition, analysis of the three required wetland parameters is as follows:

- The hydrophytic vegetation criterion is not met. Dominant vegetation includes corn (*Zea mays)*, which is not listed on the *National List of Plant Species That Occur in Wetlands: Northeast (Region 1)*, 1988.

  Subdominant species observed include small-flowered aster (*Aster vimineus*, FAC), sweet everlasting (*Gnaphalium obtusifolium*, NA), curly dock (FACU), green foxtail (*Seteria viridis*, NA), rough-stemmed goldenrod (*Solidago rugosa*, FAC), tall ironweed (*Vernonia altissima*, FAC) and common cocklebur (*Xanthium pennslyvanicum*, NA). Of these species, only small-flowered aster and rough-stemmed goldenrod are considered hydrophytes pursuant to the 1987 Manual.

- Hydric soils were observed within 12 inches of the ground surface; therefore, the hydric soil criterion is met. According to the Munsell Soil Color Charts, the matrix color was 10 YR 3/1 with mottle colors of 10 YR 5/1 and 10 YR 6/6.

- No primary or secondary indicators of wetland hydrology were observed at this location, although an existing intermittent stream bisects this area.

This field should be classified as farmed wetland and is, therefore, under USACE jurisdiction.

In summary, pursuant to the 1987 Manual, the NJTA concludes that two of the three sites in question should be classified as prior converted cropland, and do not contain the necessary parameters to meet the definition of a Section 404 jurisdictional wetland. The third site should be classified as farmed wetland. The total wetland to be permanently filled by the construction of Route 92 is reduced by 1.63 acres to 11.58 acres. The total temporary wetland impact is reduced by 0.41 acres to 2.87 acres.

The wetland impact plans, submitted as part of the NJTA's USACE Section 404 permit application in January 1999, will be revised to reflect the modifications to the wetland boundaries at the two sites classified as prior converted cropland. The revised permit plans will be submitted by the NJTA with the document addressing all the relevant project issues and public comments, as requested by the USACE at the August 17, 1999 meeting.

If you have any questions, please do not hesitate to contact Bob Grimm at (732) 247-0900 Ext. 5240. Thank you for your continued consideration of this important NJTA project.

Very truly yours,

for John G. Kunna, P.E.
Chief Engineer

Attachments
cc: E. Gross
R. J. Grimm

bcc: J. L. Williams
M. R. Greenberg (Riker-Danzig)
C. Tiernan (FRH)
J. T. Bolan (PS&S)
File

OPS

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
927 North Main Street (Bldg. D1)
Pleasantville, New Jersey 08232

PL-NY-99/182

May 04, 1999

Colonel William H. Pearce
District Engineer
New York District
U.S. Army Corps of Engineers
26 Federal Plaza
New York, New York 10278-0090

Dear Colonel Pearce:

The U. S. Fish and Wildlife Service (Service) has reviewed Public Notice No. 1999-00240-J1 dated February 26, 1999. The Public Notice describes a New Jersey Turnpike Authority (NJTA) application to construct Route 92 through Plainsboro, Monroe, and South Brunswick Townships in Middlesex County, New Jersey. Construction of this roadway would result in the permanent loss of 14.82 acres of palustrine freshwater wetlands and palustrine open waters, and the temporary loss of 3.28 acres of freshwater wetlands and 0.05 acres of open waters. Additionally 1.16 acres of palustrine forested wetlands would be affected by shading as a result of highway structures.

As proposed, Route 92 would connect the New Jersey Turnpike at Interchange 8A to Route U.S. 1 near its intersection with Ridge Road and would be located in South Brunswick, Plainsboro, and Monroe Townships, Middlesex County, New Jersey. The stated purpose of the proposed Route 92 project is to reduce traffic on local east / west roads, improve local traffic intersections, and reduce traffic on Route U.S. 1 and on Route 130.

AUTHORITY

The following comments on the proposed activity have been prepared under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401; 16 U.S.C. 661 *et seq.*) and the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*), and are consistent with the intent of the Service's Mitigation Policy (Federal Register, Vol. 46, No. 15, Jan. 23, 1981). These comments are intended for your use in determining compliance with the Section 404(b)(1) Guidelines (40 CFR 230) and for protection of fish and wildlife resources in your public interest review (33 CFR 320.4). The Service's Mitigation Policy and the Section 404(b)(1) Guidelines emphasize that avoidance and minimization precede compensation, which is to be considered solely for unavoidable adverse impacts on fish and wildlife resources and supporting ecosystems.

The Service previously provided comments on the proposed project to the U.S. Environmental Protection Agency (USEPA) via letters dated December 6, 1996, March 28, 1997, and April 15, 1998 (enclosed). All three letters recommended that a FWPA permit for the proposed project be denied because the NJTA had not demonstrated the need for the project, nor had it adequately evaluated all possible alternatives to the proposed project.

FEDERALLY LISTED THREATENED AND ENDANGERED SPECIES

Except for an occasional transit bald eagle (*Haliaeetus leucocephalus*) or peregrine falcon (*Falco peregrinus*), no other federally listed or proposed threatened or endangered species under Service jurisdiction pursuant to the Endangered Species Act of 1973 (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*), are known to occur within the project area. No further consultation pursuant to Section 7(a)(2) of the ESA is required by the Service. If project plans change, this determination may be reconsidered.

PROJECT PURPOSE AND NEED

The Service notes that traffic data used to justify the need for Route 92 have not been consistently presented. Instead, traffic data have been presented in several different documents and used to evaluate traffic in different manners. Earlier traffic data were primarily used to evaluate traffic with regard to the Level of Service (LOS) for various road segments and intersections. The LOS is rated on a scale of "A" through "F," with "A" being the best service and "F" being the worst service. However, the most recent information provided by the NJTA primarily discusses traffic with regard to the number of vehicle trips. Often data concerning vehicle trips are not tied to a LOS for the various road sections or intersections, making it difficult to compare current data to previously supplied data. An analysis of weaknesses associated with the NJTA traffic pattern presentation is detailed in our April 15, 1998 letter (enclosed) to the USEPA.

USEPA ALTERNATIVE ALIGNMENT

The USEPA identified a potential alternative Route 92 alignment (USEPA alternative) that would appear to significantly reduce wetland impacts and forest fragmentation when compared to the NJTA proposed alignment. The USEPA alignment would use the eastern portion of the NJTA alignment, then divert to the south near the 90-degree bend in Friendship Road, joining Scudders Mill Road west of the Scudders Mill Road / Dey Road intersection. NJTA would then improve Mill Road to accommodate the increased traffic generated by Route 92.

The USEPA alternative would reduce adverse impacts on forested wetlands by approximately 4.6 acres. In addition to reducing the area of wetland impacts, the adverse affects of these impacts would be less than the NJTA preferred alignment. As proposed, the NJTA preferred alignment would fragment a large block of forested wetlands associated with Devil's Brook. The Service expressed substantial concern regarding the impact of forest fragmentation from the NJTA preferred alignment on forest-interior neotropical migratory birds in the attachment to our

December 6, 1996 letter to the USEPA. The USEPA alternative would avoid the large block of forested wetlands associated with Devil's Brook, thereby greatly reducing project impacts to forest-interior neotropical migrants.

Information contained in the applicant's February 20, 1998 response document to the USEPA states that the USEPA alternative would reduce traffic on local east / west roads as well as Route U.S. 1 and Route 130. Therefore, it appears that the USEPA alternative would meet the project purpose.

The NJTA rejected the USEPA alignment because of impacts to farmland, proposed housing developments, and proposed and existing municipal open space. In rejecting the USEPA alignment, the NJTA stated that the USEPA alternative would indirectly impact 16.01 acres of farmland north of McCormack Lake by making the farmland inaccessible. The NJTA also indicated that USEPA's alternative would impact proposed housing developments. Consistent with the intent of the Section 404(b)(1) Guidelines, discharge of dredged or fill material in wetlands is discouraged when other alternatives exist. Clearly, proposed housing in agricultural fields would not deserve a higher level of protection then wetlands.

The applicant's document response states that the USEPA alternative would impact 19 acres of Plainsboro Township's proposed 550-acre open space, known as the Walker Gordon property. This property consists of agricultural fields and wetland forests. Additionally, according to the NJTA, the USEPA alternative would impact the existing Plainsboro Community Park, which consists of several baseball fields and other related facilities. The Service notes that impacts to the Walker Gordon property from the proposed NJTA alignment and the USEPA alternative would appear to be comparable since the NJTA alignment would pass through the northern section of the Walker Gordon property while the USEPA alignment would pass to the east and south of the property. Consistent with the 404(b)(1) Guidelines, use of proposed upland open space or baseball fields would be viable alternatives to the use of wetlands.

The Service's March 28, 1997 letter noted that the NJTA had not fully evaluated alternative Route 92 alignments, including alignments known as Alternative V and the Dey Road parallel. The development of the USEPA alternative further demonstrates that the NJTA has not fully evaluated alternative alignments.

WETLAND IMPACTS

Through previous design modifications, wetland impacts have been reduced from 32.9 to 15.98 acres for the NJTA alignment. Most of the wetland impacts that would occur from construction of the proposed project are located in a large wetland complex associated with the headwaters of Devil's Brook, a tributary to the Millstone River.

The Service previously expressed concern (Service letters dated December 6, 1996, March 28, 1997, and April 15, 1998) that the NJTA had not considered hydrologic impacts to wetlands that may occur as a result of construction of the proposed project. A construction technique referred to as "cut and fill" is proposed to construct the roadway through wetlands. Wetland soils incapable of supporting the proposed road bed would be removed and replaced with fill material. Replacement of wetland soils with fill material may result in a dam-like structure that would restrict the subsurface movement of water within the wetland system. Alteration of subsurface water flow could dewater wetlands downslope, and pond wetlands upslope of the proposed NJTA alignment. Any alterations to hydrology could adversely impact wetland plant communities and associated wildlife habitats within the project area. These additional wetland impacts have not been adequately addressed by the applicant.

AQUATIC RESOURCES OF NATIONAL IMPORTANCE

The Service's December 6, 1996 letter (see enclosure) to USEPA documents a large number of declining neotropical birds associated with forested or scrub wetlands that breed in the vicinity of the proposed Route 92 project location including great crested flycatcher, *(Myiarchus crinitus)*, green heron *(Butorides striatus)*, yellow-billed cuckoo *(Coccyzus americanus)*, northern flicker *(Colaptes auratus)*, wood thrush *(Hylocichla mustelina)*, yellow warbler *(Dendroica petechia)*, northern oriole *(Icterus galbula)*, orchard oriole *(Icterius spurius)*, and indigo bunting *(Passerina cyanea)*. Declining or scarce neotropical migrants that utilize the site include golden-winged warbler *(Vermivora chrysoptera)*, and Louisiana water-thrush *(Seiurus motacilla)*. Since forested wetlands at the proposed site provide high-quality habitat for a large number of declining federal trust species, the Service considers this wetland complex as an Aquatic Resource of National Importance.

SUBSTANTIAL AND UNACCEPTABLE ADVERSE IMPACTS

Project implementation would result in substantial and unacceptable adverse impacts to fish and wildlife resources through direct habitat loss, and the cumulative loss of habitat when the results of fragmentation are considered. These losses would not be fully compensated by the proposed compensatory mitigation plan. Since a substantial portion of the forested wetlands is a maturing closed-canopy red maple forest, no mitigation plan can adequately compensate for loss of this habitat and its associated federal trust species.

COMPENSATORY MITIGATION

The NJTA proposed compensatory mitigation for wetland impacts and discussed the subject in its Preliminary Route 92 Conceptual Wetland Mitigation Plan (mitigation plan) dated December 6, 1996. Additional compensatory mitigation was noted in the March 29, 1999 permit issued by the New Jersey Department of Environmental Protection to NJTA. Following some design changes and resultant reduction in wetland impacts, the NJTA now proposes to construct

approximately 57 acres of freshwater wetlands to compensate for permanent impacts to 14.82 acres of palustrine open waters and wetlands. Most of the proposed compensatory mitigation would be in the form of forested, shrub, and emergent wetland communities. Wetland construction would be sited in two areas: north of Friendship Road near Hay Press Road and south of Friendship Road near Miller Road. Additionally, NJTA would preserve 250 acres of existing forested freshwater wetlands in the project vicinity.

Wetlands at both sites would be constructed from upland fields by removing soils down to the water table. Approximately 3 feet of soil would be removed from the southern mitigation site and approximately 10 feet from the northern mitigation site. Successful construction of forested wetlands is difficult in this situation and would be made more difficult by the removal of substantial quantities of soil in attempting to provide appropriate hydrologic conditions. Successful compensatory mitigation would have a higher likelihood of success if the NJTA were to restore, instead of create, wetlands. Restoration opportunities often have a higher probability of success due to existing hydrologic site conditions. For example, sites such as drained agricultural fields should be evaluated for wetland restoration opportunities. A review of 1995 aerial photographs indicates that drained wetlands occur near McCormack Lake.

CONCLUSION

For non-water dependent projects such as the proposed project, the Section 404(b)(1) Guidelines state that the discharge of fill material into waters of the United States is prohibited unless it is clearly demonstrated that there are no practicable alternatives that would have fewer adverse impacts to the aquatic environment. Without a clear demonstration of the need for the proposed project, it is not possible to determine that other action alternatives or the "no-action" alternative are not practicable. The NJTA has not demonstrated that traffic on Route U.S. 1 would be unacceptable or that the proposed project would result in substantial improvements to traffic flow on Route U.S. 1. Additionally, the NJTA has not demonstrated that traffic on local east / west roads is unacceptable or that the proposed Route 92 alignment would result in substantial improvements in the Level of Service of local roads. Also, the NJTA has not demonstrated that the proposed project would substantially improve local intersections.

In addition to the above, the NJTA has not provided sufficient information to demonstrate that alternatives to the proposed project would fail to meet the project purpose. It is apparent that the USEPA alternate alignment would meet the project purpose while reducing impacts to wetlands and federal trust resources (e.g., neotropical migratory birds). Additionally, the NJTA has not fully evaluated impacts to wetlands associated with the proposed project nor demonstrated that all methods to minimize impacts to wetlands, associated with the currently proposed alignment, have been considered. Finally, the NJTA should carefully evaluate the USEPA alignment. Should the NJTA demonstrate the need for the proposed project, the Service would view the USEPA alignment as the least environmentally damaging alignment that has been presented to date.

Since the applicant has not supplied any additional information regarding alternatives and considering the above, documented flaws, the alternatives analysis is incomplete and the subject application does not comply with the Section 404(b)(1) Guidelines. The NJTA's additional proposed mitigation package fails to relieve the project of its essential flaws. Based upon review of the information contained in the permit as well as information contained in previous documents (see attachments), the Service concludes that implementation of the project as currently proposed would result in unacceptable adverse impacts to fish and wildlife resources and their supporting ecosystems. Additionally, the Service concludes that the NJTA has not adequately demonstrated a need for the proposed project and recommends denial of a Department of the Army permit.

Should the Corps consider granting a permit for this project over Service objections, please notify this office pursuant to the 1992 interagency Memorandum of Agreement. Should you have any questions regarding these comments, please contact Robert P. Russell or John Staples of my staff at (609) 646-9310.

Sincerely,

Clifford G. Day
Supervisor

Enclosures

Mailing Address:
P. O. Box 439
Trenton, NJ 08625-04

Location:
501 East State Street
Trenton, NJ 08625

Robert C. Shinn, Jr
Commissione

Christine Todd Whitman
Governor

State of New Jersey
Department of Environmental Protection
Land Use Regulation Program
Tel. (609) 292-1235 Fax. (609) 292-8115

AUG 27 1997

Robert Innocenzi
Frederick R. Harris, Inc.
485 B US Route One South
Islin, NJ 08830

RE: Letter of Interpretation/Line Verification
File No.: 1200-95-0001.1
Applicant: New Jersey Turnpike Authority
Block: various; Lot: various
Monroe, South Brunswick and Plainsboro Townships
Middlesex County

Dear Mr. Innocenzi:

This letter is in response to your request for a Letter of Interpretation to verify the jurisdictional boundary of the freshwater wetlands and waters on the referenced property.

In accordance with agreements between the State of New Jersey Department of Environmental Protection, the U.S. Army Corps of Engineers Philadelphia and New York Districts, and the U.S. Environmental Protection Agency, the NJDEP, Land Use Regulation Program is the lead agency for establishing the extent of State and Federally regulated wetlands and waters. The USEPA and/or USACOE retains the right to reevaluate and modify the jurisdictional determination at any time should the information prove to be incomplete or inaccurate.

Based upon the information submitted, and upon a site inspections conducted in April and May 1996, the Land Use Regulation Program has determined that **the wetlands and waters boundary line(s) within the project corridor boundaries as shown on the plan map entitled** "New Jersey Turnpike Authority, New Jersey Turnpike, Route 92, Wetlands Delineation Boundary Map, **dated October 1995, sheets 1-6, 11-12, 14-19 revised May 10, 1996, sheets 9, 10 and 13 last revised September 25, 1996, sheets 7 and 8 last revised July 22, 1997, and prepared by** Frederick R. Harris, Inc, **are accurate as shown.**

Any activities regulated under the Freshwater Wetlands Protection Act proposed within the wetlands or transition areas or the deposition of any fill material into any water area, will require a permit from this office unless exempted under the Freshwater Wetlands Protection Act, N.J.S.A. 13:9B-1 et seq., and implementing rules, N.J.A.C. 7:7A. A copy of this plan, together

with the information upon which this boundary determination is based, has been made part of the Program's public records.

Pursuant to the Freshwater Wetlands Protection Act Rules (N.J.A.C. 7:7A-1 et seq., you are entitled to rely upon this jurisdictional determination for a period of five years from the date of this letter.

The freshwater wetlands and waters boundary line(s), as determined in this letter, must be shown on any future site development plans. The line(s) should be labelled with the above LURP file number and the following note:

"Freshwater Wetlands/Waters Boundary Line as verified by NJDEP."

In addition, the Department has determined that the resource classification of wetlands is as follows:

Swales and ditches of ordinary resource value

Sheet 2- PEM (6) and the wetlands delineated by flags XX1-XX3 and XX19-XX21

Sheet 3- PEM (8)

Sheet 10- drainage ditch (50) and the wetlands delineated by flags H-17 to H-22

Sheet 15- swale (72)

Sheet 19- PEM (89-93) and the ditch delineated by flags DE5 to DE27

Detention basins of ordinary resource value

Sheet 3- PEM (7)

Sheet 18- PEM (81)

Isolated wetlands of ordinary resource value

Sheet 18- PEM (79), (82-85)

Sheet 19- PEM (88)

State Open Waters

Sheet 8- POW (28)

Sheet 10- POW (47)

Sheet 17- POW/Retention Basin (76) and (77)

The remainder of wetlands within the project limit are intermediate resource value and the standard transition area or buffer required adjacent to these wetlands is 50 feet. In addition, the wetlands delineated by lines D, E, F, J, and K on sheet 1, labeled PEM (34) on sheet 9, PF01/PSSI (41) on sheet 10, PEM/PSSI (60) on sheet 13, PEM (66) on sheet 14 are isolated. Wetlands of ordinary resource value and State Open Waters do not require a wetland buffer.

This classification may affect the requirements for a Individual Wetlands Permit (see N.J.A.C. 7:7A-3), the types of Statewide General Permits available for the wetlands portion of this property (see N.J.A.C. 7:7A-9) and the modification available through a transition area waiver (see N.J.A.C. 7:7A-7). Please refer to the Freshwater Wetlands Protection Act (N.J.S.A. 13:9B-1 et seq.) and implementing rules for additional information.

It should be noted that this determination of wetlands classification is based on the best information presently available to the Department. The classification is subject to change if this information is no longer accurate, or as additional information is made available to the Department, including, but not limited to, information supplied by the applicant.

This letter in no way legalizes any fill which may have been placed, or other regulated activities which may have occurred on-site. Also this determination does not affect your responsibility to obtain any local, State, or Federal permits which may be required.

In accordance with N.J.A.C. 7:7A-12.7, any person who is aggrieved by this decision may request a hearing within 30 days of the decision date by writing to: New Jersey Department of Environmental Protection, Office of Legal Affairs, Attention: Adjudicatory Hearing Requests, CN 402, Trenton, NJ 08625-0402. This request must include a completed copy of the Administrative Hearing Request Checklist.

Please contact Dr. Gary Bakelaar should you have any questions regarding this letter. Be sure to indicate the Program's file number in all communication.

Sincerely,

Christopher Jones
Raritan Region Section Chief
Bureau of Inland Regulation

c: Municipal Clerk
Municipal Construction Official

Christine Todd Whitman
Governor

State of New Jersey
Department of Environmental Protection

Robert C. Shinn, Jr.
Commissioner

Office of Program Coordination
CN 418
Trenton, NJ 08625-0418
Phone 609-292-2662
Fax 609-777-0972

RECEIVED
DEC 13 1996
FREDERIC R. HARRIS, INC.

December 11, 1996

Mr. Robert Grimm
New Jersey Turnpike Authority
P.O. Box 1121
New Brunswick, NJ 08903

RE: Route 92

Dear Mr. Grimm:

The Office of Program Coordination of the New Jersey Department of Environmental Protection is providing the following additional review comments from our Department's Historic Preservation Office regarding potential impacts to cultural resources from the construction and operation of the proposed Route 92. The comments are based on the review of the following reports:

Route 92 Executive Order No. 215 Response Document, Volume I, prepared by Frederick R. Harris, Inc., February 29, 1996; prepared for the New Jersey Turnpike Authority

Combined Phase I and II Cultural Resources Investigations, NJ Route 92 Alternative E, US Route 1 to the New Jersey Turnpike, South Brunswick, Middlesex County, New Jersey, prepared by Patricia Madrigal, Clifford Zink, Michael Tomkins, Vincent Maresca and Richard Hunter, February 1995; prepared for Federic R. Harris Inc.

The summary of the findings of this review are that three historic architectural properties eligible to be listed in the New Jersey Register of Historic Places have been identified within the area of potential impacts of the project as currently designed. Two of those properties will be adversely affected by the project. Mitigating measures recommended to minimize the adverse impacts this project will have on two eligible historic architectural properties are acceptable to the Historic Preservation Office with the condition stipulated herein. No eligible archaeological properties have been identified within the area of potential Impacts.

DETAILED COMMENTS

EXISTING ENVIRONMENT- IDENTIFICATION OF CULTURAL RESOURCES

Historic Architectural Resources

Three historic architectural properties along the proposed preferred alternative alignment (6E) have been identified which were determined eligible to be listed in the National Register of Historic Places by the State Historic Preservation Officer opinion dated September 4, 1986 pursuant to review under Section 106 of the National Historic Preservation Act of 1966 as amended, and therefore eligible to be listed in the New Jersey Register of Historic Places. The Historic Preservation Office reaffirms the eligibility of the three properties. The three properties are:

1. **Van Pelt-Clark House,**
2. **Dey-Benjamin Bayles House,**
3. and **Major-Mount House.**

Archaeological Resources

The Historic Preservation Office concurs with the submitted response document and attached report that there are no archaeological deposits within the area of potential impacts eligible to be listed in the New Jersey Register of Historic Places.

PROBABLE ENVIRONMENTAL IMPACTS

Historic Architectural Resources:

The proposed project will adversely impact two of the three historic architectural properties eligible to be listed in the New Jersey Register of Historic Places because it will alter characteristics of the properties which qualify them for inclusion in the New Jersey Register of Historic Places.

1. The Historic Preservation Office concurs with the submitted response document that the **Van Pelt-Clark House** is located in close proximity to the Route 92 mainline alignment and that the historic architecture and setting of the house will be adversely affected.

2. The Historic Preservation Office concurs with the submitted response document that the **Dey-Benjamin Bayles House** is located in close proximity to the Route 92 mainline alignment and that the historic rural setting of the house will be adversely affected.

Archaeological Resources

No archaeological properties have been identified within the area of potential impacts. Impacts, therefore, have not been assessed.

MITIGATION AND AVOIDANCE OF ADVERSE IMPACTS

Historic Architectural Resources

Mitigating measures developed to avoid/reduce the adverse effect this project will have on two of the three properties, i.e. **Van Pelt-Clark House** and **Dey-Benjamin Bayles House**, are acceptable to the Historic Preservation Office with the condition that specific landscape plans, specifications, and drawings are submitted to the Historic Preservation Office for review and comment prior to project commencement.

1. **Van Pelt-Clark House** - vegetative screening from the road alignment will be provided and appropriate measures taken to minimize vibrations during project construction.

2. **Dey-Benjamin Bayless House** - vegetative screening, particularly of the toll facility, will be provided to buffer the house from the road alignment.

Archaeological Resources

The Historic Preservation Office concurs that no additional archaeological work is necessary.

If you have questions concerning this project review, please contact the Historic Preservation staff Carl Nittinger for architecture and Mike Gregg for archaeology at 609-292-2023.

Please remember that the New Jersey Executive Order No. 215 of 1989 environmental review process for this proposed project has not yet been completed.

Sincerely,

Lawrence Schmidt
Director
Office of Program Coordination

c: Dorothy P. Guzzo, NJDEP
Carl Nittinger, NJDEP
Mike Gregg, NJDEP
Gary Bakelaar, NJDEP
Christine Tiernan-Varricchio, FRH

State of New Jersey

Christine Todd Whitman
Governor

Department of Environmental Protection
Division of Parks and Forestry
Natural Lands Management
P.O. Box 404
Trenton, NJ 08625-0404
Tel. #609-984-1339
Fax. #609-984-1427

Robert C. Shinn, Jr.
Commissioner

MEMORANDUM

TO: Richard C. Reilly, Section Chief
Land Use Regulation, Northeast Engineering Section

FROM: Thomas F. Hampton, Administrator

DATE: June 30, 1999

SUBJECT: Route 92, *Sagittaria australis* (southern arrowhead)

In your 6/16/99 memo, you stated that a permit will likely be approved for the above mentioned project, and that there may be some impacts to the southern arrowhead. You asked for my insights on appropriate mitigation, relocation etc. for impacts to the plant species.

In 1996, The applicant's consultant reported that 35% of the local population would be impacted by the proposed project (A.S. Greene Environmental Consultants). We have not done a detailed survey of the site, and can not confirm that the consultant's survey adequately identified, counted and located the plant species population at the site. Assuming the consultant's survey is accurate, we concur that at least 35% of the local population will be eliminated by proposed project. We have reviewed sheet #60 of the proposed grading plan produced by Christopher Nash of Boswell Engineering dated 10/30/96 with revisions dated 4/21 and 2/21. The revisions do not appear to lessen the impact of the project on the plants.

It is possible that additional plants in the vicinity will also be impacted by changes in hydrology, or by site disturbance. To lessen inadvertent damage to additional plants, it may be prudent to erect hard fencing around areas containing the rest of the plants within 150 feet of the area to be constructed to keep construction equipment or materials away from the plants. The fencing should be removed after the construction is complete and another inventory should be made of the plants to determine if additional plants were lost during the construction period.

We do not have any information on the ability of this species to withstand transplantation or the feasibility of creating habitat that replicates the natural habitat of viable native populations. The Office of Natural Lands Management generally does not promote transplantation as a preferred conservation technique for rare species because: 1)long term success rates are typically low; 2)species populations may not reproduce and persist in perpetuity in transplanted habitats; 3)the full range of habitat features that are

essential for the long term survival of a species is often poorly known and therefore difficult to reproduce; 4)the ecological role a species plays in a natural ecosystem may be lost when transplanted to an artificial habitat.

Should the applicant seek to plant and/or transplant this species on-site, as mitigation, to eliminate adverse affects on the population of plants, several issues need to be addressed. The applicant's consultant would have to present a plan that insures the long-term success of transplanting or planting the species. Because species populations may not reproduce and persist in perpetuity in transplanted habitats some means of continual monitoring and, if needed, maintenance of the population would have to be provided. Provisions would be needed to insure that if the selected new site does not adequately support the plants, reasons for the failure will be documented and another more suitable site will be established. The full range of habitat features that are essential for the long term survival of a species is often poorly known and therefore difficult to reproduce. Therefore, any mitigation should first thoroughly document the environmental and ecological setting of each subpopulation of the plants at the site prior to construction activities. Factors to be measured should include, but not be limited to, features such as soil type, water depth, source of water (groundwater or overland runoff), periodicity of saturation, flood dynamics (velocity and duration of flooding), and competition from other plant species. Sites targeted to receive transplanted/planted individuals should closely match original site conditions.

While it is conceivable that transplantation will mitigate the impact to the population, the habitat loss is still not mitigated. I suggest that you consider permanent protection of habitat for another population as mitigation for the habitat loss in this project. The only other high quality population in the state that we currently know of is in Upper Freehold Twp., Monmouth County. We believe the habitat for this population is not on state or federally protected lands. The applicant should investigate the ownership of this site (see attached) and provide a proposal for permanent protection through fee simple acquisition and transfer to a State or County land protection agency.

DMJM HARRIS

CONTACT MEMO

Date: December 15, 2004
Contacted: Mr. Mike Valent
Affiliation: NJDEP Division of Fish and Wildlife
By: Eileen Flarity-Loftus
Regarding: Bald eagle foraging habitat near Route 92 alignment
cc: File

Mr. Valent advised that the latest version (Version 2.0) of New Jersey Landscape Project Mapping available to the public on NJDEP's website does not show McCormack Lake and surrounding emergent wetlands as foraging habitat for a pair of nesting bald eagles. This is because this pair of bald eagles has recently established a nest near Carnegie Lake in Princeton and hence, their foraging habitat is not shown on Version 2.0 of the Landscape Project mapping. As long as this nest remains active, this pair's foraging habitat will be included in the next released version of Landscape Project mapping.

Appendix G
Excerpt from Conceptual Wetland Mitigation Plan

PRELIMINARY

ROUTE 92

CONCEPTUAL WETLAND MITIGATION PLAN

DECEMBER 6, 1996

Submitted to:
New Jersey Department of Environmental Protection

Submitted by:
New Jersey Turnpike Authority
New Brunswick, New Jersey

Prepared by:
Frederic R. Harris, Inc.
Consulting Engineers

In association with:
Amy S. Greene Environmental Consultants, Inc.
Medina Consultants, P.C.
Gary J. Pierce, Ph.D.

HARRIS

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EXECUTIVE SUMMARY

This report presents the Conceptual Wetland Mitigation Plan for the proposed Route 92 project in Middlesex County. A compensatory mitigation plan will be required as a condition of the Freshwater Wetlands Individual Permit for the roadway project, if approved by the NJDEP. As presented in the Individual Permit application submitted to the NJDEP, the project is expected to result in the permanent disturbance of 32.90 acres of wetlands, of which 1.90 acres of impact would be to ordinary resource value, emergent wetlands. Another 0.85 acres of impact would occur to State open waters. The impacted forested, scrub/shrub, and emergent wetlands located within the Route 92 right-of-way are components of extensive forested wetland systems and wetlands associated with agricultural lands and roadway drainage. The majority of the impacted wetlands are located in the watershed of Devil's Brook. Lesser amounts of disturbed wetlands are located in the Shallow Brook and Heathcote Brook watersheds.

The NJDEP typically requires 2:1 mitigation, on an acreage basis for the creation of wetlands, for impacts to wetlands and 1:1 replacement for impacts to State open waters (N.J.A.C. 7:7A-14.2). We are proposing 1:1 replacement for the impacts to State open waters and ordinary resource value wetlands. Since the wetlands to be created will be intermediate resource value, they would be of higher value than the ordinary resource value wetlands that would be impacted. The remainder of the impacted wetlands will be replaced by in-kind wetland creation at a 2:1 ratio. At these ratios, the total mitigation requirement would be 64.75 acres.

Two sites, the Northern Mitigation Site (north of Friendship Road and Route 92) and the Southern Site (south of Friendship Road) have been selected for wetland creation. The replacement wetlands will be primarily located in the Devil's Brook watershed, with a small portion in the Shallow Brook watershed. The mitigation plan proposes the creation of 57.19 acres of wetlands, including 36.75 acres of forested wetlands, 8.20 acres of scrub/shrub, and 12.24 acres of emergent and wet meadow; and 0.85 acres of open waters. The proposed wetland creation plan falls short of the total mitigation requirement by 6.71 acres. As compensation for this balance, preservation of existing forested lands in the vicinity of Friendship Road and Miller Road is proposed.

1. INTRODUCTION

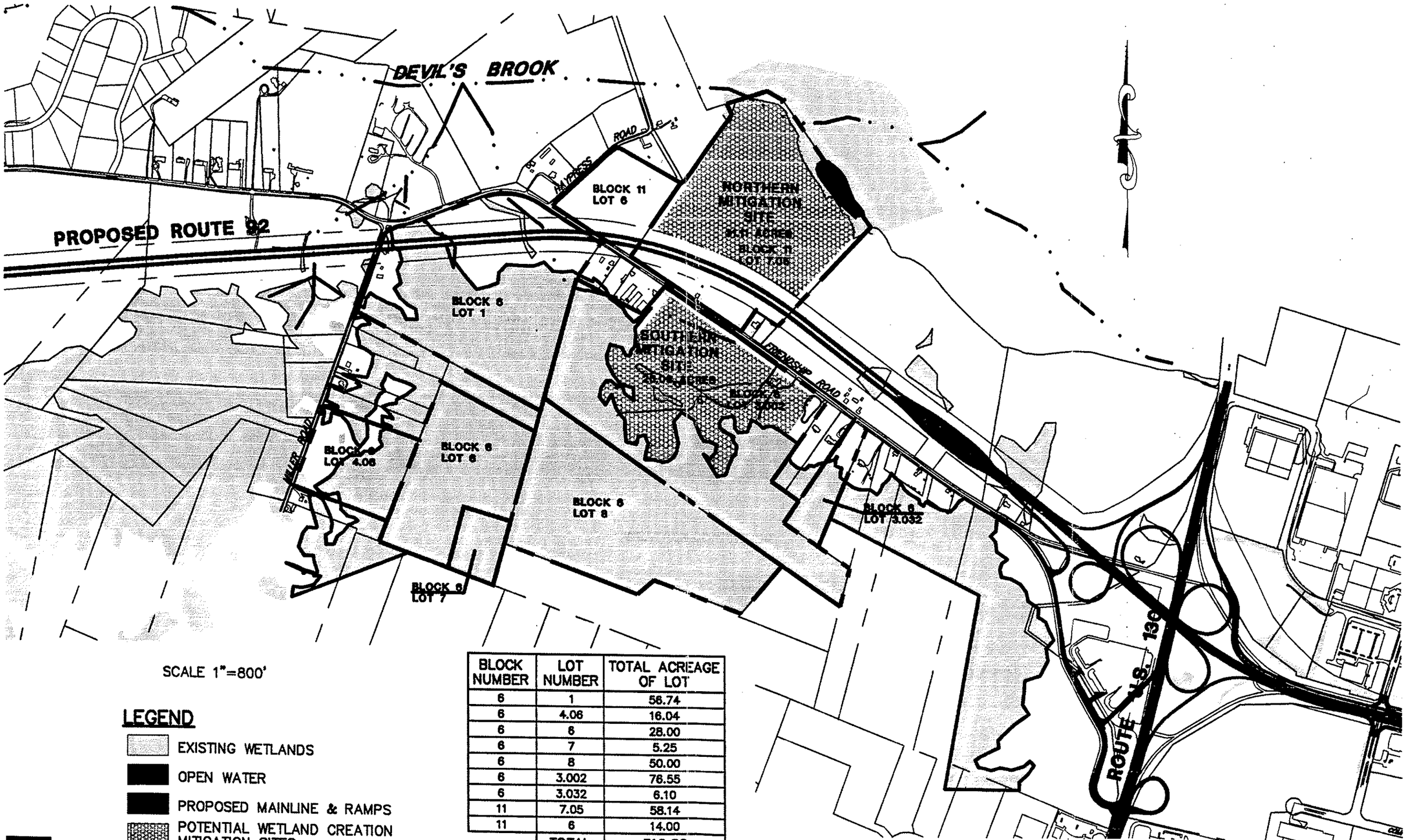
The New Jersey Turnpike Authority (NJTA) proposes the construction of a new, 6.7 mile, limited access highway (Route 92) that will serve as an east-west transportation connection for Route US 1 in South Brunswick Township and the New Jersey Turnpike at Interchange 8A. The proposed project also includes improvements to existing local roadways at interchanges with Route 92.

Wetlands were delineated within the project area. The location and extent of the wetlands are being verified by the NJDEP in a Letter of Interpretation (File #1200-95-0001.1, pending). Wetlands in the proposed mitigation areas have been delineated and surveyed, but not confirmed by NJDEP. An addendum to the LOI for the right-of-way will be submitted to include these wetlands.

The proposed Route 92 project is expected to result in 21.73 acres of impact to forested wetlands, 4.10 acres of impact to scrub/shrub wetlands, and 7.07 acres of impact to emergent wetlands associated with the proposed project (F. R. Harris, Freshwater Wetlands Individual Permit Application, September 1996). The total wetlands disturbance would be 32.90 acres. Of these impacts, 1.90 acres would be to ordinary resource value wetlands. The remaining wetlands impacted would be intermediate resource value. There would also be 0.85 acres of State open waters impacted.

The impacts to intermediate resource value wetlands will be mitigated at a ratio of 2:1, on an acreage basis for the creation of wetlands, as required by the NJDEP (N.J.A.C. 7:7A-14.2(a)2i). Impacts to ordinary resource value wetlands will be mitigated at a ratio of 1:1 because intermediate resource value wetlands that are considered to be of higher ecological value will be created as replacement. A 1:1 ratio will also be utilized for the State open water mitigation. Therefore, a total of 63.90 acres of intermediate resource value wetlands and 0.85 acres of State open water would be necessary as mitigation for the 32.90 acres of impacted wetlands and 0.85 acres of State open water associated with the proposed Route 92 project.

This mitigation plan was prepared to address mitigation requirements of the Individual Freshwater Wetlands Permit (currently under NJDEP review) should it be approved. The NJTA recently acquired approximately 310 acres of land encompassing 9 lots near the Friendship Road/Miller Road area of the Route 92 right-of-way. These lots were investigated for their wetland mitigation potential (Figure 1). Three of these lots: Block 6, Lot 6 (28 acres); Block



BLOCK NUMBER	LOT NUMBER	TOTAL ACREAGE OF LOT
6	1	56.74
6	4.06	16.04
6	6	28.00
6	7	5.25
6	8	50.00
6	3.002	76.55
6	3.032	6.10
11	7.05	58.14
11	6	14.00
	TOTAL:	310.82

ROUTE 92 WETLAND MITIGATION SITE VICINITY MAP

Figure 1

6, Lot 7 (5.25 acres); and Block 6, Lot 8 (50 acres) were deemed unsuitable for wetlands mitigation because they consist entirely of forested wetlands. Block 6, Lot 3.032 (6.10 acres) was deemed unsuitable for mitigation because most of this site is existing forested wetland. This site does include a small upland area; however, it is less than two acres and located between, and close to, two existing residences. Block 6, Lot 4.06 (16.04 acres) was deemed unsuitable for mitigation because most of this site is existing forested wetlands. There is approximately 4-6 acres of upland on this site; however, it is all forested and, as such, not suitable for wetland construction. Block 11, Lot 6 (14 acres) was deemed unsuitable for wetland mitigation due to groundwater constraints. Block 6, Lot 1 (56.74 acres) was deemed unsuitable for mitigation because most of it is either existing forested wetland or within the proposed Route 92 ROW. A small portion of this site consists of uplands outside of the ROW; however, this area is located between proposed Route 92 and Friendship Road and is too small to warrant construction of an individual mitigation site. Finally, Block 11, Lot 7.05 (58.14 acres) and Block 6, Lot 3.002 (76.55 acres) have been deemed suitable for wetland mitigation via creation. They both consist of large tracts of upland field or farmland, are adjacent to major existing wetland complexes and are of significant acreage to justify wetlands construction. In summary, of these nine NJTA sites investigated, two exhibit suitable conditions for wetlands creation.

The proposed Route 92 Northern Mitigation Site (Northern Site) is located north of Friendship Road and East of Haypress Road in South Brunswick Township. The proposed Route 92 Southern Mitigation Site (Southern Site) is located to the south of Friendship Road and the Northern Site (Figure 1). The NJTA proposes to construct 57.19 acres of wetlands and 0.85 acres of State open water within the mitigation sites. These sites maximize the use of suitable upland areas for wetland creation. A transition area of at least 50 feet is proposed around the perimeters of the created wetland areas. The wetland creation areas will be connected to wetlands in the Devil's Brook/Shallow Brook system. The Devil's Brook/Shallow Brook watershed contains the majority of the wetland impacts associated with the proposed project.

The proposed wetland creation plan falls short of the total mitigation requirement by 6.71 acres. As compensation for this balance, preservation of existing forested lands in the vicinity of Friendship Road and Miller Road is proposed. Of the 310 acres owned by the NJTA in the Friendship Road/ Miller Road area, approximately 178 acres of forest could be preserved as part of the mitigation plan. These forests include areas of upland and wetland on Block 6; portions of

Lots 1 and 3.002, and entire Lots 4.06, 6, 7 and 8 (Figure 1). The preservation of 178 acres of woodland at a 25:1 mitigation ratio would provide for the approximately 7 acres of mitigation deficient from the proposed creation of 63.90 acres of wetlands. Therefore, creation and preservation components could provide the total amount of mitigation for the proposed Route 92 project.

The proposed wetland mitigation sites (portions of Block 11, Lot 7.05 and Block 6, Lot 3.002) are currently owned by the NJTA. A portion of Block 11, Lot 7.05 will be designated as the Route 92 right-of-way, while the remaining portion of the site to the north of the right-of-way will be designated as a wetlands mitigation area. It is currently undetermined whether the mitigation wetlands will remain in NJTA ownership post-construction. The NJTA will work with the NJDEP such that a mutually agreeable arrangement is reached regarding ownership of the properties.

2. MITIGATION GOALS

The constructed wetlands will be of intermediate resource value and will replace disturbed wetlands of intermediate and ordinary resource value. The primary functions of the wetlands to be impacted by the project are flood storage, nutrient removal, and sediment retention (Frederic R. Harris, Inc. Freshwater Wetlands Individual Permit application, Sept. 1996). The functions that will be provided by the created wetlands include sediment/toxicant retention, nutrient removal, and wildlife habitat. The created wetlands have been designed to incorporate certain features to provide the indicated functions.

Both wetland creation sites will be designed to provide sediment/toxicant retention and nutrient removal. The sites will have areas of permanently impounded water and low flow velocity due to the relatively flat grade proposed in the wetlands. A low berm will partially separate the created wetlands from the existing wetlands at the lower end of each site to retard water movement and enhance the time for nutrient uptake. A diversity of persistent vegetation is proposed on each site to optimize nutrient removal.

