INTERCHANGE JUSTIFICATION STUDY

STATE ROUTE 32 (US 25E, DAVY CROCKETT PARKWAY)
AT
COLLEGE PARK DRIVE

PREPARED BY
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PREPARED FOR
THE TENNESSEE DEPARTMENT OF TRANSPORTATION
PLANNING DIVISION

MAY 2004

Interchange Justification Study

State Route 32 (US 25E, Davy Crockett Parkway) at
College Park Drive

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CHAPTER 1

INTRODUCTION

A. Purpose of Study

The purpose of this study is to determine the feasibility of providing access to US 25E (State Route 32, Davy Crockett Parkway) in the vicinity of existing College Park Drive in the City of Morristown, Hamblen County (see map).

This report will consider current and future needs of the area and analyze traffic operational features for access points at this location. Estimated costs for the proposed interchange will be prepared, functional plans will be developed and preliminary environmental concerns for the proposed project will be identified. The report also documents the local stakeholder involvement throughout the planning process.

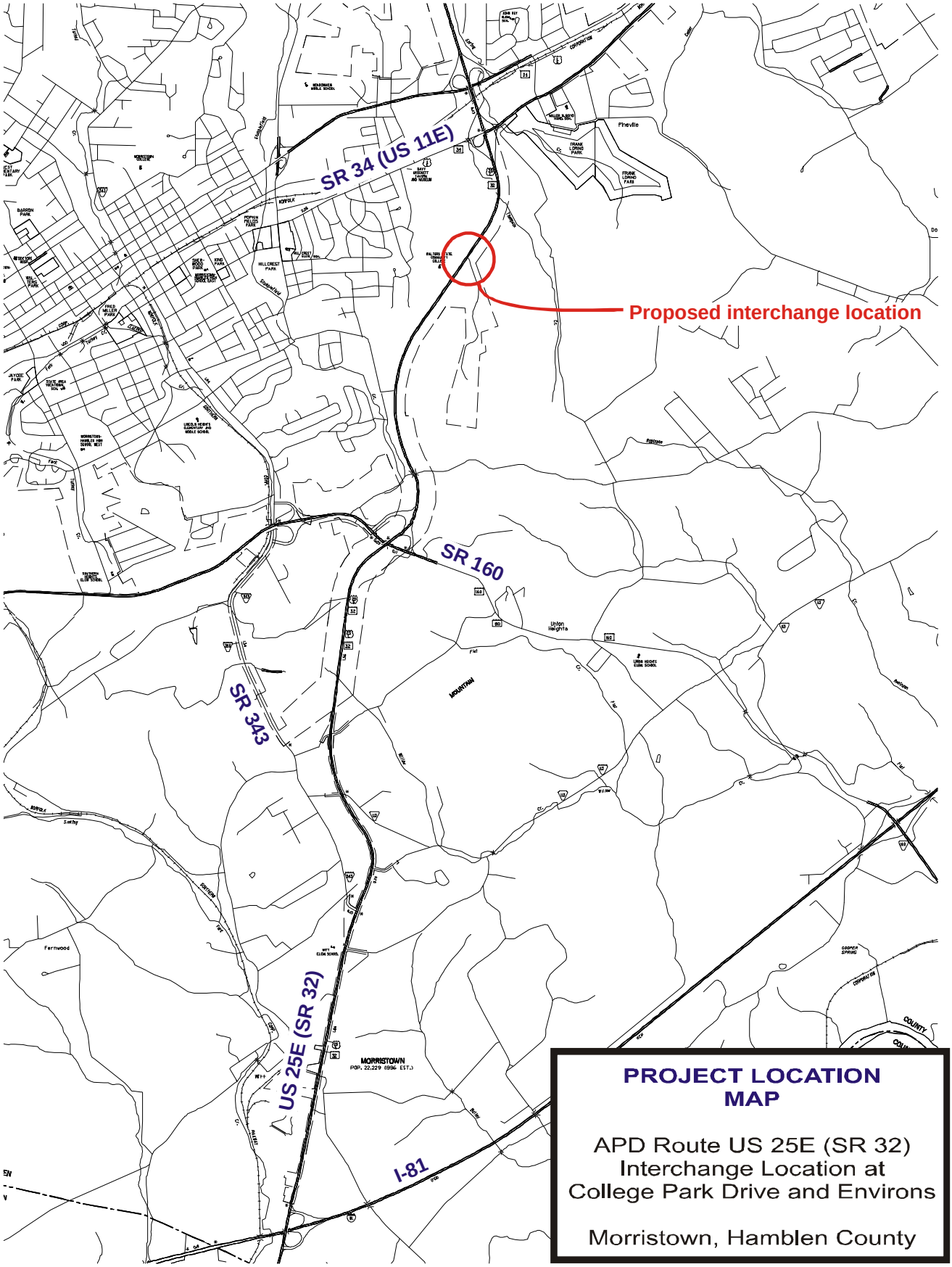
This route is a portion of the Appalachian Development Highway System and therefore falls under the jurisdiction of the Appalachian Region Commission. The original Appalachian Development Act of 1965 designated this portion of US 25E as an APD route and proposed a grade-separated interchange in this area. Recent concerns of increased development leading to a higher demand for direct access along the route, along with requests from City officials, have prompted the Tennessee Department of Transportation to study the proposed interchange location at this time.