A small area in the northwestern corner of the Southern Mitigation Site is located within the 100-year floodplain of a tributary of Devil's Brook (FEMA, Flood Boundary and Floodway Map, 1985). The Northern Site is located just outside of the 100-year floodplain of Devil's Brook (See Existing Site Conditions Plans). The floodplain boundary is nearly coincident with the limit of existing wetlands on the Northern Site. Therefore, the proposed wetlands are not designed to store floodwaters. However, since they will be

located in a topographic depression and berms and deeper depressions within the wetlands will retain stormwater runoff, the wetlands will function to slowly release stormwater to the surrounding, existing wetlands.

The existing wetlands located in the vicinity of the proposed Route 92 crossing of Devil's Brook (between Friendship Road and the Amtrak line) have been reported to support a diversity of wildlife (Frederic R. Harris, Inc., E. O. 215 Response Document, 1995). A portion of the wetlands proposed to be impacted by the project are located in this area of Devil's Brook. The proposed wetland mitigation plan should compensate for some of the loss of wildlife habitat.

The created wetlands are designed to provide a diversity of habitat types and thus support a diversity of wildlife. The created wetlands should be suitable for breeding, as well as migration and wintering habitat. The created wetlands are large areas (approx. 25-30 acres each) contiguous to large expanses of existing forested wetlands. Their proximity to agricultural lands enhances their suitability for use by wildlife during migration and the winter (Adamus, Wetland Evaluation Technique, 1987). Some of the species that are targeted in the design of the created wetland sites are wild turkey, woodpeckers, owls, passerines, wading birds, and amphibians. The wild turkey can use the hard and soft mast produced by planting oaks for winter feed. Short-lived trees such as silver maple (Acer saccharinum), sycamore (Platanus occidentalis), and black willow (Salix nigra) will be planted to provide dead branches within 10 to 20 years on which woodpeckers will forage and cavities in which owls can nest. A diversity of tree and shrub plantings will provide nest sites for passerines. They can also use the mast from the plantings and forage in the tree and shrub canopy or on the forest floor. The meadow habitat fringing the wetland and intermixed with the forest will also provide food and forage sites for many birds. The existing wetlands in the vicinity of the project, particularly those south of the Southern Site, contain a number of small, seasonally flooded, emergent or open water depressions intermixed with the forested wetlands. This community structure will be recreated on the mitigation sites to enhance habitat diversity. These depressions will provide habitat for many amphibians as well as provide feeding habitat for wading birds. These target species will not necessarily inhabit the constructed wetlands, but the wetlands are designed to incorporate their habitat requirements.

3. DESCRIPTION OF EXISTING CONDITIONS

3.1 Proposed Areas of Wetland Disturbance

Construction of the proposed Route 92 project will result in the permanent loss of approximately 32.90 acres of freshwater wetlands along the project alignment, which extends from Interchange 8A to Route 1 near Ridge Road. Of the 32.90 acres of impacted wetlands, the majority are forested wetlands with lesser amounts of scrub/shrub and emergent wetlands affected. Approximately 0.85 acres of State open waters will also be impacted (See table below).

Permanent Wetland Impacts by Wetland Type

WETLAND TYPE	IMPACT (ACRES)
PFO1	21.73
PEM	7.07 *
PSS1	4.10
POW	0.85

* 1.90 acres of these impacts are to ordinary resource value wetlands

The majority of freshwater wetland disturbance will occur in the Devil's Brook watershed, although impacts to wetlands in the watersheds of Heathcote Brook and Shallow Brook will also occur. Each of these watercourses is located within the Millstone River Drainage Basin. Approximately 80% of the wetland impacts resulting from the construction of the proposed Route 92 occur in the Devil's Brook watershed, 10% in the Heathcote Brook watershed, and 10% in the Shallow Brook watershed. Of these wetland impacts, approximately 69%, 95%, and 50% occur in forested wetlands associated with the aforementioned watercourses, respectively. The remaining wetland impacts occur in emergent and scrub/shrub wetlands associated with each of these watercourses.

The wetland systems in the areas of the proposed roadway alignment are generally characterized by a vegetative community consisting of the canopy species red maple (*Acer rubrum*, FAC), sweet gum (*Liquidambar styraciflua*, FAC), pin oak (*Quercus palustris*, FACW), and green ash (*Fraxinus pennsylvanica*, FACW). Shrub species include spicebush (*Lindera benzoin*, FACW-), sweet pepperbush (*Clethra alnifolia*, FAC+), highbush blueberry (*Vaccinium corymbosum*, FACW-), arrowwood (*Viburnum dentatum*, FAC), and swamp azalea (*Rhododendron viscosum*, FACW+). Greenbrier (*Smilax rotondifolia*, FAC) is a common woody vine in the area. The herbaceous vegetation includes skunk cabbage (*Symplocarpus foetidus*, OBL), cinnamon fern (*Osmunda cinnamomea*, FACW),

sensitive fern (Onoclea sensibilis, FACW), and spotted jewelweed (Impatiens capensis, FACW). Man-made ditches consist of cattail (Typha latifolia, OBL) and woolgrass (Scirpus cyperinus, FACW+). For a complete description of the wetlands within the project area, refer to the "Wetlands Delineation Report for Proposed Route 92 in Monroe, South Brunswick, and Plainsboro Townships, Middlesex County, NJ" (Harris, 1995).

The soils in the existing wetlands are primarily Fallsington loam and Elkton loam soils. A high water table within 18 inches of the surface is present in the wetlands. The wetlands appear to receive hydrologic inputs from several sources, primarily groundwater, overflow from adjacent waterways, and stormwater runoff.

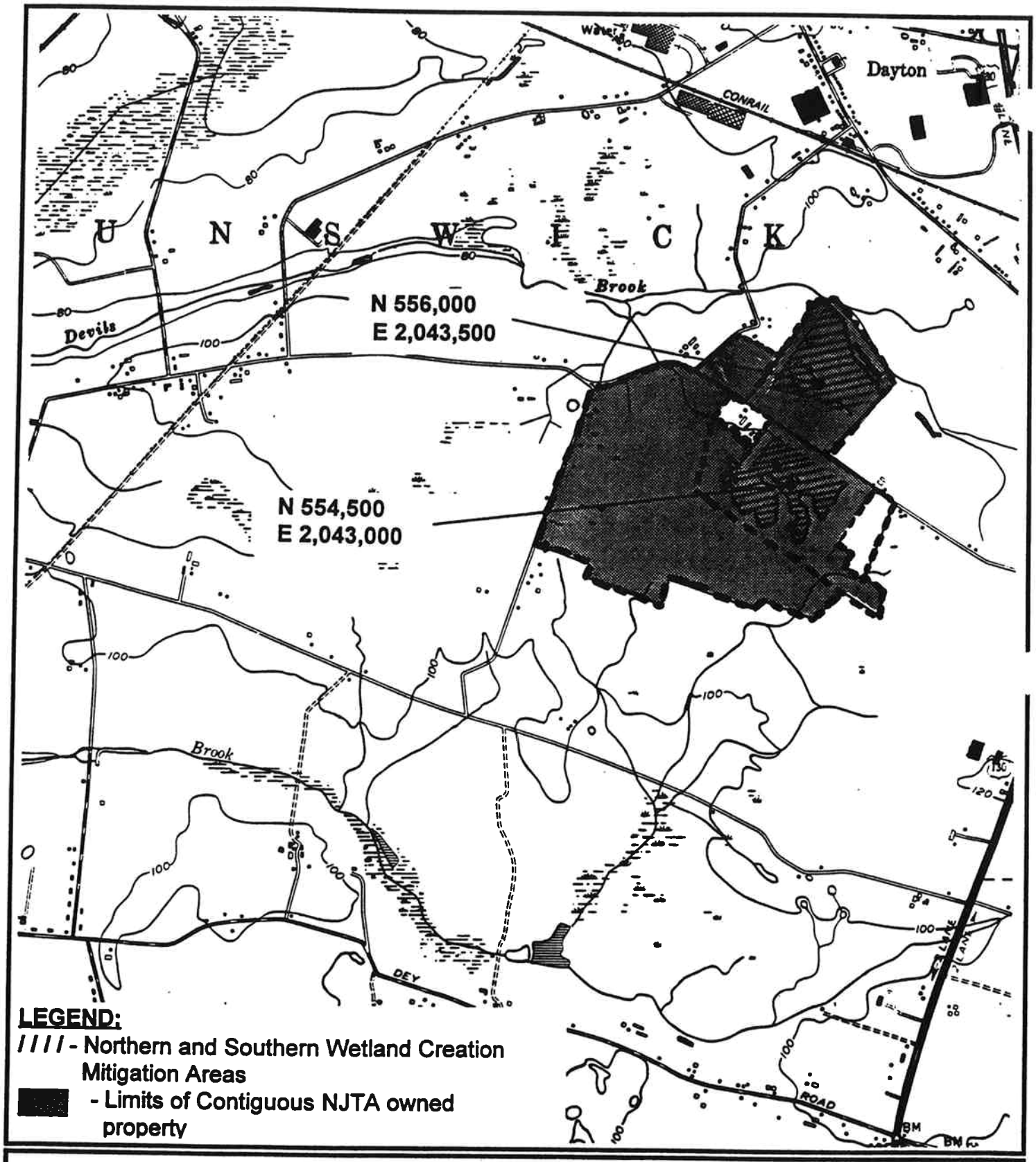
3.2 Proposed Areas of Wetland Creation

Wetlands are proposed to be created in two areas adjacent to Friendship Road in South Brunswick Township, Middlesex County, New Jersey. These sites are referred to as the Northern Site (north of Friendship Road) and the Southern Site (south of Friendship Road) (Figure 2).

Land use in areas surrounding both wetland creation sites includes roadways, agricultural land, and residences. Wildlife utilization of the areas proposed for wetland construction is limited to species that can utilize monospecific cropland, old field communities and those that live in close association with human activities. Animals commonly found in such areas include deer, raccoons, opossums, and various rodents as well as grassland birds, raptors, and common reptiles and amphibians. For a more detailed list of wildlife common to the project area, refer to the Draft Environmental Impact Statement dated April, 1994, and prepared by Frederic R. Harris, Inc.

3.2.1 Northern Mitigation Site

The Northern Site is located on Block 11, Lot 7.08 which consists of 58.14 acres. During 1996, the majority of the site was planted with an agricultural crop (soybean). The northernmost portion of the site contains forested wetlands associated with Devil's Brook (Photo #14 and #15, Appendix B). The site has a gently rolling topography (See Existing Site Conditions Plan). The elevations onsite range from 118 feet N.G.V.D. in the southern portion to 94 feet in the northern portion at an existing pond. The entire site lies within the Devil's Brook watershed. Wetlands within the forested area on this site have been delineated (See Existing Site Conditions Plan). Wetland creation is proposed within the upland portion of the site presently under agricultural production (Photo #11 and #12, Appendix



HARRIS

NEW JERSEY TURNPIKE AUTHORITY
PROPOSED ROUTE 92
Hightstown, NJ USGS Quadrangle (Topographic)

Scale 1"=2,000'
November 1996

Frederic R. Harris, Inc.
Consulting Engineers
485 US Route 1 South, Building B
Iselin, NJ 08830

U.S.G.S. SITE LOCATION MAP

FIGURE 2

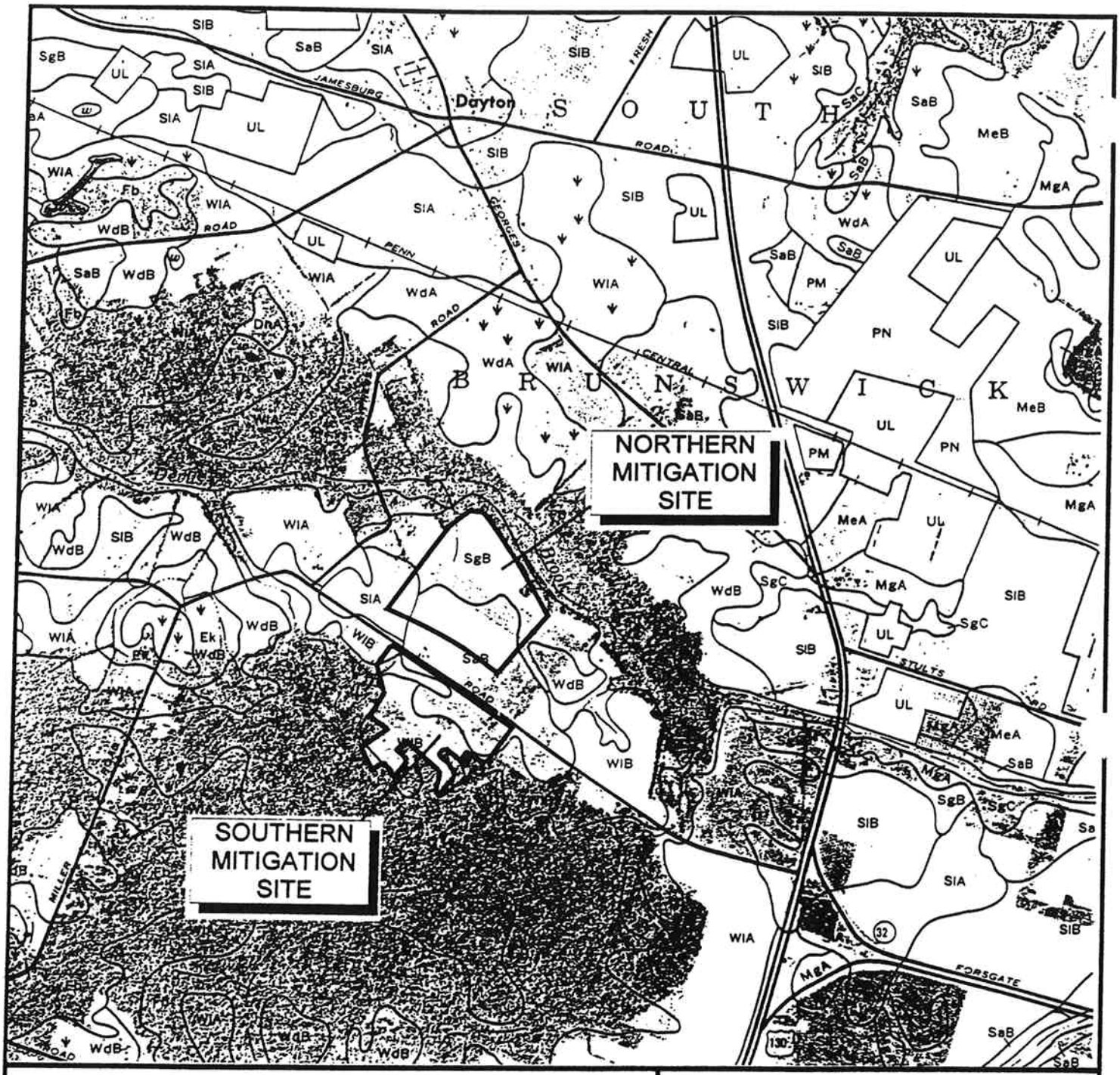
B). Approximately 31.11 acres of wetlands are proposed to be created. Two areas of mature upland forest between the creation site and the existing wetlands will be left intact to create a berm and provide habitat diversity. Drainageways are proposed to provide a surface water connection to the existing wetlands. Construction of these drainageways will disturb 0.09 acres of existing wetlands which will be restored.

The existing soils on the Northern Site include Sassafras gravelly sandy loam, 2 to 5 percent slopes (SgB); Sassafras sandy loam, 2 to 5 percent slopes (SaB); and Sassafras loam, 0 to 2 percent slopes (SlA) (Figure 3). Sassafras series soils are described in the Middlesex County Soil Survey (Powley, 1987) as deep, well drained soils that formed in acid, moderately fine textured Coastal Plain sediments. The depth to the seasonal high water table is listed as greater than 5 feet and the permeability is moderate to moderately rapid. Soil log information is provided in Appendix A and the locations of the soil logs are shown on the Existing Site Conditions Plan (Sheet 1 of 3). The soil textures reported in the logs are consistent with those mapped in the soil survey.

Monitoring wells have been installed on the Northern Site and water level data has been gathered for a year at biweekly intervals (See Existing Site Conditions Plan and Table 1). Information from this monitoring indicates that groundwater in the northern portion of the site is at an average of approximately 94 feet elevation (N.G.V.D.), corresponding to the level in the adjacent wetlands. The groundwater table rises toward the southern portion of the site to an elevation of approximately 98 feet (annual average). The groundwater monitoring was performed during a wet year. Records from the Rutgers University Weather Station in New Brunswick indicated that precipitation between May to September 1996 was 20% above normal. As seen in Figure 4, the groundwater levels at most of the well locations are higher in the November 1996 readings than in November 1995.

3.2.2 Southern Mitigation Site

The Southern Site is located on Block 6, Lot 3.002 which consists of 76.55 acres (Figure 1). It contains an old field community in the northern portion (Photo #1, #2 and #6, Appendix B). The vegetation in this field includes goldenrod (Solidago spp.), bushy aster (Aster dumosus, FAC), motherwort (Leonurus cardiaca, NL), soft rush (Juncus effusus, FACW+), yarrow (Achillea millefolium, FACU), wild garlic (Allium vineale, FACU), hardtack (Spirea tomentosa, FACW-), pearly everlasting (Anaphalis margaritacea, NL), blackberry (Rubus allegheniensis, FACU), foxtail (Setaria



LEGEND:

Fb - Fallsington loam
SaB - Sassafras sandy loam, 2-5% slopes
SgB - Sassafras gravelly sandy loam, 2-5% slopes
SIA - Sassafras loam, 0-2% slopes
WIB - Woodstown loam, 2-5% slopes

SOURCE: USDA SCS, Middlesex County Soil Survey, Powley, 1987, sheet #23.

0' 1667'

FIGURE 3
SOILS MAP

Proposed Route 92
Northern and Southern Mitigation Sites
South Brunswick Township
Middlesex County, New Jersey

ASGECI Project #1244

AMY S. GREENE
ENVIRONMENTAL CONSULTANTS, INC.

TABLE 1:
Groundwater Level Records at Monitoring Wells on the Route 92 Northern and Southern Mitigation Sites

Depth to Water (feet)/ Water Elevation (feet)

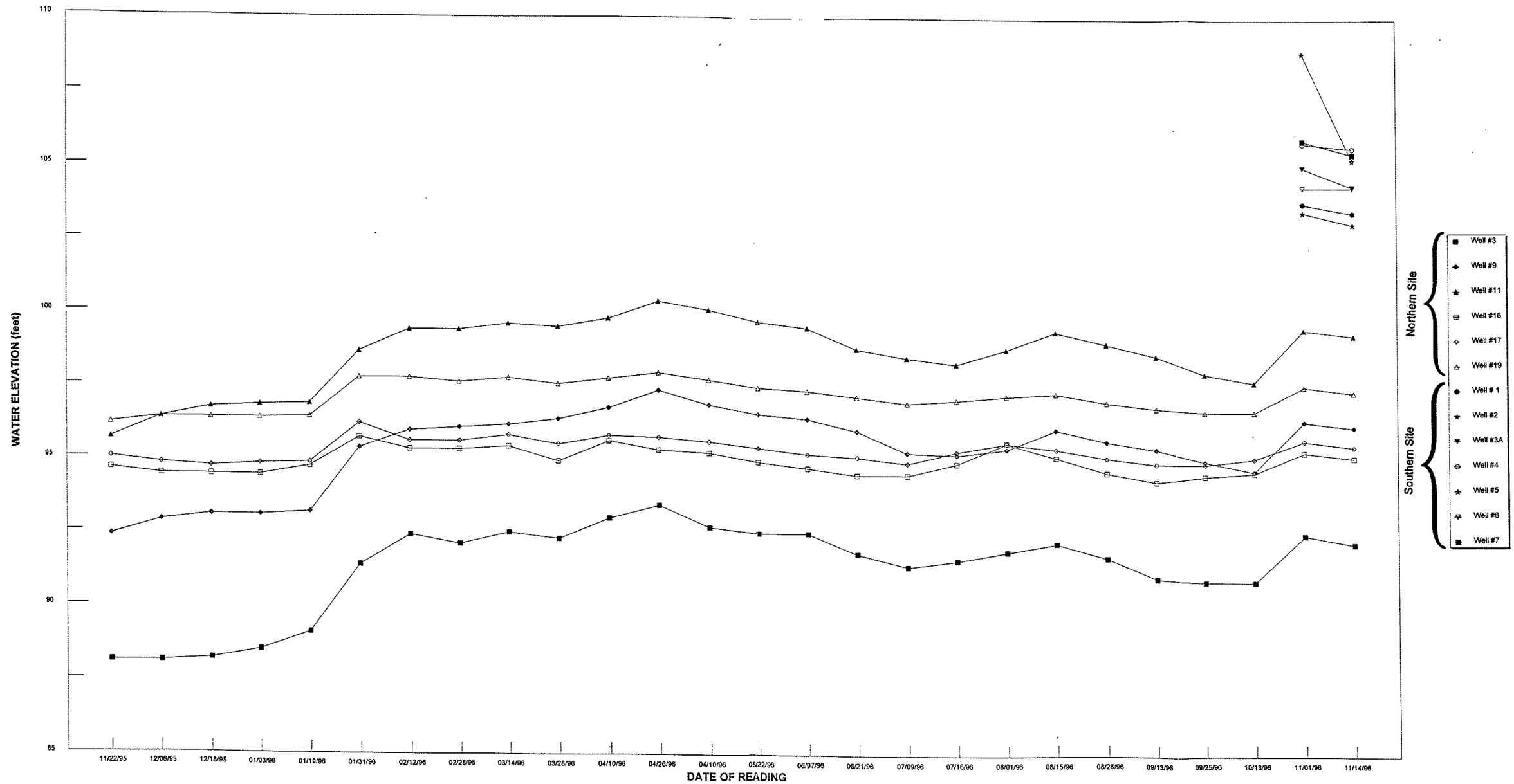
Date of Reading

		Ground Surface Elevation	11/22/95	12/06/95	12/18/95	01/03/96	01/19/96	01/31/96	02/12/96	02/28/96	03/14/96	03/28/96	04/10/96	04/26/96	05/10/96	05/22/96	06/07/96	06/21/96	07/09/96	07/16/96	08/01/96	08/15/96	08/28/96	09/13/96	09/25/96	10/18/96	11/01/96	11/14/96	Average Water Elevation
Northern Site	Well #3	102.39	14.8/88.1	14.3/88.09	14.2/88.19	13.9/88.49	13.8/89.1	11/91.39	10.5/92.4	10.3/92.09	9.9/92.49	10.1/92.29	9.4/92.99	8.95/93.44	9.7/92.69	9.9/92.49	9.9/92.49	10.5/91.8	11/91.39	10.8/91.6	10.5/91.9	10.2/92.19	10.7/91.7	11.4/91	11.5/90.9	11.5/90.9	9.9/92.49	10.2/92.19	91.34
	Well #9	110.86	18.5/92.36	18/92.86	17.8/93.06	17.8/93.06	17.7/93.16	15.5/95.36	14.9/95.96	14.8/96.06	14.7/96.16	14.5/96.36	14.1/96.76	13.5/97.36	14/96.86	14.3/96.56	14.4/96.4	14.8/96	15.6/95.26	15.7/95.2	15.5/95.4	14.8/96.06	15.2/95.66	15.5/95.4	15.9/95	16.2/94.66	14.5/96.36	14.7/96.16	95.37
	Well #11	118.21	22.5/95.6	21.8/96.3	21.5/96.71	21.4/96.81	21.35/96.86	19.55/98.66	18.8/99.41	18.8/99.41	18.6/99.61	18.7/99.51	18.4/99.81	17.7/100.4	18.1/100.1	18.5/99.71	18.7/99.51	19.4/98.8	19.7/98.51	19.9/98.3	19.4/98.8	18.8/99.41	19.2/99.0	19.6/98.6	20.2/98	20.5/97.71	18.7/99.51	18.9/99.31	98.63
	Well #16	101.42	6.8/94.62	7/94.42	7/94.42	7/94.42	6.7/94.72	5.7/95.72	6.1/95.32	6.1/95.32	6/95.42	6.5/94.92	5.8/95.62	6.1/95.32	6.2/95.22	6.5/94.92	6.7/94.72	6.9/94.5	6.9/94.5	6.5/94.9	5.8/95.6	6.3/95.12	6.8/94.6	7.1/94.3	6.9/94.5	6.8/94.62	6.1/95.32	6.3/95.12	94.93
	Well #17	105	10/95	10.2/94.8	10.3/94.7	10.2/94.8	10.15/94.85	8.8/96.2	9.4/95.6	9.4/95.6	9.2/95.8	9.5/95.5	9.2/95.8	9.25/95.75	9.4/95.6	9.6/95.4	9.8/95.2	9.8/95.1	10.1/94.9	9.7/95.3	9.4/95.6	9.6/95.4	9.9/95.1	10.1/94.9	10.1/94.9	9.9/95.1	9.3/95.7	9.5/95.5	95.31
	Well #19	107.66	11.5/96.16	11.3/96.36	11.3/96.36	11.3/96.36	11.25/96.41	9.9/97.76	9.9/97.76	10.05/97.61	9.9/97.76	10.1/97.56	9.9/97.76	9.7/97.96	9.95/97.71	10.2/97.46	10.3/97.36	10.5/97.16	10.7/96.96	10.6/97.06	10.5/97.2	10.4/97.3	10.7/97	10.9/96.8	11/96.7	11/96.7	10.1/97.56	10.3/97.36	97.16
Southern Site	Well # 1	106.01	WELLS NOT INSTALLED AT THIS TIME																								2.2/103.81	2.5/103.51	103.66
	Well #2	106.37																									2.85/103.52	3.25/103.12	103.32
	Well #3A	109.29																									4.25/105.04	4.85/104.4	104.72
	Well #4	107.76																									1.9/105.86	2.1/105.7	105.78
	Well #5	112.24																									3.35/108.89	6.9/105.3	107.1
	Well #6	107.91																									3.55/104.36	3.55/104.36	104.36
	Well #7	108.6																									2.65/105.95	3.05/105.5	105.73

WEATHER CONDITIONS

11/22/95	Brisk, clear and chilly approximately 35 degrees F.	05/22/96	Sunny and clear approximately 70 degrees F.
12/06/95	Brisk, clear and chilly approximately 38 degrees F.	06/07/96	Sunny and clear approximately 75 degrees F.
12/18/95	Brisk, clear and cold approximately 32 degrees F.	06/21/96	Sunny and clear approximately 80 degrees F.
01/03/95	Cold and overcast with freezing rain approximately 28 degrees F.	07/09/96	Mostly sunny, slight breeze and humid approx. 78 degrees F.
01/19/96	Mild and overcast with light rain approximately 55 degrees F.	07/16/96	Sunny and clear approximately 82 degrees F.
01/31/96	Cold and overcast with light snow approximately 24 degrees F.	08/01/96	Overcast, foggy with a light breeze approx. 70 degrees F.
02/12/96	Cold, clear and sunny approximately 25 degrees F.	08/15/96	Sunny and clear approx. 75 degrees F.
02/28/96	Mild and overcast approximately 56 degrees F.	08/28/96	Sunny and clear approx. 85 degrees F.
03/14/96	Mild and cloudy approximately 55 degrees F.	09/13/96	Sunny and clear approximately 75 degrees F.
03/28/96	Mostly cloudy approximately 35 degrees F.	09/25/96	Sunny and clear , with a slight breeze, approximately 65 degrees F.
04/10/96	Partly cloudy approximately 35 degrees F.	10/18/96	Overcast and breezy approximately 58 degrees F.
04/26/96	Clear and sunny approximately 75 degrees F.	11/01/96	Cool and overcast approximately 45 degrees F.
05/10/96	Overcast, light drizzle approximately 54 degrees F.	11/14/96	Cold and overcast approximately 38 degrees F.

FIGURE 4:
Groundwater Levels Recorded on the Route 92 Northern and Southern Mitigation Sites



sp.), broom sedge (Andropogon virginicus, FACU), switchgrass (Panicum virgatum, FAC), and other grasses. A southeastern field is planted with a small grain grass (not identified). The remainder of the Southern Site contains similar old field species as well as seedlings of sweet gum (Liquidambar styraciflua, FAC). An area in the western portion of the site is an abandoned agricultural field devoted to Christmas trees (Photo #10, Appendix B). Saplings of various conifers and sweet gum are dominant. The northeastern corner of the site contains an abandoned residential lot. There is a slight east/west trending rise through the center of the proposed creation area. To the north of this slight rise, drainage is to the west, within the watershed of Devil's Brook. To the south of the rise, drainage is to the south, toward Shallow Brook, which is a tributary of Devil's Brook. The highest elevations on the site (113.4 feet N.G.V.D.) occur on the ridge near Friendship Road in the northeastern portion of the site (See Existing Site Conditions Plan).

A wetland delineation was performed on the Southern Site in November 1996. The southern portion of this site contains forested wetlands (Photo #4 and #8, Appendix B). Three emergent wetland areas totalling 0.45 acres were also identified in the north central portion of the site, within the area proposed for mitigation. These wetlands will be unavoidably disturbed during construction, but will be replaced with wetlands of equal or greater value. No mitigation credit will be sought for these areas. The locations of the wetland areas will be verified by the NJDEP prior to construction. The total area of wetland creation on the Southern Site is 26.08 acres. Wetlands will be created in the old field and agricultural portions of the site.

The soils identified on the Southern Site by the Middlesex County Soil Survey (Powley, 1987) include Sassafras sandy loam, 2 to 5 percent slopes (SaB); Woodstown loam, 2 to 5 percent slopes (WlB), and Fallsington loam (Fb) (Figure 3). The Sassafras sandy loam is mapped in the northern portion of the site. Woodstown loam is described as a gently sloping, moderately well drained soil. It is mapped in the southern portion of the section of the site proposed for wetland creation. The seasonal high water table is at a depth of 1.5 feet to 2.5 feet from February to April and the permeability is moderate. Fallsington loam is mapped in the northwestern corner of the site and in the forested wetlands in the southern portion of the site. It is described as a level to nearly level, poorly drained soil. The seasonal high water table is at a depth of 0 feet to 1 foot from December to May and the permeability is moderate to moderately rapid. Fallsington loam is the only soil type that is classified as a hydric soil by the Natural Resources Conservation Service. Except for an area of wetland that

protrudes into the field along a drainageway, no other areas of wetlands were identified in the portion of the field mapped as Fallsington.

Soil log information is provided in Appendix A and the locations of the soil logs are shown on the Existing Site Conditions Plan (Sheet 1 of 3). The soil borings for the Southern Site indicate areas of fine texture (silt loam, clay loam) soils in the western portion of the site. This finer material appears to be discontinuous and is generally below the levels of proposed excavation. Therefore, it should not interfere with wetland creation.

Monitoring wells were installed in late October 1996 on the Southern Site. Groundwater levels are being gathered on a biweekly basis to assist with design of the wetland creation area (See Table 1). Groundwater monitoring will continue for at least one year. The readings obtained up until November 14, 1996 range from 103.12 feet to 105.95 feet N.G.V.D. elevation. A reading of 108.89 feet was recorded in Well #5 on November 1, 1996. This reading is being viewed as an anomalous reading or error of transcription since it is inconsistent with other well readings. The water elevations of three ponds were measured on November 14, 1996. The ponds are located within the adjacent forested area to the south (Photo #3, #5 and #7, Appendix B). The elevations range from 102.23 feet to 104.08 feet N.G.V.D., comparable to the monitoring well readings since the ponds are down gradient of the wells.

4. WETLAND & OPEN WATER CONSTRUCTION

This conceptual wetland mitigation plan has been designed to create 57.19 acres of forested, scrub/shrub, wet meadow and emergent wetlands on two sites. Approximately 31.11 acres of forested, scrub/shrub, emergent, and wet meadow wetland communities and 0.85 acres of open waters will be created on the Northern Site. On the Southern Site, 26.08 acres of similar wetland communities will be constructed (see Conceptual Wetland Communities Plans, Sheet 3 of 3). Small wetland areas impacted during mitigation area construction (approximately 0.54 acres) will be replaced. No mitigation credit will be sought for these areas.

Initially, there will be little vertical structure to the created, forested wetlands because it will take years for the trees to form a closed canopy. The sites will be rough graded with hummocks. This will provide additional species diversity (microhabitats) and will also increase survival rates of woody plantings in case of unusually wet seasons. In addition, depressional areas of varying shapes and sizes will be created within the forested portions of the created wetlands. These emergent wetland areas will serve as

sanctuaries for amphibians and other water-dependent creatures during unusually dry seasons. These small vernal pools will mimic existing depressions in the surrounding forested wetlands. Various vegetative communities will be provided with a diversity of species which will provide fruit, seeds and nuts for numerous species of wildlife.

The created wetlands will be primarily groundwater driven. The sites will be excavated into the groundwater. The created wetlands will be hydrologically connected to the existing wetlands by one or more shallow drainageways to provide an outlet for excess water. Proposed grading of the mitigation sites, particularly the Southern Site, is tentative and will be refined and modified in the final plan. Options for obtaining topsoil and the selection and quantities of plant species are being examined for refinement in the final plan.

4.1 Excavation

The initial phase of the proposed mitigation plan is the removal of soil in the wetland and open water creation areas. The excavation will not enter the tree line of the surrounding forested areas of either site. Most of the excavated material will be stockpiled in upland areas at the Route 92 construction site and used as fill for the roadway construction in accordance with NJTA standard specifications. Topsoil on both sites will be stripped and stockpiled separately while the subsoil is excavated for use in constructing the roadway.

The areas of wetland and open water creation will be excavated down to 6-12 inches below 94.5-95 feet N.G.V.D. in the Northern Site and 102-104 feet N.G.V.D. in the Southern Site. After backfilling with 6-12 inches of topsoil, the site will be at the elevation of the groundwater in the existing wetlands at each site, in order to achieve a hydrologic regime for wetland establishment (See Conceptual Grading Plans, Sheet 2 of 3). The Southern Site will not require as much excavation as the Northern Site because groundwater is closer to the ground surface at the Southern Site. The sites will be graded with a slight slope to provide positive drainage. Two drainageways on the Northern Site will be excavated between the created and existing wetlands to provide an outlet for excess water. On the Southern Site, overflow will be facilitated in two areas by grading to existing contours. These outlets may require removal of some existing trees. On the Northern Site, 0.09 acre of existing wetlands will be disturbed for grading of the outlet. The side slopes in the transition areas will be graded to 3:1 on both sites.

A 0.85-acre area of open water will be provided in the Northern Site. This open water area will serve as mitigation for the 0.85 acres of impacted State open water associated with the project.

The communities that will be created include forested wetland, scrub/shrub wetland, emergent wetland, wet meadow, and open water. During rough grading of the sites, hummocks will be created to provide additional variability within the communities. In general, the forested, scrub/shrub, and wet meadow communities will be graded such that the soil will be saturated to the surface during most of the growing season. From -2.0 to 0 feet below the ground surface, emergent wetlands will be created. Water deeper than 2.0 feet will be considered State open water (See Conceptual Wetland Communities Plan, Sheet 3 of 3).

4.2 Topsoil Spreading

Since the existing subsoils are low in organic content, they are not desirable for use in wetland creation without supplemental topsoil. On the Southern Site, the existing topsoil will be stockpiled and then re-spread on the site. On the Northern Site, the existing topsoil is not suitable for use in the created wetlands due to the probable presence of herbicide residue in the agricultural area. Topsoil for this site may be obtained from forested wetlands disturbed for construction of Route 92 or from non-agricultural uplands. Any topsoil trucked in from an upland source must be free of noxious weeds and uncontaminated.

The topsoil will be spread to a minimum depth of 6-12 inches throughout the constructed wetlands, except in the State open water area of the Northern Site. If practicable, the stumps of wetland trees removed from the impacted wetlands may be salvaged. These stumps can be implanted into the soils of the created forested wetland areas to provide additional habitat and a native seed source. Basal shoots may also sprout from the stumps if the stumps are not too desiccated.

The final elevations and hydrology of the mitigation areas will be evaluated prior to planting to determine if changes in grading or planting are required to achieve the desired elevations and replacement wetland vegetation communities. If necessary, grading adjustments or placement of additional topsoil will be evaluated and performed during construction.

4.3 Soil Erosion and Sediment Control

To avoid erosion and topsoil loss during construction activities, soil erosion and sediment control measures will be utilized. Erosion control measures will remain in effect until vegetation is established. These techniques will meet

the appropriate Soil Erosion and Sediment Control Standards of New Jersey except that no grasses may be planted in areas proposed for woody wetland communities. Measures will also be taken to stabilize the toe of slope where groundwater seepage is expected. Silt fencing will be placed around the perimeter of the wetland creation sites to prevent the washing of sediments from adjacent uplands into the wetlands. If planting cannot commence immediately upon completion of topsoil spreading, the mitigation areas will be seeded with the appropriate wetland seed mix to stabilize the area until planting can occur. It should be noted that there are two wetland seed mixes. The seed mix for the woody wetland communities does not contain turf grasses (See Section 5).

4.4 Hydrology

The created wetlands will receive their hydrologic input from groundwater and, to a limited extent, surface runoff and precipitation. The created wetlands will have seasonally saturated soil areas (forested and scrub/shrub wetlands and wet meadows), shallow water (emergent wetland), and non-vegetated, open water. The open water area will have a minimum water depth of 2 to 3 feet to prevent emergent vegetation establishment and provide overwintering habitat for amphibians and turtles. Water depths will decrease toward the edges of the numerous, small, emergent wetland creation areas so that vegetative zonation will be achieved.

Groundwater monitoring has been performed for the past year on the Northern Site and since early November 1996 on the Southern Site (Table 1). The data from the monitoring indicates that groundwater can be a reliable and consistent source of hydrology for the created wetlands. Although a minimal amount of data is available for the Southern Site, the initial groundwater readings are consistent with the expected elevation of groundwater in the adjacent wetlands and appear to fluctuate in a pattern consistent with that observed on the Northern Site (Figure 4). Monitoring on both sites will continue up until wetland construction so that any changes in groundwater levels that may affect the proposed plan can be observed and the plan adjusted, if necessary. Planes of groundwater elevations shown on the conceptual plans were determined by interpolation between the monitoring wells.

The groundwater monitoring to date has been performed during a wet year; however, the levels observed are not higher than the anticipated groundwater level in the wetlands adjacent to both sites, as evidenced by water elevations in nearby ponds. Since groundwater elevations in drier years are

apparently high enough to support the adjacent wetlands, groundwater should be available to drive the created wetlands even during these drier years.

The created wetlands on both sites will be excavated into or at the water table but not below the elevation of the adjacent wetlands. At the presently higher topographic elevations on the site, particularly the Northern Site, groundwater will seep from the side of the creation area. Seep wetlands will likely form on the slope; however, their extent will probably fluctuate with variations in the water table between wet and dry years. The majority of the created wetlands will be at the elevation of the adjacent wetlands (groundwater at the surface). Hummocks and micro-variations in the topography formed during rough grading of the sites will provide planting sites for trees so that they can establish roots above the water table. This will increase the potential for tree survival. Some areas below groundwater will be constructed to create aquatic emergent or open water habitat. The wetlands will be constructed with slight positive drainage and outlets to the adjacent wetlands to allow the discharge of excess water.

4.5 Temporary Impacts

Temporary impacts to freshwater wetlands resulting from the Route 92 project total 3.36 acres. These impacts are to emergent and scrub/shrub wetlands and will be mitigated through restoration upon completion of construction activities. The impacts result from installation of a right-of-way fence and construction of stormwater management facilities and temporary construction roads. Locations of areas of temporary impacts are shown on the Freshwater Wetlands Individual Permit Plans prepared by Frederic R. Harris, Inc. dated August 1996. Restoration activities will include removal of any temporary fill placed for construction purposes and regrading of the area to meet pre-existing contours and elevations. Scrub/shrub wetlands will be planted with selected shrubs from the scrub/shrub planting list in Table 2. Emergent wetlands will be seeded with the wetland seed mix described in Table 3.

5. WETLAND PLANTING PLAN

Forested, scrub/shrub, and emergent wetlands will be disturbed for construction of the proposed Route 92 project. The majority of the wetlands in the immediate vicinity of the project area and the proposed mitigation sites are forested wetlands. The planting plan has been designed to replace areas of emergent, forested, and scrub/shrub wetlands while creating diverse and intermixed vegetation communities. Wet meadow (seasonally saturated herbaceous

Table 2: Proposed Species for Planting in the Vegetation Communities

Proposed Community	Scientific Name (1)	Common Name	Regional Indicator (2)
Forested Wetlands	*Acer rubrum*	red maple	FAC
	Acer saccharinum	silver maple	FACW
	Quercus palustris	pin oak	FACW
	Quercus bicolor	swamp white oak	FACW+
	Quercus michauxii	swamp chestnut	FACW
	Fraxinus pennsylvanica	green ash	FACW
	Nyssa sylvatica	black gum	FAC
	Salix nigra	black willow	FACW
	Betula nigra	river birch	FACW
	Betula populifolia	grey birch	FAC
	Platanus occidentalis	sycamore	FACW–
	Vaccinium corymbosum	highbush blueberry	FACW–
	Viburnum dentatum	southern arrowwood	FAC
	Ilex verticillata	winterberry	FACW+
	Alnus rugosa	speckled alder	FACW
	Alnus serrulata	smooth alder	OBL
	Amelanchier canadensis	shadberry	FAC
Scrub/Shrub Wetlands	*Cornus amomum*	silky dogwood	FACW
	Cornus stolonifera	red–osier dogwood	FACW+
	Vaccinium corymbosum	highbush blueberry	FACW–
	Viburnum dentatum	southern arrowwood	FAC
	Ilex verticillata	winterberry	FACW+
	Aronia melanocarpa	black chokeberry	FAC
	Aronia arbutifolia	red chokeberry	FACW
	Alnus rugosa	speckled alder	FACW
	Alnus serrulata	smooth alder	OBL
	Amelanchier canadensis	shadberry	FAC
	Sambucus canadensis	elderberry	FACW–
Emergent Wetlands	*Hibiscus moscheutos*	swamp rose mallow	OBL
	Iris versicolor	wild flag	OBL
	Acorus calamus	sweet flag	OBL
	Polygonum hydropiperoides	smartweed	OBL
	Asclepias incarnata	swamp milkweed	OBL
	Carex lurida	lurid sedge	OBL
	Carex vulpinoidea	fox sedge	OBL
	Carex lupulina	hop sedge	OBL
	Carex crinita	fringed sedge	OBL
	Carex stricta	tussock sedge	OBL
	Scirpus cyperinus	woolgrass	FACW+
	Eleocharis palustris	creeping spikerush	OBL
	*Eleocharis obtusa**	blunt spikerush	OBL
	*Elodea canadensis***	waterweed	OBL
	Glyceria canadensis	rattlesnake grass	OBL
	Glyceria striata	fowl mannagrass	OBL
	Puccinellia pallida	pale mannagrass	OBL
	Osmunda regalis	royal fern	OBL
	Alisma subcordatum	water plantain	OBL
	Saururus cernuus	lizard tail	OBL
	Sparganium americanum	burreed	OBL
	Peltandra virginica	arrow arum	OBL
	Pontederia cordata	pickerel weed	OBL
	Vaccinium macrocarpon	cranberry	OBL
	Cephalanthus occidentalis	buttonbush	OBL

Note: *Buttonbush will be planted (densely spaced cuttings) at the edges of some of the emergent wetlands to add shrub cover.*

* *Will be utilized if planting occurs in the spring.*

** *Will be planted in the State open water only.*

Table 2, continued

Proposed Community	Scientific Name (1)	Common Name	Regional Indicator (2)
Wet Meadow	*Aster novae–angliae*	New England aster	FAC
	Cyperus esculentus	nutsedge	FACW
	Lobelia cardinalis	cardinal flower	FACW+
	Eupatoriadelphus maculatus	spotted joe–pye weed	FACW
	Vernonia noveboracensis	New York ironweed	FACW+
	Asclepias incarnata	swamp milkweed	OBL
	Pycnanthemum tenuifolium	slender mountain mint	FACW
	Juncus effusus	soft rush	FACW+
	Chelone glabra	turtlehead	OBL
	Andropogon glomeratus	bushy broomsedge	FACW+
	Ludwigia alternifolia	seedbox	FACW+
	Scirpus atrovirens	green bulrush	OBL
	Spiraea latifolia	meadowsweet	FAC+
	Penstemon digitalis	foxglove beardtongue	FAC
	Epilobium coloratum	purple willowweed	FACW+
	Verbena hastata	blue vervain	FACW+
	Rubus hispidus	bristly blackberry	FACW
Note:	*Chokeberry and red–osier dogwood will be spaced at approximately 30–foot intervals.*		
	Species planted will depend upon availability.		
Transition Areas	*Acer rubrum*	red maple	FAC
	Quercus rubra	red oak	FACU–
	Quercus alba	white oak	FACU
	Betula populifolia	grey birch	FAC
	Cornus racemosa	grey dogwood	FAC–
	Prunus virginiana	choke cherry	FACU
	Myrica pensylvanica	bayberry	FAC

Notes:

1. Nomenclature conforms to that of the National List of Plant Species That Occur in Wetlands: Northeast (Region 1), Reed (1988).

2. Wetland indicator status according to Reed (1988) as amended by NEIRP (1995).

Table 3: Proposed Seed Mixes

Proposed Community	Scientific Name (1)	Common Name	Regional Indicator (2)
Woody Community Seed Mix	*Verbena hastata*	blue vervain	FACW+
	Scirpus atrovirens	green bulrush	OBL
	Asclepias incarnata	swamp milkweed	OBL
	Juncus effusus	soft rush	FACW+
	Carex lurida	lurid sedge	OBL
	Carex vulpinoidea	fox sedge	OBL
	Aster novae–angliae	New England aster	FAC
	Polygonum pennsylvanicum	smartweed	FACW
Wetland Seed Mix	*Aster novae–angliae*	New England aster	FAC
	Eupatoriadelphus maculatus	spotted joe–pye weed	FACW
	Veronia noveboracensis	New York ironweed	FACW+
	Asclepias incarnata	swamp milkweed	OBL
	Pycnanthemum tenuifolium	slender mountain mint	FACW
	Glyceria canadensis	rattlesnake grass	OBL
	Panicum clandestinum	deertongue grass	FAC+
	Panicum virgatum	switchgrass	FAC
	Euthamia graminifolia	flat–topped goldenrod	FAC
	Juncus effusus	soft rush	FACW+
	Chelone glabra	turtlehead	OBL
	Andropogon glomeratus	bushy broomsedge	FACW+
	Ludwigia alternifolia	seedbox	FACW+
	Scirpus atrovirens	green bulrush	OBL
	Spiraea latifolia	meadowsweet	FAC+
	Penstemon digitalis	foxglove beardtongue	FAC
	Epilobium coloratum	purple willowweed	FACW+
	Verbena hastata	blue vervain	FACW+
Note:	*Species planted will depend upon availability.*		
Transition Area Seed Mix	*Lolium multiflorum*	annual rye grass	FACU–
	Asclepias syriaca	common milkweed	FACU–
	Achillea millefolium	yarrow	FACU
	Rudbeckia hirta	black–eyed susan	FACU–
	Festuca ovina	sheep fescue	NL
	Verbena hastata	blue vervain	FACW+
	Aster novae–angliae	New England aster	FAC
	Monarda fistulosa	wild bergamot	UPL
	Euthamia graminifolia	flat–topped goldenrod	FAC

Notes:

1. Nomenclature conforms to that of the National List of Plant Species That Occur in Wetlands: Northeast (Region 1), Reed (1988).

2. Wetland indicator status according to Reed (1988) as amended by NEIRP (1995).

community) and emergent (permanently inundated aquatic rooted-plant community) wetlands will be created to replace emergent wetlands impacted by the Route 92 project. Numerous plant species have been proposed for planting based on the objective of creating diverse plant communities and wildlife habitat. Many of the plant species have been selected due to the food source and nesting habitat they can provide. A total of 36.75 acres of forested, 8.20 acres of scrub/shrub, and 12.24 acres of emergent/wet meadow wetlands will be created on the two sites.

All phases of planting are anticipated to occur in the fall. However, if the construction schedule is altered, planting may instead be done in the spring. Woody species will be planted in their dormant condition. The woody vegetation will be bare root seedling and small caliper stock only (no trees > 3 feet in height) to assure that they can adapt to the hydrologic regime of the mitigation area. All vegetation will be obtained from commercial sources. The species proposed for planting and the quantities and stock types of each will be provided in the Final Landscaping Plans. Two wetland seed mixes are proposed to be utilized in the creation areas. The woody community seed mixture that will be utilized in the forested and scrub/shrub communities will not contain grass species due to competition. This seed mix will provide vegetative cover until the woody vegetation becomes established. All seeding will be done at a rate of 3.5 lbs per acre. Table 2 contains a complete list of species proposed for the wetland creation areas. A secondary species list will be provided for substitutions if necessary. No substitutions will be accepted by the contractor. The selected planting firm must be experienced in wetland plantings. A wetland ecologist experienced in wetland planting should be onsite during planting to assure success.

Planting, seeding, fertilizing, and mulching will be done according to contract specifications prepared for the Final Plan. Fertilizer with a commercial designation of 10-20-10 will be used in the transition areas only. In the woody wetland communities, only timed release fertilizer tablets or granules deposited directly into the planting hole may be used. No fertilizer will be used in ponded or flooded areas. Following planting, the saturated soil portions of the mitigation areas will be mulched with straw.

Forested and Scrub/shrub Wetlands

The tree and shrub species will be planted in the zone of seasonal soil saturation (0 to 1 foot above the water table) in their respective forested and scrub/shrub areas. (See Conceptual Wetland Communities Plans). Shrub species such as highbush blueberry (Vaccinium corymbosum), shadberry (Amelanchier canadensis), winterberry (Ilex verticillata),

and southern arrowwood (Viburnum dentatum), and alders (Alnus spp.) will be included in the forested areas (Table 2). No tree species will be planted in the scrub/shrub wetland communities. The areas will also be seeded with the woody community seed mix (Table 3).

Emergent Wetland

Herbaceous vegetation will be planted in the emergent wetlands where the depth of water will be 0-2 feet (Table 2). The plants will be planted in zones according to their hydrologic tolerances. Plants will be bare root, tubers, or potted where appropriate. Buttonbush (Cephalanthus occidentalis, OBL) will be planted (densely spaced cuttings) at the edges of some of the emergent wetlands to add shrub cover. At water depths greater than 2 feet, open water will be created. Only Elodea canadensis will be planted in these areas to prevent the growth of Myriophyllum or other noxious aquatic weeds.

Wet Meadow

The wet meadow areas will be planted with herbaceous species that can tolerate saturated soil conditions (Table 2). Species from the emergent wetland list that will tolerate drier conditions can be utilized in the wet meadow and species from the wet meadow list that will tolerate wetter conditions can be utilized in the emergent wetland. Shrubs such as red-osier dogwood (Cornus stolonifera) and red chokeberry (Aronia arbutifolia) may be included at 30+ foot intervals within the wet meadow to provide perching/feeding habitat. The proposed herbaceous species may be planted in peat pots (Table 2) or seeded with the wetland seed mix (Table 3), depending upon availability.

Transition Areas

A minimum 50-foot transition area will be provided between the created wetlands and adjacent properties. Wetland transition areas will be planted and seeded with the species indicated in Tables 2 and 3.

6. POTENTIAL PROBLEMS AND SOLUTIONS

The planting plan has been designed to minimize the growth of undesirable species in the created wetlands, to provide wildlife habitat, and to stabilize the soil. Mitigation sites can become contaminated by common reed grass (Phragmites australis), cattail (Typha latifolia) and/or purple loosestrife (Lythrum salicaria). The proposed

mitigation plan will attempt to eliminate the introduction of these nuisance species by innovative construction practices thereby enhancing the ecological value of the entire area.

Prior to any earth-moving activities at the mitigation site (this includes the mass excavation for roadway fill), any equipment to be utilized at the mitigation site or utilized to handle any soil proposed for the mitigation site, must be thoroughly cleaned of foreign soil and plant material (particularly roots) prior to entering the mitigation site. The transfer and introduction of undesirable vegetation such as common reed grass is often due to contamination by construction equipment.

Since the existing subsoils are loams and sandy loams, they have a low organic content and variable permeability. Therefore, the subsoils on the site are unsuitable for use in the constructed wetlands without supplemental topsoil. Every effort must be made to assure that unwanted invasive species are not introduced with the topsoil. To avoid the establishment of such species in the mitigation wetlands, no topsoil should be obtained from sites, wetlands or uplands, containing common reed grass, cattails, or purple loosestrife.

During the first year after planting, a regular maintenance program should be implemented to check the sites for noxious plants and hand-weed any that are observed. Following the first year, the sites should be checked at minimum twice a year and any undesirable plants removed by hand.

There will be vegetation losses due to herbivory at the mitigation sites. Deer and other animals will utilize the newly planted areas for food. To prevent this damage, the sites can be fenced. This would require an eight-foot fence, unless the fence was electrified, in which case a shorter fence (six foot) would be adequate. If fencing is not an acceptable solution, due to cost, aesthetics, or practicability, then overplanting is recommended. Overplanting will ensure a greater survival rate.

7. SCHEDULE OF COMPLETION

Construction of the Route 92 project is expected to begin in the spring of 1997 and is estimated to last approximately 56 months. At this time, dates of completion of the various aspects of the project are not accurately known. Construction scheduling is still being reviewed to arrive at an efficient working schedule. The road contractor will probably strip and stockpile the topsoil and perform mass excavation of the sites to remove the subsoil for use as fill for the roadway as one of the first steps. Following,

the mitigation contractor will perform the fine grading of the sites. Construction of the Northern Mitigation Site is expected to begin prior to construction of the Southern Mitigation Site.

Construction of the wetland will begin immediately prior to disturbance of any existing wetlands in the project area. The wetland creation sites are scheduled for completion before the construction portion of the project is completed. Planting of the trees/shrubs and herbaceous vegetation will be performed in the fall (October 15 to December 1) of 1998 following grading. All work required for construction of the wetlands is expected to be completed by the end of December, 1999.

8. MONITORING AND MAINTENANCE PLAN

The NJDEP requires a monitoring and maintenance plan to ensure 85% survival and 85% coverage of the mitigation sites for up to five years following planting. The creation sites will be planted with stands of various woody species and herbaceous plants and seeded as specified in the Landscaping Plan.

For determining the success of the mitigation plan, 85% survival will be based on the number of woody plantings per acre. A minimum of 400 trees and/or shrubs per acre will be planted. Following the first year and each subsequent year of monitoring required by the NJDEP, a minimum of 340 woody plants per acre with indicator classifications of facultative or wetter must be alive. These 340 plants may include planted and volunteer species. Trees must be a minimum of 24 inches in height to be counted. The criteria of 85% cover will be applied to each planted community as a whole. The mitigation will be considered a success if each community has a minimum of 85% total aerial coverage of facultative or wetter trees, shrubs, or herbaceous plants excluding noxious weeds and non-native species. No plants, other than Elodea, are expected to be present in the area designated as open water and no minimal coverage of this plant is required.

In the first growing season following completion of planting within the mitigation sites, planted species will be inspected to determine survival and coverage. If visual observation of each planted area is not sufficient to verify whether or not an 85% or greater survival rate or cover has been attained, then a quantitative sampling plan will be initiated for those areas where it is required. Quadrat areas of known dimensions will be established, and live plants will be counted (for trees and shrubs) or percent cover estimated to determine the density of plantings for that area. If the calculated density of live woody plants

is less than 85% of the original, planted density or each community does not have 85% cover of vegetation, then replanting to obtain the desired success rate will be initiated, if considered necessary after consultation with the NJDEP. NJTA typically requires a one-year guarantee from its landscape contractor.

An annual report with photographs documenting the survival and coverage of the wetland plantings will be submitted to NJDEP no later than November 15th in each of the five years following construction of the mitigation site. An onsite review meeting with the NJDEP representatives will be held in the final year to evaluate the success of the wetland mitigation sites. If 85% or better success is not evident at that time, the NJTA will coordinate with the permit agency to develop and implement a plan to ensure the desired success of the wetland.

Appendix H
Selected Plant and Wildlife Surveys

Swamp Pink Survey

1.0 INTRODUCTION

The New Jersey Turnpike Authority proposes the construction of Route 92 in Somerset and Middlesex Counties, New Jersey (see figure D-1). The seven-mile, four-lane highway would serve as an east-west link between County Route 27 in eastern Franklin Township to Interchange 8A of the New Jersey Turnpike in western Monroe Township with potential interchanges at U.S. Route 1, Perrine Road, and Route 130. The majority of proposed Route 92 would be situated in South Brunswick Township with a shorter section located in the northern reaches of Plainsboro Township. The east and west termini of the proposed highway would extend into Monroe and Franklin Townships, respectively.

Three alignment alternatives are being considered, each with various interchange alternatives. For purposes of this report, the Project Impact Corridor is defined as the area 500 feet from the both sides of the centerline of each alignment alternative. In accordance with the National Environmental Protection Act (NEPA), Federal Highway Administration Procedures, and New Jersey Executive Order Number 215, an Environmental Impact Statement was prepared analyzing the impacts of all alternatives. In support of the Environmental Impact Statement, has been directed by the Federal Department of Interior, Division of Fish and Wildlife Service (FWS), a survey was performed to ascertain the presence or absence of swamp pink (*Helonias bullata*), which is considered a nationally threatened species and of which occurrences have been recorded within proximity to the Project Impact Corridor. A threatened species is defined by FWS as one likely to become endangered within at least a significant portion of its range.

The species, listed as imperiled by the New Jersey Department of Environmental Protection and Energy (DEPE) on the basis of its rarity (6-to-20 occurrences), is not contained in the New Jersey Natural Heritage Database as having been observed within the Project Impact Corridor. The FWS, on the other hand, does have record of its occurrence within six miles of the Project Impact Corridor and therefore requested a survey be implemented to verify the plant's status within the Project Impact Corridor.

Swamp pink, a member of the Lily family (Liliaceae), is a 1-to-2 foot high herb restricted to bogs and swamps from southern New York State to the Carolinas. FWS indicated that *H. Bullata* typically occurs in forested wetlands, although occurrence in scrub/shrub wetlands is known. It is an early blooming plant, and thus very conspicuous in mid-April to mid-May when it sets out its bright pink, lavender-pink or lilac flowers with bright blue stamens. The flowers, which have a hyacinth scent, form a dense, spike-like cluster at the top of a leafless, hollow stalk. At the base of the stalk is a rosette of lance-shaped, parallel-veined evergreen leaves. It has national and regional obligate wetland indicator status, meaning that it occurs in wetlands 99% of the time.

2.0 PROPOSED ROUTE 92 PROJECT IMPACT CORRIDOR

General

The Project Impact Corridor consists of mildly rolling topography that slopes in a southwestern direction toward the Millstone River. The area is dominated by agricultural and mature-to-early successional wooded land punctuated by scattered single-family homes, horticultural nurseries, farms, and commercial development. The intensity of non-agricultural development is typically greater at the eastern and western ends (particularly the former) of the Project Impact Corridor.

Forests

A large portion of the Project Impact Corridor consists of woodlands in various stages of secondary successional growth and with various blends of hydrophytic species. The older mature forested areas predominate and, depending on hydrology and soils, are typically dominated by a mix of red maple (*Acer rubrum*), sweet gum (*Liquidambar styraciflua*), American beech (*Fagus grandifolia*) and various species of Oak (*Quercus sp.*). Common shrub species include sweet pepperbush (*Clethra alnifolia*), arrowwood (*Viburnum dentatum*), highbush blueberry (*Vaccinium corymbosum*), spicebush (*Lindera benzoin*) dewberry (*Rubus flagellaris*) and sassafras (*Sassafras albidum*). The vine stratum is characterized by Japanese honeysuckle (*Lonicera japonica*), poison ivy (*Toxidendron radicans*), greenbrier (*Smilax rotundifolia*) while common non-woody species include spring beauty (*Claytonia virginica*), pine moss (*Lycopodium obscurum*), ground cedar (*Lycopodium complantatum*), sensitive fern (*Onoclea sensibilis*) and jewelweed (*Impatiens capensis*).

Red Maple/Sweet Gum is the most prevalent forest cover type and is found in low lying poorly drained wetland areas. Associated trees include pin oak (*Quercus palustris*), American elm (*Ulmus Americana*) and black gum (*Nyssa sylvatica*). These trees have shallow root systems due to saturated soil conditions. The shrub layer is composed of sweet pepperbush, sweetbay (*Magnolia virginiana*) and highbush blueberry. Groundcover consists of cinnamon fern (*Osmunda cinnamonea*), sensitive fern and jewelweed. Common species in areas subject to inundation include various species of sedge (*Carex sp.*) inclusive of tussock sedge (*Carex stricta*), various species of rush (*Juncus sp.*) inclusive of soft rush (*Juncus effusus*), and jewelweed.

Small areas of scrub/shrub wetland were also found within the wetland forest. These scrub/shrub wetlands are dominated by buttonbush (*Cephalanthus occidentalis*).

Younger woodlands are typically dominated by red maple and sweet gum with understory and ground cover associations similar to those identified with more mature Maple/Gum woodlands. The most substantial young woodlands are located near Devils Brook, along the Amtrak rail lines in the central portion of the Project Impact Corridor, and along Heathcote Brook in the central/western portion of the Project Impact Corridor. Much of the younger woodlands are associated with wetlands or fringes of former agricultural fields.

The Beech/Oak forest, the second most prevalent cover type, is indicative of dryer, upland areas. The common species of this ecosystem include American beech, white oak (*Quercus alba*), sweet gum, red maple, sassafras and chestnut oak (*Quercus prinus*). Other species include grey birch (*Betula populifolia*), black cherry (*Prunus serotina*) and shagbark hickory (*Carya ovata*). The shrub layer is characterized by sweet pepperbush and dewberry. Common groundcover species are ground cedar, Japanese honeysuckle, poison ivy and wood fern (*Dryopteris sp.*).

A transitional zone of Maple/Oak cover occurs between the wetland and upland forests and is represented by red maple, pin oak, sweetgum and red oak. The shrub layer typically consists of spicebush, witch hazel (*Hamamelis virginiana*) and arrowwood. Groundcover is fairly dense in parts with Japanese honeysuckle, poison ivy and patches of fern.

Agricultural Lands

A portion of the Project Impact Corridor consists of agricultural lands primarily used for soybean, corn and pasture/hay production. Agricultural fields are dispersed throughout the Project Impact Corridor with the greatest concentration in the central portion of the corridor. The agricultural lands in the Project Impact Corridor are generally upland in nature as they are situated on well-drained soils, a prerequisite for non-hydric, upland conditions. Finally, there is also a modest cattle ranch in the central portion of the Project Impact Corridor near Friendship and Broadway roads.

The active agricultural fields in the Project Impact Corridor are cultivated in soybean (*Glycine max*) or corn (*Zea mays*), many of which are separated by hedgerows. A typical hedgerow canopy is composed of black cherry, sweet cherry (*Prunus avium*) or Sassafras with a shrub layer of multiflora rose (*Rosa multiflora*), dewberry, black locust saplings (*Robinia pseudoacacia*) and Japanese honeysuckle or poison ivy in the vine stratum. Groundcover consists of common morning glory (*Ipomoea sp.*), field garlic (*Allium vineale*), common fleabane (*Erigeron philadelphicus*), red clover (*Trifollium pratense*), goldenrods (*Solidago sp.*) and common ragweed (*Ambrosia artemisifolia*).

Non-forested, Non-agricultural Lands

The remainder of the Project Impact Corridor consists of developed and landscaped properties. Landscaped corporate parks are concentrated at the eastern and western ends of the Project Impact Corridor in close proximity to Route 130 and Route 1, respectively. Single-family residential development and associated landscaping is scattered throughout the Project Impact Corridor, typically on well drained uplands.

Finally, there is a scattering of early successional fields near the developed areas, the most prominent of such being in the vicinity of U.S. Routes 130 and 32. This area was utilized for pasture, a nursery and was apparently cultivated in the past. Groundcover in the unutilized areas consists of species typical of disturbed areas such as wild carrot (*Daucus carota*), foxtail (*Setaria glauca*), dogbane (*Apocynum androsaemifolium*), goldenrods, common fleabane, and blue toad-flax (*Linaria canadensis*). The nursery area is planted with young blue spruce (*Picea sp.*) and white pine (*Pinus strobus*).

Soils

The soils within the Project Impact Corridor are classified into several associations, each having a distinct pattern of component soils, relief and drainage, culminating in unique natural landscapes. East of the Amtrak railroad tracks, the Project Impact Corridor is dominated by Woodstown-Fallsington-Sassafras and the Sassafras-Woodstown soil associations. Both associations exhibit variable characteristics with nearly level to strongly sloping grades and well drained to poorly drained conditions. The soil associations west of the Amtrak railroad are primarily of the Mount Lucas-Watchung-Chalfont Association, Urban Land-Nixon-Nixon Variants and Keyport-Elkton Associations. Lucas-Watchung-Chalfont Associations are characterized as nearly level to gently sloping soils that can be moderately well drained to poorly drained. Nixon-Nixon Variants are described as well drained urban lands that are nearly level to gently sloping. Keyport-Elkton Associations are nearly level to strongly sloping soils that are deep, moderately well drained to poorly drained soils.

Within the aforementioned soil associations, wetlands, forested uplands, and farmland are the prevalent ecosystems. Wetlands are associated with the hydric soil unit, Fallsington loam (Fb), which parallels Devils Brook and its tributaries and is the primary soil unit in the central portion of the Project Impact Corridor.

Soils of the Nixon series occupy most of the western portion of the Project Impact Corridor from the Amtrak railroad west to Route 27. The soil units within this series are designated as prime farmland in Middlesex County by the Soil Conservation Service and are actively farmed. Although much of the western portion of the Project Impact Corridor is suitable for farmland, wetland areas are associated with Carters and Heathcote Brooks and their tributaries. These wetlands are characterized by Fallsington loam soils as well as Humaquepts, another designated hydric soil. Hydric inclusions such as these are often too small to be included in county soil survey maps.

The eastern end of the Project Impact Corridor consists largely of Sassafras loam (SlA), Sassafras sandy loam (SaC), and to a lesser extent, Matapeake silt loam (MeA) and Mattapex silt loam (MgA).

Hydrology

Three major waterways cross the Project Impact Corridor - Devils, Heathcote and Carter's Brooks. Devils Brook originates at the eastern portion of the Project Impact Corridor near Route 130 in South Brunswick. It flows from east to west through South Brunswick Township before turning south into Plainsboro Township and joining Shallow Brook south of the Project Impact Corridor. There are also numerous minor tributaries, particularly near the north-central portion of the Project Impact Corridor, associated with Devils Brook. Between U.S. Route 1 and Route 27, the Project Impact Corridor is crossed by Heathcote and Carters Brooks.

These waterways provide the major hydrological input for Project Impact Corridor wetlands. The relatively gentle topography, which has a modest slope to the southwest, results in

relatively wide floodplain areas associated with each of the streams and tributaries. These wide floodplain areas are largely manifested as saturated/seasonally flooded wooded wetlands and are potential habitat for the hydrophytic, obligate swamp pink.

3.0 METHODOLOGY

The search for swamp pink was limited to potential habitat and was executed on two levels. Initially, all forested and scrub-shrub wetlands within 500-feet of the centerline of each proposed alignment were visually inspected for the occurrence of *H. bullata*. These inspections took place throughout the months of April and May, when the early-blooming, brightly-colored plant contrasts sharply with an otherwise predominantly green and brown background.

After inspecting each alignment, nineteen (19) representative locations in the Project Impact Corridor were more closely examined to better characterize the habitat (see Figure D-1 for sampling locations). Dominant vegetation within a 30 foot radius of each sampling location was identified, as was approximate percent canopy cover, wetland indicator status and general field observations. Soil data was based upon information from the Freshwater Wetland Letter of Interpretation Request Report, prepared for the proposed project.

In addition to the data collected at each sampling location, plant species observed throughout the entire Project Impact Corridor were recorded.

4.0 RESULTS

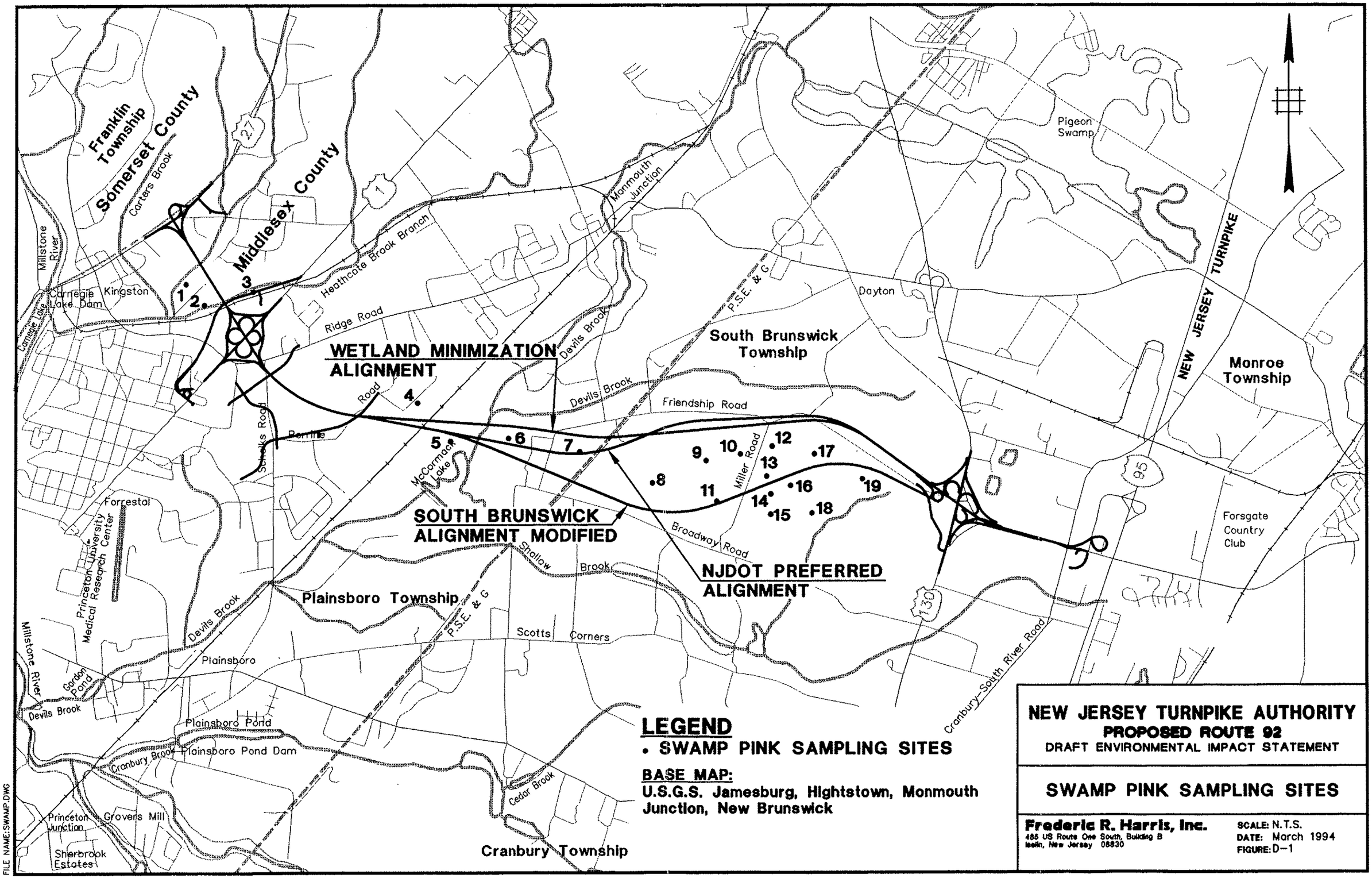
Vegetation

Swamp pink was not detected in any of the forested and scrub-shrub wetlands within 500-feet of the centerline of each proposed alignment nor at any of the nineteen (19) scrutinized, representative sampling sites.

Of the 71 identified hydrophytes in the Project Impact Corridor that are regionally classified as Facultative (FAC), Facultative wetland (FACW) or Obligate wetland, 17 were Obligates (OBL). Of those 17 Obligate species only three - swamp azalea (site 1), skunk cabbage (site 1), and fox sedge (site 6) - were observed within the 19 sampling sites. In addition, burreed (site 11) and spaghnum (site 12) were observed but were not identified to species level. The remaining Obligate species were observed in emergent wetland habitats manifested in swales, ditches and/or shallow depressions.

Soils & Hydrology

The majority of forested wetlands in the Project Impact Corridor are situated on Fallsington loam (Fb) soil. A total of eleven (11) of 19 sampling locations were situated on the Fb unit, which is strongly correlated to the floodplains of Devil's Brook and its tributaries, and less strongly so with Heathcote Brook and its tributaries. Two additional sites were situated on the similar Fallsington sandy loam (Fa) unit. Carter's Brook and its tributaries, as well as the northern floodplain of Heathcote Brook, are situated on the humaquepts, frequently


Franklin Township
Somerset County
Middlesex County
Carters Brook
Millstone River
Carnegie Lake
Carnegie Lake Dam
Kingston
Heathcote Brook Branch
Ridge Road
Manmouth Junction
Devils Brook
P.S.E. & G
Dayton
Pigeon Swamp
NEW JERSEY TURNPIKE
Monroe Township
South Brunswick Township
WETLAND MINIMIZATION ALIGNMENT
Road
Friendship Road
Schenks Road
Berrins
McCormack Lake
Miller Road
Forrestal
Princeton University Medical Research Center
SOUTH BRUNSWICK ALIGNMENT MODIFIED
Broadway Road
Shallow Brook
NJDOT PREFERRED ALIGNMENT
Forsgate Country Club
Plainsboro Township
Scotts Corners
Plainsboro
Gordon Pond
Cranbury-South River Road
Plainsboro Pond
Plainsboro Pond Dam
Cranbury Brook
Cedar Brook
Princeton Junction
Grovers Mill
Sherbrook Estates
Cranbury Township
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
27
1
95
130
LEGEND
• SWAMP PINK SAMPLING SITES
BASE MAP:
U.S.G.S. Jamesburg, Hightstown, Monmouth Junction, New Brunswick
NEW JERSEY TURNPIKE AUTHORITY
PROPOSED ROUTE 92
DRAFT ENVIRONMENTAL IMPACT STATEMENT
SWAMP PINK SAMPLING SITES
Frederic R. Harris, Inc.
485 US Route One South, Building B
Iselin, New Jersey 08830
SCALE: N.T.S.
DATE: March 1994
FIGURE: D-1
FILE NAME: SWAMP.DWG

flooded (HU) unit, which was represented at sampling site one (1) and the remaining sampling sites were situated on Woodstown loam, 0 to 2 percent slopes (WIA), and Woodstown sandy loam, 2 to 5 percent slopes (WIB). Woodstown soils were often situated adjacent to Fallsington soil on the fringes of floodplains and were not saturated.

According to the Soil Survey of Middlesex County, the permeability of Fb and Fa soils are moderate to moderately rapid and available water capacity is moderate. The seasonal high water table is between the surface and one-foot deep from fall to late spring and the root zone is restricted to 25 inches by wetness. Runoff is slow, organic content is moderate and the poorly drained soil is extremely acid (pH < 4.5) to very strongly acid (pH 4.5-to-5).

5.0 CONCLUSIONS

Fallingston soil, based on its low pH and drainage characteristics, appears to comprise chemical and physical characteristics suited for *H. bullata*. However, the gently sloping topography, relative lack of standing water, absence of drift lines or clear drainage patterns, and wide floodplains associated with the tributaries of the Project Impact Corridor, cumulatively indicate that the requisite hydrology needed to support distinct hydrophytes, such as swamp pink, was not present. Where microtopography was favorable for dominance by obligate wetland species, emergent species not commonly associated with swamp pink were found.

The supposition that the Project Impact Corridor is not "boggy" enough to support swamp pink is most strongly evidenced by the strong dominance of red maple and sweet gum - both Facultative species - and the complete absence of common swamp pink tree associates such as Atlantic white cedar, balsam willow, black spruce, northern white-cedar, poison sumac and Tamarack.

TABLE 1 - VEGETATION OBSERVED IN THE PROJECT IMPACT CORRIDOR

Scientific Name	Common Name	Regional Indicator Status[1]
Acer rubrum	Red Maple	FAC
Achillea millefolium	Yarrow	FACU
Agrostis alba	Red top grass	FACW
Allaria petiolata	Garlic mustard	FACU-
Allium canadense	Meadow onion	FACU
Allium sp.		----
Allipocurus pratensis	Meadow foxtail	FACW
Amelanchier arborea	Downy serviceberry	FAC-
Ambrosia artemisiifolia	Common ragweed	FACU
Andropogon virginicus	Broom-sedge	FACU
Apocynum cannabinum	Indian hemp	FACU
Arisaema triphyllum	Jack-in-the-pulpit	FACW-
Artemesia vulgaris	Mugwort	UPL
Asclepias incarnata	Swamp milkweed	OBL
Asclepias syriaca	Common milkweed	UPL
Aster novae-angliae	New England aster	FACW-
Aster sp.		
Berberis sp.	Barberry	FACU
Betula lenta	Black birch	FACU
Betula nigra	River birch	FACW
Betula populifolia	Gray birch	FAC
Boehmeria cylindrica	False nettle	FACW+
Carex lurida	Shallow sedge	OBL
Carex sp.	sedge	----
Carex stricta	Tussock sedge	OBL
Carex vulpinoidea	Fox sedge	OBL
Carpinus caroliniana	Ironwood	FAC
Carya glabra	Pignut hickory	FACU
Carya ovata	Shagbark hickory	FACU-
Catalpa bignoniodes	Southern catalpa	UPL
Centaurea sp.	Knapweed	
Cephalanthus occidenalis	Buttonbush	OBL
Cinna latifolia	Wood reed grass	FACW
Claytonia virginica	Spring Beauty	FACU
Clethra alnifolia	Sweet Pepperbush	FAC+
Convolvulus arvensis	Field bindweed	UPL
Cornus amomum	Silky dogwood	FACW
Cornus florida	Flowering dogwood	FACU
Cornus stolonifera	Red osier dogwood	FACW+
Cyperus strigosus	Umbrella sedge	FACW

VEGETATION OBSERVED IN THE PROJECT IMPACT CORRIDOR (Cont'd)

Scientific Name	Common Name	Regional Indicator Status[1]
Danthonia sp.	Oatgrass	----
Daucus carota	Queen Anne's lace	UPL
Dichanthelium clandestinum	Deer-tongue witchgrass	FAC+
Elaeagnus angustifolia	Russian olive	FACU
Eulalia viminea	Strawberry bush	FAC
Euonymus alata	Winged euonymus	UPL
Eupatoriadelphus maculatum	Spotted Joe-pye weed	FACW
Eupatorium perfoliatum	Common boneset	FACW+
Euthamia graminifolia	Fragrant goldenrod	FAC
Fagus grandifolia	American beech	FACU
Fragaria virginiana	Common strawberry	FACU
Fraxinus pennsylvanica	Green ash	FACW
Geum sp.	Avens	----
Glycine max	Soybean	UPL
Goodyera pubescens	Rattlesnake plaintain	FACU-
Hamamelis virginiana	American witch-hazel	FAC-
Heracleum lanatum	Cow-Parsnip	FACU-
Hibiscus moscheutos	Rose mallow	OBL
Ilex opaca	American holly	FACU+
Ilex verticillata	Winterberry	FACW+
Impatiens capensis	Jewelweed	FACW
Juncus effusus	Soft rush	FACW+
Juncus tenuis	Slender rush	FAC-
Juniperus sp.	Creeping juniper	----
Juniperus virginiana	Eastern red cedar	FACU
Leersia oryzoides	Rice cutgrass	OBL
Leucothoe racemosa	Fetterbush	FACW
Liqustrum cf. vulgare	European privet	FACU
Linaria canadensis	Blue toad-flax	NL
Lindera benzoin	Spicebush	FACW-
Liquidambar styraciflua	Sweetgum	FAC
Liriodendron tulipifera	Tulip tree	FACU
Lonicera japonica	Japanese honeysuckle	FAC-

VEGETATION OBSERVED IN THE PROJECT IMPACT CORRIDOR (Cont'd)

Scientific Name	Common Name	Regional Indicator Status[1]
Ludwigia alternifolia	Seedbox	FACW+
Lycopodium complanatum	Trailing clubmoss	FACU-
Lycopodium obscurum	Tree clubmoss	FACU
Lycopodium tristachym	Ground pine	NL
Lythrum salicaria	Purple loosetrife	FACW+
Magnolia virginiana	Sweetbay	FACW+
Maianthemum canadense	Canadian mayflower	FAC-
Malus sp.		----
Malus scandens	Climbing hempweed	FACW+
Morus alba	White mullberry	UPL
Muhlenbergia schreberi	Nimble-will	FAC
Myrica pensylvanica	Northern bayberry	FAC
Nasturtium officinale	True water-cress	OBL
Nyssa sylvatica	Blackgum	FAC
Oenothera biennis	Evening primerose	FACU-
Onoclea sensibilis	Sensitive fern	FACW
Osmunda cinnameomea	Cinnamon fern	FACW
Osmunda regalis	Royal fern	OBL
Panicum dichtomiflorum	Fall panic grass	FACW
Panicum sp.	Panic grass	----
Panicum virgatum	Switch grass	FAC
Parthenocissus quinquefolia	Virginia creeper	FACU
Phalaris arundinacea	Reed canary grass	FACW+
Phragmites australis	Common reed	FACW
Phytolacca americana	Pokeweed	FACU+
Pinus abies	Norway spruce	NL
Pinus nigra	Austrian pine	NL
Pinus strobus	Eastern white pine	FACU
Plantago lanceolata	English plantain	UPL
Plantago major	Common plantain	FACU
Poa sp.	Bluegrass	----
Polygonum cespitosum	Bristled smartweed	FACU-
Polygonum pensylvanicum	Pennsylvaniasmartweed	FACW
Polygonum sagittatum	Tearthumb	OBL

VEGETATION OBSERVED IN THE PROJECT IMPACT CORRIDOR (Cont'd)

Scientific Name	Common Name	Regional Indicator Status[1]
Polygonum sp.	Smartweed	----
Populus deltoides	Easteron Cottonwood	FAC
Populus grandidentata	Big-toothed aspen	FACU-
Potentilla simplex	Common cinquefoil	FACU-
Prunus avium	Sweet Cherry	NL
Prunus serotina	Black cherry	FACU
Pteridium aquilinum	Bracken fern	FACU
Pyrola secunda	One-Sided wintergreen	FAC
Quercus alba	White oak	FACU-
Quercus bicolor	Swamp white oak	FACW+
Quercus coccinea	Scarlet Oak	NL
Quercus falcata	Spanish oak	FACU-
Quercus palustis	Pin oak	FACW
Quercus phellos	Willow oak	FAC+
Querucs rubra	Red Oak	FACU-
Quercus cf. velutina	Black Oak	UPL
Rhododendron viscosum	Swamp azalea	OBL
Rhus copallinum	Winged sumac	NI
Rhus glabra	Smooth sumac	NL
Rhus radicans	Poison Ivy	FAC
Rhus typhina	Staghorn sumac	UPL
Robina pseudoacacia	Black locust	FACU-
Rosa multiflora	Multiflora rose	FACU
Rubus allegheniensis	Allegheny blackberry	FACU-
Rubus flagellaris	Blackberry	FACU-
Rudbeckia hirta	Black-eyed susan	NL
Rumex acetosella	Garden sorrel	FACU
Rumex crispus	Curly dock	FACU
Salix nigra	Black willow	FACW+
Sambucus canadensis	Elderberry	FACW-
Sassafras albidum	Sassafras	FACU-
Scripus cyperinus	Wool grass	FACW+
Setaria faberi	Japanese bristle grass	UPL
Setaria glauca	Yellow foxtail	FAC
Smilacina racemosa	False Solomon's seal	FACU-
Smilax rotundifolia	Common greenbrier	FAC

VEGETATION OBSERVED IN THE PROJECT IMPACT CORRIDOR (Cont'd)

Scientific Name	Common Name	Regional Indicator Status[1]
Solanum carolinense	Horse Nettle	NL
Solidago altissima	Tall goldenrod	FACU-
Solidago canadensis	Canada goldenrod	FACU
Solidago gigantea	Giant goldenrod	FACW
Solidago rugosa	Rough-stemmed goldenrod	FAC
Sparganium sp.	Burreed	----
Sphagnum sp.	Sphagnum moss	----
Spirea tomentosa	Steeplebush	FACW
Stellaria media	Starwort	NL
Symplocarpus foetidus	Skunk cabbage	OBL
Taraxacum officinale	Common dandelion	FACU-
Thelypteris noveboracensis	New York fern	FAC
Toxicodendron radicans	Poison ivy	FAC
Trifolium pratense	Red clover	FACU-
Trifolium repens	White clover	FACU-
Trifolium sp.	Clover	----
Typha latifolia	Cattail	OBL
Ulmus americana	American elm	FACW-
Vaccinium corymbosum	Highbush blueberry	FACW-
Verbascum blattaria	Moth mullein	UPL
Verbascum thapsus	Common mullein	UPL
Veronia noveboracensis	New York ironweed	FACW+
Viburnum acerifolium	Mapleleaf viburum	UPL
Viburnum dentatum	Arrowwood	FAC
Viburnum prunifolium	Black haw	FACU
Viola sp.	Violet	----
Vitis sp.	Grape	----
Xanthium spinosum	Spiny cockle-bur	FACU
Zea mays	Corn	----

Note: (1) USFWS National List of Plant Species That Occur in Wetlands: Northeast (Region 1). 1988.

Source: Louis Berger & Associates, Inc., June 1991.

Indicator Status and estimated probability of occurring in wetlands under natural conditions: OBL-Obligate Wetland Plant (67%-99%); FAC-Facultative Plant (34%-66%); FACU-Faculative Upland Plan (1%-33%); NA-Not Applicable due to level of identification; NL-Not Indicated. A (+) indicates a higher probability of being found in a wetland compared to other species within a category and a (-) indicates the opposite.