B. Description of Project Location

The proposed interchange location is approximately 0.75± miles south of the existing US 11E separation structure. This is the approximate location of the at-grade signalized intersection of US 25E at College Park Drive. This location is approximately 4.4± miles north of the existing interchange with State Route 160.

US 25E is currently a four-lane, partially-controlled access facility with a depressed grass median through the proposed interchange area. The typical roadway cross-section contains four (4) 12’ travel lanes, 6’ inside shoulders, 10’ outside shoulders, and a 60’ grass median inside of a variable width right-of-way. Separated turn lanes also exist for three at-grade intersections in the area.

The proposed interchange location serves three major destinations within the Morristown urban area: Walters State Community College, College Square Mall, and Crockett Square Shopping Center. Other adjacent tracts of land are currently open and additional commercial development is expected. No residential, recreational, or other land use areas are directly impacted by the proposed interchange location.



PROJECT LOCATION MAP

APD Route US 25E (SR 32)
Interchange Location at
College Park Drive and Environs

Morristown, Hamblen County

C. Relationship to Other Transportation Improvement Plans & Classifications

Preliminary planning has been completed and design is currently underway for an interchange modification between US 25E and Interstate 81 approximately 5.8± miles south of this location. In order to more completely establish full access control between I-81 and State Route 34, future planning between these termini will establish three new or improved grade separated interchanges.

The first, as mentioned, is currently under design and will improve loop radii at the existing US 25E/I-81 interchange location.

The second, located approximately 1.83± miles north of I-81 in the vicinity of State Route 343, will replace three at-grade intersections including two intersections with state routes.

The third is the subject of the current study and will replace three at-grade intersections and establish future access opportunities for further commercial development.

Because direct access along the segment of US 25E between I-81 and College Park Drive has been allowed, additional planning and considerable infrastructure improvement would be required to eliminate all at grade access points. With the completion of the above mentioned interchange studies, additional investigation may then proceed to determine the feasibility of altering the access policy along this entire 6± mile segment.

. . .

US 25E in the study area is classified as an urban major arterial being located inside the Morristown City Limits. College Park Drive is an urban collector, generally providing access to the Walters State Community College campus on the west side of US 25E and the Crockett Square shopping center on the east side of US 25E. The other two at-grade intersections within the study area are unnamed and unclassified and provide access to the campus south of College Park Drive and the shopping center and College Square regional mall north of College Park Drive.

The proposed interchange is not anticipated to cause the modification of any existing classification. Rather, it will serve to redefine access to the adjacent developments and allow higher quality, unimpeded movement along the major arterial route.

Other planning in this area may also impact this proposed interchange location. Large open tracts of land (currently pasture) exist just north and just south of the shopping center on the east side of US 25E. Discussions with local officials and developers have indicated that future retail development in this area is likely and future travel demand should be anticipated with any improvement. Planning of the proposed interchange has been completed with consideration of the possible future development.

In addition to commercial land development, it is also expected that adjacent property owned by Walters State Community College will undergo future land use changes. Campus expansion on both sides of US 25E has been noted and the proposed interchange developed to fit with the plans of the campus to the greatest extent possible.

Due to high speeds, multiple lanes, and partial access control along US 25E, no dedicated pedestrian or bicycling features currently exist. No crosswalks or pedestrian signals are present at any at grade crossing of US 25E. Current planning for Walters State Community College indicates the need for an improved pedestrian connection between the main campus on the west side of US 25E and other college-owned property (including recreational fields) on the east side of US 25E. As part of this study, such connections have been investigated. Public transit in Morristown is limited to on-demand service by the East Tennessee Human Resource Agency. Therefore, no fixed-route, fixed-schedule transit will be affected. No additional transit facilities are being proposed.