FREDERIC R. HARRIS, INC.
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SWAMP PINK SURVEY DATA SHEET

PROJECT: Proposed Route 92
SITE LOCATION: As shown on map
CLIENT: New Jersey Turnpike Authority

DATE(S): April 27, 1993
INVESTIGATOR(S): M. Terenzi & C. Hicks
SEARCH AREA: 1

VEGETATION

PLANT COMMUNITY CLASSIFICATION: Broad-leaved, deciduous forested wetland
PERCENT CANOPY COVER: *TREE: 70* *SHRUB: 85* *HERB: 40* *VINE: 40*

DOMINANT PLANT SPECIES	% AREAL COVER	INDICATOR STATUS	STRATUM
Acer rubrum	55	FAC	Tree
Quercus palustrus	5	FACW	Tree
Ulmus americana	10	FACW-	Tree
Smilax rotundifolia	30	FAC	Vine
Rhus radicans	10	FAC	Vine
Clethra alnifolia	35	FAC+	Shrub
Lindera benzoin	35	FACW-	Shrub
Rhodendron viscosum	5	OBL	Shrub
Symplocarpus foetidus	5	OBL	Herb
Osmunda cinnamomea	5	FACW	Herb
Onoclea sensibilis	5	FACW	Herb
Impatiens capensis	10	FACW	Herb
Eulalia viminea	10	FAC	Herb

SOILS AND HYDROLOGY

SERIES/PHASE: HUMAQUEPTS. FREQ. FLOODED

MOTTLED: YES **GLEYED: YES**

INUNDATED: NO

SATURATED: YES

SOIL PROFILE

DEPTH inches	BRIEF DESCRIPTION
0-7	2.5 YR 4/4, 10% mottles (2.5YR 4/2), silty loam
7-12	2.5 YR 4/4, 20% mottles (5 YR 5/1), silty loam
12-18	5YR 5/1, 20% mottles (5YR 6/8), clay loam

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SITE LOCATION: As shown on map
CLIENT: New Jersey Turnpike Authority

DATE(S): April 27, 1993
INVESTIGATOR(S): M. Terenzi & C. Hicks
SEARCH AREA: 2

VEGETATION

PLANT COMMUNITY CLASSIFICATION: Broad-leaved, deciduous forested wetland
PERCENT CANOPY COVER: *TREE: 75* *SHRUB: 35* *HERB: 45* *VINE: 45*

DOMINANT PLANT SPECIES	% AREAL COVER	INDICATOR STATUS	STRATUM
Acer rubrum	60	FAC	Tree
Quercus palustrus	5	FACW	Tree
Quercus rubra	5	FACU-	Tree
Liriodendron tulipifera	5	FACU	Tree
Smilax rotundifolia	45	FAC	Vine
Vaccinium corymbosum	30	FACW-	Shrub

SOILS AND HYDROLOGY

SERIES/PHASE: FALLSINGTON LOAM

MOTTLED: YES **GLEYED: NO**

INUNDATED: NO

SATURATED: NO

SOIL PROFILE

DEPTH Inches	BRIEF DESCRIPTION
0-6	10YR 5/2, no mottles, loam
6-12	10YR 5/1, 30% mottles (10YR 5/2), loam
12-18	10YR 7/1, 40% mottles (10YR 6/1), loam w/gravel

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SWAMP PINK SURVEY DATA SHEET

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SITE LOCATION: As shown on map
CLIENT: New Jersey Turnpike Authority

DATE(S): April 27, 1993
INVESTIGATOR(S): M. Terenzi & C. Hicks
SEARCH AREA: 3

VEGETATION

PLANT COMMUNITY CLASSIFICATION: Broad-leaved, deciduous forested wetland
PERCENT CANOPY COVER: *TREE:* 65 *SHRUB:* 30 *HERB:* 25 *VINE:* 45

DOMINANT PLANT SPECIES	% AREAL COVER	INDICATOR STATUS	STRATUM
Acer rubrum	50	FAC	Tree
Quercus palustrus	5	FACW	Tree
Cornus stolonifera	5	FACW+	Tree
Rosa Multiflora	30	FACU	Tree
Smilax rotundifolia	15	FAC	Vine
Muhlenbergia schreberi	10	FAC	Herb
Juncus effusus	10	FACW+	Herb

SOILS AND HYDROLOGY

SERIES/PHASE: FALLSINGTON LOAM

MOTTLED: YES GLEYED: NO

INUNDATED: NO

SATURATED: YES

SOIL PROFILE

DEPTH Inches	BRIEF DESCRIPTION
0-4	10YR 5/2, 40% mottles (10YR 5/3), loam
4-18	10YR 5/1, 30% mottles (10YR 5/2), loam, Free-standing water at 4"

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SWAMP PINK SURVEY DATA SHEET

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SITE LOCATION: As shown on map
CLIENT: New Jersey Turnpike Authority

DATE(S): April 27, 1993
INVESTIGATOR(S): M. Terenzi & C. Hicks
SEARCH AREA: 4

VEGETATION

PLANT COMMUNITY CLASSIFICATION: Broad-leaved, deciduous forested wetland
PERCENT CANOPY COVER: *TREE: 75* *SHRUB: 35* *HERB: 25* *VINE: 45*

DOMINANT PLANT SPECIES	% AREAL COVER	INDICATOR STATUS	STRATUM
Acer rubrum	55	FAC	Tree
Quercus palustrus	10	FACW	Tree
Prunus serotina	5	FACU	Tree
Rosa Multiflora	10	FACU	Shrub
Vaccinium corymbosum	25	FAC	Shrub
Smilax rotundifolia	5	FAC	Vine

SOILS AND HYDROLOGY

SERIES/PHASE: FALLSINGTON LOAM

MOTTLED: YES **GLEYED: NO**

INUNDATED: NO

SATURATED: NO

SOIL PROFILE

DEPTH Inches	BRIEF DESCRIPTION
0-2	10YR 3/1, no mottles, loam
2-16	2.5Y 5/3, 40% mottles (2.5Y 5/2), loam
16-20	2.5Y 6/2, 30% mottles (2.5Y 6/3), loam

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SWAMP PINK SURVEY DATA SHEET

PROJECT: Proposed Route 92
SITE LOCATION: As shown on map
CLIENT: New Jersey Turnpike Authority

DATE(S): April 28, 1993
INVESTIGATOR(S): M. Terenzi & C. Hicks
SEARCH AREA: 5

VEGETATION

PLANT COMMUNITY CLASSIFICATION: Broad-leaved, deciduous forested wetland
PERCENT CANOPY COVER: *TREE:* 75 *SHRUB:* 45 *HERB:* 10 *VINE:* 35

DOMINANT PLANT SPECIES	% AREAL COVER	INDICATOR STATUS	STRATUM
Acer rubrum	55	FAC	Tree
Fraxinus pennsylvanica	15	FACW	Tree
Viburnum dentatum	25	FAC	Shrub
Rosa Multiflora	10	FACU	Shrub
Symplocarpus foetidus	10	FAC	Shrub
Lonicera japonica	10	FAC-	Vine
Smilax rotundifolia	25	FAC	Vine

SOILS AND HYDROLOGY

SERIES/PHASE: FALLSINGTON LOAM

MOTTLED: YES GLEYED: NO

INUNDATED: NO

SATURATED: YES (18")

SOIL PROFILE

DEPTH Inches	BRIEF DESCRIPTION
0-14	10YR 3/1, no mottles, sandy loam
14-18	10YR 4/1, 10% mottles (10YR 3/1), loamy sand

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SWAMP PINK SURVEY DATA SHEET

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SITE LOCATION: As shown on map
CLIENT: New Jersey Turnpike Authority

DATE(S): April 28, 1993
INVESTIGATOR(S): M. Terenzi & C. Hicks
SEARCH AREA: 6

VEGETATION

PLANT COMMUNITY CLASSIFICATION: Broad-leaved, deciduous forested wetland
PERCENT CANOPY COVER: *TREE:* 75 *SHRUB:* 30 *HERB:* 5 *VINE:* _

DOMINANT PLANT SPECIES	% AREAL COVER	INDICATOR STATUS	STRATUM
Acer rubrum	25	FAC	Tree
Fagus grandifolia	10	FACU	Tree
Liriodendron tulipera	10	FAC	Tree
Prunus serotina	5	FACU	Tree
Liquidambar styraciflua	30	FAC	Tree
Clethra alnifolia	25	FAC+	Shrub
Carex vulpinoidea	5	OBL	Herb

SOILS AND HYDROLOGY

SERIES/PHASE: WOODSTOWN SANDY LOAM 2-5% SLOPES

MOTTLED: YES **GLEYED:** NO

INUNDATED: NO

SATURATED: NO

SOIL PROFILE

DEPTH inches	BRIEF DESCRIPTION
0-2	10YR 3/1, no mottles, loam
2-12	2.5Y 6/2, 10% mottles (2.5Y 5/1), silty loam
12-20	10YR 6/1, 30% mottles (10YR 5/6), silty loam

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SWAMP PINK SURVEY DATA SHEET

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SITE LOCATION: As shown on map
CLIENT: New Jersey Turnpike Authority

DATE(S): April 28, 1993
INVESTIGATOR(S): M. Terenzi & C. Hicks
SEARCH AREA: 7

VEGETATION

PLANT COMMUNITY CLASSIFICATION: Broad-leaved, deciduous forested wetland
PERCENT CANOPY COVER: *TREE:* 85 *SHRUB:* 20 *HERB:* 15 *VINE:* _

DOMINANT PLANT SPECIES	% AREAL COVER	INDICATOR STATUS	STRATUM
Acer rubrum	35/10	FAC	Tree/Sapling
Fagus grandifolia	10/5	FACU	Tree/Sapling
Quercus veluntina	5	UPL	Tree
Quercus bicolor	5	FACW+	Tree
Liquidambar styraciflua	30/10	FAC	Tree/Sapling
Clethra alnifolia	5	FAC+	Shrub
Vaccinium corybosum	15	FACW-	Shrub
Claytonia virginica	15	FACU	Herb

SOILS AND HYDROLOGY

SERIES/PHASE: **FALLSINGTON LOAM**

MOTTLED: YES **GLEYED: NO**

INUNDATED: NO

SATURATED: YES (at 20")

SOIL PROFILE

DEPTH Inches	BRIEF DESCRIPTION
0-2	10YR 2/1, no mottles, loam
2-18	10YR 7/1, 10% mottles (10YR 6/6), silt
18-20	10YR 6/1, 20% mottles (10YR 6/6), loamy clay

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SWAMP PINK SURVEY DATA SHEET

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DATE(S): April 28, 1993
INVESTIGATOR(S): M. Terenzi & C. Hicks
SEARCH AREA: 8

VEGETATION

PLANT COMMUNITY CLASSIFICATION: Broad-leaved, deciduous forested wetland
PERCENT CANOPY COVER: *TREE:* 85 *SHRUB:* _ *HERB:* 40 *VINE:* _

DOMINANT PLANT SPECIES	% AREAL COVER	INDICATOR STATUS	STRATUM
Acer rubrum	30/10	FAC	Tree/Sapling
Fagus grandifolia	10/10	FACU	Tree/Sapling
Quercus palustris	5	FACW	Tree
Liquidambar styraciflua	40/10	FAC	Tree/Sapling
Thelypteris noveboracensis	25	FAC	Herb
Claytonia virginica	15	FACU	Herb

SOILS AND HYDROLOGY

SERIES/PHASE: FALLSINGTON LOAM

MOTTLED: YES **GLEYED:** NO

INUNDATED: NO

SATURATED: NO

SOIL PROFILE

DEPTH inches	BRIEF DESCRIPTION
0-1	10YR 2/1, no mottles, organic
1-8	2.5Y 6/3, 30% mottles (2.5Y 6/4), loam
8-20	2.5Y 6/2, 20% mottles (10YR 5/6), silty loam

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SWAMP PINK SURVEY DATA SHEET

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SITE LOCATION: As shown on map
CLIENT: New Jersey Turnpike Authority

DATE(S): April 28, 1993
INVESTIGATOR(S): M. Terenzi & C. Hicks
SEARCH AREA: 9

VEGETATION

PLANT COMMUNITY CLASSIFICATION: Broad-leaved, deciduous forested wetland
PERCENT CANOPY COVER: *TREE: 75* *SHRUB: 35* *HERB: 5* *VINE: _*

DOMINANT PLANT SPECIES	% AREAL COVER	INDICATOR STATUS	STRATUM
Acer rubrum	30	FAC	Tree
Quercus palustris	15	FACW	Tree
Liquidambar styraciflua	40	FAC	Tree
Prunus serotina	5	FACU	Tree
Vaccinium corymbosum	35	FACW-	Shrub

SOILS AND HYDROLOGY

SERIES/PHASE: FALLSINGTON LOAM

MOTTLED: YES GLEYED: NO

INUNDATED: NO

SATURATED: YES (at 10")

SOIL PROFILE

DEPTH Inches	BRIEF DESCRIPTION
0-2	10YR 4/3, no mottles, loam
2-10	10YR 3/1, no mottles, clay loam
10-17	10YR 2/1, no mottles, clay loam
17-24	5Y 6/1, 10% mottles (10YR 5/6), clay

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SWAMP PINK SURVEY DATA SHEET

PROJECT: Proposed Route 92
SITE LOCATION: As shown on map
CLIENT: New Jersey Turnpike Authority

DATE(S): April 28, 1993
INVESTIGATOR(S): M. Terenzi & C. Hicks
SEARCH AREA: 10

VEGETATION

PLANT COMMUNITY CLASSIFICATION: Broad-leaved, deciduous forested wetland
PERCENT CANOPY COVER: *TREE:* 60 *SHRUB:* 10 *HERB:* 25 *VINE:* 10

DOMINANT PLANT SPECIES	% AREAL COVER	INDICATOR STATUS	STRATUM
Acer rubrum	30	FAC	Tree
Quercus palustris	15	FACW	Tree
Rosa multiflora	20	FACU	Shrub
Rumex crispus	5	FACU	Herb
Trifolium sp.	10	—	Herb
Dichanthelium clandestinum	15	FAC+	Herb
Vitis sp.	10	—	Vine

SOILS AND HYDROLOGY

SERIES/PHASE: WOODSTOWN SANDY LOAM 2-5% SLOPES

MOTTLED: YES **GLEYED:** NO

INUNDATED: NO

SATURATED: YES (at 6")

SOIL PROFILE

DEPTH Inches	BRIEF DESCRIPTION
0-9	10YR 4/2, 15% mottles (5YR 4/6), clay loam
9-15	2.5Y 4/2, 15% mottles (5YR 4/6), clay loam
15-24	5Y 4/1, 15% mottles (5YR 4/6), clay loam

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SWAMP PINK SURVEY DATA SHEET

PROJECT: Proposed Route 92
SITE LOCATION: As shown on map
CLIENT: New Jersey Turnpike Authority

DATE(S): April 28, 1993
INVESTIGATOR(S): M. Terenzi & C. Hicks
SEARCH AREA: 11

VEGETATION

PLANT COMMUNITY CLASSIFICATION: Broad-leaved, deciduous forested wetland
PERCENT CANOPY COVER: *TREE:* 75 *SHRUB:* _ *HERB:* 5 *VINE:* 10

DOMINANT PLANT SPECIES	% AREAL COVER	INDICATOR STATUS	STRATUM
Acer rubrum	30	FAC	Tree
Liquidambar styraciflua	35	FAC	Tree
Allium vineale	2	FACU-	Herb
Sparganium sp.	3	----	Herb
Vitis sp.	10	----	Vine

SOILS AND HYDROLOGY

SERIES/PHASE: FALLSINGTON SANDY LOAM 0-2% SLOPES

MOTTLED: YES **GLEYED:** NO

INUNDATED: NO

SATURATED: YES (at 24")

SOIL PROFILE

DEPTH Inches	BRIEF DESCRIPTION
0-8	2.5Y 4/2, 10% mottles (5YR 4/6), clay loam
8-22	2.5Y 5/2, 15% mottles (10YR 5/6), clay
22-24	2.5Y 5/2, 30% mottles (5YR 4/6), clay

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SWAMP PINK SURVEY DATA SHEET

PROJECT: Proposed Route 92
SITE LOCATION: As shown on map
CLIENT: New Jersey Turnpike Authority

DATE(S): April 28, 1993
INVESTIGATOR(S): M. Terenzi & C. Hicks
SEARCH AREA: 12

VEGETATION

PLANT COMMUNITY CLASSIFICATION: Broad-leaved, deciduous forested wetland near ponded area
PERCENT CANOPY COVER: *TREE: 75* *SHRUB: 25* *HERB: 25* *VINE: 20*

DOMINANT PLANT SPECIES	% AREAL COVER	INDICATOR STATUS	STRATUM
Acer rubrum	25/10	FAC	Tree/Sapling
Liquidambar styraciflua	35/10	FAC	Tree/Sapling
Vaccinium corymbosum	20	FACW-	Shrub
Fagus grandifolia	10	FACU	Tree
Smilax rotundifolia	20	FAC	Vine
Lycopodium obsurum	10	FACU	Herb
Sphagnum sp.	15	—	Herb

SOILS AND HYDROLOGY

SERIES/PHASE: **FALLSINGTON SANDY LOAM 0-2% SLOPES**

MOTTLED: YES **GLEYED: NO**

INUNDATED: YES

SATURATED: YES (at 1")

SOIL PROFILE

DEPTH Inches	BRIEF DESCRIPTION
0-9	10YR 4/1, no mottles, clay loam
9-20	10YR 6/1, 20% mottles (10YR 5/6), sandy clay loam

FREDERIC R. HARRIS, INC.
Metropolitan Corporate Plaza - Building B
485 U.S. Route One South, Iselin, NJ 08830

HARRIS

SWAMP PINK SURVEY DATA SHEET

PROJECT: Proposed Route 92
SITE LOCATION: As shown on map
CLIENT: New Jersey Turnpike Authority

DATE(S): April 29, 1993
INVESTIGATOR(S): M. Terenzi & C. Hicks
SEARCH AREA: 13

VEGETATION

PLANT COMMUNITY CLASSIFICATION: Broad-leaved, deciduous forested wetland near ponded area
PERCENT CANOPY COVER: *TREE:* 15 *SHRUB:* _ *HERB:* 45 *VINE:* 20

DOMINANT PLANT SPECIES	% AREAL COVER	INDICATOR STATUS	STRATUM
Acer rubrum	10	FAC	Tree
Liquidambar styraciflua	5	FAC	Tree
Onoclea sensibilis	10	FACW	Herb
Allium vineale	5	FACU-	Herb
Trifolium sp.	5	---	Herb
Parthenocissus quinquefolia	10	FACU	Vine
Smilax rotundifolia	10	FAC	Vine

SOILS AND HYDROLOGY

SERIES/PHASE: **FALLSINGTON LOAM**

MOTTLED: YES **GLEYED: NO**

INUNDATED: NO

SATURATED: NO

SOIL PROFILE

DEPTH Inches	BRIEF DESCRIPTION
0-10	10YR 4/1, 25% mottles (7.5YR 4/6), loam
10-16	10YR 5/4, 10% mottles (10YR 6/1), clay loam
16-24	10YR 5/4, 40% mottles (10YR 6/1), sandy loam

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SWAMP PINK SURVEY DATA SHEET

PROJECT: Proposed Route 92
SITE LOCATION: As shown on map
CLIENT: New Jersey Turnpike Authority

DATE(S): April 29, 1993
INVESTIGATOR(S): M. Terenzi & C. Hicks
SEARCH AREA: 14

VEGETATION

PLANT COMMUNITY CLASSIFICATION: Broad-leaved, deciduous forested wetland near road edge
PERCENT CANOPY COVER: *TREE:* 35 *SHRUB:* 55 *HERB:* _ *VINE:* 5

DOMINANT PLANT SPECIES	% AREAL COVER	INDICATOR STATUS	STRATUM
Liquidambar styraciflua	30	FAC	Tree
Rumex sp.	10	—	Shrub
Clethra alnifolia	20	FAC+	Shrub
Smilax rotundifolia	10	FAC	Vine

SOILS AND HYDROLOGY

SERIES/PHASE: WOODSTOWN LOAM 0-2% SLOPES

MOTTLED: NO **GLEYED:** NO

INUNDATED: NO

SATURATED: NO

SOIL PROFILE

DEPTH Inches	BRIEF DESCRIPTION
0-6	10YR 3/1, no mottles, loam
6-20	10YR 6/1, no mottles, sandy loam
16-24	2.5Y 6/2, no mottles, sandy loam

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HARRIS

SWAMP PINK SURVEY DATA SHEET

PROJECT: Proposed Route 92
SITE LOCATION: As shown on map
CLIENT: New Jersey Turnpike Authority

DATE(S): April 29, 1993
INVESTIGATOR(S): M. Terenzi & C. Hicks
SEARCH AREA: 15

VEGETATION

PLANT COMMUNITY CLASSIFICATION: Broad-leaved, deciduous forested wetland near road edge
PERCENT CANOPY COVER: *TREE:* 75 *SHRUB:* 25 *HERB:* _ *VINE:* _

DOMINANT PLANT SPECIES	% AREAL COVER	INDICATOR STATUS	STRATUM
Acer rubrum	30	FAC	Tree
Quercus rubra	10	FACU-	Tree
Fagus grandifolia	10	FACU	Tree
Liquidambar styraciflua	10	FAC	Tree
Clethra alnifolia	20	FAC+	Shrub

SOILS AND HYDROLOGY

SERIES/PHASE: **WOODSTOWN LOAM 0-2% SLOPES**

MOTTLED: YES **GLEYED: NO**

INUNDATED: NO

SATURATED: YES (at 16")

SOIL PROFILE

DEPTH Inches	BRIEF DESCRIPTION
0-2	10YR 3/1, no mottles, loam
2-20	2.5Y 6/2, 30% mottles (2.5Y 6/3), sandy loam

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SWAMP PINK SURVEY DATA SHEET

PROJECT: Proposed Route 92
SITE LOCATION: As shown on map
CLIENT: New Jersey Turnpike Authority

DATE(S): April 29, 1993
INVESTIGATOR(S): M. Terenzi & C. Hicks
SEARCH AREA: 16

VEGETATION

PLANT COMMUNITY CLASSIFICATION: Broad-leaved, deciduous forested wetland near road edge
PERCENT CANOPY COVER: *TREE:* 35 *SHRUB:* 25 *HERB:* _ *VINE:* _

DOMINANT PLANT SPECIES	% AREAL COVER	INDICATOR STATUS	STRATUM
Nyssa sylvatica	20	FAC	Tree
Quercus rubra	10	FACU-	Tree
Fagus grandifolia	10	FACU	Tree
Liquidambar styraciflua	10	FAC	Tree
Clethra alnifolia	20	FAC+	Shrub

SOILS AND HYDROLOGY

SERIES/PHASE: FALLSINGTON LOAM

MOTTLED: YES **GLEYED:** NO

INUNDATED: NO

SATURATED: YES (near surface)

SOIL PROFILE

DEPTH Inches	BRIEF DESCRIPTION
0-6	10YR 5/1, 40% mottles (10YR 5/1), loam
6-20	10YR 6/1, 5% mottles (10YR 5/6), clay loam

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SWAMP PINK SURVEY DATA SHEET

PROJECT: Proposed Route 92
SITE LOCATION: As shown on map
CLIENT: New Jersey Turnpike Authority

DATE(S): April 30, 1993
INVESTIGATOR(S): M. Terenzi & C. Hicks
SEARCH AREA: 17

VEGETATION

PLANT COMMUNITY CLASSIFICATION: Broad-leaved, deciduous forested wetland near road edge
PERCENT CANOPY COVER: *TREE:* 75 *SHRUB:* 45 *HERB:* 10 *VINE:* 10

DOMINANT PLANT SPECIES	% AREAL COVER	INDICATOR STATUS	STRATUM
Acer rubrum	30	FAC	Tree
Liquidambar styraciflua	30	FAC	Tree
Vaccinium corymbosum	15	FACW-	Shrub
Hammamelis virginiana	15	FAC-	Shrub
Smilax rotundifolia	10	FAC	Vine

SOILS AND HYDROLOGY

SERIES/PHASE: FALLSINGTON LOAM

MOTTLED: NO **GLEYED:** NO

INUNDATED: NO

SATURATED: YES (at 12")

SOIL PROFILE

DEPTH Inches	BRIEF DESCRIPTION
0-1	Organic material
1-10	10YR 3/1, no mottles (10YR 5/6), sandy clay loam
10-20	2.5Y 5/2, no mottles, sand

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SWAMP PINK SURVEY DATA SHEET

PROJECT: Proposed Route 92
SITE LOCATION: As shown on map
CLIENT: New Jersey Turnpike Authority

DATE(S): April 30, 1993
INVESTIGATOR(S): M. Terenzi & C. Hicks
SEARCH AREA: 18

VEGETATION

PLANT COMMUNITY CLASSIFICATION: Broad-leaved, deciduous forested wetland near road edge
PERCENT CANOPY COVER: *TREE: 65* *SHRUB: 45* *HERB: 10* *VINE: 15*

DOMINANT PLANT SPECIES	% AREAL COVER	INDICATOR STATUS	STRATUM
Acer rubrum	30/10	FAC	Tree/Sapling
Fagus grandifolia	10	FACU	Tree
Vaccinium corymbosum	15	FACW-	Shrub
Clethra alnifolia	10	FAC+	Shrub
Smilax rotundifolia	15	FAC	Vine

SOILS AND HYDROLOGY

SERIES/PHASE: WOODSTOWN SANDY LOAM 2-5% SLOPES

MOTTLED: YES **GLEYED:** NO

INUNDATED: NO

SATURATED: YES (at 18")

SOIL PROFILE

DEPTH Inches	BRIEF DESCRIPTION
0-4	10YR 2/1, no mottles, organic
4-12	10YR 5/2, 30% mottles (10YR 5/3), clay loam
12-20	10YR 5/1, 20% mottles (10YR 5/2), clay loam

AMY S. GREENE
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WILDLIFE INVENTORY

FOR

PROPOSED ROUTE 92
NEW JERSEY TURNPIKE AUTHORITY

MONROE, SOUTH BRUNSWICK AND PLAINSBORO TOWNSHIPS
MIDDLESEX COUNTY, NJ

FEBRUARY 5, 1996

Submitted to:

Frederic R. Harris, Inc.
Metropolitan Corporate Plaza
Office Building B
485 US Route One South
Iselin, NJ 08830

Prepared by:

AMY S. GREENE ENVIRONMENTAL
CONSULTANTS, INC.

Project #1244

EXECUTIVE SUMMARY

Amy S. Greene Environmental Consultants, Inc. (ASGECI) was contracted by Frederic R. Harris, Inc. (FRH) to perform an endangered and threatened species and general wildlife inventory and to assess impacts from the proposed Route 92 on wildlife populations within the proposed right-of-way (ROW) and adjacent areas within 300 feet (on either side) of the proposed ROW - the "project area". The proposed highway consists of the reconstruction of Route 32 to provide a roadway consisting of two through lanes, weaving and acceleration/deceleration lanes plus shoulders in each direction between NJ Turnpike Interchange 8A and NJ Route 130, and the construction of a new, limited access, four-lane roadway (two lanes plus shoulders in each direction), Route 92, between Route 130 and Route 1. The Interchange 8A toll plaza will also be enlarged. The alignment will pass through the Townships of South Brunswick and Plainsboro in Middlesex County, NJ. Improvements in the vicinity of Interchange 8A are located in Monroe Township.

The proposed Route 92 alignment has been termed the "Wetlands Minimization Alignment", as it disturbs the lowest acreage of wetlands of the five alignments previously studied. These five alignments include the following: 1) Alignment A - the NJDOT North Scheme; 2) Alignment B - the NJDOT Preferred Alternative; 3) Alignment C - the NJDOT South Scheme; 4) Alignment D - the South Brunswick Preferred Alignment; and 5) Alignment E - the Wetlands Minimization Alignment. The Wetlands Minimization Alignment is also the furthest from McCormack Lake, a 46-acre, man-made lake located south of the central portion of the alignment. McCormack Lake is associated with a large amount of critical wildlife habitat.

Species of Concern (SOCs) for the project area were determined based on written recommendations from the New Jersey Department of Environmental Protection (NJDEP) Division of Fish, Game and Wildlife. The list of SOCs provided by NJDEP included 18 avian species, two amphibians (turtles), and three invertebrate (mussel) species. The NJDEP Natural Heritage Program was also consulted.

The scope of the study included the following:

1) Habitat mapping within and immediately adjacent to the alignment;

2) Survey of scientific literature on SOC habitats to determine the extent of potentially suitable habitat within the project area and to formulate search methodologies;

3) Limited field surveys for

   a. the SOCs; and

   b. documentation of the species utilizing the habitats within and around the alignment;

4) Assessment of potential impacts to wildlife from the proposed highway.

Field investigations utilized various survey methods to determine the presence of SOCs within the study area. The "study area" was determined from the extent of potential habitat in the project area and similar contiguous habitat that extended outside the project area. Therefore, the study area extended beyond the project area along some sections of the alignment. These investigations took place in mid-June through early August, and early October, 1995. Approximately twelve days of field survey were performed.

Based upon the literature search and field habitat mapping, a rating index of potentially suitable habitat for each of the SOCs was developed. Habitat suitability was rated from 0 (no potential) to 4 (high potential). As a result of the above investigations, it was concluded that there is no potentially suitable habitat on, or within 300 feet of, the project site for pied-billed grebe, American bittern, osprey, peregrine falcon, bog turtle, brook floater or yellow lampmussel. In addition, there is no breeding habitat for great blue heron or northern harrier, although there is potentially suitable feeding habitat for these species. Potentially suitable habitat for red-headed woodpecker, grasshopper sparrow, Henslow's sparrow, and triangle floater was determined to be minimal. It was noted, however, that McCormack Lake and its environs, the northernmost arm of which is located approximately 1000 feet south of the central portion of the proposed ROW alignment, could provide suitable habitat for pied-billed grebe, American bittern, osprey and mussels.

There is potentially suitable habitat of low to high potential within the limits of the study area for Cooper's hawk, red-shouldered hawk, upland sandpiper, barred owl, cliff swallow, loggerhead shrike, vesper sparrow, savannah sparrow, bobolink, and wood turtle. Although there is potentially suitable habitat for these SOCs within the study area, most of these species (or signs thereof) were not observed during our field investigations. Only one SOC (great blue heron) was directly observed and one SOC (Cooper's hawk) was thought to be heard within the project area. However, field investigations were limited (12 days) and did not take place during optimal observation time frames for all of the SOCs. Therefore, while we may conclude that some of these species are not present within

the project area, based on the absence of suitable habitat, some SOCs may utilize habitat or merely be easier to observe within the project area at other times of the year. Cooper's hawk, barred owl, upland sandpiper, savannah sparrow and bobolink were determined to be the most likely to inhabit the study area based on the presence of potentially suitable habitat and reported sightings by others.

The main impacts of the proposed project to wildlife in general would be from the destruction or degradation of wetland and upland forest, upland early successional field, and hedgerows. Direct destruction will occur from the construction activities within the ROW. The majority of this habitat destruction will be permanent. This will result in the loss of nesting, resting, and feeding habitat within the ROW. Degradation impacts include fragmentation of contiguous habitats and noise and human activity impacts resulting from both construction and the use of the highway. This could result in avoidance of the area by sensitive migratory and resident species, and direct mortality of wildlife attempting to cross the highway. Of the endangered and threatened species likely to be present in the project area, barred owl is the most likely to be affected by the project due to forest fragmentation and increased human activity. Other potential impacts include alteration of the water quality or volume of the Devil's Brook which could impact fish, reptiles and amphibians that depend on this open water habitat for the continuation of their life cycle. Overall impacts to potential habitat for the other species have been minimized; however, the potential for impacts could be further reduced by the following recommendations:

1) A wetland mitigation plan should be prepared for the project, in accordance with the New Jersey Freshwater Wetlands Protection Act, to mitigate for the loss of wetland habitats for the endangered and threatened species potentially impacted by the project.

2) The use of bridges that span an area of land in addition to the Devil's Brook and railroad crossings would be beneficial for allowing wildlife movement through forest corridors. The preliminary plans for the project include a 500' bridge span over the Devil's Brook, and a 400' bridge span over the railroad line. Bridging these areas of forested wetlands will not only permit continued access to the fields and lake by wildlife, but will decrease wetland and stream impacts as well. A planted barrier or fencing should be used along adjacent areas of the highway outside of the wetlands to help funnel wildlife to the bridged areas.

3) Box culverts should be used in permanent streams that are not bridged to allow fish passage. Construction activities in streams should be limited to late summer (late July - early September) to avoid impacts to wood turtles and spawning fish. The bottom of the culverts should be set below the natural streambed and then lined with natural materials.

4) Fragmentation of the field north of McCormack Lake could potentially impact wildlife in the area and should be avoided if feasible. Shifting the alignment above McCormack Lake to the north of the existing treerow would avoid fragmentation of this important upland, early successional field. The benefits gained by avoiding the fragmentation of the field would need to be weighed against increased wetland impacts, the potential for an additional stream crossing due to this change, and potential increased residential takings.

5) A stormwater management plan for the project should be prepared with the intention of minimizing potential impacts to water quality or volume of the Devil's Brook, thereby minimizing impacts to fish, reptiles and amphibians. Periodic maintenance of stormwater management facilities should be adhered to in order to ensure that water quality in the vicinity is not compromised.

Except in the Pinelands and CAFRA Areas, New Jersey does not have regulations specifically protecting upland-dwelling animals from habitat degradation. Therefore, environmental constraints due to endangered and threatened species are imposed mainly by the limits to development in wetlands and wetland transition areas. The NJ Freshwater Wetlands Act provides that any wetlands which are documented habitat for endangered or threatened species are classified as exceptional resource value wetlands and are subject to 150-foot transition areas. Some of the wetlands within the project area may be classified as exceptional resource value due to the presence of potentially suitable habitat for some endangered species. This will be determined by NJDEP in the Letter of Interpretation pending for the project. Requirements for transition area waivers and permits are more stringent for exceptional resource value wetlands.

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I. INTRODUCTION

This report summarizes the findings of an endangered and threatened species and general wildlife inventory within the proposed Route 92 ROW and adjacent areas within 300 feet (on either side) of the proposed ROW - the "project area". A limited amount of field work was performed to identify wildlife during the preparation of the Environmental Impact Statement (EIS) by Frederic R. Harris, Inc. During review of the EIS, the NJDEP Division of Fish, Game and Wildlife expressed concern that potential impacts to wildlife, particularly threatened and endangered species, may have been underestimated. Amy S. Greene Environmental Consultants, Inc. (ASGECI) was contracted to perform additional qualitative wildlife surveys and habitat evaluations in order to properly assess the potential impacts to wildlife along the proposed alignment.

The project area is located in Monroe, South Brunswick and Plainsboro Townships, in Middlesex County, NJ and runs generally east-west between the New Jersey Turnpike and US Route 1 (Figure 1). The proposed highway consists of the reconstruction of Route 32 to provide a six-lane roadway (three lanes plus shoulders in each direction) between NJ Turnpike Interchange 8A and NJ Route 130 and the construction of a new, limited access, four-lane roadway (two lanes plus shoulders in each direction), Route 92, between Route 130 and Route 1. The Interchange 8A toll plaza will also be enlarged by eight additional lanes, and a new, barrier-type toll plaza will be constructed on the west side of Route 130. The Interchange 8A/Route 32/Cranbury-South River Road intersection will be reconstructed and new interchanges will be constructed at Route 130, Perrine Road and Route 1. The alignment will pass through the Townships of South Brunswick and Plainsboro in Middlesex County, NJ. Improvements in the vicinity of Interchange 8A are located in Monroe Township. The site is located in the Piedmont physiographic province (USGS Geological Map, 1992). Topography is generally level with elevations ranging between 120 and 140 feet National Geodetic Vertical Datum (Figure 1).

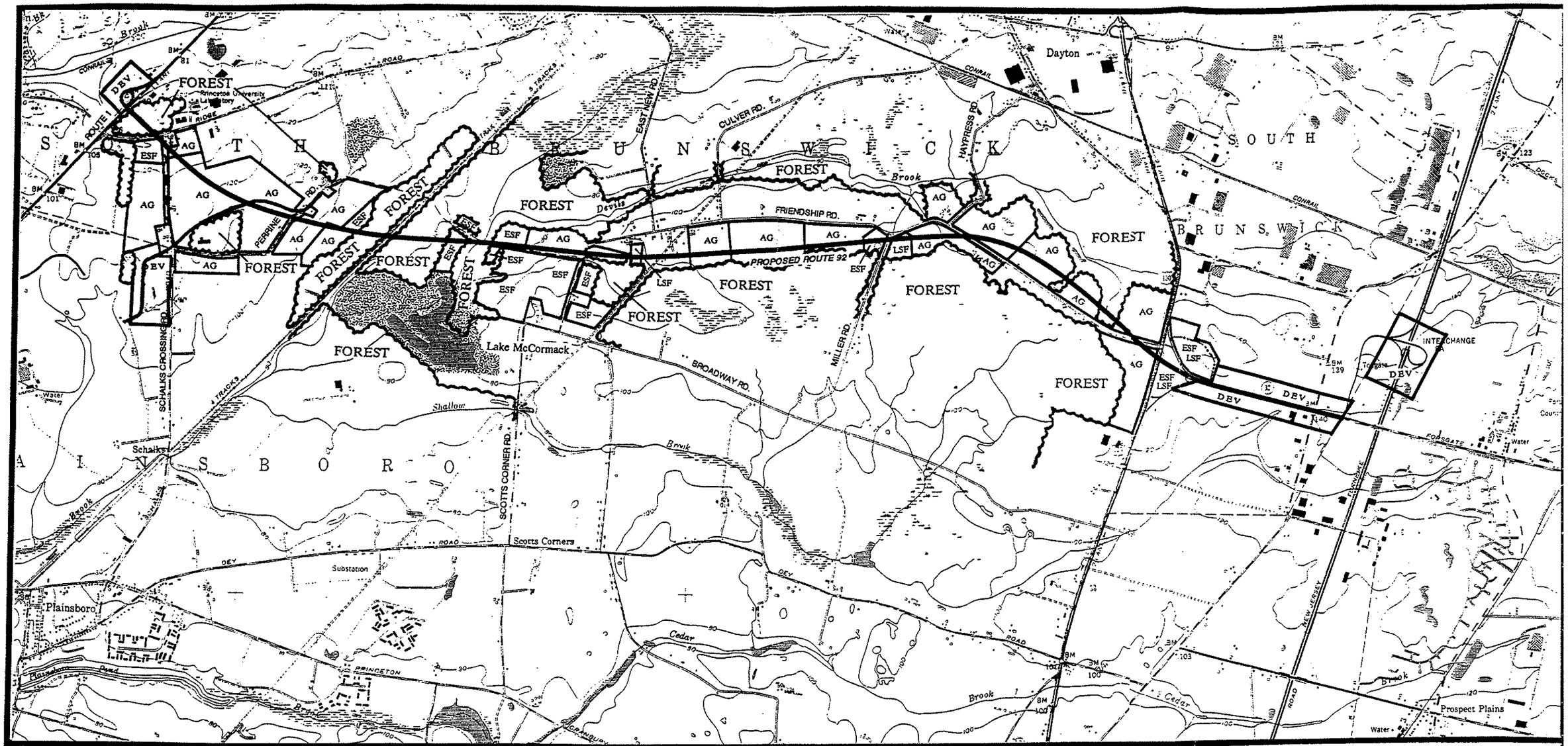
Land use surrounding the project area consists of forest and commercial development to the west, forest and farmland to the north and south, and office and commercial complexes to the east. The area through which the alignment passes consists of agricultural land, mowed and unmowed early and late successional fields, upland and wetland forested areas and hedgerows. The alignment crosses the Devil's Brook and associated forested wetland in the approximate central portion.

Within the project area, the area between the New Jersey Turnpike and Route 130, at the eastern end of the alignment

is highly developed. Because of this, the wildlife study focused on the portion of the project area between Route 130 and Route 1. The western terminus of the alignment, at Route 1, is also developed. The area between Route 130 and the curve in Friendship Road (curve located approximately 1/3 mile west of the Friendship Road/East New Road intersection) is mainly agricultural land (corn and soybeans), and the area between Perrine Road and Route 1 consists of a combination of agricultural and developed land.

The approximate central portion of the project area, between Friendship and Perrine roads, while partially in agriculture, has limited access and is essentially undisturbed. This area contains upland and emergent wetland fields, streams and forested wetland. While there is certainly wildlife habitat throughout the alignment, it is this central area that contains the most valuable and varied habitat types.

This report presents information on the species of concern, on wildlife utilizing the study area, on habitats throughout the alignment, survey methodologies, results, a discussion of impacts from the proposed project, and recommendations for minimizing wildlife impacts. Endangered and threatened species of concern were determined through coordination with the NJDEP Division of Fish, Game and Wildlife, and information obtained from the NJDEP Natural Heritage Program. A literature search and field surveys were performed.



LEGEND:

- AG — AGRICULTURAL FIELDS
- ESF — EARLY SUCCESSIONAL FIELD
- DEV — DEVELOPED LAND
- LSF — LATE SUCCESSIONAL FIELD
- FOREST BOUNDARIES
- FIELD BOUNDARIES
- PROPOSED ROUTE 92

NOTE: Habitat types were determined from the review of current aerial photographs and field verification by Amy S. Greene Environmental Consultants, Inc.

SOURCE: USGS 7.5 Topographic Series Map, Hightstown and Jamesburg, NJ Quadrangles.

N

0 2500'

FIGURE 1
STUDY AREA AND HABITAT MAP

South Brunswick, Plainsboro & Monroe Townships
Middlesex County, NJ
ASGECI Project #1244

AMY S. GREENE
ENVIRONMENTAL CONSULTANTS, INC.

II. METHODOLOGY

A. Literature/Agency Information Review

A list of endangered, threatened and rare wildlife species of concern (SOCs) potentially present within the project area was provided by the NJDEP Division of Fish, Game and Wildlife (Appendix B). These were the species focused on in this study. These species are as follows:

Common Name	Latin Name	State Status
pied-billed grebe	*Podilymbus podiceps*	E/S
great blue heron	*Ardea herodias*	T/S
American bittern	*Botaurus lentiginosus*	T/S
osprey	*Pandion haliaetus*	T/T
Northern harrier	*Circus cyaneus*	E/U
Cooper's hawk	*Accipiter cooperii*	E/E
red-shouldered hawk	*Buteo lineatus*	E/T
peregrine falcon	*Falco peregrinus*	E
upland sandpiper	*Bartramia longicauda*	E
barred owl	*Strix varia*	T/T
red-headed woodpecker	*Melanerpes erythrocephalus*	T/T
cliff swallow	*Hirundo pyrrhonota*	T/S
loggerhead shrike	*Lanius ludovicianus*	E
vesper sparrow	*Pooecetes gramineus*	E
savannah sparrow	*Passerculus sandwichensis*	T/T
grasshopper sparrow	*Ammodramus savannarum*	T/T
Henslow's sparrow	*Ammodramus henslowii*	E
bobolink	*Doolichonyx oryzivorus*	T/T
wood turtle	*Clemmys insculpta*	T
bog turtle	*Clemmys muhlenbergi*	E
triangle floater	*Alasmidonta undulata*	rare
brook floater	*Alasmidonta varicosa*	rare
yellow lampmussel	*Lampsilis cariosa*	rare

Notes: E = Endangered. T = Threatened. S = Stable. U = Undetermined. Where there are two letters (e.g., E/E), the first refers to the breeding populations and the second to the migratory or winter populations.

The peregrine falcon is a Federal-listed endangered species. The loggerhead shrike, Henslow's sparrow, bog turtle, brook floater and yellow lampmussel are candidates for Federal listing.

The New Jersey Natural Heritage Program (NJNHP) was consulted to identify species in their database that have been previously reported in the vicinity of the project. A listing of endangered and threatened species reported in the Hightstown and Jamesburg USGS quadrangles, in which the project area is located, was also obtained to identify species known to occur in the region (Appendix C).

A literature search was undertaken in order to ascertain identifying features, habitat preferences, parameters that would constitute potentially suitable habitat, and the best time of year and applicable search methodologies to use to survey for each of the SOCs. Aerial maps and site survey maps were reviewed prior to and following field investigations to determine and document the locations and extents of potentially suitable habitats for the SOCs.

Mr. Jim Sciasca, Mr. Michael Valent and Ms. Jeanette Bowers-Altman of the NJDEP Division of Fish, Game and Wildlife were also consulted regarding habitat usage, search methodologies, and the best time period to survey for certain species (see conversation logs - Appendix B). Mr. Larry Torok and Ms. Sherry Meyer of the Division provided additional information regarding the suitability of the project area habitat for barred owl, Cooper's hawk, wood turtle and bog turtle. Mr. Dave Jenkins (NJDEP) was consulted for information regarding great blue heron and Cooper's hawk populations, and Ms. Kathy Clark (NJDEP) provided information on the peregrine falcon. Habitat Suitability Index Models, prepared by the US Fish and Wildlife Service, for barred owl and osprey were also consulted.

An Ecological Resource Inventory (ERI) of the Turkey Island Corporation property, prepared by Eastern States Environmental Associates, Inc. (Fishback, 1994) was reviewed extensively. The ERI covered an 817-acre study area, the northernmost portion of which coincides with the central portion of the Route 92 project area. The ERI study area is bounded by the Penn-Central (Amtrak) Railroad tracks to the west, Scott's Corner and Friendship Road to the east, and the Shallow Brook to the south. South Brunswick parklands, north of the Devil's Brook, form the northern boundary. The ERI included McCormack Lake, a 46-acre man-made lake. This lake is located approximately 1000 feet south of the Route 92 alignment, outside of the proposed Route 92 project area. The ERI contains a compilation of over 1700 hours of research and 700 hours of field investigation conducted over a period of one year, and documents all rare, threatened and endangered species observed within that time.

B. Field Investigations

In June 1995, the entire project area was walked in order to verify vegetative cover types (e.g., forest, agricultural field, late successional field, etc.) within up to 300 feet on either side of the proposed ROW. Limits of areas investigated were identified in the field using digitized mapping prepared by Frederic R. Harris, Inc. Since the majority of the alignment passes through open fields of various types, each distinct field area was investigated as a separate potential habitat unit. Field mapping from these

site walks was then used to help determine the location and quality of habitat for each of the SOCs. The "study area" for wildlife (including SOCs) searches was determined from the extent of potential habitat in the project area and similar contiguous habitat that extended outside the project area. For example, if an early successional field habitat unit was present within 300 feet of the proposed ROW, but also extended beyond this limit, and was determined to be potentially suitable habitat for one or more SOCs, the field was searched up to the first reasonable break point outside of the project area. Therefore, the study area extended beyond the project area along some points of the alignment. Figure 2 presents the limits of the study area.

Subsequent visits to the study area were made to perform rare species and general wildlife surveys in mid-June, July and early August 1995. Additional visits to the wetlands in the central portion of the site were made in early October, 1995 to survey these areas for wood and bog turtles. Table 1 presents the dates, times and personnel involved on each field survey. Resumes of the persons involved in these searches and in the preparation of this report are presented in Appendix D. During field surveys for general wildlife, Species of Concern were searched for where habitat was deemed appropriate.

Searches were conducted only for those SOCs for which it was determined that any potentially suitable habitat existed within the study area. Surveys for the SOCs were conducted in accordance with published methodologies. In general, walking meander surveys through potentially suitable habitat were used to search for turtles and raptors. Transect surveys were used for grassland birds. A call and response survey was used for barred owl. No intensive search for mussels was conducted due to the limited potential for habitat within the project area. The identification of freshwater mussel species requires primarily the use of shell characteristics, but other characteristics such as gill color, stomach anatomy, etc. may also be important. Since many species are polymorphic in shell characters, differences occur even among individuals within populations extending from headwaters to river mouths. This causes difficulties for even professional taxonomists, and reliable species identification should be sought from professional malacologists (Terwilliger, 1991). This level of identification is beyond the scope of this investigation.

In addition, all wildlife observed or heard during the field investigations and the habitat in which observed was recorded on wildlife observation sheets (Table 3, Appendix A). Specific search methodologies for each of the SOCs searched for are described below.

LEGEND:

— — — — WILDLIFE INVENTORY STUDY AREA BOUNDARY

NEW JERSEY TURNPIKE AUTHORITY
ROUTE 92
WILDLIFE INVENTORY

STUDY AREA

Frederic R. Harris, Inc.
Iselin, New Jersey 08830

SCALE: 1" = 2500'
DATE: February 1996
Figure 2

X-REF'S: QUADBASE.92FRMT-B,ALIGN92
LAST EDIT: 02/02/96 08:29 AM
PROJECT: 3150-03 FILE NAME: C:\3150\03\ENV\CH01 WORKSTATION: 001

TABLE 1
FIELD SURVEY INFORMATION

Field Survey Conducted for	Approximate location of Survey	Date and time of Survey	Personnel conducting Survey
Bobolink, General wildlife	Upland fields between US Route 1 and Friendship Road	June 13, 1995 8:30 AM – 4:00 PM	L. Roche R. Riberdy
Bobolink, General wildlife	Upland fields between Friendship and Cranberry Roads	June 14, 1995 8:30 AM – 4:00 PM	L. Roche R. Riberdy
General wildlife	Study area between NJ Tpk. and Miller Road	June 30, 1995 9:40 AM – 3:50 PM	L. Brave M. Brancheau
General wildlife	Study area between Miller Road and Devils Brook	July 6, 1995 9:30 AM – 4:00 PM	L. Brave M. Brancheau
Grassland SOC's, Cooper's and Red–shouldered hawks, Northern harrier and Loggerhead shrike	Turkey Island fields, forest edges, hedgerows and barbed–wire fencelines	July 7, 1995 6:30 AM – 10:15 PM	L. Brave M. Brancheau
General wildlife	Study area between Devils Brook and US Route 1	July 12, 1995 9:50 AM – 4:00 PM	L. Brave M. Brancheau
Grassland birds and Raptors	Agricultural fields, treerows and hedgerows between US Route 1 and railroad line	July 19, 1995 6:00 AM – 10:15 AM	L. Brave M. Brancheau

TABLE 1
FIELD SURVEY INFORMATION

Field Survey Conducted for	Approximate location of Survey	Date and time of Survey	Personnel conducting Survey
Barred owl	5 points within Forested areas located between Perrine Road and Georges Road	July 19/20, 1995 8:00 PM – 12:30 AM	L. Brave M. Brancheau
Grassland birds, Raptors, Woodpecker and Loggerhead shrike	Turkey Island fields, forest edges, hedgerows and barbed–wire fencelines	July 20, 1995 5:45 AM – 11:00 AM	L. Brave M. Brancheau
Grassland birds, Raptors, Woodpecker and Loggerhead shrike	Turkey Island fields and forest edges; and Cedar forest between Ridge Road and US Route 1	August 4, 1995 5:45 AM – 11:00 AM	M. Brancheau P. Lupini
Wood turtle and Bog turtle	Forested wetlands in Devil's Brook area – Turkey Island prop.	October 3, 1995 9:30 AM – 1:30 PM	L. Brave W. Smejkal
Wood turtle and Bog turtle	Forested wetlands in Devil's Brook area – Turkey Island prop.	October 10, 1995 10:30 AM – 2:30 PM	L. Brave W. Smejkal

Wood and Bog Turtles

Forested wetlands along the Devil's Brook and adjacent forested and open areas were searched for wood turtles. April through June is the best time to search for wood turtles, due to their expected movement between stream corridor (winter hibernacula habitat), open fields (nesting habitat), and woodland (summer feeding/resting habitat) at that time. Since field surveys could not be initiated until June, field searches for wood turtle were performed in early October when the turtles would be expected to begin movement back to the stream corridors. Research has indicated that streamside searches between the hours of 11:00 a.m. and 1:00 p.m. in April, May and October are the most likely to yield results (Farrell and Zappalorti, 1979). Because the survey methodology for bog turtle is similar to that of wood turtle, searches for the two species were performed concurrently. Two field ecologists performed streamside searches of all potentially suitable habitat within the project area between the hours of 9:30 a.m. and 1:00 p.m. on October 3 and 10, 1995. Wetlands associated with the Devil's Brook, within the project area, were walked in separate zigzag patterns by the two field personnel. Sticks were used to move vegetation that turtles might use for cover, and to poke under undercut banks and roots. Adjacent upland fields were also searched for roaming turtles and shells of turtles that may have died during the nesting season.

Barred Owl

Forested uplands and wetlands were searched for barred owls. A methodology published in a letter by NJDEPE, Division of Environmental Regulation, Land Use Regulation Program (February 25, 1994) was used to search for barred owls on a very calm evening in July from approximately 8:00 p.m. to 12:30 a.m.. This method involves the use of an audiotape player to broadcast barred owl vocalizations and listening for responses. The 1994 NJDEPE letter states that while barred owls respond to tape calls throughout the year, the period from March through July has been documented to result in greater owl response success. The letter also noted that the survey should be performed after sunset when winds are less than 8 mph and there is little or no precipitation. During the survey, the tape was broadcast from four stations located in the forested areas within the study area determined to be potential habitat. Each broadcast consisted of six 10-second sets of barred owl vocalizations separated by 1 minute of active listening. The tape player was rotated 180 degrees between each 10-second interval. Each complete broadcast was preceded and followed by 5 minutes of active listening. Approximately twenty minutes were spent at each station. Time was also spent listening for owls between stations.

Grassland Birds

Late spring (May and June) is the best time to survey for grassland bird species. They are migratory and historically arrive in New Jersey and establish breeding territories by this time. Territorial birds are vocal and thus easily observed. Although field surveys began in mid-June, the grassland birds should still have been present, but possibly less evident at this time.

Pre-determined transect lines were located in 40 open fields (many agricultural) and early successional field areas. As many as five transects were located in larger fields and fields with greater habitat potential. One to two transects were located in small fields and active soybean fields, as sight distance is greater and habitat potential is lower in these fields. The transects were walked in the early hours of morning (approximately 6:00 a.m. to 10:00 a.m.) to search for grassland bird species, which included upland sandpiper, vesper sparrow, savannah sparrow, grasshopper sparrow, Henslow's sparrow and bobolink. Stops were made along the transect at predetermined points. At least five minutes were spent at each of these points in order to make more detailed observations. Some of these points were located in late successional field areas, along fencelines and hedgerows, or along forested edges in order to get a more complete listing of wildlife in the study area, and to include potential habitat for raptors, loggerhead shrike and red-headed woodpecker. Meander searches of fields determined to have higher habitat potential were used to supplement the transect searches. While most of the agricultural fields were surveyed only once or twice (due to a determined lack of suitable habitat), fields determined to provide higher potential for habitat were each surveyed on three to four different mornings.

Raptors

The optimum time to survey for raptors is during the spring nesting season. Raptors observed during site visits from June through August were identified either aurally or visually during meander and transect searches performed on the same days as the grassland bird surveys. It was expected that if Cooper's or red-shouldered hawks were present, they would either be heard or seen, most likely in forested areas adjacent to fields. Therefore, the field investigations for raptors generally coincided with the early morning field surveys for grassland birds. Additional searches of forested habitat were performed following the early morning open field searches.

Loggerhead shrike

Habitat for loggerhead shrike, including cedar forest, fencelines and hedgerows, was walked to search for the loggerhead shrike or signs of its presence, including impaled insects. Hedgerows were walked in all fields during

or following the early morning, grassland bird, field surveys. The cedar forest area, located between Ridge Road and US Route 1, was walked once in the early morning and once in mid-afternoon on two separate days.

III. RESULTS

A. Habitat/Vegetative Communities

Approximately 15% of the project area, primarily to the east, is developed land, which is paved, landscaped (mowed regularly), or otherwise disturbed. Approximately 15% of the site consists of early to late successional fields. Approximately 20% of the project area is forested. The remaining 50% of the project area consists of agricultural fields. For the purposes of this report, the term "agricultural" refers to the production of corn, soybeans or oats only. Hay fields and grass fields used for grazing cattle, are included as early successional fields. Figure 1 depicts the locations of each of these vegetative communities.

Developed land is located primarily in the area between the New Jersey Turnpike and Route 130, at the eastern end of the alignment. The western terminus of the alignment, at the intersection of US Route 1, is also highly developed. The area between Perrine Road and Route 1 consists of a combination of agricultural and developed land. Most of these areas contain no potential habitat for rare species. One field, located east of Route 130, north of Route 32 was determined to have minimal potential for bobolink. The forested area east of US Route 1, west of Ridge Road, was determined to provide low-rated potentially suitable habitat for loggerhead shrike.

Early successional fields are primarily located in the central portion of the project area, between Friendship and Perrine Roads. This area has limited access and is essentially undisturbed. Undisturbed early successional fields were dominated by mixed grasses including foxtail grasses (*Setaria* spp.), panic grasses (*Panicum* spp.), and orchard grass (*Dactylis glomerata*), as well as Canada thistle (*Cirsium arvense*), goldenrods (*Solidago* spp.), white clover (*Trifolium repens*) and yellow sweet clover (*Melilotus officinalis*). Other early successional fields are used for hay production and/or grazing. Some are located west of Friendship Road, east of McCormack Lake, and one is located directly north of the northern extension of McCormack Lake (Figure 1). Some of the early successional fields contained areas of emergent wetland vegetation, generally located near forest edges. These patches were dominated by various sedges (*Carex* spp.) and common rush (*Juncus effusus*).

Late successional fields are located southeast of the curve in Friendship Road (curve located approximately 1/3 mile west of the Friendship Road/East New Road intersection). These fields contained herbaceous species similar to those found in the early successional fields, but also contained woody species and seedlings or saplings. Dominant woody species included eastern red cedar (Juniperus virginiana), blackberry (Rubus allegheniensis), and multiflora rose (Rosa multiflora).

Wetland forest is located primarily in the area between the Friendship Road curve and Perrine Road. A large expanse of forested wetland is associated with the Devil's Brook in this area. Dominant canopy species in the forested wetland included sweet gum (Liquidambar styraciflua), red maple (Acer rubrum), swamp white oak (Quercus bicolor), green ash (Fraxinus pensylvanica), and pin oak (Quercus palustris).

Upland forest is located south of Friendship Road, east of the curve, in the area of the power line easement, and also between Route 1 and Ridge Road. Dominant canopy species in the upland forest south of Friendship Road include white oak (Quercus alba), American beech (Fagus grandifolia), red oak (Quercus rubra), and American elm (Ulmus americana). Various hickory (Carya spp.) species were present in both upland and wetland forests. The westernmost forested area (between Route 1 and Ridge Road) was dominated by eastern red cedar and crabapple (Malus sp.).

The majority of the agricultural land throughout the project area was planted in either corn or soybeans at the time of the field surveys. One field, located at the western end of the project area, at the intersection of Ridge Road and Schalk's Crossing Road, was planted in oats.

B. Habitat Evaluation for Species of Concern

The potential for suitable habitat and presence within the study area of each of the SOCs were evaluated. Habitat suitability was determined based on a comparison of descriptions of habitat reported in the literature to vegetative community characteristics observed in the field or deduced from review of aerial photographs. A rating index of potentially suitable habitat for each of the SOCs was developed. Habitat suitability was rated from no potential (0) to high potential (4).

The presence of potentially suitable habitat within the project area does not necessarily imply that a particular species will be present. However, in general, the higher the potential that the habitat is suitable, the higher the likelihood that the species is present. The presence of each of the SOCs within the study area was determined from

direct observation during field surveys and previous reports in the vicinity of the project area. The results of these evaluations for each SOC are summarized in Table 2 (Appendix A) and are discussed below.

Pied-billed grebe

The pied-billed grebe is a permanent New Jersey resident of well-vegetated lakes, ponds and marshes. Only the breeding population is endangered in New Jersey. They build floating nests of vegetative material and prefer to nest in areas that are not heavily vegetated. They eat fish, frogs and aquatic invertebrates (Ehrlich *et al.*, 1988). There is no potential habitat to support pied-billed grebe within the project area. There are two small impoundments of the Devil's Brook, located north and south of the dirt farm road (Turkey Island Road) within the central portion of the project area. Both ponded areas, however, are surrounded by dense forest cover. McCormack Lake and its surrounds provide more potentially suitable habitat; therefore, it is unlikely that pied-billed grebe would utilize the small impoundments within the project area.

Although it is not recorded in the NJ Natural Heritage Program database (1995), pied-billed grebe has been documented on McCormack Lake (Fishback, 1994). No pied-billed grebes were observed during field surveys. It was determined that pied-billed grebe are not present within the project area due to lack of suitable habitat.

Great blue heron

The great blue heron is a large bird of marshes, swamps, shores and tidal flats. Only the breeding population is threatened in New Jersey. Breeding habitat consists of freshwater or brackish marshes, swamps, rivers, lakes or mangroves, and is used by large colonies of the birds. They forage alone, however, at remote feeding sites. There are 10 - 15 great blue heron rookeries in New Jersey. There are no known rookeries in Middlesex County (Mr. Dave Jenkins, personal communications, 1995). Potentially suitable feeding habitat occurs within the project area on the Turkey Island property, within the Devil's Brook and the two small impoundments north and south of the dirt farm road.

The NJ Natural Heritage Program database (1995) does not record any sightings on or in the immediate vicinity of the site, or within the Hightstown or Jamesburg quadrangles. According to the Ecological Resources Inventory for the Turkey Island property, great blue herons do utilize habitat in and around McCormack Lake and the Devil's Brook (Fishback, 1994). However, this is not critical breeding habitat. A great blue heron was observed in mid-June, standing in the northern corner of an agricultural field located east of Perrine Road, north of the project alignment. Another (or possibly the same individual) was

observed flying over forested wetlands and agricultural fields within the project area during field investigations in July. It was concluded that there is some potentially suitable feeding habitat, but no potentially suitable nesting habitat within the project area.

American bittern

The American bittern is a bird of marshes, meadows and, occasionally, upland pastures (Pearson, 1936). Only the breeding population is threatened in New Jersey. They nest on the ground among reeds in marshes. The bittern has a habit of standing among the reeds with its head cocked straight up so that they easily blend with the environment and are difficult to observe. Habitat size requirements are variable, but American bitterns are more abundant in larger wetland complexes (NJDEP, 1993).

Although they can be found in swamps, it appears that potentially suitable habitat would be associated with the areas surrounding McCormack Lake. The wooded swamp habitat surrounding the Devil's Brook within the project area would not provide suitable habitat. There is no record of American bittern in the NJ Natural Heritage Program database (1995) for the Hightstown or Jamesburg quadrangles. American bittern was sighted by Fishback (1994) within wetland emergent and open water (McCormack Lake) habitat on the Turkey Island Corporation property.

No field surveys were conducted specifically for American bittern, since it was determined that no habitat exists within the project area.

Osprey

The osprey is mainly a coastal bird, but can occur inland near bodies of water that are well stocked with fish, the primary component of the osprey's diet (NJDEP, 1980). They nest on tall structures such as dead trees or man-made towers or poles, overlooking the water which is the source of their food supply. No standards for minimum size have been applied to establish the suitability of a water body for osprey foraging, but there must be a sufficient fish population. Timing, frequency of and distance from human disturbance is critical to nesting of ospreys. Adverse impacts have been recorded for activities from 0.12 to 0.9 miles from the nesting site.

Although there are no records of osprey within the Jamesburg and Hightstown quadrangles of the NJ Natural Heritage Program database (1995), Fishback (1994) reports occurrence of osprey at McCormack Lake, south of the project area. The specific location and activity (nesting, resting or feeding) was not reported. While there might be a sufficient fish population within McCormack Lake to support osprey, there is no suitable habitat within the project area for this raptor.

No field surveys were conducted specifically for osprey, since it was determined that no habitat exists within the project area.

Northern harrier

The northern harrier is also known as "marsh hawk", which reflects its habitat requirements. In New Jersey, they breed and nest in wet meadows and marshes. Outside of the breeding season, they roost communally on the ground. They feed on anything from insects to reptiles and small mammals (especially voles), hunting over any kind of open land including short-grass or plowed fields and freshwater marshes (Terwilliger, 1991). Only the breeding population is listed as endangered in New Jersey. Findings suggest that they are largely extirpated as an inland breeder. The northern harrier has been documented as breeding only in salt marshes (Terwilliger, 1991).

Wet meadow habitat is located in the central portion of the project area, bordering forested wetlands. The two wet meadow areas, located on either side of the dirt farm road, and east of the Devil's Brook, are small, no more than a few acres, and close to forested habitat. The wet meadows are also occasionally grazed by cattle or mowed. It is unlikely that northern harriers would utilize these areas. In addition, there are no recorded sightings of the species in the Jamesburg or Hightstown USGS quadrangles (NJNHP, 1995). Fishback (1994) reports occasional use of upland grassland within the Turkey Island Corporation property by this species, although he does not report the time of year, exact location or activities of the observed bird(s). Although the location is not specifically given, the largest area of upland grassland within the ERI study area coincides with the large, contiguous, upland early successional field area just west of Friendship Road within the study area.

No northern harriers were observed during field investigations. There are no salt marshes within the study area; therefore, it was determined that there is no breeding habitat, although there is low potentially suitable feeding habitat. Northern harrier, if present within the area, might occasionally utilize fields within the study area for foraging, particularly during the winter.

Cooper's hawk

Cooper's hawks prefer riparian deciduous, or sometimes coniferous forest for breeding and hunting. Utilizing open woodlands and wood margins, they usually nest 20 to 60 feet above the ground and are considered very secretive birds (Pearson, 1936; Craighead, 1956). Like many raptors, the Cooper's hawk eats small mammals, passerines, reptiles and amphibians. Cooper's hawk has been considered a transient species in New Jersey, passing through only during migration

(Leck, 1975). However, according to Ms. Sherry Meyer and Mr. Dave Jenkins of the NJDEP Division of Fish, Game and Wildlife (personal communications, 1995), Cooper's hawks are becoming more common nesting and year-round residents in New Jersey.

The proposed Route 92 alignment passes through riparian deciduous forest within the Turkey Island Corporation property, the edges of which could provide suitable habitat for the Cooper's hawk. Fishback (1994) reports sighting of Cooper's hawk within upland forest on the Turkey Island Corp. property, but does not specify whether this was north or south of McCormack Lake, and does not report the time of year. There are no records of Cooper's hawk in the Natural Heritage Program database (1995) for the Jamesburg or Hightstown quadrangles.

Though no Cooper's hawks were positively identified during field investigations, an unidentified hawk, approximating the silhouette of a Cooper's or sharp-shinned hawk was observed soaring over deciduous forest northeast of McCormack Lake within the project area in June, 1995. The bird was not sufficiently close to be able to identify distinguishing characteristics. However, it was determined that it was not a red-tailed hawk. In addition, an unidentified hawk call was heard within the same area of the site, which may have been a Cooper's hawk.

The area of the siting contains potential habitat for Cooper's hawk. Although no Cooper's hawks were definitively sighted during our field investigation, it is possible that they utilize forest habitat within the immediate vicinity of the project area for hunting and/or breeding habitat.

Red-shouldered hawk

The red-shouldered hawk breeds in moist to swampy woodlands, generally nesting in the first main crotch of a hardwood. They are generally found in pairs, as they mate for the entire year and possibly for life. They eat small mammals, amphibians, reptiles, insects and some small birds (Craighead, 1956; NJDEP, 1980; Pearson, 1936). Red-shouldered hawk is a transient, and an uncommon breeder in New Jersey (Leck, 1975). However, they can be found in New Jersey year-round (Valent, 1989).

There is low potentially suitable habitat (forested wetland) within the central portion of the project area, northwest of McCormack Lake. No red-shouldered hawks were reported by Fishback (1994) during his extensive studies in the area, and there is no record of this species in the Natural Heritage Program database (1995) for the Hightstown and Jamesburg quadrangles.

No evidence of red-shouldered hawk was noted during ASGECI field investigations. Although there is low potentially suitable habitat within and around the project area, the species is not likely to be present in the project area since it is generally a transient species, and has never been recorded as being sighted within either of the USGS quadrangles that encompass the project area.

Peregrine falcon

Although the peregrine falcon has historically been one of the most widely distributed species in the world, being present on every continent except Antarctica, it is rare in the northeast region, and is Federally listed as endangered. Peregrine falcons nest on cliffs, talus slopes, hollows of trees, 50 to 90 feet up in the tops of trees, and in nests of other large birds. They do not build nests themselves, but may scrape out hollows on cliffs. They may use the same nest site for many years (Hickey and Anderson, 1969). The peregrine is generally a cosmopolitan species (Terwilliger, 1991), perhaps due to its association with one of its favorite prey species, the rock dove. Since their reintroduction in New Jersey and New York, they have often nested on man-made structures in urban areas. As of 1995, 15 pairs of peregrines are known to breed in New Jersey and all nest only on artificial structures such as bridges, buildings and constructed hack towers (Ms. Kathy Clark, personal communications, 1995). Nest sites are usually selected by early March, and eggs are laid by late March or early April in this area (Dr. Tom Cade, personal communication, 1995). Peregrines may lay a second clutch of eggs if the first set is destroyed early in incubation (Beebe, 1967). The young are fledged within 35 to 42 days of hatching (Brown and Amadon, 1968). Fledging ends toward the end of June in New Jersey (Dr. Cade).

No suitable habitat for the peregrine falcon is present within or in the vicinity of the project area. In addition, no peregrines have been reported to the NJ Natural Heritage Program (1995) within the Jamesburg or Hightstown quadrangles, or in the Environmental Resources Inventory of the Turkey Island Corporation property (Fishback, 1994).

No field surveys were conducted specifically for peregrine falcon, since it was determined that no habitat exists within the project area.

Upland sandpiper

Upland sandpipers prefer large, open grasslands with a thin, uniform cover or areas of dense grass interspersed with less dense areas (Carter, 1992). They nest in grass ranging from 6 to 16 inches in height, but feed in grassy fields with low vegetation height. Plowed fields and/or short-grass, heavily grazed pastures or sod farms, as well as airports

are also used, especially in migration (Terwilliger, 1991). Upland sandpipers will avoid forests and successional fields, even in flight (Plage, 1983).

According to Jones and Vickery (1995), upland sandpipers need breeding area of at least 100 acres and preferably 400 acres. Some studies suggests that they require a minimum area of contiguous habitat of at least 10 hectares (24.1 acres) while other studies indicate minimum requirements of 30 hectares (72.3 acres) (Askins, 1993). There is a positive correlation between the area of contiguous grassland and the frequency of occurrence of the upland sandpiper. These and other grassland birds are now reduced to breeding primarily at airports, a few remaining large hay fields and pastures, and some meadows in conservation areas. Extensive row cropping and early crop-cutting threaten these birds.

The upland sandpiper generally nests in early May, constructing four-inch cups in bunches of grass or in a slight hollow scooped in the ground and lined with fine grasses. Family groups appear to remain together until post-breeding migration. Post-breeding upland sandpipers may linger in the breeding locales, or may join others at airfields or other locations (Terwilliger, 1991). Potentially suitable habitat for this species occurs only within the central portion of the study area. One field is located immediately north of McCormack Lake. This field, however, at approximately 25 acres, is smaller than the minimum requirements suggested by Jones and Vickery (1995) and Askins (1993). The largest contiguous stretch of fields is located west of Friendship Road, northeast of McCormack Lake. This stretch consists of several fields, separated only by occasional fencing, and continues beyond the project area. It totals approximately 90 acres, which according to Jones and Vickery (1995), is not quite large enough to be optimal habitat. However, Fishback (1994) documented use of upland grassland habitat on the Turkey Island Corporation property by upland sandpiper. Although the location is not specifically given, the largest area of upland grassland within the ERI study area coincides with the larger field described above. A record of upland sandpiper (1976) is also found in the Natural Heritage Program Database, Hightstown quadrangle.

No upland sandpipers were sighted during field surveys of potentially suitable habitat. However, there is potential for this species to use the expanse of fields adjacent to and south of the alignment on the Turkey Island Corporation property.

Barred owl

The barred owl inhabits wetland and sometimes upland deciduous forests. They are seldom found far from wet habitats. Woodlands bordering lakes, streams, wet meadows, swamps or marshes are particularly attractive to this species. The vocal barred owl resides in New Jersey year-round (Valent, 1989).

The barred owl generally nests in tree cavities, but will also utilize abandoned crow, hawk or squirrel nests (Terres, 1980). Their diet consists mainly of small rodents, but they will also prey upon other small mammals, birds, reptiles and invertebrates. Destruction of wetlands and woodlands is the main threat to this species. Barred owls have been documented to exhibit a strong avoidance for human activity, major roadways and suburban housing developments (NJDEP, 1993).

Potentially suitable habitat for barred owl is present within the central forested area of the project area, surrounding the Devil's Brook and Amtrak lines, and within upland deciduous forest south and east of Friendship Road, near the PSE&G right-of-way. Barred owl has been documented on the Natural Heritage Program database (1995), in the wooded wetlands in the immediate vicinity of the project area. Conversations with a local farmer indicated that he had heard barred owl within the wooded wetlands in the project area on several evenings in the fall and winter. In addition, barred owl use has been documented in the forested wetlands on the Turkey Island Corporation property, which may include a portion of the project area (Fishback, 1994). According to Mr. Larry Torok of the NJDEP Division of Fish, Game and Wildlife, the habitat within the project area does not appear to be ideal for barred owl (personal communication, October 1995).

A survey for barred owls using a taped vocalization was performed on a very calm night in early June, which would have been an optimal time for observing this species. No barred owls were seen or heard in any of the areas determined by ASGECI to provide suitable habitat. It is possible that habitat within the project area is utilized by barred owl. However, it was expected that vocalizations within the forested areas would produce responses if barred owls were present within two miles. However, additional nights of observation may have yielded different results.

It was determined that barred owl may be present within the project area. Potentially suitable habitat is present.

Red-headed woodpecker

The red-headed woodpecker lives mostly in open deciduous woods or prairie country (Terres, 1980). Parklike settings, open fields or pastures with open groves of large trees are

preferred, although they will frequently dwell in hearts of small cities and nest in utility poles along streets in rural areas. They will also inhabit areas of mature forest with an open understory, or forest edges near an open area (Vodak, 1992). Nest cavities are generally located in dead trees 23 to 40 feet above the ground.

The red-headed woodpecker catches flying insects on the wing and seldom drills into trees in typical woodpecker fashion. They will also forage on the ground and in shrubs, eating all kinds of insects, but also fruits, vegetable matter, and young birds or mice (Pearson, 1936).

There is minimal potentially suitable habitat for the red-headed woodpecker within the project area. Only two small areas of forest edge habitat, within the central portion of the project area could potentially support this species. No documentation of this species has been recorded in either the Fishback study (1994) or within the Hightstown or Jamesburg quadrangles in the Natural Heritage Program database (1995).

The area of minimal potentially suitable habitat was surveyed and no red-headed woodpeckers were seen or heard (downy and hairy woodpeckers were heard in adjacent forested areas). It is unlikely that this species exists within the project area due to the lack of sightings and minimal potential for suitable habitat.

Cliff swallow

These birds are colonial nesters that formerly nested on cliffs. Only the breeding population is threatened in New Jersey. They now nest almost exclusively on or under barn eaves (NJDEP, 1980). Insects are their primary diet. Foraging occurs over open lands, particularly agricultural fields. They summer in open country habitats near running water (Terwilliger, 1991). No information was found regarding their success in competition with other species of swallows (i.e., tree swallows and barn swallows).

There is one barn located within the project area. Some barns are located to the north and south. These are the only locations of potential habitat for the cliff swallow. However, these locations contained very high populations of barn and tree swallows.

No sightings of cliff swallow are reported in the Fishback study (1994) or in the Natural Heritage Program database (1995) for the USGS quadrangles in which the project area occurs. Field surveys performed by ASGECI produced no evidence of this species within the project area. Although there is low potentially suitable habitat within the project area, it is used extensively by other swallows. It is not likely that this species is present within the project area.

Loggerhead shrike

The loggerhead shrike is a bird of hedgerow habitats. Its interesting characteristic of impaling its prey has earned it the nickname "butcher bird". Because of this habit, the bird requires habitat with thorny or sharp vegetation (including red cedars) or barbed fencerows. Red cedars and hawthorns are frequently used for nesting (Terwilliger, 1991). Invertebrates are the chief source of food, but the loggerhead may also take small mammals or other birds. When forced to move to forested areas due to habitat or prey loss, shrikes can fall prey to raptors.

Several fencerows and hedgerows of multiflora rose are present within the central portion of the project area. In addition, a red cedar stand is present within the project area, at the western end, near US Route 1.

There is no documentation of loggerhead shrike within the USGS quadrangles in which the project area occurs (NJNHP, 1995). No loggerhead shrikes were documented by Fishback (1994) during surveys of the Turkey Island Corporation property. Evidence of the existence of loggerhead shrike was not observed within suitable habitat determined to be of low potential for this species. It is unlikely that this species is present within the project area.

Vesper sparrow

Vesper sparrows prefer fields that are adjacent to or bisected by a hedgerow with shrubs (Best and Rodenhouse, 1984). They generally perch in the hedgerow and nest in sparsely vegetated areas in adjacent fields. They sing throughout the day in the nesting season. Vesper sparrows forage over the ground, eating insects, weed seeds and waste grain (Terres, 1980). They nest on the ground under dead weed stems in small depressions, occasionally in alfalfa or previous year corn fields. Several studies (Askins, 1993; Jones and Vickery, 1995; Vickery, Hunter and Melvin, 1994) have indicated that incidence of this species reached 50% at 50 acres of suitable habitat and that the incidence was strongly correlated with the size of the grassland. The 50% incidence is thought to provide a reasonable estimate of a species' minimum area requirement (Vickery *et al.*, 1994).

Low potentially suitable habitat for the vesper sparrow is present in the central portion of the study area, west of Friendship Road, where contiguous fields continue south of the project area. The total area of these fields is approximately 90 acres. However, these fields may be too thickly vegetated to support any breeding pairs. Agricultural fields exceeding 50 acres within the study area might provide some habitat if and when they are left fallow. However, these would vary yearly. Nearly all agricultural fields within the study area were planted in 1995.

There is no documentation of vesper sparrow within the USGS quadrangles which include the project area (NJNHP, 1995). Fishback (1994) did not observe this species during surveys of the Turkey Island Corporation property. No vesper sparrows were observed within low potentially suitable habitat for this species by ASGECI. It is unlikely that this species is present within the study area.

Savannah sparrow

As a breeding bird in New Jersey, the savannah sparrow is restricted to short grass fields or relatively dry, short-grass salt marshes. However, habitat size is not as restricting as it is with the vesper and Henslow's sparrow. Approximately 25 acres seems to be the minimum habitat size (Askins, 1993). Like most of the grassland passerines, territory size is only 1 to 3 hectares (approximately 2 1/2 to 7 1/2 acres). They prefer areas of relatively dense, continuous grass cover with a relatively thick layer of dead grass, similar to typical eastern meadowlark habitat. However, they have also been known to use agricultural fields.

Savannah sparrows nest in excavated or natural ground depressions lined with fine vegetation, and generally well concealed (Ehrlich *et al.*, 1988). They roost in small compact groups on the ground. Their diet mainly consists of spiders and grass seeds.

The project area contains some potentially suitable habitat for savannah sparrow, particularly the mowed grassy hay fields in the central portion of the project area, on the Turkey Island Corporation property. The field north of McCormack Lake is approximately 25 acres. Contiguous fields northeast of the lake, west of Friendship Road, total approximately 90 acres. Savannah sparrow has been documented on the Turkey Island property within wetland emergent, upland grassland and upland agricultural habitats (Fishback, 1994). This species is recorded as being on or within the immediate vicinity of the site in the Natural Heritage Program database (1995).

No savannah sparrows were observed during ASGECI field surveys within the study area. Although the field investigations began near the end of the nesting/breeding season, they still took place during a time which should have yielded sightings if this species were present. However, this species has been reported previously in the vicinity and potentially suitable habitat does exist.

Grasshopper sparrow

The grasshopper sparrow is an inconspicuous bird traditionally restricted in the forested northeast to extensive natural clearings and sparsely wooded areas.

Clearing of land for agriculture permitted this species to spread as a result of increases in availability of suitable nesting habitat. However, as a result of loss of agricultural land to development, mowing during the breeding/fledging period, and with the decline in the agricultural base of the northeast resulting in the regeneration of farmland to a shrub or forested state, the status of this species, as well as other grassland birds in New Jersey (e.g., vesper and savannah sparrows, upland sandpiper, etc.), has declined in recent years (NJDEP, 1980 & 1987).

Smith (1963) describes grasshopper sparrow habitat as consisting primarily of cultivated grasslands, particularly those containing orchard grass (Dactylis glomerata), alfalfa (Medicago sativa), red clover (Trifolium pratense), and bush clover (Lespedeza spp.). Habitat suitability for this species declines dramatically as fertility of grassland increases, resulting in increases in vegetation density or, in successional old field communities, in a marked increase in woody vegetation cover (i.e., shrubs). Old field communities inhabited by the grasshopper sparrow may also include poverty grass (Danthana spicata), bramble (Rubus spp.), and beardgrass (Andropogon spp.), but the birds leave as the fields fill with shrubs (Smith, 1963).

Vickery (1994) states that grasshopper sparrows prefer areas of at least 200 acres. Incidence increases with grassland size, and nests have been found with significantly greater frequency in the grassland interior, farther from the edge (Askins, 1993). The species breeds in open areas that are maintained at a height of approximately 10 to 16 inches and are composed mainly of grasses. It is most common in areas of bunch grasses with areas of bare ground (at least 24%), rather than areas of continuous grass cover. Grasshopper sparrows have been reported to abandon fields when shrub cover exceeds 35% (Johnston and Odum, 1956), however some low shrubs are important for singing perches (Vickery, 1990).

There is minimal potentially suitable grasshopper sparrow habitat within the study area. Hay fields in the central portion, on the Turkey Island property, west of Friendship Road are not nearly as large as research indicates as the preferred size for habitation by this species. The largest contiguous field area is 90 acres. However, this does not preclude the grasshopper sparrow from utilizing smaller fields. Smith (1962) documented up to six breeding pairs within a 30-acre area of otherwise suitable habitat. Fields in the study area contain nearly continuous cover, with little bare area. The high fertility of these fields indicates that usage by grasshopper sparrow, if present,

would be low. Shrub cover in the field east of Friendship Road, and in fields east of Route 130, appears to exceed 35%.

There is no documentation of grasshopper sparrow within the USGS quadrangles which include the project area (NJNHP, 1995). No grasshopper sparrows were documented by Fishback (1994) during surveys of the Turkey Island Corporation property. Grasshopper sparrows were not observed by ASGECI within minimal potentially suitable for this species. It was determined that this species may not be present within the study area, since there is minimal potentially suitable habitat and there has been no documented occurrence.

Henslow's sparrow

Henslow's sparrow is a secretive bird of low wet meadows and abandoned, early successional, agricultural fields. Much of its time is spent on the ground among tall grass and brush (Terwilliger, 1991). This sparrow prefers low damp places, but also frequents dry upland fields. Ground cover is usually dense and one to two feet high (Terres, 1980). When breeding, male Henslow's sparrows sing day and night, usually from a bush or tall weed, but occasionally concealed in the grass. They are reported to sing incessantly in the rain.

The Henslow's sparrow forages on the ground, eating insects and seeds. They live in loose colonies, nesting on the ground. Terres (1980) refers to a territory size of one to two acres. The Askins (1993) study found that Henslow's sparrow was absent from prairies smaller than approximately 25 acres. Unlike the grasshopper sparrow, the Henslow's sparrow does not inhabit burned or mowed fields, preferring dense litter to bare spaces. On the other hand, too much brush will drive them from a site. Therefore, this species must constantly shift to new patches of habitat (Askins, 1993).

Minimal potentially suitable habitat for Henslow's sparrow was found within the study area. Most of the fields within the study area are mowed or grazed on a rotational basis. Fields that are not mowed are smaller than 25 acres. Therefore, there is limited potential for the presence of Henslow's sparrow.

There is no documentation of Henslow's sparrow within the USGS quadrangles that include the project area (NJNHP, 1995). None were documented by Fishback (1994) during surveys of the Turkey Island Corporation property. No Henslow's sparrows were observed during field investigations by ASGECI. It is unlikely that this species is present within the project area. There is only minimal potentially suitable habitat present.

Bobolink

Bobolinks inhabit fields with dense grasses or forbs, especially hay fields. They nest on the ground in a natural or scraped depression (Ehrlich *et al.*, 1988). Bollinger and Gavin (1992) found that bobolinks were more abundant in hay fields than in any other open habitat. They concluded that they are most abundant in fields with relatively sparse vegetation dominated by grass. In addition, a dense mat of dead vegetation, typical of older hay fields, is preferred (Askins, 1993). While large areas of habitat do not appear to be required by this species, incidence of bobolinks does increase exponentially with increases in habitat area from 2.5 to 75 acres.

There is potentially suitable habitat for the bobolink within the hay fields and pasture in the central portion of the project area (Turkey Island Corporation property) and in successional fields east of Route 130 and north of Route 32. Additional potential habitat may occur south of the project area. Fishback (1994) reports occurrence of bobolink within wetland emergent and upland grassland habitat on the Turkey Island Corporation property, but does not indicate the location. However, the largest area of upland grassland within the ERI study area coincides with the approximately 90 acres of upland field within this project's study area. The Natural Heritage Program database (1995) contains a sighting of bobolink within the immediate vicinity of the project area.

Although no bobolinks were sighted during field investigations by ASGECI, potentially suitable habitat does exist within and south of the project area and the species has been reported in the vicinity by others.