CHAPTER 2

PRELIMINARY PLANNING DATA

A. Land Use

The proposed interchange is located inside the eastern City Limits of Morristown (population 24,965) in Hamblen County. Land use in the immediate vicinity of the interchange location is a mixture of institutional use, retail development, open agricultural (pastureland), and scattered outlying residential development. Heavier residential development exists west of the proposed interchange location. The three affected stakeholders in the development of the proposed interchange are Walters State Community College (6,000 students), Crockett Square Shopping Center (including a Wal-Mart Supercenter), and College Square Mall (460,000 s.f.). Apart from these three destinations, no other lands are accessible directly from US 25E at the proposed interchange location.

Thompson Creek runs through the project area, a small portion of which has been relocated to accommodate a driveway serving College Square Mall. This is primarily a wet weather stream and crosses US 25E in a box culvert located approximately 0.27± miles north of the intersection with College Park Drive.

Adjacent existing interchanges are located at State Route 160, approximately 1.88± miles south of College Park Drive and at State Route 34 (US 11E), approximately 0.75± miles north of College Park Drive.

B. Traffic Served

The Tennessee Department of Transportation (TDOT) furnished traffic data for this study effort. Traffic provided for the existing system shows 2006 ADT volumes of 22,700 on US 25E between College Park Drive and the SR 34 (US 11E) interchange. Design year (2026) volumes on this section are expected to reach 36,200 vehicles per day. Traffic on existing College Park Drive shows a daily volume of 3,800 vehicles in the base year (2006) and 4,500 by the 2026 design year. Just north of College Park Drive, the secondary access point to the shopping center is predicted to accommodate 4,300 vehicles daily in 2006, growing to 5,200 vehicles in 2026. South of College Park Drive, the southern college access is expected to see base and design year daily volumes of 2,600 and 3,800 vehicles, respectively. Existing and projected traffic volumes are shown on pages 7 and 8.

Because this proposed interchange is not expected to initiate major traffic growth or significantly alter travel patterns within the Morristown area, large scale volume shifts are not expected. Rather, reassignment of turning movements representing those motorists with destinations to the college, the shopping center, or the regional mall would

be expected. Therefore, except for the standard growth rates applied generally to the City of Morristown and environs, the Walters State Community College enrollments, and anticipated further retail development within the interchange limits, forecasted traffic volumes will likely not grow significantly with the construction of the proposed interchange.

Major AM peak hour (7:15 – 8:15 AM) turning movements are the northbound left turn into the south college entrance and the southbound right turn onto College Park Drive. This is consistent with the expected travel patterns generated by a campus and the relatively low amount of travel to/from retail areas during the morning peak.

Heavier volumes of traffic must be accommodated during the PM peak hour (4:30 – 5:30 PM). The most significant turning movements during this time are right turns from the northern driveway to NB US 25E, left turns from SB US 25E into the northern driveway, right turns from the northern driveway onto SB US 25E, and right turns from NB US 25E onto College Park Drive. These movements, too, are consistent with travel patterns generated by the major retail centers in this area.