Wood turtle

Wood turtles require both aquatic and terrestrial habitat (NJDEP, 1993). They tend to be aquatic from approximately mid-November to mid-March, terrestrial from mid-May to mid-September, and in transition the remainder of the year. Streams and rivers are used primarily for breeding and hibernating. They prefer slow meandering streams with sandy bottoms and shoals for breeding in the spring or fall. In the winter, they hibernate on the bottom or within the banks of streams or rivers. Wood turtles will nest in any number of habitats, including agricultural fields (Zappalorti *et al.*, 1984).

The Devil's Brook and its environs appears to provide low potentially suitable habitat for this species. During field surveys of the project area in the summer, many portions of the Devil's Brook were dry, or nearly so. However, because New Jersey was experiencing a drought during the summer of 1995, it is not known if the brook generally carries enough water to support wood turtle activities. Because most of

the Devil's Brook has been channelized within the project area, it does not provide many undercut banks that the turtles hibernate under. Portions of the stream outside of the project area may, however, have suitable characteristics. Wood turtles might use the fields in the project area during the summer. Mr. Larry Torok of NJDEP, Division of Fish Game and Wildlife, who has made limited field surveys of the forested habitat surrounding the brook, stated that the habitat is not optimum for wood turtles (personal communication, October 1995).

The NJ Natural Heritage Program database (1995) contains records of wood turtles in both the Hightstown and Jamesburg quadrangles. Fishback (1994), however, does not report sighting of wood turtles within the Turkey Island Corporation property.

No wood turtles were found during field surveys of the forested wetlands associated with the Devil's Brook. The majority of the brook within the project area is channelized and therefore, not likely to support wood turtles. Field surveys, however, were limited, and wood turtles can be difficult to find, even in optimal habitat. Therefore, it is possible that wood turtles are present within the project area, but not likely, due to the low potential for the habitat to be suitable.

Bog turtle

The bog turtle is most abundant in Monmouth, Warren, Sussex, Morris, Passaic, and Union counties. It is considered to be imperiled because of rarity (6 - 20 occurrences in the State). Much of its historical habitat has been lost due to destruction of wetlands (Zappalorti, 1990).

Bog turtles hibernate through the winter in burrows of muskrats and other small mammals or in burrows they have excavated for themselves (Ernst *et al.*, 1989). These small turtles leave their hibernacula in April through May, and return in the late summer. They are occasionally seen in the fall months (Terwilliger, 1991). Summer hibernation (aestivation) may occur in hot weather, usually in July or August (Bury, 1979). Bog turtles can mate from late April through July (Gourley, 1979; Ernst *et al.*, 1989). They may lay two clutches in one year.

Preferred habitat includes relatively open portions of sphagnum bogs, swamps, or marshy meadows with slow-moving, spring fed streams or spring seeps with soft bottoms (Zappalorti, 1980; Bury, 1979; Chase, 1989). Pure, unpolluted water is required. The nest and hibernacula sites include grass/forb areas and areas with emergent aquatic vegetation. Common flora in bog turtle habitat includes alder (Alnus sp.), low grasses and sedges, skunk cabbage (Symplocarpus foetidus), cattail (Typha spp.),

jewelweed (Impatiens capensis), and smartweed (Polygonum sp.)(Terwilliger, 1991; Zappalorti, 1980; Chase, 1989). Bog turtles disappear when boggy areas with muddy substrate and associated flora succeed to hardwood swamps. Zappalorti (1980) suggests that open canopy is essential to bog turtle habitat.

The NJ Natural Heritage Program database (1995) contains no records of bog turtle in either the Hightstown or Jamesburg quadrangles. Fishback (1994) does not report sighting of bog turtle within the Turkey Island Corporation property.

No potentially suitable habitat exists within the project area. Swamp habitat with sedge tussocks and skunk cabbage does exist in association with the Devil's Brook in the central portion. However, this area is flowed only intermittently and has a closed canopy.

No bog turtles were found during field surveys. Field surveys, however, were limited, and did not occur during optimum search times. Bog turtles are small and difficult to find. It is unlikely that bog turtles are present within the project area, since there is no potentially suitable habitat.

Triangle floater

The triangle floater is a rare mussel in New Jersey. It prefers small streams where it becomes locally very abundant, going far up towards the headwaters (Clark, 1981). It is found chiefly where steady water flow prevails, and seems to avoid rough water and riffles. While this mussel tends not to prefer slackwater, it has occasionally been found in ponds and canals. It lives mostly in a mixture of coarser or finer gravel with sand and mud. However, it has also been documented in eddies with slow current embedded in the mud deposited between larger stones. Clark (1981) observed that it is also abundant in outlet streams just below lakes.

Potentially suitable habitat in the project area includes the channelized portion of the Devil's Brook parallel to the railroad. This portion of the brook was diverted to accommodate the Amtrak Railroad line. This portion of the Devil's Brook is canal-like; it consists of a very straight channel with a sandy, gravelly bottom. It is very clear and generally void of stones, vegetation or debris. This brook could contain habitat for the triangle floater, although more suitable habitat would potentially exist south of the project area, within the Shallow Brook outlet of McCormack Lake.

The NJ Natural Heritage Program database (1995) contains a documented occurrence within the Hightstown USGS topographic quadrangle, as recently as September 1994 (location not

described). No geographical records for the species, however, were listed within the Millstone River drainage basin by Clark (1981), and the Ecological Resources Inventory of the Turkey Island Corporation property (Fishback, 1994) does not report sighting of this species.

No mussels or mussel shells of any kind were observed within the project area. Unidentified bivalve shells and shell pieces were observed by ASGECI field personnel within the northern limits of McCormack Lake, south of the project area.

It is unlikely that this species is present in the project area. Only minimal potentially suitable habitat is located within the project area.

Brook floater

The brook floater is a mussel, usually found in rapids or riffles on rock and gravel substrates and also on sandy shoals (Clark, 1981). It is found in small rivers and creeks.

There is no potentially suitable habitat within the project area for the brook floater. There may be suitable habitat for this species in the Millstone River or the Shallow Brook, south of the project area. This species, however, has not been recorded within the Millstone River drainage basin (Clark, 1981) nor within the Jamesburg or Hightstown USGS quadrangles (NJNHP, 1995). The Ecological Resources Inventory of the Turkey Island Corporation property (Fishback, 1994) does not report a sighting of this species.

No mussels or mussel shells of any kind were observed within the project area. There is little potential for this species to exist within the project area, as there is no potentially suitable habitat.

Yellow lampmussel

This mussel species is very adaptable to artificial lacustrine habitats, and favors stable sand and muddy sands in larger bodies of water, apparently with little regard for waves and current (Fuller, 1980). Potentially suitable habitat for yellow lampmussel appears to be absent from the project area. McCormack Lake, south of the project area, could provide potential habitat for this species.

There is no documented occurrence of this species within the USGS quadrangles that contain the project area (NJNHP, 1995), and it was not reported in the Ecological Resources Inventory of the Turkey Island Corporation property (Fishback, 1994). The species has not been sighted and was determined not to be present within the project area due to lack of potentially suitable habitat.

C. Other Wildlife Sightings

Several mammals, reptiles, amphibians, and 45 species of birds were observed throughout the study area (Table 3; Appendix A). The species observed are generally common to rural, developed and agricultural areas. Additional species common to agricultural and developed areas, although not observed, would also be expected to inhabit the area.

The avian community, while varied, consists primarily of common songbirds. These birds tended to be present primarily along hedgerows and wooded edges of early successional and agricultural fields. Forest interiors and central areas of agricultural fields were less active with avian species. In general, birds were not prevalent in areas in the immediate vicinity of human disturbances. Swallows (tree and barn), however, were observed on overhead wires, and in very close proximity to houses and barns. These species are somewhat dependant on this type of human development. It is interesting to note that most birds were found to be associated with upland habitat. Raptors (e.g., American kestrel and red-tailed hawk) were mainly associated with forest edges of agricultural fields, presumably so they can overlook the fields for foraging.

Mammals were found in nearly all habitat types. All mammals observed are common to agricultural/rural areas. White-tailed deer were observed mainly within forested areas, while smaller mammals were observed in fields and close to hedgerows, and along the wooded stream corridors. In mid-June, a fox was observed playing in the early successional field located north of Lake McCormack, in the central portion of the study area. According to the landowner, a den is located in the vicinity. Reptiles and amphibians were observed only in the forested wetlands or within the brook itself.

The greatest diversity of species was observed in upland fields (including agricultural), but was concentrated at hedgerows and forested edges. This may be partially accounted for by the fact that this habitat is the most abundant throughout the alignment. However, it is also good habitat because it provides food, cover and nesting habitat for many avian species, which were the most abundant group of wildlife observed here. Small mammals such as rabbits and hedgehogs also thrive in this habitat.

Forested wetland habitat also yielded sightings of diverse species, primarily reptiles and amphibians but also mammals. Wetland emergent areas and upland forested areas were not prevalent within the study area, and did not yield a great diversity or concentration of wildlife sightings.

Because this investigation was performed primarily during the summer months, migratory species that potentially utilize the project area were not identified. Additionally, many species that could use the project area during the summer months were also not observed. Species that are primarily nocturnal, cautious or inconspicuous may be present. Examples of species not observed, but expected to be present in the project area, include skunks, bats, small frogs and migratory warblers.

IV. ANALYSIS OF POTENTIAL PROJECT IMPACTS TO WILDLIFE

The potential for adverse impacts to wildlife, and endangered and threatened species in particular, as a result of construction of the wetland minimization alignment for Route 92 was evaluated. The evaluation was based on the probability that the SOCs utilize habitat within the proposed ROW of the alignment, the types of wildlife found in the project area, and the relative value of the wildlife habitat.

Wildlife within the project area would be directly impacted by the loss of some habitat. Fragmentation of fields and forests may also impact habitat suitability for some species. The development of the highway will increase human activity in the project area. This may impact wildlife within the project area and wildlife that resides outside of the project area, but is sensitive to human disturbance. Impacts to water quality could impact reptiles and amphibians, as well as other wildlife that utilizes the water supply in or around the project area.

The development of proposed Route 92 will cause the direct loss of areas of several habitat types within the alignment. The greatest acreage of habitat type lost will be agricultural land. Although 40 species, nearly all avian, were observed utilizing agricultural land throughout the alignment, the majority of these species were observed to be concentrated within hedgerows, or at the perimeter of forested areas. Although some of the hedgerow habitat will be lost, the Wetlands Minimization Alignment was designed to avoid as much of the forested area as possible, and is concentrated in the open areas of the agricultural fields throughout the majority of the alignment. These planted areas were observed to support fewer species and a lower concentration of wildlife in general. Forest/field edges will generally be preserved. Therefore, concentration of the alignment through agricultural lands minimizes the habitat loss.

Early successional fields provided habitat for the greatest diversity of species (primarily avian) in relation to the amount of habitat within the project area. The proposed

alignment generally runs along the edges of this habitat type, although one field at the intersection of Route 32 and Route 130 and another located north of the northern extension of Lake McCormack, will be bisected (see Figure 1). The planned location of the alignment primarily along the edges of early successional field habitat will minimize the impact of habitat loss to species in this community.

Direct loss of forested habitat will primarily occur within the central and western areas of the alignment. The alignment avoids forested areas as much as possible; approximately 32 acres of forest will be impacted between Perrine Road and Route 130. The species most likely to be affected by the loss of this habitat are the woodland birds. Habitat for some species, such as the white-tailed deer, may be enhanced by the creation of additional edge habitat. Since much of surrounding lands to the north and south are forested, direct impacts to wildlife from the loss of this amount of forest should be low. The same species utilizing forested land within the project area would be expected to also be present in the extensive forested areas outside of the project area.

In addition to the direct impacts of highway construction, there may be impacts on wildlife associated with the fragmentation of habitats. The most significant area affected by forest fragmentation is in the area between Friendship Road and the railroad tracks. The alignment bisects forested wetlands and upland early successional field (grassland) habitat in this area. The alignment generally follows an existing dirt road in the eastern portion of the Turkey Island Corporation property, which forms the northern boundary of the largest contiguous area of early successional field (approximately 90 acres) within the study area. The alignment then traverses two forested wetland areas and the northern half of an upland early successional field, north of McCormack Lake. With the exception of savannah sparrow and bobolink, the field, at approximately 25 acres, is probably not large enough to support significant populations of endangered or threatened grassland birds; but it was observed to support a large population of eastern meadowlarks. Fragmentation of this field may decrease the suitability of the upland field habitat for some species, such as eastern meadowlark and savannah sparrow.

The primary forested areas that the alignment bisects are "fingers" of a larger forested area located to the north of the project area. The eastern finger abuts the eastern portion of the northern extension of McCormack Lake to the west, and early successional fields to the east. This extension may provide a forested corridor for some wildlife, particularly mammals (e.g., deer, raccoon), to travel from the northern forest to the lake and fields. Fragmenting

this extension from the northern forest will make it difficult for these species to access the lake and fields. Some avian species, such as barred owl, although physically able to continue to use the corridor, may avoid accessing the fields and lake due to the presence of the highway. Fragmentation of the western "finger" will reduce the suitability of the southern fragment of this forest for species that utilize the forest interiors. Fragmentation of forest in this portion of the project area can not be avoided.

Non-avian wildlife will still be able to use the corridor provided along the railroad since the highway will be bridged over the tracks. In addition, box culverts are proposed where the highway crosses the Devil's Brook. These culverts should be designed to permit passage for fish and many reptiles and amphibians.

A small area of eastern red cedar-dominated forest will also be fragmented by the proposed alignment. This area, however, is located between US Route 1 and Ridge Road. This area does not support a large number or diversity of wildlife. Wildlife utilizing this habitat would be species that do not require large forested areas and are adapted to living near a highway. Two peninsulas of forest located north of Friendship Road just west of Route 130 will also be fragmented from contiguous forest by the highway. The value of these areas as wildlife corridors is low since the peninsulas are narrow and are disconnected from the forest south of Friendship Road by the existing roadway. Therefore, impacts in these areas due to fragmentation are expected to be minimal.

Amphibians, reptiles and aquatic species are susceptible to changes in water quality that could result from stormwater runoff from the highway. However, water quality of the streams should not be impacted due to proposed pre-treatment of stormwater discharge through the use of detention basins and grassed swales. Stormwater management practices will be in accordance with the standards of the Delaware and Raritan Canal Commission. The addition of detention basins may attract species such as Canada geese.

The impacts of human activity (e.g., increased noise, human presence) on wildlife will vary depending on the species. Due to the limited season and frequency of the field surveys conducted during this investigation, all species that utilize the project area were not observed. This includes species that are primarily nocturnal (bats, skunks), migratory (warblers, geese), or particularly cautious or inconspicuous (some frogs, rodents, etc.). However, most of the species observed within the project area are common to disturbed areas (see Table 3) and can be assumed to be indicative of the general wildlife population in the area.

These species continue to thrive amidst human development. Therefore, the impact of human activity within the project area, on species known to inhabit the project area, is anticipated to be minimal. However, some species that may be present in the immediate vicinity of the project area (e.g., osprey, barred owl) are known to strongly avoid human activity, including highways. If these species are present in the area, they will be adversely impacted by the construction of the proposed highway. Migratory species that are sensitive to human activity may also avoid the area once the highway is constructed.

Specific impacts to the SOCs that may be present in the project area were evaluated. The species with the potential to be impacted by the project area are osprey, barred owl, Cooper's hawk, bobolink, savannah sparrow, and wood turtle (Table 4). Since great blue heron and northern harrier are most likely to use habitats within the project area for foraging only, this is little potential to impact these species. Significant areas for foraging will remain unaffected by the project.

Timing, frequency of, and distance from disturbance is critical to nesting of osprey. Adverse impacts have been recorded for activities from 0.12 to 0.9 miles from the nesting site. Fishback (1994) reports occurrence of osprey at McCormack Lake. Time of year, activities (nesting or feeding) and a specific location are not given in the report. It is not known if osprey are nesting within the distance mentioned; however, inland nesting of ospreys is unlikely. If osprey do nest near the lake, they would most likely nest at the southern end of the lake because this is the area farthest removed from human development. This is approximately 0.6 miles from proposed Route 92. Therefore, there is potential for adverse impacts to any nesting osprey. However, nesting of osprey in this area is not likely since the area is far inland, and is proximal to human development (Scott's Corner Road, railroad tracks). The NJDEP Natural Heritage Program database (1995) contains no records of osprey within the USGS quadrangles containing the project area. There is no potentially suitable habitat for osprey within the project area itself. Therefore, the potential for impacts to osprey is low.

The barred owl typically inhabits forested wetlands and has been reported in the immediate vicinity of the project area. They have been documented to exhibit extreme avoidance to human activity such as major roadways. The proposed alignment does encroach on some potentially suitable barred owl habitat. Therefore, construction of the proposed Route 92 may impact this species by fragmentation of their habitat, particularly the forested areas north of McCormack Lake, and by causing avoidance of the highway area. The proposed alignment, however, is located south of a large

contiguous forested area that provides potentially suitable habitat for barred owl. More forested habitat is located south of the alignment between Friendship and Miller Roads, and between Miller Road and Route 130, and south of Miller Road in the forested wetlands along the Shallow Brook. Therefore, large areas of potential habitat for barred owl will remain intact in the general area.

Cooper's hawk may also be present within the project area, or in the immediate vicinity. Potentially suitable habitat within the project area consists of wood margins bordering open fields. This type of habitat is present outside of the project area as well. The presence of Cooper's hawk is increasing in New Jersey (Sherry Meyer, personal communication, 1995). Therefore, it is reasonable to conclude that they are not particularly sensitive to human activities. Although the proposed highway will disturb some potentially suitable habitat, large areas of forest edge bordering early successional field will be left intact. Construction of the highway will not cause significant reduction in nesting, resting or foraging habitat for this species. Therefore, this project has low potential impact to the Cooper's hawk.

Upland sandpiper, savannah sparrow and bobolink all have similar open-field habitat requirements. Size of the field is one of the most important characteristics of the habitat for determining the suitability for these species. The construction of the proposed highway will disturb some potentially suitable habitat for these grassland birds. The alignment fragments two successional field areas. One located east of the intersection of Routes 32 and 130 may provide habitat for bobolink, although none have been observed in this field. The other field, an upland island of approximately 25 acres, is located north of McCormack Lake and surrounded on three sides by forest. Because of its small size and proximity to wood margins, this field is unlikely to provide habitat for upland sandpiper since this species generally requires much larger areas of contiguous habitat. However, this field may be suitable for savannah sparrow and bobolink. Fragmentation of this field would reduce its suitability for these area-sensitive species. The large field west of Friendship Road, east of McCormack Lake and north of the Shallow Brook provides the best potentially suitable habitat within the immediate vicinity of the project area. The alignment runs along the northern edge of this field, thereby avoiding impacts due to fragmentation. Therefore the potential for impacts from the project is minimal for the upland sandpiper and low for savannah sparrow and bobolink. These species are not known to be particularly sensitive to human activity since they often utilize airports.

Wood turtles have not been documented within the immediate vicinity of the project (NJNHP, 1995; Fishback, 1994); however, there is potential habitat, albeit of low suitability, in the vicinity. If wood turtles are present in the vicinity, the proposed alignment would disturb some potentially suitable habitat through direct disturbance and potential water quality impacts. These potential impacts, however, would be minimized by engineering design. Box culverts that are currently proposed at stream crossings would provide routes for turtles to bypass the roadway, if necessary. Stormwater management and water quality treatment will be designed to minimize impacts to water quality. Therefore, potential impacts to wood turtles, if they are present in the area, would be minimal.

The potential for impacts to wildlife from the wetland minimization alignment of Route 92 is dependant upon the particular species. Most species known to be present in the project area are common to developed areas and thus should not be greatly affected. Habitat fragmentation will disrupt corridors for wildlife movement, particularly for mammals, and reduce habitat suitability for species that require large contiguous areas or interior habitats.

The Species of Concern with the highest potential to be impacted by the project is the barred owl. Forest fragmentation and increased human activity will reduce the suitability of one area of potential habitat for this species. Osprey may only be affected if nesting in the vicinity, which is not likely. One field that provides marginal potential habitat for savannah sparrow and bobolink will be bisected by the alignment. A larger field containing more suitable habitat for these species and the upland sandpiper will be relatively unaffected. The wood turtle, although not expected in the project area, could be present, but should not be significantly impacted by the project. Impacts to SOCs are summarized in Table 4 (Appendix A). Overall, the potential for adverse impacts to wildlife is low due to the linear nature of the project, concentration in agricultural areas and general avoidance of valuable habitat.

V. PRELIMINARY ASSESSMENT OF CONSTRAINTS TO DEVELOPMENT

Cooper's hawk, barred owl, savannah sparrow, upland sandpiper, bobolink and wood turtle were determined to be potentially present in the project area. Osprey was determined to be potentially present within one mile of the project area. Osprey and barred owl, if present, are the only rare species likely to be adversely impacted by the project. Only if osprey are nesting near McCormack Lake would this species be impacted by the project.

Of the species determined to be potentially present within the project area, barred owl, bobolink and wood turtle are considered by NJDEP to utilize wetlands. Therefore, the potential presence of these species may affect the resource value classification of wetlands in the project area (NJDEP, draft 1994). In New Jersey, those wetlands "which are present habitats for threatened or endangered species, or those which are documented habitats for threatened or endangered species, and which remain suitable for breeding, resting, or feeding by these species during the normal period these species would use the habitat" are classified as exceptional resource value wetlands (N.J.A.C. 7:7A-2.5). These wetlands are subject to 150 foot buffers, called transition areas. The exceptional resource value classification increases the constraints and limitations on the availability of general permits and transition area waivers for activities in wetlands. A determination of the resource value of wetlands in the project area is pending in an application submitted to NJDEP for a Letter of Interpretation.

Normally, transition area waivers can be granted in order to conduct certain activities in transition areas. In the case of exceptional resource value wetlands, however, transition areas can not be reduced to less than 75 feet unless the applicant demonstrates to the satisfaction of the NJDEP that the proposed activity would meet the standards for granting a freshwater wetlands permit if the activity were proposed in the wetland instead of the transition area. However, transition areas may not be reduced if the wetland contains a present or "documented habitat for threatened or endangered species" unless the applicant can demonstrate "no significant impact" (N.J.A.C. 7:7A-7.2 (c)1 and (g)). In addition, transition area averaging (reducing in some areas and compensating in others) will not be approved for exceptional resource value wetlands if "the freshwater wetland adjacent to the transition area is a breeding or nesting habitat for threatened or endangered species" (N.J.A.C. 7:7a-7.5(b)1). This determination is made by NJDEP.

The disturbance of habitat in wetlands and wetland transition areas, as required by the New Jersey Turnpike Authority for the construction of proposed Route 92 will require a Freshwater Wetlands Individual Permit. This permit will require, as a condition, a wetland restoration or mitigation plan.

Upland species are not afforded the same habitat protection as wetland species. There are no State regulations concerning development or disturbance of upland habitat for endangered or threatened species, except in the Pinelands and CAFRA Areas. Therefore, potential habitat for the savannah sparrow and upland sandpiper, and uplands used by

the other species potentially present in the project area, are not protected by regulation. Because there is no habitat for Federal-listed endangered or threatened species, the Federal Endangered Species Act of 1973 does not apply to this project. In addition, there are no Township ordinances regarding wildlife or endangered and threatened species that would pre-empt the existing State legislation (personal communications with Plainsboro, Monroe and South Brunswick Township representatives, 1995).

The State Endangered and Nongame Species Conservation Act (1973) regulates the taking (including harassment and killing) of endangered and nongame species. The NJDEP Division of Fish, Game and Wildlife will determine if this project complies with the Act.

VI. CONCLUSIONS AND RECOMMENDATIONS

The study area for the proposed Route 92 was surveyed for the presence of endangered or threatened species in mid-June through early August and in early October, 1995. The survey focused primarily on the following species: Cooper's hawk, red-shouldered hawk, upland sandpiper, barred owl, cliff swallow, loggerhead shrike, vesper sparrow, savannah sparrow, bobolink and wood turtle. Of the Species of Concern for the project area, only a great blue heron was definitively observed within or adjacent to the project area. However, based on reports of other sightings in the vicinity, Cooper's hawk, barred owl, upland sandpiper, savannah sparrow and bobolink may also be present in the study area. The most valuable area of potential habitat for these species is in the central portion of the study area, between the railroad and Friendship Road.

Forty-five species of birds, and several mammals, reptiles and amphibians were observed throughout the study area. The species observed are generally common to rural developed and agricultural areas. Additional species common to agricultural and developed areas, although not observed, would also be expected to inhabit the area. Common songbirds tended to be present primarily along hedgerows and wooded edges of early successional and agricultural fields. Raptors were mainly associated with forest edges of agricultural fields. Most birds were found to be associated with upland habitat. Mammals were found in nearly all habitat types, but were typically associated with hedgerows and forested wetlands. All mammals observed are common to agricultural/rural areas. Reptiles and amphibians were observed only in the forested wetlands or within the brook itself.

The greatest diversity of species was observed in upland fields (including agricultural), but was concentrated at hedgerows and forested edges. This habitat provides food, cover and nesting habitat for many avian species, which were the most abundant group of wildlife observed here. Small mammals such as rabbits and hedgehogs also thrive in this habitat.

Potential impacts to wildlife within the project area include direct loss of some habitat, fragmentation of habitats, particularly forested wetlands, and an increase in human activity in the project area. Impacts may also extend to wildlife that resides outside of the project area, but is sensitive to human disturbance (e.g., osprey).

The Wetlands Minimization Alignment was designed to avoid as much of the forested area as possible, and is concentrated in the open areas of the agricultural fields throughout the majority of the alignment. The agricultural areas support fewer species and a lower concentration of wildlife in general. Greater species diversity and concentration was observed in forest/field edges than in the forest interior. This forest edge habitat will generally be preserved by the alignment, thereby minimizing habitat loss. Approximately 32 acres of forest, however, will be lost. Since much of surrounding lands to the north and south of the project area are forested, direct impacts to wildlife from the loss of forest should be low. In addition, a wetland mitigation plan will be prepared to mitigate for the loss of the wetland areas of the forest.

The most significant area affected by forest fragmentation is in the area between Friendship Road and the Amtrak railroad tracks. This includes two "fingers" of forested wetland that provide corridors for wildlife, particularly mammals, to travel from the northern forest to fields within the project area and to McCormack Lake, south of the project area. Fragmenting this extension from the northern forest will make it difficult for some species to access the lake and fields. It is recommended that the eastern finger, which includes a portion of the Devil's Brook be bridged to provide a corridor for terrestrial species. The preliminary plans for the project include a 500' bridge span over this area. Bridging this area of forested wetlands will not only permit continued access to the fields and lake by wildlife, but will decrease wetland and stream impacts as well. A planted barrier or fencing should be used along adjacent areas of the highway outside of the wetlands to help funnel wildlife to the bridged area. A terrestrial corridor will also be provided to the west, along the railroad tracks, somewhat distant from the fields and lake, since the highway will be bridged over the tracks. A 400' bridge span is proposed for this area, in order to allow for the safe passage of wildlife on either side of the tracks. The

provision of wildlife corridors under the highway will reduce the adverse impacts of habitat fragmentation and human activities by allowing safe passage to and from the surrounding habitat. At other stream crossings (with permanent flow) that cannot be bridged, box culverts should be used to permit passage for fish, reptiles and amphibians. The bottom of the culverts should be set below the natural streambed and then lined with natural materials. It would be favorable to install box culverts during the late summer months (late July - early September), so as not to disturb hibernating turtles that may be present and to avoid impacts to spawning fish.

The proposed alignment primarily runs only along the edges of successional fields such as in the area of the existing dirt road on the Turkey Island Corporation property. In general, location of the alignment primarily along these edges will minimize the impact of habitat loss to species in these habitats. Two upland successional fields, however, will be bisected by the alignment. The proposed alignment currently fragments one early successional field that is juxtaposed between forested wetlands and McCormack Lake. This field, due to its position in the landscape and its habitat value for a large variety of wildlife, appears to be an area of importance within the alignment. While no endangered or threatened species were observed in this field, it provides potentially suitable habitat for savannah sparrow and bobolink, two of the SOC's. In addition, it provides suitable hunting ground for raptors, including the Cooper's hawk, which may possibly inhabit the adjacent forest edge. This field also provides habitat for wildlife species that may not be able to utilize the smaller fields remaining following fragmentation. A large population of eastern meadowlarks was observed here. This population might be lost following fragmentation. Fox, which are generally shy of human activity, were also observed in this field. At the northern end of the field is a treerow, surrounding the Devil's Brook. North of this treerow is a small upland field. This small field was observed to be inhabited by fewer species and less wildlife in general than the larger field described above. If it is possible, and economically feasible, to engineer the design of the alignment to pass north, rather than south of the treerow, fragmentation of the larger field could be avoided. The benefits gained by avoiding the fragmentation of the field would need to be weighed against increased wetland impacts, the potential for an additional stream crossing due to this change, and potential increased residential takings. The other field, located at the intersection of Routes 32 and 130, is small and only provides potentially suitable habitat for bobolink. Fragmentation of this field can not be avoided to meet the project objectives.

In summary, potential impacts to endangered and threatened species include the loss of potentially suitable habitat, forest fragmentation and human disturbance of the area for barred owl, the potential disturbance of osprey nesting activity, and loss or fragmentation of potentially suitable habitat for Cooper's hawk, savannah sparrow and bobolink and wood turtle. However, there is additional potentially suitable habitat for barred owl in forested wetlands outside of the project area, and there is no documentation of osprey nesting activity within this species' potential impact area. Potential impacts to Cooper's hawk, savannah sparrow and bobolink, that may be present in the study area, are expected to be low. The proposed alignment generally runs only along the edges of the most suitable habitat for the grassland birds, preserving the largest contiguous fields within the study area. However, as discussed above, fragmentation of the field north of McCormack Lake could potentially impact these species and other wildlife in the area. It is recommended that fragmentation of this field be avoided if feasible. Only a small amount of forest edge habitat will be lost to the Cooper's hawk. Since this species has not been shown to be sensitive to human activity, if it is present in the project area, impacts of construction of the highway are expected to be low.

The wetland mitigation plan to be prepared for the project, in accordance with the New Jersey Freshwater Wetlands Protection Act, will mitigate for the loss of wetland habitats for the endangered and threatened species potentially impacted by the project. In addition, periodic maintenance of stormwater management facilities should be adhered to in order to ensure that water quality in the vicinity is not compromised. The use of bridges and/or box culverts at the stream crossings will provide corridors for some wildlife between areas fragmented by the highway. A portion of the highway is proposed to bridge the existing railroad. The length of this crossing (400') should provide enough area under the bridge to provide a corridor for terrestrial wildlife in the vicinity. Impacts to threatened and endangered species and recommendations for reducing impacts are summarized in Table 4 (Appendix A).

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APPENDIX A

Table 2 - Habitat Suitability for Species of Concern

Table 3 - Wildlife Encountered within the Study Area

Table 4 - Impacts and Recommendations for Species of Concern

TABLE 2
HABITAT SUITABILITY FOR SPECIES OF CONCERN

Species Common Name	Optimal Habitat Type(s)	Breeding/ Nesting Season	Identified Within the Study Area?	Migration Dates (NJ) (**)	Habitat Rating(s) A. Breeding B. Other****	Location of Potential Habitat (s) Within the Project Area
pied–billed grebe	well vegetated lakes, ponds, and marshes	April–June	No	Arrives: March Departs: November	A. 0 B. 0	None
great blue heron	marshes, swamps, tidal flats	April–July	Yes	Arrives: March Departs: November	A. 0 B. 3	Impoundments north and south of dirt road; Turkey Island property, Devil's Brook and ag. flds.
American bittern	marshes, meadows	May–July	No	Arrives: April Departs: October	A. 0 B. 0	None
osprey	coastal, open water	May–August	No	Arrives: March Departs: October	A. 0 B. 0	None
northern harrier (marsh hawk)	marshes, wet meadows, coastal areas	May–June	Yes***	Permanent Resident	A. 0 B. 2	Wet meadow, hayfields/ cow pastures north and south of dirt road, Turkey Island property
Cooper's hawk	riparian forest margins	Spring: nesting resident	Possible Sighting	Some Resident	A. 2 B. 3	Forest northeast of McCormack Lake, Turkey Island property
red–shouldered hawk	swampy woods	Spring: uncommon nesting resident	No	Transient	A. 2 B. 2	Devil's Brook Area, forest northwest of McCormack Lake, Turkey Island property

(continued)

TABLE 2 (Continued)
HABITAT SUITABILITY FOR SPECIES OF CONCERN

Species Common Name	Optimal Habitat Type(s)	Breeding/ Nesting Season	Identified Within the Study Area?	Migration Dates (NJ) (**)	Habitat Rating(s) A. Breeding B. Other****	Location of Potential Habitat (s) Within the Project Area
*peregrine falcon	cosmopolitan, waterbody areas	March–June	No	Sept.–Oct. occasional winter resident	A. 0 B. 0	None
upland sandpiper	large grasslands, mowed or grazed, far from forest	May–July	Yes***	Arrives: April Departs: September	A. 2 B. 2	pasture and hayfields, Turkey Island property, central study area
red–headed woodpecker	open deciduous woods, parklike groves, forest edges	May–July	No	Permanent Resident	A. 1 B. 1	forest edges central study area, cow pasture, Turkey Island property, dead/dying decid. trees
barred owl	wetland and upland deciduous forest	March–May	Yes***	Permanent Resident	A. 3 B. 3	wetland forest(s) north of McCormack Lake, upland forest south and east of Friendship Rd.
cliff swallow	barn eaves, cliffs; agricultural fields	May–July	No	Arrives: April Departs: September	A. 2 B. 2	barn at western end of study area, near intersection of Ridge & Schalk's Crossing Roads
loggerhead shrike	hedgerows, cedar or hawthorns	?	No	Arrives: May Departs: September	A. 2 B. 2	hedgerows and barbed fencerows, cow pastures, Turkey Island property, edges of cedar forest betwn. Rt. 1 and RidgeRd. western end of project area
vesper sparrow	grasslands, 50 acres or more with hedgerows	May–July	No	Arrives: May Departs: November	A. 2 B. 2	grass fields (cow pasture) central study area, Turkey Island property, corn fields throughout site

(continued)

TABLE 2 (Continued)
HABITAT SUITABILITY FOR SPECIES OF CONCERN

Species Common Name	Optimal Habitat Type(s)	Breeding/ Nesting Season	Identified Within the Study Area?	Migration Dates (NJ) (**)	Habitat Rating(s) A. Breeding B. Other****	Location of Potential Habitat (s) Within the Project Area
savannah sparrow	short grass fields and salt marshes 25 acres or more	May–July	Yes***	Arrives: March Departs: November	A. 3 B. 3	mowed hayfield north of McCormack Lake, Turkey Island property, and wet emergent pasture
grasshopper sparrow	cultivated grasslands, old fields 200 acres or more	May–July	No	Arrives: March Departs: October	A. 1 B. 1	fields west of Friendship Road – Turkey Island property
Henslow's sparrow	low wet meadows, early succ. fields dense, unmowed, not brushy	May–July	No	Arrives: May Departs: October	A. 1 B. 1	fields west of Friendship Road – Turkey Island property
bobolink	dense fields, hayfields	May–June	Yes***	Arrives: May Departs: September	A. 3 B. 3	old fields north of Rte. 32; hayfields on Turkey Island property; old field east of Friendship Road, south of treerow
wood turtle	streams, rivers, forest (wetland or upland), fields	March–May OR Sept.–Oct.	No	Transition Dates: Mar.–May Sept.–Oct.	A. 2 B. 2	Wetlands, Devil's Brook area
bog turtle	open bogs, swamps, marshy meadows, pure water	April–July	No	N/A	A. 0 B. 0	None
triangle floater	aquatic, small streams	unknown	No	N/A	A. 1 B. 1	channelized area of Devil's Brook

(continued)

TABLE 2 (Continued)
HABITAT SUITABILITY FOR SPECIES OF CONCERN

Species Common Name	Optimal Habitat Type(s)	Breeding/ Nesting Season	Identified Within the Study Area?	Migration Dates (NJ) (**)	Habitat Rating(s) A. Breeding B. Other****	Location of Potential Habitat (s) Within the Project Area
brook floater	rapids of small rivers, creeks	unknown	No	N/A	A. 0 B. 0	None
yellow lampmussel	lacustrine, or large rivers	unknown	No	N/A	A. 0 B. 0	None

Notes:

* = Federal–listed endangered species
** = Leck, 1975.
*** = Sighting reported by Fishback (1994)
****= Feeding, cover or resting habitat

0 = no potential
1 = minimal potential
2 = low potential
3 = potential
4 = high potential

TABLE 3
ROUTE 92 WILDLIFE INVENTORY

HABITAT TYPES LEGEND	
OW = OPEN WATERS (Lake or Impoundment)	AG = AGRICULTURAL FIELD
F = FLYOVER	L = LAWN
S = STREAMSIDE	DF = DECIDUOUS FOREST
EW = EMERGENT WETLAND	OR = ORCHARD
FW = FORESTED WETLAND	RD = ROAD
EF = EARLY SUCCESS. FIELD	
LF = LATE SUCCESS. FIELD	

COMMON NAME *	SCIENTIFIC NAME **	HABITAT TYPE													COMMENTS
		OW	F	S	EW	FW	EF	LF	AG	L	DF	OR	RD		
WADING BIRDS (Herons, Egrets, Bitterns, Ibis)															
Great Blue Heron	*Ardea herodias*		X												TURKEY ISLAND PROPERTY
WATERFOWL (Swans, Geese, Ducks)															
Canada Goose	*Branta canadensis*		X												
DIURNAL RAPTORS (Vultures, Kites, Hawks Eagles)															
Turkey Vulture	*Cathartes aura*		X												OVER AG & FW
Cooper's Hawk	*Accipiter cooperii*		X												OVER FW
Red-tailed Hawk	*Buteo jamaicensis*		X				X		X						
American Kestrel	*Falco sparverius*						X								CHASED BY SMALLER BIRD; HOVERING; HEDGEROW
Sharp-shinned Hawk	*Accipiter striatus*								X						EDGE OF CORNFIELD; DOVE INTO CORNFIELD
Rough-legged Hawk	*Buteo lagopus*					X	X								
SHOREBIRDS (Plovers, Sandpipers, Phalaropes)															
Killdeer	*Charadrius vociferus*						X								
Greater Yellowlegs	*Tringa melnoleuca*						X								PUDDLE IN DISTURBED FIELD NEAR ROUTE 130
JAEGERS, GULLS, TERNS, ALCIDS															
Great Black-backed Gull	*Larus marinus*		X												

TABLE 3 (continued)
ROUTE 92 WILDLIFE INVENTORY

HABITAT TYPES LEGEND	
OW = OPEN WATERS (Lake or impoundment)	AG = AGRICULTURAL FIELD
F = FLYOVER	L = LAWN
S = STREAMSIDE	DF = DECIDUOUS FOREST
EW = EMERGENT WETLAND	OR = ORCHARD
FW = FORESTED WETLAND	RD = ROAD
EF = EARLY SUCCESS. FIELD	
LF = LATE SUCCESS. FIELD	

COMMON NAME *	SCIENTIFIC NAME **	HABITAT TYPE													COMMENTS
		OW	F	S	EW	FW	EF	LF	AG	L	DF	OR	RD		
DOVES, OWLS, NIGHT JARS, WOODPECKERS															
Rock Dove	*Columba livia*		X				X								
Mourning Dove	*Zenaida macroura*		X				X	X	X				X		RD–PUDDLE DRINKING
Chimney Swift	*Chaetura pelagica*						X								NEAR FW EDGE
Belted Kingfisher	*Ceryle alcyon*			X					X						NEAR FW EDGE
Red–bellied Woodpecker	*Melanerpes carolinus*					X			X						
Downy Woodpecker	*Picoides pubescens*					X			X		X				
Hairy Woodpecker	*Picoides villosus*					X	X								EDGE OF FIELD
Northern Flicker	*Colaptes auratus*		X				X		X						ALSO FLYING OVER LAKE
Woodpecker sp.					X	X									FW–PERIMETER OF FIELD
FLYCATCHERS AND SWALLOWS															
Eastern Wood Pewee	*Contopus virens*					X			X		X				
Eastern Phoebe	*Sayornis phoebe*								X						EDGE
Eastern Kingbird	*Tyrannus tyrannus*					X	X		X		X				
Tree Swallow	*Tachycineta bicolor*		X				X					X			F–FORAGING OVER FIELD, GATES
No. Rough–winged Swallow	*Stelgidopteryx serripennis*		X												
Barn Swallow	*Hirundo rustica*		X				X		X						BARN EAVES; TELEPHONE WIRE; GATE
Flycatcher							X		X						HEDGEROW
JAYS, CROWS, CHICKADEES, TUFTED TITMOUSE, NUTHATCHES, BROWN CREEPER, WRENS															
Blue Jay	*Cyanocitta cristata*					X	X		X		X				NEAR FW EDGE
American Crow	*Corvus brachyrhynchos*		X				X		X						AG–FLYOVER
Fish Crow	*Corvus ossifragus*		X						X						
Black–capped Chickadee	*Parus atricapillus*					X			X						EDGES AND HEDGEROWS
Tufted Titmouse	*Parus bicolor*					X			X						EDGES AND HEDGEROWS
Carolina Wren	*Thryothorus ludovicianus*								X						EDGES AND HEDGEROWS
House Wren	*Troglodytes aedon*						X	X	X	X	X				EDGES AND HEDGEROWS

TABLE 3 (continued)
ROUTE 92 WILDLIFE INVENTORY

HABITAT TYPES LEGEND	
OW = OPEN WATERS (Lake or Impoundment)	AG = AGRICULTURAL FIELD
F = FLYOVER	L = LAWN
S = STREAMSIDE	DF = DECIDUOUS FOREST
EW = EMERGENT WETLAND	OR = ORCHARD
FW = FORESTED WETLAND	RD = ROAD
EF = EARLY SUCCESS. FIELD	
LF = LATE SUCCESS. FIELD	

COMMON NAME *	SCIENTIFIC NAME **	HABITAT TYPE													COMMENTS
		OW	F	S	EW	FW	EF	LF	AG	L	DF	OR	RD		
KINGLETS, GNATCATCHER, THRUSHES, MOCKINGBIRDS, SHRIKES, STARLINGS															
Wood Thrush	*Hylocichla mustelina*					X		X			X				
American Robin	*Turdus migratorius*		X		X	X	X	X	X	X	X		X		
Gray Catbird	*Dumetella carolinensis*		X	X		X	X	X	X		X				JUVENILE ALSO SEEN ALONG STREAM
Northern Mockingbird	*Mimus polyglottos*		X				X	X	X	X	X		X		
Brown Thrasher	*Toxostoma rufum*								X	X					EDGE OF FOREST
Cedar Waxwing	*Bombycilla cedrorum*							X							
European Starling	*Sturnus vulgaris*		X						X	X		X			
Eastern Bluebird	*Sialia sialis*									X					
VIREOS, WARBLERS															
Common Yellowthroat	*Geothlypis trichas*					X	X	X	X		X				EF–ROSE; HEDGE ROW; FW EDGE
TANAGERS, GROSBEAKS, BUNTINGS, SPARROWS															
Scarlet Tanager	*Piranga olivacea*					X									
Northern Cardinal	*Cardinalis cardinalis*		X				X		X	X					
Rose–breasted Grosbeak	*Pheucticus ludovicianus*						X								EDGE
Indigo Bunting	*Passerina cyanea*						X	X	X				X		PHONE WIRE; EDGE
Rufous–sided Towhee	*Pipilo erythrophtholmus*					X	X		X		X				WOODS AROUND FLD.; DF/AG–WET EDGE; JUVENILE
American Tree Sparrow	*Spizella arborea*		X								X				
Chipping Sparrow	*Spizella passerina*						X		X						MAINLY HEDGEROWS
Field Sparrow	*Spizella pusilla*						X		X	X	X				MAINLY HEDGEROWS
Song Sparrow	*Melospiza melodia*						X	X	X			X			MAINLY HEDGEROWS

TABLE 3 (continued)
ROUTE 92 WILDLIFE INVENTORY

HABITAT TYPES LEGEND	
OW = OPEN WATERS (Lake or Impoundment)	AG = AGRICULTURAL FIELD
F = FLYOVER	L = LAWN
S = STREAMSIDE	DF = DECIDUOUS FOREST
EW = EMERGENT WETLAND	OR = ORCHARD
FW = FORESTED WETLAND	RD = ROAD
EF = EARLY SUCCESS. FIELD	
LF = LATE SUCCESS. FIELD	

COMMON NAME *	SCIENTIFIC NAME **	HABITAT TYPE													COMMENTS
		OW	F	S	EW	FW	EF	LF	AG	L	DF	OR	RD		
BLACKBIRDS, ORIOLES, FINCHES, HOUSE SPARROW															
Red-winged Blackbird	*Agelaius phoeniceus*						X		X						EDGES
Eastern Meadowlark	*Sturnella magna*						X		X						AG-FLYING, LANDING; FIELDS-FORAGING
Common Grackle	*Molothrus ater*		X				X		X						EF-ROSE
Brown-headed Cowbird	*Icterus spurius*		X				X		X			X			HEDGEROWS, EDGES
House Finch	*Carpodacus mexicanus*							X							WIRE
American Goldfinch	*Carduelis pinus*		X				X	X	X			X			ALSO FLYING OVER LAKE
MAMMALS															
Eastern Chipmunk	*Tamias Striatus*					X				X			X		
White-tailed Deer	*Odocoileus virginianius*			X		X	X	X	X						TRAILS; FW-EDGE OF EF
Gray Squirrel	*Sciurus carolinensus*					X			X						NEST IN TREE
Woodchuck	*Marmota monax*					X	X		X						HOLES AT TOP OF STREAMBANK; EF-FORAGING
Raccoon	*Procyon lotor*			X											
Eastern Cottontail	*Sylvilagus floridanus*						X			X					
Opossum	*Didelphis marsupialis*			X											PRINTS
Fox (red or gray)				X											
REPTILES/AMPHIBIANS															
Eastern Garter Snake	*Thamnophis s. sirtalis*					X									OW--EDGE - RESTING IN SHRUB
Eastern Painted Turtle	*Chrysemy p. picta*	X				X									MANY BASKING/FLOATING IN SMALL IMPOUNDMENT
Box Turtle	*Terrapene c. carolina*					X									
Leopard Frog	*Rana spenocephala*			X		X									
Green Frog	*Rana clamitans melanota*	X		X		X									
Red-backed Salamander	*Plethodon c. cinereus*					X									UNDER LOGS

NOTES:

* Common names for birds according to "ABA Checklist; Birds of the Continental United States and Canada", by the American Birding Association, 4th Edition, 1990. Common names for mammals, reptiles and amphibians according to "New Jersey's Wildlife: A Checklist of Birds, Mammals, Reptiles and Amphibians", by the NJ Department of Environmental Protection, Division of Fish, Game and Wildlife.