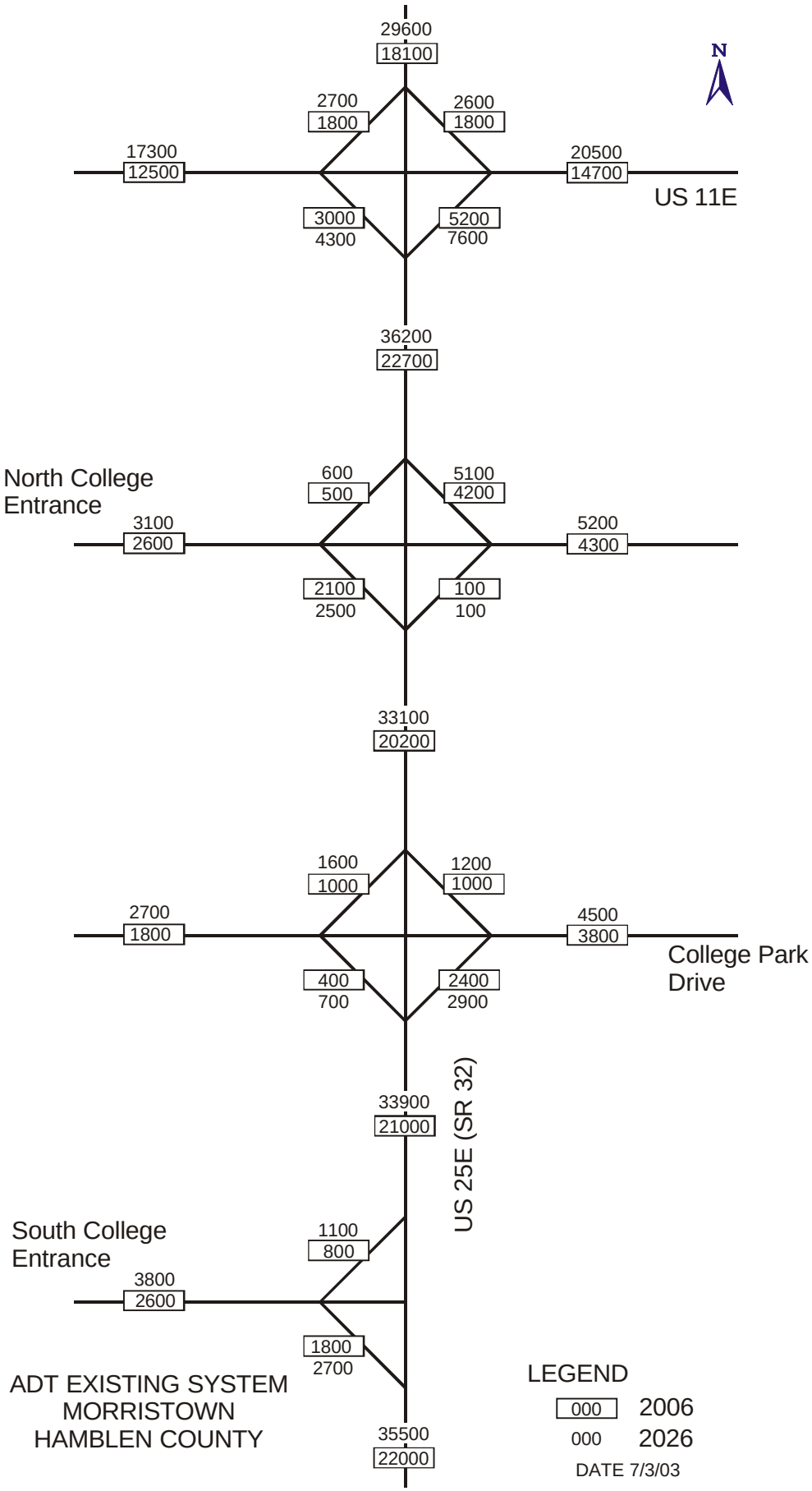
Present and projected ADT volumes, along with Design Hour Volumes (DHV) are shown in the Appendix.

C. Proposed Improvement

From the technical analysis conducted for this study and from the input of local stakeholders, the resulting proposed interchange form may best be described as a split single-point urban interchange (SPUI) with one-way frontage roads. At least ten other interchange forms have been investigated with respect to safety, operational efficiency, maintenance/improvement of access to adjacent properties, impacts to these properties, compatibility with future development, cost, and aesthetics. The proposed interchange has been found to satisfy the objection of restructuring access in this area while limiting detrimental impacts to adjacent properties.

Cross-streets at College Park Drive and at the northern driveway will remain as two-way roads. Connecting these two cross-streets will be one-way frontage roads running parallel to mainline US 25E. The terminal of these frontage roads will resemble one-half of a SPUI with left-turning and through traffic being brought to a single signalized location.

To allow movement between mainline US 25E and the frontage roads and cross-streets, ramps would be constructed on both sides of US 25E. On the west side of the mainline, ramps would carry traffic to/from southbound US 25E. Northbound traffic would enter/exit on the ramps east of the mainline. Off ramps will terminate and on ramps will begin at a signalized intersection located roughly midway along the frontage road. Signalization at these locations provides the safest movement and allows the ramps to terminate without extra allowance for frontage road weaving movements.


29600
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South College
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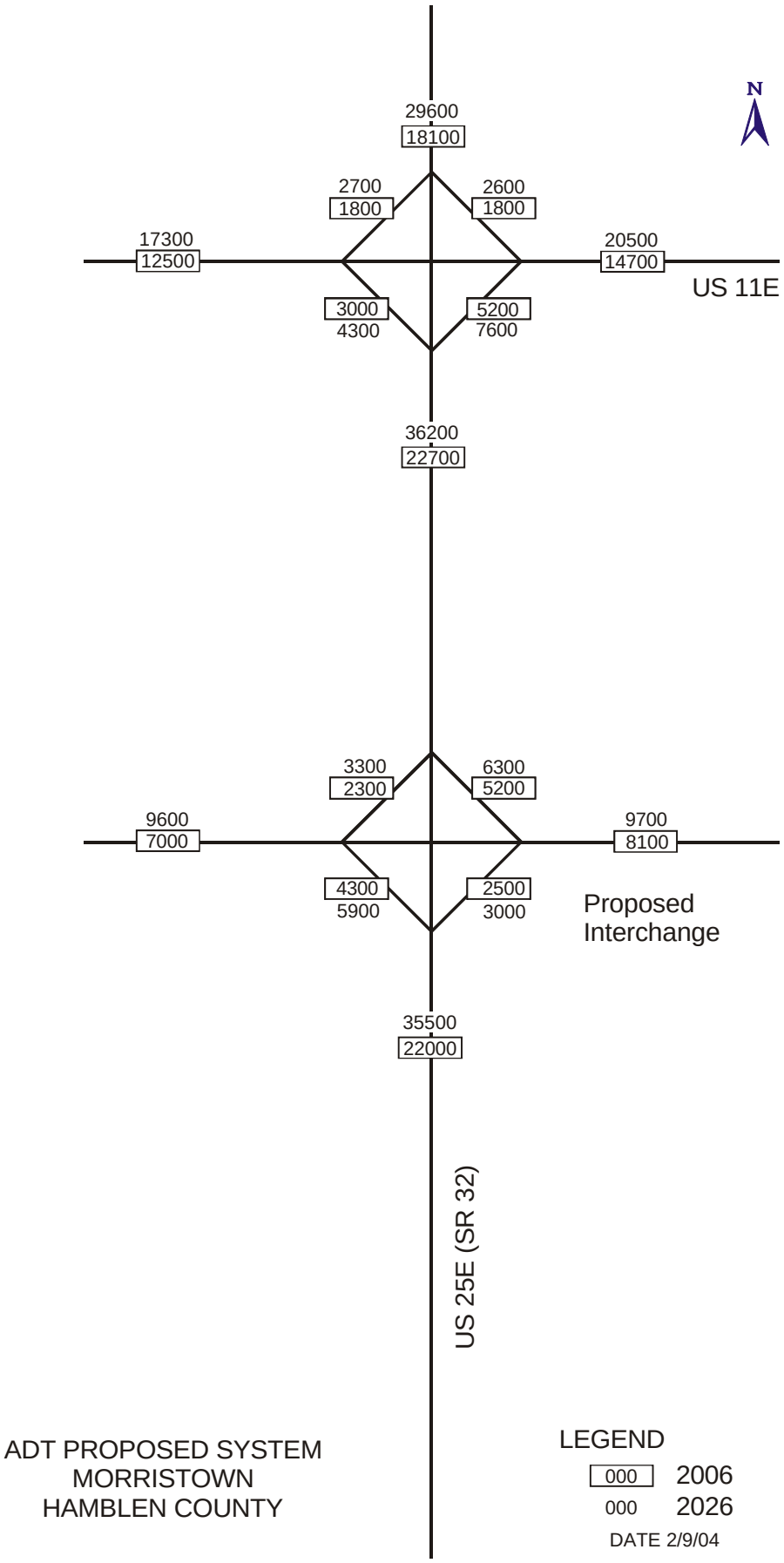


ADT PROPOSED SYSTEM
MORRISTOWN
HAMBLEN COUNTY

LEGEND

000	2006
000	2026

DATE 2/9/04

Other related considerations include:

1. To keep access ramps to and from the proposed cross-streets as compact as possible within standards, a portion of mainline US 25E should be rebuilt to better utilize the existing median. With construction of a median barrier to separate opposing travel directions, all travel lanes on US 25E can be built from the center out, creating a more compact roadway area while maintaining safety and capacity. The rebuilding into the center of the mainline will extend a total of approximately 2200'.

2. Because standard bridge runout lengths for elevated separation structures for College Park Drive and the northern cross-street would have severe impacts on the campus and one or more of the shopping center outparcels, it is proposed to vary the elevation of mainline US 25E while maintaining the cross-street elevations roughly as existing.