** Latin names and order for birds according to "ABA Checklist; Birds of the Continental United States and Canada:, by the American Birding Association, 4th Edition, 1990. Latin names for mammals, reptiles and amphibians according to "New Jersey's Wildlife: A Checklist of Birds, Mammals, Reptiles and Amphibians", by the NJ Department of Environmental Protection, Division of Fish, Game and Wildlife.

TABLE 4
IMPACTS AND RECOMMENDATIONS FOR SPECIES OF CONCERN*

Species of Concern (Common Name)	Impacts of Project	Recommendations for Reducing Impacts
great blue heron	None	None
osprey	potential disturbance of nesting activity – if nesting at McCormack Lake	None – nesting not likely
northern harrier (marsh hawk)	None	None
Cooper's hawk	low potential for impact – some loss of forest and edge habitat	None
red–shouldered hawk	None	None
upland sandpiper	None – alignment skirts only edges of potentially suitable habitat	None
red–headed woodpecker	None	None

TABLE 4
IMPACTS AND RECOMMENDATIONS FOR SPECIES OF CONCERN*

Species of Concern (Common Name)	Impacts of Project	Recommendations for Reducing Impacts
barred owl	disturbance and fragmentation of potentially suitable habitat	None feasible
cliff swallow	None	None
loggerhead shrike	None	None
vesper sparrow	None	None
savannah sparrow	disturbance/fragmentation of potentially suitable habitat (upland field north of McCormack Lake)	Shift alignment north of upland field
grasshopper sparrow	None	None

TABLE 4
IMPACTS AND RECOMMENDATIONS FOR SPECIES OF CONCERN*

Species of Concern (Common Name)	Impacts of Project	Recommendations for Reducing Impacts
Henslow's sparrow	None	None
bobolink	disturbance/fragmentation of potentially suitable habitat (upland field north of McCormack Lake, old fields north of Route 32)	Shift alignment north of upland field near lake
wood turtle	minimal impact, if present – disturbance of potentially suitable habitat (wetlands), potential water quality impacts (can be mitigated)	1. bridge over the Devil's Brook, and use of box culverts at minor crossings 2. construction near stream only in late July to early September
triangle floater	None	None

*Note:
Pied–billed grebe, American bittern, peregrine falcon, bog turtle, brook floater and yellow lampmussel will not be impacted by the project since no habitat exists for these species within the study area.

APPENDIX B

Correspondence/Coordination with the Division of Fish, Game and Wildlife

Christine Todd Whitman
Governor

State of New Jersey
Department of Environmental Protection
Division of Fish, Game and Wildlife
Box 383, R.D. 1
Hampton, N.J. 08827
Phone (908) 735-8975
Fax (908) 735 5639

Robert C. Shinn, Jr.
Commissioner

April 21, 1995

Ms. Christine Tiernan-Varricchio
Frederic R. Harris, Inc.
Metropolitan Corp. Plaza
Iselin, NJ 08830

Dear Ms. Tiernan-Varricchio:

As per your request, this is our recommendation regarding wildlife inventory needs to evaluate the proposed Route 92 potential impacts to endangered, threatened and rare wildlife species.

Attached you will find a list of endangered, threatened and rare wildlife species that could potentially occur within the proposed alignments. We suggest that the potentially affected habitats within the alignment be evaluated for their suitability for the listed species. Any areas within the alignment that are suitable for the listed species should then be surveyed for the presence or absence of those species during appropriate seasons and using survey methodologies commonly employed to find each species. The results of the surveys, if performed properly, can be used to identify potential impacts to populations of any of the listed species that occur within the project area.

Sincerely,

James C. Sciascia

James C. Sciascia
Principal Nongame Zoologist
Endangered and Nongame Species Program

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Recycled Paper

Endangered, Threatened and Rare Wildlife Species Occurring in Somerset and Middlesex Counties

Common Name	Heritage Rank	State Status	Federal Status
~~BLACK-SPOTTED SALAMANDER~~	~~S1~~	~~E~~	
~~LONGTAIL SALAMANDER~~	~~S2~~	~~E~~	
~~PINE BARRENS TREEFROG~~	~~S3~~	~~T~~	SC
PIED-BILLED GREBE	S1	E/S	
GREAT BLUE HERON	S2	T/S	
~~YELLOW-CROWNED NIGHT HERON~~	~~S2~~	~~T/T~~	
NORTHERN HARRIER	S2	E/U	
COOPER'S HAWK	S2	E	
RED-SHOULDERED HAWK	S2	E/T	
PEREGRINE FALCON	S1	E	E/SA
UPLAND SANDPIPER	S1	E	
BARRED OWL	S3	T/T	
RED-HEADED WOODPECKER	S3	T/T	
CLIFF SWALLOW	S2	T	
LOGGERHEAD SHRIKE	S1	E	C2
VESPER SPARROW	S2	E	
SAVANNAH SPARROW	S2	T/T	
GRASSHOPPER SPARROW	S2	T/T	
HENSLOW'S SPARROW	S1	E	C2
BOBOLINK	S2	T/T	
WOOD TURTLE	S3	T	
BOG TURTLE	S2	E	C2
TRIANGLE FLOATER	S3		
BROOK FLOATER	S1		C2
YELLOW LAMPMUSSEL	S1		C2
AMERICAN BITERN	S3	T	
OSPREY	S3	T	

AMY S. GREENE
ENVIRONMENTAL CONSULTANTS, INC.
18 COMMERCE STREET PLAZA • FLEMINGTON, NJ 08822
(908) 788-9676 • FAX (908) 788-6788
PA (610) 250-0773

CONVERSATION LOG

JOB NUMBER: 1244
JOB NAME: Route 92
DATE: 6/28/95
TIME: 2:50
YOUR NAME: Lisa Brave
SPOKE TO: Jim Sciasca
COMP.NAME: NJDEP
TEL. # (908) 735-8975

Content of Conversation:

He remembers the project. He will fax a copy of a list of the Species of Concern for the project to me.

I mentioned the Walker-Gordon study and the 47 sightings, and their possible inclusion in the new Natural Heritage letter that is being ordered. He said it is highly unlikely to have had 47 sightings of E&T species as there are only 61 listed, and many are whales. They (Walker-Gordon) probably included "rare" species. Also, to be considered by Natural Heritage, sightings must meet certain criteria, such as sighting during the nesting season. Flyovers wouldn't meet the criteria. **We should be concerned with the species he outlined in his letter to Christine, which he is faxing.**

The NINJA database has shifted it's emphasis from recording sightings to Natural History information on the species.

Copy to: Lois
File

AMY S. GREENE
ENVIRONMENTAL CONSULTANTS, INC.
18 COMMERCE STREET PLAZA • FLEMINGTON, NJ 08822
(908) 788-9676 • FAX (908) 788-6788
PA (610) 250-0773

CONVERSATION LOG

JOB NUMBER: 1244
JOB NAME: Route 92
DATE: 7/17/95
TIME: 3:30
YOUR NAME: Lisa Brave
SPOKE TO: Mike Valent
COMP.NAME: NJDEP Fish, Game and Wildlife
TEL. # 735-8975

Content of Conversation:

I asked Mike if my planned methodology would be sufficient, explained what we were doing and also asked many questions.

According to Mike, the best time to do the call search for barred owl is after sunset (look up time of sunset) and we could go until 1 to 2 a.m. Play a call set for about 10 seconds, then wait 50-60 seconds. Do this six times, then wait 5 minutes for owls to answer. They can respond from up to 1 mile away, but you probably wouldn't hear them if they're that far. 100 decibels is the optimal noise level for playing the recording. He will give us a recording if I can pick it up today by 4:25.

Mike said it's very late in the season to be doing this. They are no longer nesting and so won't be as responsive. Also, if we do hear them, we can't say they are nesting because they are a resident species, and won't necessarily (although likely) be using the habitat we hear them in now to breed.

They do successfully coexist with great horned owls, although great horneds have an edge over barreds **if** the habitat is fragmented. In large contiguous tracts, they'll do just fine.

We should do the survey in the same places **at least** twice, 7 to 10 days apart (he does each site 5 times). Approximately 3/4 mile intervals is fine to play the tape.

Don't use your flashlight during the survey. It will be of no advantage to climb a treestand, just stay on the ground. Therefore, 1 point in each of the three forested areas should be fine.

Copy to: Lois
Peg
File

AMY S. GREENE
ENVIRONMENTAL CONSULTANTS, INC.
18 COMMERCE STREET PLAZA • FLEMINGTON, NJ 08822
(908) 788-9676 • FAX (908) 788-6788
PA (610) 250-0773

CONVERSATION LOG

JOB NUMBER: 1244
JOB NAME: Route 92
DATE: 8/8/95
TIME: 10:15
YOUR NAME: Lisa Brave
SPOKE TO: Jeanette Bowers
COMP.NAME: NJDEP Div. of Fish, Game & Wildlife - End. Species
TEL. # (609) 292-2084

Content of Conversation:

I asked Jeanette for information on the Brook Floater, Triangle Floater and Yellow Lampmussel; descriptions, habitat and search methodologies.

The brook floater and yellow lampmussel are Category 2, Federal Candidate species, very rare. New Jersey would like to have them listed immediately. Jeanette believes that the brook floater is currently only known in the Stoney Brook, Mercer County, NJ. Any records for Middlesex County would be very old (1910 or thereabout). However, she will look it up and send me the information. It is, as the name indicates, a brook species. The yellow lampmussel is a big river species, although it can live in large brooks. Neither of the above species "love lakes", as they are too stagnant, but it is possible they could live in one.

The triangle floater is less rare than the other two. It is more tolerant of stagnant conditions and may utilize lake habitat. It is not a candidate species.

Methodologies for finding these species are highly variable, depending on budget. They range from running transects with a viewing bucket (with a plexiglass bottom) to SCUBA dive searches.

Jeanette will gather as much information as she has on all three species and search methodologies and send it as soon as possible.

Copy to: File

1244

State of New Jersey

Christine Todd Whitman
Governor

Department of Environmental Protection

Robert C. Shinn, Jr.
Commissioner

DIVISION OF FISH, GAME AND WILDLIFE
ROBERT MCDOWELL, DIRECTOR
CN 400
TRENTON, NJ 08625-0400
609-292-2965
609-984-1414 FAX

RECEIVED
AUG 18 1995
AMY S. GREENE Envir. Cons. Inc.

14 August 1995

Ms. Lisa Brave
Amy Green Environmental Consultants
18 Commerce Street Plaza
Flemington, NJ 08822

Dear Ms. Brave:

Per your recent request regarding Middlesex County locations of the brook floater, yellow lampmussel and triangle floater, there was one recent (1994) sighting of a triangle floater shell in Middlesex County in Heathcote Brook, between the D & R canal and Carnegie Lake. There are no known occurrences of the brook floater or yellow lampmussel in the county. I have enclosed information on these three species, along with a key to freshwater bivalves.

Please contact me if you have any questions or need additional information.

Sincerely,

Jeanette Bowers-Altman

Jeanette Bowers-Altman
Senior Zoologist
Endangered & Nongame Species Program
609-292-9451

Enclosures

APPENDIX C

Natural Heritage Program Database Information

State of New Jersey

Christine Todd Whitman
Governor

Department of Environmental Protection
Division of Parks and Forestry
Office of Natural Lands Management
Natural Heritage Program
CN 404
Trenton, NJ 08625-0404
Tel. #609-984-1339
Fax. #609-984-1427

Robert C. Shinn, Jr.
Commissioner

August 2, 1995

Sean Vroom
Frederic R. Harris, Inc.
Metropolitan Corporate Plaza
Office Building B
485 US Route 1 South
Iselin, NJ 08830

Re: Proposed Route 92

Dear Mr. Vroom:

Thank you for your data request regarding rare species information for the above referenced project site in Middlesex County.

The Natural Heritage Data Base has records for occurrences of barred owl, *Ranunculus pusillus* and *Sagittaria australis* which may be on the project site. There is a record for a savannah sparrow occurrence which may be on, or in the immediate vicinity of the site. Additionally, there are records for occurrences of bobolink, *Anax longipes*, *Elatine americana*, *Gentiana saponaria*, *Isoetes riparia*, *Limosella acaulis*, *Myriophyllum tenellum*, *Stachys hyssopifolia*, *Utricuaria gibba* and *Viola brittoniana* in the immediate vicinity of the site. The attached list provides more information about all these occurrences.

Also attached are lists of rare species which have been documented from the Hightstown and Jamesburg USGS quadrangles. Also attached is a list of rare species and natural communities which have been documented from Middlesex County. If suitable habitat is present at the project site, these species have potential to be present. If you have questions concerning the wildlife records or wildlife species mentioned in this response, we recommend you contact the Division of Fish, Game and Wildlife, Endangered and Nongame Species Program.

PLEASE SEE THE ATTACHED 'CAUTIONS AND RESTRICTIONS ON NHP DATA'.

Thank you for consulting the Natural Heritage Program. The attached invoice

details the payment due for processing this data request. Feel free to contact us again regarding any future data requests.

Sincerely,

Thomas F. Breden
Supervisor

cc: Lawrence Niles
Thomas Hampton
NHP File No. 95-4007435

I
)2 AUG 1995

ON OR IN THE IMMEDIATE VICINITY OF PROJECT SITE
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN
THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK	DATE OBSERVED	IDENT.	LOCATION
*** Vertebrates									
DOLICHONYX ORYZIVORUS	BOBOLINK		T/T		G5	S2	1994-05-15	Y	FROM THE TOWN OF PLAINSBORO, EAST ON DEY ROAD, LEFT ONTO SCOTT'S CORNER ROAD, ONE MILE TO SHARP BEND IN ROAD. TAKE DRIVEWAY INTO THE FARM TO THE FIELDS ON THE LEFT, NW OF THE BARN.
PASSERCULUS SANDWICHENSIS	SAVANNAH SPARROW		T/T		G5	S2	1994-04-30	Y	FROM THE TOWN OF PLAINSBORO, EAST ON DEY ROAD, LEFT ONTO SCOTT'S CORNER ROAD, ONE MILE TO SHARP BEND IN ROAD. TAKE DRIVEWAY INTO THE FARM TO THE WETLAND MEADOW AND ADJACENT PLOWED FIELDS.
STRIX VARIA	BARRED OWL		T/T		G5	S3	1993-12-09		HEADWATERS OF A TRIBUTARY TO THE DEVIL'S BROOK, EAST OF THE AMTRACK LINE, AND NW OF THE MAN-MADE LAKE WEST OF SCOTTS CORNER-MONMOUTH JUNCTION ROAD.
*** Invertebrates									
ANAX LONGIPES	COMET DARNER				G5	S2?	1994-07-10	Y	FROM THE TOWN OF PLAINSBORO, EAST ON DEY ROAD, LEFT ONTO SCOTT'S CORNER ROAD, ONE MILE TO SHARP BEND IN ROAD. APPROXIMATELY 3/4 MILE TO THE NORTH-NORTHWEST, BETWEEN MCCORMICK LAKE AND THE AMTRACK LINE.

ON OR IN THE IMMEDIATE VICINITY OF PROJECT SITE
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN
THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK	DATE OBSERVED	IDENT.	LOCATION
*** Vascular plants									
ELATINE AMERICANA	AMERICAN WATERWORT				G4	S2	1994-10-05	Y	NORTH END OF MCCORMACK LAKE, APPROXIMATELY 2.0 MILES NORTH EAST OF JUNCTION OF SCHALKS RD. AND PRINCETON-CRANBURY RD., PLAINSBORO.
GENTIANA SAPONARIA	SOAPWORT GENTIAN				G5	S3	1994-10-05	Y	NORTH SIDE OF MCCORMACK LAKE, APPROXIMATELY 1.3 MILES NORTH NORTHWEST OF SCOTT'S CORNER.
ISOETES RIPARIA	RIVER-BANK QUILLWORT				G4	S3	1994-10-05	Y	SOUTHEAST SIDE OF NORTHERNMOST FINGER OF MCCORMACK LAKE, APPROXIMATELY 1.2 MILES NORTH NORTHWEST OF SCOTT'S CORNER.
LIMOSELLA ACAULIS	SOUTHERN MUDWORT				G5	SU	1994-10-05	Y	MCCORMACK LAKE, APPROXIMATELY 2.0 MILES NORTHEAST OF JUNCTION OF SCHALKS RD. AND PRINCETON-CRANBERRY RD., PLAINSBORO.
MYRIOPHYLLUM TENELLUM	SLENDER WATER-MILFOIL		E		G5	S1	1994-10-05	Y	NORTH END OF MCCORMACKS LAKE, APPROXIMATELY 2.0 MILES NORTHEAST OF JUNCTION OF SCHALKS RD. AND CRANBURY-PRINCETON RD., PLAINSBORO.
RANUNCULUS PUSILLUS	LOW SPEARWORT				G5	S2	1994-05-11	Y	NORTH SIDE OF BRANCH OF DEVIL'S BROOK APPROXIMATELY 1.4 MILES NORTH OF SCOTT'S CORNER.

ON OR IN THE IMMEDIATE VICINITY OF PROJECT SITE
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN
THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK	DATE OBSERVED	IDENT.	LOCATION
SAGITTARIA AUSTRALIS	SOUTHERN ARROW HEAD		E		G5	S1	1994-10-05	Y	EAST SIDE OF DEVILS BROOK APPROXIMATELY 0.2 MILE NORTHEAST OF NORTH END OF MCCORMACK LAKE AND APPROXIMATELY 1.4 MILES NORTH NORTHWEST OF SCOTT'S CORNER. ALSO PRESENT IN COVE ON SOUTHWEST SIDE OF LAKE.
STACHYS HYSSOPIFOLIA	HYSSOP HEDGE-NETTLE				G5	S2	1994-07-13	Y	WEST SIDE OF SCOTT'S CORNER RD. AT ITS INTERSECTION WITH BROADWAY RD., 1 MILE NORTH OF SCOTT'S CORNER.
UTRICULARIA GIBBA	HUMPED BLADDERWORT			LP	G5	S3	1994-07-13	Y	NORTH END AND EAST SIDE OF MCCORMACK LAKE, APPROXIMATELY 2.0 MILES NORTHEAST OF THE JUNCTION OF SCHALKS RD. AND PRINCETON-CRANBURY RD.
VIOLA BRITTONIANA	COAST VIOLET				G4G5	S3	1994-10-05	Y	NORTH SHORE OF MCCORMACK LAKE, APPROXIMATELY 1.2 MILES NORTH NORTHWEST OF SCOTT'S CORNER.

14 Records Processed

: AUG 1995

HIGHTSTOWN USGS QUADRANGLE
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN
THE NEW JERSEY NATURAL HERITAGE DATABASE

ME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK	DATE OBSERVED	IDENT.
* Vertebrates								
MODRAMUS SAVANNARUM	GRASSHOPPER SPARROW		T/T		G5	S2	1981-SUMMR	Y
IO OTUS	LONG-EARED OWL		T/T		G5	S3	1995-03-27	Y
RTRAMIA LONGICAUDA	UPLAND SANDPIPER		E		G5	S1	1976-??-??	Y
EMMYS INSCULPTA	WOOD TURTLE		T		G4	S3	1986-SUMMR	Y
EMMYS INSCULPTA	WOOD TURTLE		T		G4	S3	1991-??-??	
LICHONYX ORYZIVORUS	BOBOLINK		T/T		G5	S2	1994-05-15	Y
SSERCULUS SANDWICHENSIS	SAVANNAH SPARROW		T/T		G5	S2	1982-??-??	Y
SSERCULUS SANDWICHENSIS	SAVANNAH SPARROW		T/T		G5	S2	1994-04-30	Y
RIX VARIA	BARRED OWL		T/T		G5	S3	1993-12-09	
* Invertebrates								
ASHIDONTA UNDULATA	TRIANGLE FLOATER				G4	S3	1994-09-30	Y
IAX LONGIPES	COMET DARNER				G5	S2?	1984-07-17	Y
IAX LONGIPES	COMET DARNER				G5	S2?	1994-07-10	Y
LITHEMIS MARTHA	MARTHA'S PENNANT				G4	S3S4	1984-08-17	Y
STES EURINUS	AMBER-WINGED SPREADWING				G4	S1?	1984-07-17	Y
CROPHORUS AMERICANUS	AMERICAN BURYING BEETLE	LE	E		G1	SH	1919-??-??	Y
MPETRUM AMBIGUUM	BLUE-FACED MEADOWFLY				G5	S1?	1991-08-25	Y
* Vascular plants								
REX BARRATTII	BARRATT'S SEDGE	3C		LP	G4	S4	1938-04-24	Y
ATINE AMERICANA	AMERICAN WATERWORT				G4	S2	1994-10-05	Y
PHORBIA MARILANDICA	MARYLAND SPURGE		E		G1?Q	SH.1	1922-05-28	Y
NTIANA SAPONARIA	SOAPWORT GENTIAN				G5	S3	1994-10-05	Y
OETES RIPARIA	RIVER-BANK QUILLWORT				G4	S3	1994-10-05	Y
MOSELLA ACAULIS	SOUTHERN MUDWORT				G5	SU	1994-10-05	Y
STERA AUSTRALIS	SOUTHERN TWAYBLADE			LP	G4	S2	1994-05-02	Y
LANTHIUM VIRGINICUM	VIRGINIA BUNCHFLOWER		E		G5	S1	1915-08-??	Y
MULUS ALATUS	WINGED MONKEY FLOWER				G5	S3	1994-10-05	Y

HIGHTSTOWN USGS QUADRANGLE
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN
THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK	DATE OBSERVED	IDENT.
MYRIOPHYLLUM TENELLUM	SLENDER WATER-MILFOIL		E		G5	S1	1994-10-05	Y
RANUNCULUS PUSILLUS	LOW SPEARWORT				G5	S2	1890-??-??	Y
RANUNCULUS PUSILLUS	LOW SPEARWORT				G5	S2	1994-05-11	Y
SAGITTARIA AUSTRALIS	SOUTHERN ARROW HEAD		E		G5	S1	1994-10-05	Y
STACHYS HYSSOPIFOLIA	HYSSOP HEDGE-NETTLE				G5	S2	1994-07-13	Y
UTRICULARIA GIBBA	HUMPED BLADDERWORT			LP	G5	S3	1994-07-13	Y
VIOLA BRITTONIANA	COAST VIOLET				G4G5	S3	1994-10-05	Y
WOLFFIA PAPULIFERA	POINTED DUCKWEED				G4	S3	1993-08-27	Y

33 Records Processed

JAMESBURG USGS QUADRANGLE
RARE SPECIES AND NATURAL COMMUNITIES PRESENTLY RECORDED IN
THE NEW JERSEY NATURAL HERITAGE DATABASE

NAME	COMMON NAME	FEDERAL STATUS	STATE STATUS	REGIONAL STATUS	GRANK	SRANK	DATE OBSERVED	IDENT.
*** Vertebrates								
CLEMMYS INSCULPTA	WOOD TURTLE		T		G4	S3	1983-05-24	
HYLA ANDERSONII	PINE BARRENS TREEFROG	3C	E		G4	S3	????-??-??	Y
*** Invertebrates								
BOLORIA SELENE MYRINA	A SILVER-BORDERED FRITILLARY				G5T5	S2S4	1901-08-25	Y
INCISALIA IRUS	FROSTED ELFIN				G4	SU	1910-03-29	Y
SPEYERIA IDALIA	REGAL FRITILLARY	C2			G3	SX	1902-07-02	Y
*** Vascular plants								
CAREX BARRATTII	BARRATT'S SEDGE	3C		LP	G4	S4	1941-11-27	Y
LIATRIS SCARIOSA VAR NOVAE-ANGLIAE	NORTHERN BLAZING STAR	C2	E		G5?T3	SH	1940-09-29	Y
MELANTHIUM VIRGINICUM	VIRGINIA BUNCHFLOWER		E		G5	S1	????-??-??	Y

8 Records Processed

APPENDIX D

Preparer's Qualifications

AMY S. GREENE
President

AREAS OF EXPERTISE:

Aquatic, Terrestrial and Wetlands Ecology, Wetlands Mitigation, Environmental Impact Assessment, Endangered and Threatened Species Habitat Assessment, Natural Resources Inventory, Environmentally Sensitive Area Mapping

EDUCATION:

M.S. Ecology, Rutgers University, 1984
B.A. Biology, Boston University, 1974

CERTIFICATES:

Certified Wetlands Delineator, US Army Corps of Engineers, 1993

Certified Ecologist/Ornithologist, NJDEP Bureau of Discharge Prevention.

Certified Ecologist, Ecological Association of America

Certificate of Completion in Jurisdictional Delineation of Wetlands in the Mid-Atlantic States, New Brunswick, NJ - June 1988

Certificate of Completion in Wetlands Functions and Values (WET), Chincoteaque, VA July 1990

Certificate of Completion, 40 Hour OSHA Health and Safety Training Course for Hazardous Waste Site Workers

U.S. Fish and Wildlife Service, Habitat Evaluation Procedures Certified 1982

PROFESSIONAL EXPERIENCE:

Ms. Greene is President and owner of AMY S. GREENE ENVIRONMENTAL CONSULTANTS, INC. and as such has been providing professional environmental services to private and public sector clients since February 1986. She is recognized as an expert in the field of wetlands science, natural resources inventory, and environmental impact assessment. She has presented guest lectures at universities and educational seminars. She has been selected as mediator in litigation involving wetlands impacts and restoration.

Ms. Greene has twenty (20) years experience in the performance and management of environmental studies. She has prepared wetland evaluations, delineations and mitigation plans for coastal and inland wetlands. She has also conducted wildlife habitat evaluations, natural resources inventories and environmental impact assessments. Projects completed have entailed environmental planning for residential, commercial, industrial and recreation development and wastewater, sludge, solid waste and transportation facilities. Ms. Greene has prepared successful State and Federal permit applications for wetlands filling, waterways dredging, coastal zone development, stream encroachment, pollutant discharge, soil erosion and sediment control plans, NJ Pinelands development and hazardous waste facilities. She has prepared numerous environmentally sensitive area protection plans for industrial facilities throughout New Jersey.

Ms. Greene has been principally responsible for performance of the following representative projects:

Burlington County Sludge and Septage Management Plan. This project included preparation of environmentally sensitive area maps for all of Burlington County in accordance with Federal Clean Water Act requirements. Identification and environmental impact assessment of sludge and septage treatment, re-use and disposal options were performed.

Howland Hook Marine Terminal Expansion, Staten Island, N.Y. New York City Parks and Terminals and Port Authority of New York. Environmental Impact Report for submission to the U.S. Army Corps of Engineers, NY District, for an individual 404 dredge and fill permit. Wetland mapping, evaluation and impact mitigation, and protection of critical bird breeding areas were central issues.

Burlington City/Burlington Township Wastewater Facilities Management Plan. A natural resources inventory for the study area was prepared. Environmentally sensitive area mapping was performed. These tasks identified unique terrestrial and aquatic biological resources as well as physical resources of the municipalities and the Delaware River in the vicinity of the study area. Environmental impacts of proposed wastewater management alternatives were assessed.

Berkshire Valley Road Expansion Environmental Impact Assessment, Morris and Passaic Counties, NJ, New Jersey Department of Transportation. Natural, socioeconomic and cultural resources inventory and environmental impact assessment of roadway widening. Issues included assessment of endangered and threatened species habitat and mitigation of cultural resources.

Burlington County, NJ, Solid Waste Management Facilities Complex, Environmental Impact Statement. Inventory of natural, socioeconomic and cultural resources at a proposed solid waste management site. Master Plan development and evaluation of environmental impacts of proposed facilities including a sanitary landfill, co-composting facility and leachate treatment plant. Permit applications were prepared for a wetland fill permit, discharge to surface water permit and 208 consistency determination. Inspections of the wetlands mitigation site in accordance with the 404 permit were conducted by Amy S. Greene Environmental Consultants, Inc.

Leisuretowne Southampton Township, Burlington County, NJ, wetlands delineation was performed and wetlands fill authorization obtained from the US Army Corps of Engineers for proposed residential development. This authorization was obtained to satisfy a condition of the NJ Pinelands Commission Waiver of Strict Compliance.

US Army Depots, PA Environmental Assessments of three Army Hazardous Waste Management sites. Physical, biological and cultural resources were inventoried for each site. Impacts on these resources from operation of the facilities were assessed.

Ecological Analysis of Leisure Technology, Inc. property and adjacent properties in Berkeley Township, Ocean County, NJ. Detailed vegetation, soils, wildlife and aquatic biota studies were performed to assess the resource utilization potential for the properties relative to surrounding properties.

O&Y Old Bridge Development Site Wetlands Delineation for 2,700 acre parcel in Old Bridge, Middlesex County, NJ. This site was located at the boundary of the northern extent of pitch pine/oak vegetation communities in New Jersey.

Arthur Kill Generating Station, Tidal Wetlands Survey and Mitigation Plan, Staten Island, NY, Consolidated Edison Co. Wetland communities were mapped and evaluated for preparation of a NY State Tidal Wetlands Permit application. Detailed analyses were performed regarding geology, soils, hydrology, estuarine biota, and wildlife to assess the origin and resource value of onsite wetlands.

Eleanor Roosevelt National Historic Site Natural Resources Inventory, Hyde Park, NY, National Park Service. Monitoring, mapping and description of natural resources, including vegetation and wildlife, aquatic biota, water resources, soils and geology.

Francis E. Walter Dam, PA, Environmental Impact Assessment. Terrestrial and aquatic bioecological, physical, and socioeconomic resources were inventoried. Potential impacts on these resources from increasing the reservoir area from 90 acres to 1,000 acres were assessed. Issues included Delaware River Basin water supply, protection of downstream coldwater fisheries, and loss of terrestrial habitat.

Sussex and Nassau Counties Low Flow Augmentation Needs Study, US Environmental Protection Agency. The study entailed analysis of stream quality to determine the need for low flow augmentation following sewering of the region. Ms. Greene was responsible for analysis of fish species assemblage data to evaluate stream quality.

Cohansey River Dredging Project, Environmental Impact Assessment, US Army Corps of Engineers, Philadelphia District. Riverine, economic and wetlands impacts from the proposed dredging project were assessed. Issues included protection of the oyster beds in Delaware Bay and avoidance of wetlands impacts during dredged material disposal.

PUBLIC HEARING TESTIMONY: Ms. Greene has been qualified as an expert witness in wetlands investigation and environmental impact assessment before many Municipal Planning Boards and Environmental Commissions as well as county boards and in Superior Court including the following:

Atlantic County Court
Ocean County Court
Middlesex County Court
NJ Office of Admin. Law
Old Bridge Township, NJ
Raritan Township, NJ
Readington Township, NJ
S.Brunswick Township, NJ
Sparta Township, NJ
Tewksbury Township, NJ
Tinton Falls Borough, NJ
Vernon Township, NJ
White Township, NJ
Woodbridge Township, NJ
New Providence Borough, NJ
Mahwah Township, NJ
Mercer County, NJ
Lawrence Township, NJ
Mt. Olive Township, NJ
Bridgewater Township, NJ
Burlington Township, NJ
Chesterfield Township, NJ
E.Brunswick Township, NJ
Edgemont Township, PA
Helmetta Borough, NJ
Hillsborough Township, NJ
Howell Township, NJ
Independence Township, NJ
Berkeley Hts. Township, NJ

EMPLOYMENT HISTORY:

1986-Present	President, Amy S. Greene Environmental Consultants, Inc.
1980-1986	IT Corporation/Princeton Aqua Science, Edison, New Jersey Project Manager/Environmental Scientist
1975-1980	Pandullo Quirk Associates, Wayne, New Jersey Environmental Scientist
1974-1975	Essex County Park Commission, Center for Environmental Studies, Park Naturalist

AFFILIATIONS:

NJ Audubon Society - Member
Society of Wetland Scientists - Member
Philadelphia Botanical Club - Member
Ecological Society of America - Member
Somerset County Chamber of Commerce - Member
NJ Shore Builders Association - Member
Northwest Builders Association - Representative to State Association Environmental Committee
NJ and National Association of Women Business Owners - Member
NJ Parks and Recreation Association - Member, Wetlands Committee
South Branch Watershed Association - Vice President, Board of Trustees

LOIS E. M. ANDERSON
Project Director

AREAS OF EXPERTISE: Wetlands Ecology, Environmental Impact Assessment, Wetland Delineation in Problem Areas.

EDUCATION: M.S. Biology, 1986, The Pennsylvania State University.

B.A. Biological Sciences, cum laude, 1980, Mount Holyoke College. Environmental, Population and Organismic Biology, Spring 1979, University of Colorado, Boulder.

CERTIFICATES: Certificate of Completion. Wetland Delineation in Problem Areas. Wetland Training Institute. Pikesville, MD - October 1993.

Certificate of Completion. Wetland Functions and Values. Wetland Training Institute. Chincoteague, VA - July 1990.

Certificate of Completion. Jurisdictional Delineation of Wetlands in the Mid-Atlantic States. National Wetland Training Cooperative. New Brunswick, NJ - May 1989.

PROFESSIONAL EXPERIENCE: Ms. Anderson has ten (10) years experience in wetland ecology. She has a strong educational background in aquatic and forest ecology, hydrology, physiological ecology, and environmental resource management. Ms. Anderson has conducted extensive vegetation and wildlife surveys of impacted and unimpacted wetlands. She has performed wetland delineations on a wide variety of sites and is especially skilled in delineating disturbed areas. She has a strong working knowledge of current State and Federal wetland regulations and has experience and training in the use of the 1987 US Army Corps of Engineers and the 1989 Joint Federal Wetland Delineation methodologies.

As Project Director for ASGECI, Ms. Anderson oversees and coordinates work by the field staff on large projects, including project administration. Ms. Anderson performs wetland delineations and wildlife surveys and habitat assessments. She also prepares environmental impact statements, permit applications, and wetland and habitat mitigation plans. She is responsible for reviewing work performed by the field staff for wetland delineations, reports, and permit applications. In addition, she develops and writes project proposals and meets with clients to discuss new projects.

Ms. Anderson has been principally responsible for the performance of the following projects:

Ecology section of AA/DEIS Study, Hudson River Waterfront Transportation Project for NJ Transit, Hudson County, NJ.

Endangered and Threatened Species Inventory and Habitat Management Plan for the Master Plan Update at the Atlantic City International Airport and FAA Technical Center. South Jersey Transportation Authority, Atlantic Co., NJ.

Wetlands delineation and permitting for Gateway Transit Hub, Waterfront Transit Hub Project. NJ Transit, Hudson County, NJ.

Wetlands delineation and wetlands restoration plan for Kearny Connection Project. NJ Transit, Hudson County, NJ.

Wetlands delineation, Individual Freshwater Wetlands Permit application, and mitigation plan for NJ Dept. of Transportation. Interstate RT. 80 C-D Road, Bergen County, NJ.

Wetlands investigation, Endangered and Threatened species impact assessment and habitat mitigation plan, and Pinelands development application for proposed apron expansion at Atlantic City International Airport, Egg Harbor Township, Atlantic County, NJ.

Natural Resource Inventories of wetlands, vegetation and endangered and threatened species for Millstone Township, Monmouth County, NJ and East Amwell Township, Hunterdon County, NJ.

PUBLIC HEARING TESTIMONY:

Ms. Anderson has been qualified as an expert witness in wetlands investigation and environmental impact assessment before the following New Jersey Municipal Planning Boards:

Warren Township
Independence Township
Bernards Township
Tewksbury Township
Hillsborough Township

EMPLOYMENT HISTORY:

7/94-Present: Project Director, Amy S. Greene Environmental Consultants, Inc.

3/90-7/94: Senior Project Manager, Amy S. Greene Environmental Consultants, Inc.

4/89-3/90: Project Manager, ASGECI.

6/87-4/89: Environmental Scientist, ASGECI.

9/86-6/87: Senior Research Technologist, Biotechnology Institute, Pennsylvania State University.

8/86-10/86: Field Assistant, Department of Forestry, Pennsylvania State University.

PRESENTATIONS & PUBLICATIONS:

Guest lecturer. April 1991. Introduction to Wetland Ecology. Continuing Education, Rutgers University, New Brunswick, NJ.

Guest speaker. March 1991. Freshwater Wetlands in New Jersey. Kiwanis Club, Flemington, NJ Chapter.

McHerron L.E., Stevens S.E., Webster H.J., Stark L.R., Dionis K. 1987. Iron removal in a simulated wetland for acid mine drainage treatment. In Eighth Annual Surface Mine Drainage Task Force Symposium, Morgantown, WV. April 7-8, 1987.

McHerron L.E. 1985. The seasonal effectiveness of a Sphagnum wetland in removing iron and manganese from mine drainage. p. 385. In Wetlands and Water Management on Mined Lands. R.P. Brooks, D.E. Samuel, J.B. Hills (eds.). Penn State University.

Burris J.E., Gerber D.W., McHerron L.E. 1984. Removal of iron and manganese from water by Sphagnum moss. pp. 1-13. In Treatment of Mine Drainage by Wetlands, J.E. Burris (ed.). Pennsylvania State University, University Park, Contribution No. 264 Dept. of Biology.

AFFILIATIONS:

Society of Wetland Scientists
The Nature Conservancy
New Jersey Audubon Society

LISA J. BRAVE
Project Manager

AREA OF EXPERTISE:

Wetlands Delineation and Permitting, Environmental Impact Assessment, Wildlife Habitat Assessment, Environmental Site Assessment, Level of Action Assessment

EDUCATION:

B.S. Natural Resources (Wildlife Management), The Ohio State University, 1985.

CERTIFICATES/ PROFESSIONAL COURSES:

Certification as a Professional Wetland Scientist - Society of Wetland Scientists

Appointed Member - White Township Environmental Commission

Certificate of Completion, 40-Hour OSHA Health and Safety Training Course for Hazardous Site Workers

EPA-AHERA Certified Asbestos Inspector

Cook College, Rutgers University:
- Environmental Enforcement: NJDEP Policy
- Freshwater Wetlands, Permitting
- Understanding Soil Conditions in Wetlands
- Wetland Systems of the Northeast
- Planning for NJ Wetlands, Wetlands of NJ
- Vegetation Identification for Wetlands Delineation , Spring/Summer/Fall Conditions
- Vegetation Identification for Wetlands Delineation, Winter Conditions

PROFESSIONAL EXPERIENCE:

Ms. Brave has over eight years experience working in the environmental field. She has a strong background in the environmental consulting field and specifically in wetlands delineations, wetlands permitting, environmental site assessments and environmental impact assessments. She has an excellent working knowledge of current State and Federal wetlands regulations and has experience and training in the use of the 1987 US Army Corps of Engineers and 1989 Joint Federal Wetland Delineation methodologies.

As Project Manager for ASGECI, Ms. Brave is responsible for performing and coordinating all work on assigned projects including: field investigations, wetland delineations, hydrologic and soils investigations, wildlife studies, environmentally sensitive areas mapping, impact assessments, report preparation, regulatory agency submissions, and the interaction with clients as well as local, State, and Federal governmental agencies

Ms. Brave has been principally responsible for the performance of the following projects:

Performed wetlands delineations, prepared NEPA Environmental Impact Assessment and obtained permits for Paterson Plank Road/Routes 1 and 9 roadway improvements, for NJ Dept. of Transportation and Federal Highway Authority, Towns of North Bergen and Secaucus, Bergen County.