3. From points 1 and 2 above, the resulting portion of mainline US 25E would accommodate 12' outside shoulders, 4 @ 12' travel lanes, and 11' inside shoulders including a concrete median barrier. Because the change in elevation of the mainline will require retaining structures, reconstruction that would be required for future potential widening through this area may prove infeasible. Thus, it is proposed to allow a minimum 12' width on the outside of the shoulders to accommodate potential future widening. While this allowance will not and is not intended to add capacity to the roadway, it will contribute to the sustainable design of the interchange.

4. Depression of the roadway would begin approximately at the location of the southern college property limit and would remain depressed for approximately 1700', returning to grade approximately 300' north of existing College Park Drive. Here, the mainline would remain elevated for approximately 1200' before returning to grade just south of the ramps to/from the Morris Boulevard interchange. Due to limited right-of-way and slope easement area, it is proposed that retaining walls be constructed along the length of this portion of US 25E. Entrance and exit ramps to and from US 25E would also require smaller lengths of retaining structures.

5. All ramps will be constructed to allow acceptable minimum acceleration/deceleration distances. The distance between the southbound on-ramp from Morris Boulevard and the southbound off-ramp at College Park Drive is expected to be approximately 1600'. Between the northbound on-ramp from College Park Drive and the northbound off-ramp at the SR 34 interchange, a distance of roughly 1700' is expected. While adequate merging and diverging distances are given between these ramps, weaving traffic flows have been considered. It is proposed to add a single continuous auxiliary lane between the proposed interchange and the ramps to/from Morris Boulevard on both the east and west sides of the mainline.

6. Signalization will be required at four locations in this interchange. At the southernmost intersection, a three-phase signal will allow southbound to eastbound or northbound movement (⦸1), eastbound to northbound or through movement (⦸2), and westbound through movement (⦸3). A similar configuration would exist at the northernmost intersection. Along the frontage roads, a two-phase signal would allow movement from the off ramp to the frontage road (⦸1), then from the frontage road to the on ramp or through the intersection (⦸2). It is anticipated that signal coordination could allow a vehicle to pass through three of the four signals without being stopped. All right turns are separated from the intersections and would operate on yield conditions.

CHAPTER 3

ENGINEERING INVESTIGATIONS

A. Traffic Operations

An analysis was conducted to determine what impacts the proposed interchange would have on the US 25E route and on the surface street network as a whole. The traffic operation analyses contained in the appendix include basic multilane segments, ramps, and ramp intersections with the proposed connector routes.

Existing Conditions (No-Build Analysis)

Without the proposed interchange, the analysis shows the existing mainline between the College Park Drive intersection and the SR-34 (US 11E) interchange operating at a Level of Service (LOS) "A" in the northbound lanes during the AM peak with base year (2006) traffic. Service for these lanes drops to a LOS "B" during PM peaks. The southbound lanes, through this same area, will operate at a LOS "B" during both peak periods in the base year. Using projected design year (2026) traffic, these northbound and southbound lanes are expected to operate at a LOS "C" during both AM and PM peaks.

The unsignalized intersection of the south college entrance and US 25E is expected to operate at a minimum LOS "C" through the 2006 base year during both peaks and through the AM peak of 2026. However, during the design year (2026) PM peak, operation is likely to drop to a LOS "F". This categorization is mainly due to left-turn delays onto SB US 25E approaching one minute.

The currently signalized intersection with College Park Drive is expected to operate at a LOS "B" during both peak periods through the 2006 base year. By 2026, the intersection would be predicted to continue to operate acceptably with a LOS "C" in both peak times.

The unsignalized intersection with the northern access driveway is expected to operate at a LOS "B" during AM peaks of 2006. A minimum LOS "E" would characterize one approach of the intersection during PM peak hours. In 2026, AM hours would operate at a LOS "C", dropping to LOS "F" in the PM peak. At this intersection, large volumes of right-turning vehicles cannot find ample gaps in the traffic stream along the mainline US 25E.

Proposed Conditions (Full-Build Analysis)

With the proposed interchange, mainline sections of US 25E are not expected to see significant increases or decreases in traffic volumes. Therefore, mainline operations would be expected to be characterized as stated above.

With combination of all three at grade intersections into, effectively, one interchange location operating with four signals, efficient operation of these signalized intersections is crucial. Traffic analyses performed at these locations reveals an expectation of all approaches to operate with a minimum LOS "B" during both peak periods through the 2026 design year. The majority of ramps and weave areas within the proposed interchange limits are expected to operate under minimum LOS "B" conditions. The exceptions are the northbound and southbound on ramps. These ramps are expected to operate with a LOS "C" through the peak periods of the 2026 design year.

To analyze the operation of adjacent on and off ramps of the existing interchange with SR 34, merge and diverge analyses have been completed. Through both peak periods of 2006 and 2026, all ramps generally operate with a LOS "B", none operating below a minimum acceptable LOS "C". Weaving movements between the proposed interchange and the SR 34 interchange are not expected to drop below a LOS "B" through the 2026 design year.

The signalized intersections of the SR 34 interchange should not be significantly affected. The northbound ramp intersection with SR 34 will likely operate with a LOS "B" during both peak periods of 2006, and a LOS "C" in the PM peak period of 2026. The intersection of the southbound ramps with SR 34 is expected to continue to operate in both peak periods with a minimum LOS "B" into the design year 2026.

Traffic volumes and level of service analyses for both base year volumes (2006) and design year volumes (2026) are presented in the Appendix.

B. Cost

The total estimated cost for the proposed interchange is $18,742,000 and is detailed on Page 17 of this report. This total estimated cost includes $983,000 for right-of-way acquisition, $307,000 for utility relocations, $15,358,000 for construction, and $2,094,000 for preliminary engineering. Worksheets used in developing these cost estimates are contained in the Appendix of this report.

C. Environmental Concerns

The area in the vicinity of the interchange consists of primarily institutional and commercial uses with some undeveloped (pasture and wooded) property. No residences or businesses are expected to be acquired for the construction of the proposed interchange. No National Register listed properties or other cultural resource areas were identified during preliminary reviews. One small stream, Thompson Creek, will be affected by construction of the proposed alternative and will require proper permitting. Special considerations may be necessary to minimize impacts to this stream.

D. Access Analysis

This study has been undertaken in accordance with the Federal Highway Administration's (FHWA) policy for granting new or modified APD route access and conforms to the Administration's analysis of interchange justification on the Interstate system. The FHWA policy, as described in FHWA Docket No. 89-23, "Additional Interchanges to the Interstate System" (Federal Register 55, No. 204, October 22, 1990), is provided in the following paragraphs along with comments for consideration. In these paragraphs and for purposes of this study only, references to the Interstate System have been replaced with the Appalachian Development Highway System.

> *It is in the national interest to maintain the [Appalachian Development Highway] System to provide the highest level of service in terms of safety and mobility. Adequate control of access is critical to providing such service. Therefore, new or revised access points to the existing [Appalachian Development Highway] System will be considered for approval only if:*
>
> *1. The existing interchanges and/or local roads and streets in the corridor can neither provide the necessary access nor be improved to satisfactorily accommodate the design year traffic demands while at the same time providing the access intended by the proposal.*
>
> The City of Morristown is a growing city located approximately 6.5± miles north of Interstate 81 in Hamblen County. The City has a certified population of 24,965. Primary movement between the Morristown urban area and Interstate 81 is along the US 25E corridor. Also, three of the City's largest trip generators are located within the proposed interchange limits.
>
> Current access in this area is provided by signalized and unsignalized at-grade intersections. Traffic analysis has shown that additional capacity and/or additional signalization is needed within this area. The purpose of this interchange is to maintain the mobility integrity of US 25E while providing efficient access to adjacent properties.
>
> Implementation of this proposed roadway project will provide improved transportation access and, as is the function of Appalachian Development Routes, enhance continued development of business and industry within this area of Morristown and Hamblen County.
>
> *2. All reasonable alternatives for design options, location and transportation system management type improvements (such as ramp metering, mass transit, and HOV facilities) have been assessed and provided for if currently justified, or provisions are included for accommodating such facilities if a future need is identified.*

Due to the limited amount of undeveloped land in this area, only one interchange location has been investigated. However, through preliminary analysis of the proposed interchange, ten distinct interchange alternative configurations were considered. These alternates were reviewed and evaluated in field investigations and meetings with representatives from TDOT's Planning, Design, and Structures Divisions as well as affected local stakeholders (see Chapter 4). Officials from FHWA's Tennessee Division Office have also been involved in the alternative selection.

Public transit services are currently available only on a demand-response basis in the Morristown area through the East Tennessee Human Resource Agency. HOV facilities are not applicable or warranted through this area of US 25E.

3. The proposed access point does not have a significant adverse impact on the safety and operation of the [Appalachian Development Highway] facility based on analysis of current and future traffic. The operational analysis for existing conditions shall, particularly in urbanized areas, include an analysis of sections of [Appalachian Development Highway] to and including at least the first adjacent existing or proposed interchange on either side. Crossroads and other roads and streets shall be included in the analysis to the extent necessary to assure their ability to collect and distribute traffic to and from the interchange with new or revised access points.