Wildlife and Rare Species Habitat Assessment, Wetlands Delineations, CAFRA Environmental Impact Statement, and NJDEP Freshwater Wetlands and Pinelands Permitting, Garden State Parkway Interchanges 40 and 44 and ETC toll plaza for the New Jersey Highway Authority, Townships of Port Republic and Galloway, Atlantic County, New Jersey.

Wetlands delineations and NJDEP Individual Wetlands Permit application for the Township of Rockaway in accordance with the NJ Freshwater Wetlands Protection Act for drainage improvements at McKeel's Brook in Rockaway Township, Morris County, NJ.

Obtained NJDEP approval of a Wetlands Transition Area Averaging Plan prepared in accordance with the NJ Freshwater Wetlands Protection Act for the Franklin Township Board of Education, Franklin Township, Hunterdon County, New Jersey.

Performed wetlands delineations and obtained Statewide General Permits and Transition Area Averaging Plan approval for the Morris County Vocational Technical School in the Township of Denville, Morris County, New Jersey.

Ecological Assessment for environmentally sensitive areas for the Robert Wood Johnson, Forrestal Center property in South Brunswick, Middlesex County, New Jersey.

Level of Action Assessments: Coordinated all sections, performed field studies for, and wrote Wildlife, Wetlands, Hazardous Waste, Noise and Air Quality sections for the NJ Department of Transportation - Bureau of Environmental Assessment. Work involved many sites throughout New Jersey.

Prepared applications for Statewide General Permits for the NJDOT for their Newark Regional Headquarters facility. The application packages were prepared on an emergency basis, and completed within 48 hours. Follow-up with the NJDEP allowed for receipt of the permits within one week of application.

In addition to numerous wetlands delineations and permit preparations, Ms. Brave has also coordinated, managed and performed numerous Phase I Environmental Site Assessments in New Jersey, New York, Ohio and Florida. She has performed ECRA/ISRA investigations, media sampling, and has managed the removal of underground storage tank systems throughout New Jersey.

EMPLOYMENT HISTORY:

1/95-Present:	Project Manager, Amy S. Greene Environmental Consultants, Inc.
3/92-1/95:	Project Manager, Environmental Specialist, The RBA Group, Morristown, NJ.
3/91-3/92:	Senior Staff Scientist, Bell Environmental Consultants, Dover, NJ.
6/89-2/91:	Environmental Specialist, Environmental Connection, Inc., Freehold, NJ.
9/87-6/89:	Environmental Specialist, TRC Environmental Consultants, Inc., Somerset, NJ.

AFFILIATIONS:

National Wildlife Federation
Society of Wetland Scientists
White Township Environmental Commission

MARGARET BRANCHEAU
Project Manager

AREAS OF EXPERTISE: Wildlife Surveys, Vegetation Surveys, Behavioral Observation of Wildlife, Wetland Investigations.

EDUCATION: B.S., Environmental Studies Biology, 1987, Millersville University of Pennsylvania.

CERTIFICATIONS & PROFESSIONAL COURSES: Habitat Evaluation Procedures Certification, USFWS/Colorado State University - May, 1993.

Hydric Soils, Office of Continuing Education, Cook College, Rutgers University - October, 1994.

PROFESSIONAL EXPERIENCE: As an Environmental Scientist for Amy Greene Environmental Consultants, Inc., Ms. Brancheau performs wetland delineations and wildlife surveys, and prepares wetland delineation, endangered and threatened species, and environmental impact reports. She has prepared numerous applications for NJDEP wetland permits and letters of interpretation.

Ms. Brancheau has been involved in wildlife observation and documentation over the past seven (7) years. She conducted a vegetational survey on the Lois Howe Nature Trail for the Somerset County Parks Commission which included mapping, bird survey, and terrestrial wildlife observation. She monitored the common loon population on a 2,500 square mile area in New Hampshire. Ms. Brancheau was involved in two pesticide studies which involved small mammal and bird surveys, nest monitoring, residue collections, habitat identification, vegetational surveys, and observation of wildlife for pesticide-induced behavior patterns. The study sites were located in the Finger Lakes area of New York and the coastal region of North Carolina.

Ms. Brancheau has been principally or partially responsible for the following projects:

Endangered and threatened species report and habitat-type mapping for the proposed 3,000 acre Disney's America site in Prince William County, VA.

Endangered and threatened species and general wildlife survey with impact assessment for Princeton Airport Expansion Environmental Impact Study, Montgomery Township, Somerset County, NJ. Endangered and threatened species surveyed included wood turtles, grasshopper sparrows and barred owls.

Environmental Impacts Evaluation of a 977 acre Superfund site within the New Jersey Pinelands. Included was wetland delineation and a survey of Endangered and Threatened species such as timber rattlesnake, Pine Barrens treefrog, pine snake, corn snake, and barred owl as well as evaluation of potential habitat.

Wildlife section of Environmental Assessment for additions and renovations at Kean College, Union, NJ.

Endangered and Threatened species investigation for Atlantic City Airport Master Plan, Pomona, NJ. This project mainly involved grasshopper sparrows and upland sandpipers.

Search for wood turtles and assessment of habitat suitability, wetlands delineation and documentation and Individual Freshwater wetlands permit application for NJDOT for Route 130/Adams Lane in Middlesex County, NJ.

Wetlands delineation for Route 287 High Occupancy Vehicle lane expansion, NJDOT, Morristown, NJ.

Grasshopper sparrow population/habitat study, Atlantic City International Airport, Pomona, NJ.

Wildlife survey at proposed septic system construction area for AT&T in Holmdel, NJ.

Wetlands delineation and report for proposed Snake Den Road Bridge replacement, NJDOT, West Milford, NJ.

Wildlife inventory as part of Environmental Assessment, Manorfield Development, Bernards Township, NJ.

Wildlife inventory as part of Environmental Assessment, Warren Springs Development, Warren Township, NJ.

EMPLOYMENT HISTORY:

3/94-present	Project Manager, Amy S. Greene Environmental Consultants, Inc.
2/92-3/94	Environmental Scientist, Amy S. Greene Environmental Consultants, Inc.
3/91-10/91	Field Biologist/Ornithologist, Wildlife International, Ltd.
5/90-9/90	Field Ornithologist, Audubon Society of New Hampshire.

5/85-8/85 and 5/86-8/86	Park Naturalist/Ranger, Somerset County Parks Commission

AFFILIATIONS:

National Audubon Society
New Jersey Audubon Society
Audubon Society of New Hampshire
The Nature Conservancy
New Jersey Conservation Foundation
South Branch Watershed Association

WILLIAM H. SMEJKAL
Project Manager/Geologist

AREAS OF EXPERTISE: Geology, Wetlands Ecology, Soils, Herpetology, Environmental Impact Assessment, Permit Preparation

EDUCATION: M.S. Geological Science, December 1992, Rutgers University, Newark, New Jersey.

B.S. Biology, May 1976, Ramapo College, Mahwah, New Jersey.

PROFESSIONAL COURSES:

Delaware Valley College Herpetology Program, spring 1995.

NJ Association of Professional Soil Scientists Meeting. Stockton, NJ - October 1990.

Identification of Sedges and Rushes. Continuing Education, Cook College, Rutgers University - August 1990.

Wetlands Delineation. National Wetland Training Institute - July 1990.

The New Jersey Pinelands, Our Country's First National Reserve. Cook College, Rutgers University - March 1990.

Geology and Hydrogeology of New Jersey. Continuing Education, Cook College, Rutgers University - October 1989.

Understanding Soil Conditions of Wetlands. Continuing Education, Cook College, Rutgers University - April 1989.

The Permit Seminar. NJ Department of Environmental Protection and Rutgers University, Jamesburg, NJ - February 1989.

Planning for New Jersey's Freshwater Wetlands: Ecology and Regulations. Cook College, Rutgers University, - January 1989.

PROFESSIONAL EXPERIENCE: Mr. Smejkal has a strong background in Biology and Wetlands Ecology as well as over eight years experience in the bedrock geology and soils of the Northeastern United States. As Project Manager for Amy S. Greene Environmental Consultants, Inc., Mr. Smejkal is responsible for all aspects of wetlands investigations. These include: wetlands delineations, wildlife studies, hydrology and soils investigations, preparation of wetlands reports and environmental impact assessments, and interaction with governmental agencies.

Mr. Smejkal has been principally responsible for the performance of the following projects:

Environmental Impacts Evaluation of a 977 acre Superfund site within the New Jersey Pinelands. Included was a survey of Endangered and Threatened species such as timber rattlesnakes, Pine Barrens treefrog, pine snake, corn snake, bog turtles, and barred owl as well as evaluation of potential habitat.

Environmentally Sensitive Areas Assessment for developers in Montville Township, Morris County, NJ. Included was an analysis of wetlands and steep slopes and a wood turtle survey.

Wetlands delineation of a 300-acre parcel in Bridgewater Township, Somerset County, NJ. This project included extensive early spring searches for wood turtles to confirm reported sightings.

Wetland delineation and documentation of wood turtle occurrence on 83 acre site in Morris County.

Water quality sampling of three streams for 500 acre mixed development project in South Brunsick, Middlesex County.

Aquifer study in Hudson County including the Palisades diabase, Brunswick and Stockton formations and overlying sediments. Movement of contaminants in groundwater due to overpopulation was also addressed.

Wetland delineation of 450+ acre research/office complex in Monmouth County.

Wood turtle survey on 116 acre site of proposed residential development in Somerset County.

Preparation of a restoration plan including establishing previous wetland boundary, fill removal and replanting, and monitoring plan for the recovery and rehabilitation of a wetland in Morris County.

Preparation of a Statement of Compliance and application for a Waterfront Development Permit for an industrial complex in Woodbridge, Middlesex County.

Wetland delineation for proposed office and industrial park in Freehold Township, Monmouth County, NJ.

Wetland delineation and Letter of Interpretation application for proposed expansion of industrial building in Woodbridge Township, Middlesex County, NJ.

Hydrologic investigation of ground water drawdown and subsequent changes in vegetation in Marlboro Township, Monmouth County, NJ.

Wetland delineation and habitat evaluation for endangered and threatened species in Bergen and Monmouth County, NJ.

Environmental Impact Assessment in Randolph Township, Morris County, NJ. Wetlands delineation and endangered and threatened species assessment including documentation of wood turtle occurrence.
Colts Neck, Monmouth County, NJ. Wetland delineation and aquifer study for presentation to Township Environmental Council.

EMPLOYMENT HISTORY:

11/88-Present	Project Manager, Amy S. Greene Environmental Consultants, Inc.
2/87-11/88:	Geologist, Norman J. Coons, Inc., Consulting Engineers.
9/85-9/87:	Paleontological Research, Lamont-Doherty Geological Observatory of Columbia University.
AFFILIATIONS:	American Association for the Advancement of Science Geological Association of New Jersey Geological Society of America World Wildlife Fund Nature Conservancy

AMY S. GREENE
ENVIRONMENTAL CONSULTANTS, INC.

18 COMMERCE STREET PLAZA • FLEMINGTON, NJ 08822
(908) 788-9676 • FAX (908) 788-6788
PA (610) 250-0773

WOOD TURTLE SURVEY

FOR

NEW JERSEY TURNPIKE AUTHORITY
PROPOSED ROUTE 92

SOUTH BRUNSWICK AND PLAINSBORO TOWNSHIPS
MIDDLESEX COUNTY, NEW JERSEY

JULY 15, 1996

Submitted to:

FREDERIC R. HARRIS, INC.

Prepared by:

AMY S. GREENE ENVIRONMENTAL
CONSULTANTS, INC.

Project #1244A

EXECUTIVE SUMMARY

A wood turtle survey was performed as a supplement to the Wildlife Inventory Report (Amy S. Greene Environmental Consultants, Inc., 1996) for proposed Route 92, at the request of the New Jersey Department of Environmental Protection (NJDEP). The purpose of the survey was to determine whether wood turtles are present within the vicinity of the proposed right-of-way for Route 92. The survey consisted of field searches for wood turtles and evaluation of wood turtle wintering habitat along the Devil's Brook corridor between Lake McCormack and East New Road.

The majority of the area surveyed was determined to be flooded forest and did not provide the necessary components for wood turtle wintering habitat. Upland/wetland transition areas were also searched for wood turtles. No evidence of wood turtles was discovered. It is highly unlikely that wood turtles utilize the searched corridor from November through March.

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I. INTRODUCTION

A Wildlife Inventory Report (WIR) dated February 5, 1996 was prepared by Amy S. Greene Environmental Consultants, Inc. (ASGECI) for the proposed Route 92 project. The WIR was reviewed by the New Jersey Department of Environmental Protection (NJDEP) Land Use Regulation Program, NJDEP Division of Fish, Game and Wildlife and NJDEP Office of Program Coordination submitted as Appendix B of the Route 92 Executive Order No. 215 Response Document dated February 1996. The proposed Route 92 traverses wetland and upland forest, upland and agricultural fields and wet meadows. The central portion of the alignment crosses Devil's Brook.

It was determined in the WIR (ASGECI, 1996) that the area within 300 feet of where the alignment crosses Devil's Brook did not provide necessary wintering habitat for wood turtles, due to the lack of defined bed and banks in this area. However, at a March 14, 1996, meeting the NJDEP Division of Fish, Game and Wildlife and Land Use Regulation Program requested that additional studies be performed to examine whether adequate wintering habitat exists further up- or downstream from the alignment. If wintering habitat were available, any existing wood turtles could migrate to the project ROW for breeding, nesting, resting or feeding, since there is such habitat within the immediate vicinity of the alignment. Therefore, additional surveys were performed along Devil's Brook during the spring of 1996 (April and May), encompassing a more expansive area, to determine whether wood turtles exist within the vicinity of the proposed right-of-way (ROW) for Route 92.

The additional survey consisted of two phases. The first phase consisted of walking the Devil's Brook corridor to determine which areas, if any, had the potential for wood turtle wintering habitat, while at the same time surveying the area for wood turtles. The second phase consisted of searching areas of potential habitat for wood turtles. The survey was discussed and verbally accepted by the NJDEP (Jim Sciascia, personal communication, April 2 and May 17, 1996). This report explains the survey methodology utilized and presents and discusses the results obtained.

II. HABITAT INFORMATION

Wood turtles require both aquatic and terrestrial habitat (NJDEP, 1993). They tend to be aquatic from approximately mid-November to mid-March, terrestrial from mid-May to mid-September, and in transition the remainder of the year. They are very difficult to find in the summer, after they have migrated from the streams, as they hide in dense grass

and underbrush. Streams and rivers are used primarily for breeding and hibernating. They prefer slow meandering streams with sandy bottoms and shoals for breeding in the spring and sometimes in the fall. In the winter, they hibernate within the banks or on the bottom of streams or rivers.

In New Jersey, mating was found to nearly always occur in streams with water levels from 30 cm to 100 cm (approximately 1 to 3 feet) in depth (Farrell and Zappalorti, 1980). Wood turtles will nest in any number of habitats, including agricultural fields (Zappalorti et al., 1984).

Zappalorti and Johnson (1980) found that wood turtles tend to live side by side with brook trout, highlighting their requirements for pure, unpolluted water. Zappalorti and Farrell (1984) found that wood turtles were usually found to be associated with a water system that had an abundant fish population, especially an area that was stocked annually with trout. Another common denominator of wood turtle populations is their proximity to large tracts of undisturbed fields and forest, used for nesting and foraging (Zappalorti and Johnson, 1981), usually separated from populated, residential areas or major highways by at least one-half mile or more (Zappalorti and Farrell, 1984).

Although home range is not yet clearly defined, it is known that wood turtles can travel long distances from their wintering site. There are several reports of recaptured turtles found from one-half to one mile from original capture points near winter hibernacula.

III. METHODOLOGY

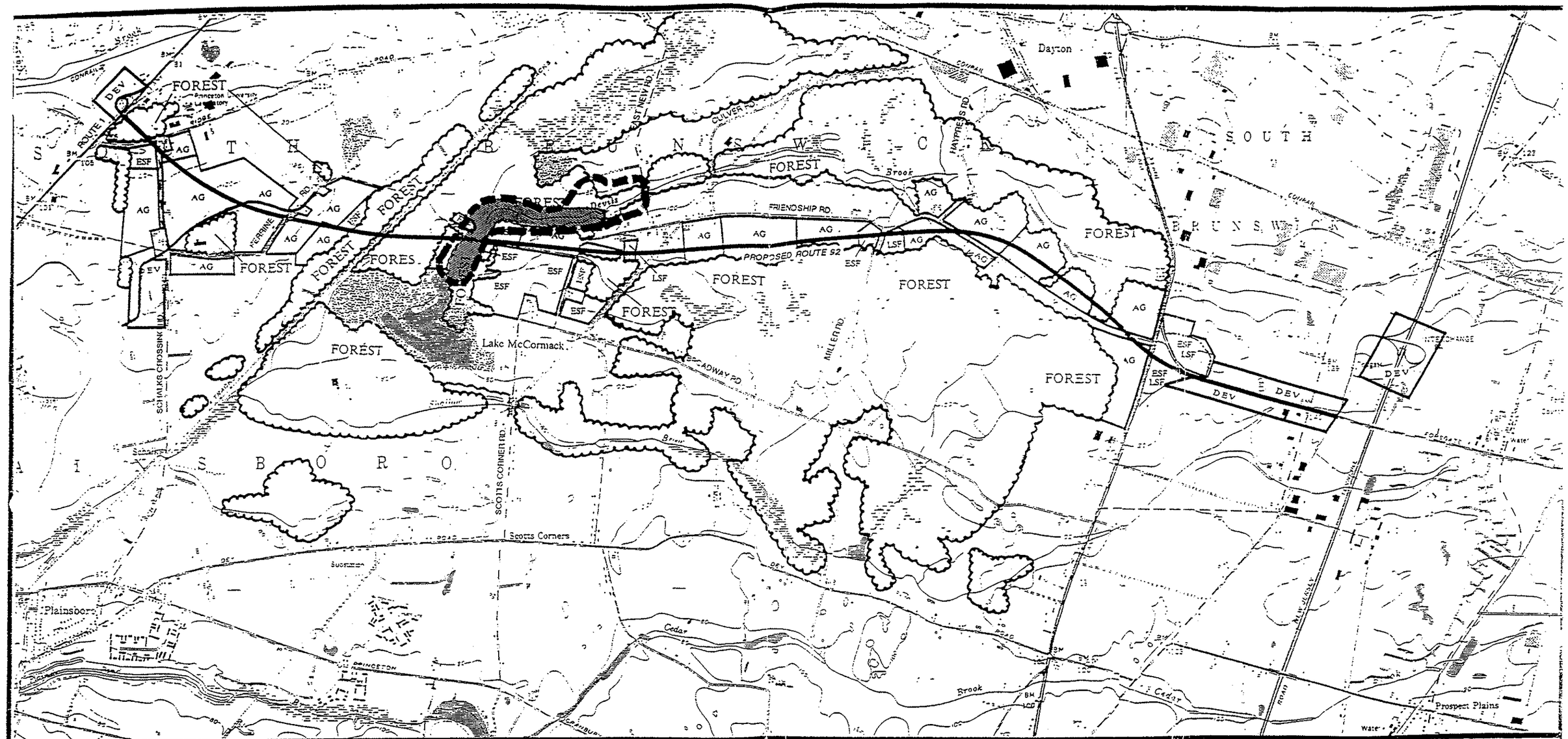
Forested wetlands along Devil's Brook and adjacent forested and open areas were searched for wood turtles (Figure 1). April through June is the best time to search for wood turtles, due to their expected movement between stream corridor (winter hibernacula habitat), open fields (nesting habitat), and woodland (summer feeding/resting habitat) at that time.

Our scope of work proposed a search area of 1000 feet on either side of the proposed Route 92 alignment at the intersection of the roadway with Devil's Brook, located east of the Amtrak rail line, and was verbally accepted by NJDEP staff (Jim Sciascia, personal communication, April 2, 1996). This survey was to include six search days from mid-April to mid-May on days when the temperature exceeded 70 degrees F. The first phase of the survey (two days) was to identify the nature and extent of potential habitat within the study area. If only a portion of the study area contained the

undercut banks typical of winter hibernacula, then only those areas remained in the search area. Remaining survey time (four days) could then be used for searches of the upland/wetland boundary and adjacent fields later in May. If no areas of suitable wintering habitat were observed, then coordination with NJDEP to discuss the feasibility of continuing the survey would be pursued.

The habitat was evaluated within the 2000 foot corridor in early to mid-May. Air temperature was not a concern during the first day since the primary purpose was to evaluate the habitat, not to look for wood turtles. Stream banks, where present, were examined for overhangs, exposed roots, muskrat burrows, or any other feature which could potentially be utilized for wood turtle hibernacula. Over two days, an area of approximately 50 to 100 feet wide, on either side of the brook was walked in separate zigzag patterns by two field personnel. Sticks were used to move vegetation that turtles might use for cover, to poke under undercut banks and roots, and to check water depths. No suitable wintering habitat was observed within the 2000 foot corridor. Therefore, we extended the search area further upstream to include the portion of Devil's Brook up to East New Road (Figure 1). The stream extending 1000 feet west of East New Road was found to have bed and banks. Table 1 presents the dates and locations of field surveys.

Due to the lack of suitable habitat in the majority of the study area observed during the first phase of the survey and some cold spring weather, it was decided that it would be more productive to search the transition areas and adjacent uplands during the end of May and/or beginning of June (Jim Sciascia, personal communication, May 17, 1996). This is the time when turtles would be expected to be moving into these areas. The second phase of the survey continued through June and focused on the area near East New Road that had bed and banks. It was verbally agreed upon between ASGECI and NJDEP staff that only three additional days of survey were necessary, instead of the four originally proposed. Searches were generally conducted between the hours of 9:30 a.m. and 1:00 p.m. The search methodology used was the same as that described above. The two field ecologists performed searches of transition areas associated with Devil's Brook and adjacent upland fields 100 feet or more from the wetland boundary from East New Road to the west approximately 1000 feet.



LEGEND:

AG	AGRICULTURAL FIELDS
ESF	EARLY SUCCESSIONAL FIELD
DEV	DEVELOPED LAND
LSF	LATE SUCCESSIONAL FIELD
	FOREST BOUNDARIES
	FIELD BOUNDARIES
	PROPOSED ROUTE 92

BOUNDARY OF STUDY AREA

FLOODED FOREST

NOTE: Habitat types were determined from the review of current aerial photographs and field verification by Amy S. Greene Environmental Consultants, Inc.

SOURCE: USGS 7.5 Minute Topographic Series Map, Hightstown and Jamesburg, NJ Quadrangles.

0 2500'

FIGURE 1
LOCATION OF STUDY AREA
FOR WOOD TURTLE SURVEY

Proposed Route 92
South Brunswick & Plainsboro Townships
Middlesex County, New Jersey

ASGECI Project #1244A

AMY S. GREENE
ENVIRONMENTAL CONSULTANTS, INC.

TABLE 1 – SURVEY DATES AND CONDITIONS

SURVEYS	CONDITIONS	AREA SEARCHED
May 8, 1996	Rainy/ 50–70 F	Stream Corridor and Wetlands From McCormack Lake to Channelized Portion of Devil's Brook.*
May 15, 1996	Sunny/ >70 F	Stream Corridor and Wetlands From Channelized Portion of Devil's Brook to East New Road.
May 15, 1996	Sunny/ >70 F	Transition Areas and Adjacent Fields Between Channelized Portion of Devil's Brook and East New Road.
June 7, 1996	Sunny/ >70 F	New Road to Flooded Forest Section.** Transition Areas and Adjacent Fields
June 19, 1996	Rainy/ >70 F	New Road to Flooded Forest Section. Transition Areas and Adjacent Fields

* Channelized portion of Devil's Brook is located just north of proposed Route 92 Right–of–Way above Lake McCormack (Figure 1).

** Flooded Forest Section includes the area of Devil's Brook from Lake McCormack to approximately 1,000 feet west of New Road (Hatched Area, Figure 1).

IV. RESULTS AND CONCLUSIONS

The results of the first phase of the wood turtle survey indicated that there is minimal potential wintering habitat within the surveyed corridor. Only one area along Devil's Brook, from East New Road to approximately 1000 feet west of East New Road, exhibited defined bed and banks; however, few undercut banks were observed. The remainder of the corridor consisted of flooded forest with no distinguishable bed and banks along Devil's Brook. In the area within 1000 feet of the proposed Route 92 ROW crossing Devil's Brook, the area was primarily a flooded forest in which the trees were on hummocks and the stream channel was mostly undefined (Figure 1). There were no overhanging banks typical of wood turtle winter habitat. Because most of the Devil's Brook corridor within the area surveyed consists of flooded forest without a distinct stream channel, it does not provide the undercut banks that typify the turtle's hibernacula. Because there is minimal potential winter hibernacula habitat within the surveyed corridor, it is unlikely that wood turtles are utilizing this area for wintering.

No wood turtles were found during the survey. While other wildlife surveys such as for the grassland birds and the barred owl surveys were being performed, observations were also made for evidence of wood turtles. No evidence of the wood turtle was found during these other surveys. Wood turtles are reported to travel up to a mile from their wintering habitat. Although there is an extensive amount of potential feeding and nesting habitat throughout the proposed Route 92 corridor, wood turtles need to have a wintering hibernacula within a mile of these areas in order to utilize this habitat. Since it appears that there is minimal suitable wintering habitat within this distance of the proposed ROW, it is unlikely that wood turtles would be utilizing the area within the immediate vicinity of the ROW from November through March.

In addition to our own findings, Mr. Larry Torok of the NJDEP, Land Use Regulation Program, who has made limited field surveys of the forested habitat surrounding Devil's Brook, stated that the habitat in the area is not ideal for wood turtles (personal communication, October 1995 and May 1996).

V. LIST OF REFERENCES

Conant, R. 1975. A Field Guide to Reptiles and Amphibians of Eastern and Central North America. Houghton Mifflin Co., Boston, MA.

Farrell, R.F. and Zappalorti, R.T. 1979 and 1980. An Ecological Study of the Wood Turtle, Clemmys insculpta, Le Conte, (Reptilia, Testudines, Emyididae) in Northern New Jersey, Parts I and II. Herpetological Associates, Staten Island, NY.

NJDEP, Division of Fish, Game and Wildlife. 1990. New Jersey DFG&W Database - Turtle, wood.

NJDEP, Division of Water Resources. 1984. Delineation of the Floodway and Flood Hazard Area, Devils Brook, South Brunswick Township, Middlesex County, Sheets 48 and 49.

NJDEP, Endangered and Nongame Species Program and USDA Soil Conservation Service. 1980. Endangered and Threatened Species of New Jersey.

NJDEP, Endangered and Nongame Species Program. 1987. Annual Report.

NJDEP, Land Use Regulation Program. 1994. Notice of the Opportunity for Public Comment on the Criteria used for Establishing Exceptional Resource Value Wetland Classifications Based on Endangered and Threatened Species Locational Data (Draft). Trenton, NJ.

NJDEP, Natural Heritage Program. 1995. Natural Heritage Database Correspondence (unpublished letter). Trenton, NJ.

NJDEP, Office of Natural Lands Management. 1992. Special Animals of NJ. Division of Parks and Forestry, Trenton, NJ.

Sciascia, J. 1996. Personal communications with Lisa Brave, Amy S. Greene Environmental Consultants, Inc.

Torok, L. 1992. Wetlands and Wildlife Habitat. In: Freshwater Wetlands Identification and Regional Conference Proceedings, September 22-23 1992. Sponsored by NJ Division of American Foresters, Rutgers Cooperative Extension and U.S. Forest Service.

Torok, L. 1995 and 1996. Personal communications with Lisa Brave, Amy S. Greene Environmental Consultants, Inc.

Zappalorti, R.T. and E.W. Johnson. 1980. Additional Updated Locality and Distribution Records of Endangered and Threatened Amphibians and Reptiles in New Jersey (Third Supplement). Unpublished report to NJDEP, Division of Fish, Game, and Wildlife, Endangered and Nongame Species Program by Herpetological Associates, Staten Island, NY.

Zappalorti, R.T. and E.W. Johnson. 1981. Proposed Management Plans for Endangered and Threatened Amphibians and Reptiles in New Jersey. Unpublished report to NJDEP, Division of Fish, Game, and Wildlife, Endangered and Nongame Species Program by Herpetological Associates as quoted in NJDEP letter dated February 9, 1993.

Zappalorti, R.T., R. Farrell and P.A. Reap. 1984. The Ecology of the Wood Turtle, Clemmys insculpta in New Jersey, Part III. Herpetological Associates, Inc., Staten Island, New York.

APPENDIX A

QUALIFICATIONS OF PREPARERS

LOIS E. M. ANDERSON
Project Director

AREAS OF EXPERTISE: Wetlands Ecology, Environmental Impact Assessment, Wetland Delineation in Problem Areas.

EDUCATION: M.S. Biology, 1986, The Pennsylvania State University.

B.A. Biological Sciences, cum laude, 1980, Mount Holyoke College. Environmental, Population and Organismic Biology, Spring 1979, University of Colorado, Boulder.

CERTIFICATES: Certificate of Completion. Wetland Delineation in Problem Areas. Wetland Training Institute. Pikesville, MD - October 1993.

Certificate of Completion. Wetland Functions and Values. Wetland Training Institute. Chincoteague, VA - July 1990.

Certificate of Completion. Jurisdictional Delineation of Wetlands in the Mid-Atlantic States. National Wetland Training Cooperative. New Brunswick, NJ - May 1989.

PROFESSIONAL EXPERIENCE: Ms. Anderson has ten (10) years experience in wetland ecology. She has a strong educational background in aquatic and forest ecology, hydrology, physiological ecology, and environmental resource management. Ms. Anderson has conducted extensive vegetation and wildlife surveys of impacted and unimpacted wetlands. She has performed wetland delineations on a wide variety of sites and is especially skilled in delineating disturbed areas. She has a strong working knowledge of current State and Federal wetland regulations and has experience and training in the use of the 1987 US Army Corps of Engineers and the 1989 Joint Federal Wetland Delineation methodologies.

As Project Director for ASGECI, Ms. Anderson oversees and coordinates work by the field staff on large projects, including project administration. Ms. Anderson performs wetland delineations and wildlife surveys and habitat assessments. She also prepares environmental impact statements, permit applications, and wetland and habitat mitigation plans. She is responsible for reviewing work performed by the field staff for wetland delineations, reports, and permit applications. In addition, she develops and writes project proposals and meets with clients to discuss new projects.

Ms. Anderson has been principally responsible for the performance of the following projects:

Ecology section of AA/DEIS Study, Hudson River Waterfront Transportation Project for NJ Transit, Hudson County, NJ.

Endangered and Threatened Species Inventory and Habitat Management Plan for the Master Plan Update at the Atlantic City International Airport and FAA Technical Center. South Jersey Transportation Authority, Atlantic Co., NJ.

Wetlands delineation and permitting for Gateway Transit Hub, Waterfront Transit Hub Project. NJ Transit, Hudson County, NJ.

Wetlands delineation and wetlands restoration plan for Kearny Connection Project. NJ Transit, Hudson County, NJ.

Wetlands delineation, Individual Freshwater Wetlands Permit application, and mitigation plan for NJ Dept. of Transportation. Interstate RT. 80 C-D Road, Bergen County, NJ.

Wetlands investigation, Endangered and Threatened species impact assessment and habitat mitigation plan, and Pinelands development application for proposed apron expansion at Atlantic City International Airport, Egg Harbor Township, Atlantic County, NJ.

Natural Resource Inventories of wetlands, vegetation and endangered and threatened species for Millstone Township, Monmouth County, NJ and East Amwell Township, Hunterdon County, NJ.

PUBLIC HEARING TESTIMONY: Ms. Anderson has been qualified as an expert witness in wetlands investigation and environmental impact assessment before the following New Jersey Municipal Planning Boards:

Warren Township
Independence Township
Bernards Township
Tewksbury Township
Hillsborough Township

EMPLOYMENT HISTORY:

7/94-Present: Project Director, Amy S. Greene Environmental Consultants, Inc.

3/90-7/94: Senior Project Manager, Amy S. Greene Environmental Consultants, Inc.

4/89-3/90: Project Manager, ASGECI.

6/87-4/89: Environmental Scientist, ASGECI.

9/86-6/87: Senior Research Technologist, Biotechnology Institute, Pennsylvania State University.

8/86-10/86: Field Assistant, Department of Forestry, Pennsylvania State University.

PRESENTATIONS & PUBLICATIONS: Guest lecturer. April 1991. Introduction to Wetland Ecology. Continuing Education, Rutgers University, New Brunswick, NJ.

Guest speaker. March 1991. Freshwater Wetlands in New Jersey. Kiwanis Club, Flemington, NJ Chapter.

McHerron L.E., Stevens S.E., Webster H.J., Stark L.R., Dionis K. 1987. Iron removal in a simulated wetland for acid mine drainage treatment. In Eighth Annual Surface Mine Drainage Task Force Symposium, Morgantown, WV. April 7-8, 1987.

McHerron L.E. 1985. The seasonal effectiveness of a Sphagnum wetland in removing iron and manganese from mine drainage. p. 385. In Wetlands and Water Management on Mined Lands. R.P. Brooks, D.E. Samuel, J.B. Hills (eds.). Penn State University.

Burris J.E., Gerber D.W., McHerron L.E. 1984. Removal of iron and manganese from water by Sphagnum moss. pp. 1-13. In Treatment of Mine Drainage by Wetlands, J.E. Burris (ed.). Pennsylvania State University, University Park, Contribution No. 264 Dept. of Biology.

AFFILIATIONS: Society of Wetland Scientists
The Nature Conservancy
New Jersey Audubon Society

LISA J. BRAVE
Project Manager

AREA OF EXPERTISE:

Wetlands Delineation and Permitting, Environmental Impact Assessments, Wildlife Habitat Assessments, Environmental Site Assessments, Level of Action Assessments.

EDUCATION:

B.S. Natural Resources (Wildlife Management), The Ohio State University, 1985.

CERTIFICATES/ PROFESSIONAL COURSES:

Professional Wetland Scientist - Society of Wetland Scientists

Certificate of Completion, 40-Hour OSHA Health and Safety Training Course for Hazardous Site Workers

EPA-AHERA Certified Asbestos Inspector

Cook College, Rutgers University:
- Environmental Enforcement: NJDEP Policy
- Freshwater Wetlands, Permitting
- Understanding Soil Conditions in Wetlands
- Wetland Systems of the Northeast
- Planning for NJ Wetlands, Wetlands of NJ
- Vegetation Identification for Wetlands Delineation, (Spring/Summer/Fall)
- Vegetation Identification for Wetlands Delineation, Winter Conditions

PROFESSIONAL EXPERIENCE:

Ms. Brave has over eight years experience working in the environmental field. She has a strong background in the environmental consulting field and specifically in wetlands delineations, wetlands permitting, environmental site assessments and environmental impact assessments. She has an excellent working knowledge of current State and Federal wetlands regulations and has experience and training in the use of the 1987 US Army Corps of Engineers and 1989 Joint Federal Wetland Delineation methodologies.

As Project Manager for ASGECI, Ms. Brave is responsible for performing and coordinating all work on assigned projects including: field investigations, wetland delineations, hydrologic and soils investigations, wildlife studies, environmentally sensitive areas mapping, impact assessments, report preparation, regulatory agency submissions, and the interaction with clients as well as local, State, and Federal governmental agencies.

Ms. Brave has been principally responsible for the performance of the following projects:

Wetlands delineation, NEPA Environmental Impact Assessment and obtained permits for Paterson Plank Road/Routes 1 and 9 roadway improvements, for NJ Dept. of Transportation and Federal Highway Authority, Towns of North Bergen and Secaucus, Bergen County.

Wildlife and rare species habitat assessment, wetlands delineations, CAFRA Environmental Impact Statement, and NJDEP Freshwater Wetlands and Pinelands permitting (obtained all permits), Garden State Parkway Interchanges 40 and 44 and ETC toll plaza for the New Jersey Highway Authority, Townships of Port Republic and Galloway, Atlantic County, New Jersey.

Wetlands delineation and NJDEP Individual Wetlands Permit application in accordance with the NJ Freshwater Wetlands Protection Act for the Township of Rockaway for drainage improvements at McKeel's Brook in Rockaway Township, Morris County, NJ.

Prepared and obtained NJDEP Wetlands Transition Area Averaging Plan in accordance with the NJ Freshwater Wetlands Protection Act for the Franklin Township Board of Education, Franklin Township, Hunterdon County, New Jersey.

Wetlands Delineation, obtained Statewide General Permits and Transition Area Averaging Plan in accordance with the NJ Freshwater Wetlands Protection Act for the Morris County Vocational Technical School in the Township of Denville, Morris County, New Jersey.

Ecological Assessment for environmentally sensitive areas for the Robert Wood Johnson, Forrestal Center property in South Brunswick, Middlesex County, New Jersey.

Level of Action Assessments: Coordinated all sections, performed field studies for, and wrote wildlife, wetlands, hazardous waste, noise and air quality sections for the NJ Department of Transportation - Bureau of Environmental Assessment. Work involved many sites throughout New Jersey.

Wildlife and Endangered and Threatened Species Habitat Assessment for Frederic R. Harris and the NJ Turnpike Authority proposed Route 92, prepared as a supplement for the EIS, as required by the NJDEP Division of Fish, Game and Wildlife. Six of the twenty-three NJDEP Species of Concern were determined to be potentially present within one mile of the project area. Recommendations for minimizing impacts to these and general wildlife species were suggested.

Applications for Statewide General Permit Numbers 6 and 7 were prepared for the NJDOT for their Newark Regional Headquarters facility. Because free fill material was available for only a limited time, the application packages were prepared on an emergency basis and completed within forty-eight hours. Follow-up with the NJDEP allowed for receipt of the permits within one week of application.

In addition to numerous wetlands delineations and permit preparations, Ms. Brave has also coordinated, managed and performed numerous Phase I Environmental Site Assessments in New Jersey, New York, Ohio and Florida. She has performed ECRA/ISRA investigations, media sampling, and has managed the removal of underground storage tank systems throughout New Jersey.

EMPLOYMENT HISTORY:

1/95-Present:	Project Manager, Amy S. Greene Environmental Consultants, Inc.
3/92-1/95:	Project Manager, Environmental Specialist, The RBA Group, Morristown, NJ.
3/91-3/92:	Senior Staff Scientist, Bell Environmental Consultants, Dover, NJ.
6/89-2/91:	Environmental Specialist, Environmental Connection, Inc., Freehold, NJ.
9/87-6/89:	Environmental Specialist, TRC Environmental Consultants, Inc., Somerset, NJ.

AFFILIATIONS:

National Wildlife Federation
Society of Wetland Scientists
Appointed Member of the White Township Environmental Commission

WILLIAM H. SMEJKAL
Project Manager/Geologist

AREAS OF EXPERTISE: Geology, Wetlands Ecology, Soils, Herpetology, Environmental Impact Assessment, Permit Preparation

EDUCATION: M.S. Geological Science, December 1992, Rutgers University, Newark, New Jersey.

B.S. Biology, May 1976, Ramapo College, Mahwah, New Jersey.

PROFESSIONAL COURSES:

Delaware Valley College Herpetology Program, spring 1995.

NJ Association of Professional Soil Scientists Meeting. Stockton, NJ - October 1990.

Identification of Sedges and Rushes. Continuing Education, Cook College, Rutgers University - August 1990.

Wetlands Delineation. National Wetland Training Institute - July 1990.

The New Jersey Pinelands, Our Country's First National Reserve. Cook College, Rutgers University - March 1990.

Geology and Hydrogeology of New Jersey. Continuing Education, Cook College, Rutgers University - October 1989.

Understanding Soil Conditions of Wetlands. Continuing Education, Cook College, Rutgers University - April 1989.

The Permit Seminar. NJ Department of Environmental Protection and Rutgers University, Jamesburg, NJ - February 1989.

Planning for New Jersey's Freshwater Wetlands: Ecology and Regulations. Cook College, Rutgers University, - January 1989.

PROFESSIONAL EXPERIENCE: Mr. Smejkal has a strong background in Biology and Wetlands Ecology as well as over eight years experience in the bedrock geology and soils of the Northeastern United States. As Project Manager for Amy S. Greene Environmental Consultants, Inc., Mr. Smejkal is responsible for all aspects of wetlands investigations. These include: wetlands delineations, wildlife studies, hydrology and soils investigations, preparation of wetlands reports and environmental impact assessments, and interaction with governmental agencies.

Mr. Smejkal has been principally responsible for the performance of the following projects:

Environmental Impacts Evaluation of a 977 acre Superfund site within the New Jersey Pinelands. Included was a survey of Endangered and Threatened species such as timber rattlesnakes, Pine Barrens treefrog, pine snake, corn snake, bog turtles, and barred owl as well as evaluation of potential habitat.

Environmentally Sensitive Areas Assessment for developers in Montville Township, Morris County, NJ. Included was an analysis of wetlands and steep slopes and a wood turtle survey.

Wetlands delineation of a 300-acre parcel in Bridgewater Township, Somerset County, NJ. This project included extensive early spring searches for wood turtles to confirm reported sightings.

Wetland delineation and documentation of wood turtle occurrence on 83 acre site in Morris County.

Water quality sampling of three streams for 500 acre mixed development project in South Brunsick, Middlesex County.

Aquifer study in Hudson County including the Palisades diabase, Brunswick and Stockton formations and overlying sediments. Movement of contaminants in groundwater due to overpopulation was also addressed.

Wetland delineation of 450+ acre research/office complex in Monmouth County.

Wood turtle survey on 116 acre site of proposed residential development in Somerset County.

Preparation of a restoration plan including establishing previous wetland boundary, fill removal and replanting, and monitoring plan for the recovery and rehabilitation of a wetland in Morris County.

Preparation of a Statement of Compliance and application for a Waterfront Development Permit for an industrial complex in Woodbridge, Middlesex County.

Wetland delineation for proposed office and industrial park in Freehold Township, Monmouth County, NJ.

Wetland delineation and Letter of Interpretation application for proposed expansion of industrial building in Woodbridge Township, Middlesex County, NJ.

Hydrologic investigation of ground water drawdown and subsequent changes in vegetation in Marlboro Township, Monmouth County, NJ.

Wetland delineation and habitat evaluation for endangered and threatened species in Bergen and Monmouth County, NJ.

Environmental Impact Assessment in Randolph Township, Morris County, NJ. Wetlands delineation and endangered and threatened species assessment including documentation of wood turtle occurrence.
Colts Neck, Monmouth County, NJ. Wetland delineation and aquifer study for presentation to Township Environmental Council.

EMPLOYMENT HISTORY:

11/88-Present	Project Manager, Amy S. Greene Environmental Consultants, Inc.
2/87-11/88:	Geologist, Norman J. Coons, Inc., Consulting Engineers.
9/85-9/87:	Paleontological Research, Lamont-Doherty Geological Observatory of Columbia University.
AFFILIATIONS:	American Association for the Advancement of Science Geological Association of New Jersey Geological Society of America World Wildlife Fund Nature Conservancy