As stated earlier, the major purpose of this study is to provide an interchange proposal which will allow the removal of specific at-grade intersections along US 25E. Additionally, this proposal will continue to serve existing and future commercial development in this part of Hamblen County without compromising the operation of US 25E in the addition of signalized intersections.

An operational analysis of current and future traffic was made for sections of the APD route, all ramps, and ramp termini within the limits of the interchange area. The adjacent existing interchange (State Route 160) south of the proposed site is approximately 1.9± miles south and outside the influence of weaving or operational effects of the proposed interchange. The adjacent interchange north of the proposed site is State Route 34 which is located 0.75± miles north. Auxiliary lanes are proposed on both sides of US 25E between this and the proposed interchange. Analysis of the weaving movements between these two interchanges reveals expected minimum weaving levels of service of "B" through the 2026 design year.

4. The proposed access connects to a public road only and will provide for all turning movements. Less than "full interchanges" for special purpose access for transit vehicles, for HOV's or into park and ride lots may be considered on a case-by-case basis. The proposed access will be designed to meet or exceed current standards for Federal-Aid projects on the [Appalachian Development Highway] system.

The proposed interchange has been described as a split single-point type interchange with one-way frontage roads and will provide for all traffic movements. The recommended interchange design will meet or exceed all American Association of State Highway and Transportation Officials (AASHTO) criteria. The northernmost cross-street will be maintained as a public road but will terminate into private roads at its eastern and western ends. Future development in the area will likely extend the limits of this roadway to access additional adjacent properties.

5. The proposal considers and is consistent with local and regional land use and transportation plans. Prior to final approval, all requests for new or revised access must be consistent with the metropolitan and/or statewide transportation plan, as appropriate, the applicable provisions of 23 CFR part 450 and the transportation conformity requirements of 40 CFR parts 51 and 93.

The recently formed Lakeway Area Metropolitan Planning Organization has not yet formed a Long Range Transportation Plan for the Morristown Area. Upon its formulation, the proposed interchange should be included. The proposed interchange is consistent with the Statewide Transportation Plan. The proposal has also been developed in partnership with multiple local officials and fits with local planning objectives.

6. In areas where the potential exists for future multiple interchange additions all requests for new or revised access are supported by a comprehensive [Appalachian Development Highway] network study with recommendations that address all proposed and desired access within the context of a long term plan.

Implementation of the interchange at College Park Drive will place four APD route interchanges within a distance of approximately 2.75 miles. No additional interchanges are either planned or proposed for this portion of APD route US 25E. One additional interchange location is currently under review, however. This interchange would also attempt to limit at-grade access to the mainline route, but is located approximately 4.2 miles south of the currently proposed location.

Additional study of the Appalachian Development Highway route has been proposed south to Interstate 81. The aim of this study would be investigation of complete access control along this portion of US 25E. Due to the relatively high number of at-grade intersections with public roads and private driveways, however, a comprehensive study of the route's travel patterns and access needs would be required.

7. The request for a new or revised access generated by new or expanded development demonstrates appropriate coordination between the development and related or otherwise required transportation system improvements.

The primary objectives of the proposed interchange are to provide safe and adequate mainline access for existing traffic volumes and those likely to be generated through normal growth of adjacent land uses. Also, the proposed interchange will provide improved access to an area that is targeted for future expansion and development by the City. The interchange facility proposed in this study will meet these objectives.

8. The request for new or revised access contains information relative to the planning requirements and the status of the environmental processing of the proposal.

Construction of the proposed interchange scheme would not require the acquisition of any residences or businesses. Acquisition of small amounts of land now held by a community college would be required. Construction is not expected to impact any environmentally sensitive areas, but will necessitate crossing a USGS-identified blue-line stream.

COST DATA SHEET

Project Total

PROJECT: College Park Drive at US 25E Interchange

LENGTH: _____ CROSS-SECTION: _____

Right-of-Way			
Land, Improvements and Damages (4.78± Acres)		$	$937,000.00
Incidentals (12 Tracts)		$	$46,000.00
Relocation Payments:	(0 Residences)	$	-
	(0 Business)		
	(0 Non-Profits)		
TOTAL RIGHT-OF-WAY COST		$	983,000.00
Utility Relocation			
Reimbursable		$	$8,000.00
Non-Reimbursable		$	$299,000.00
TOTAL ADJUSTMENT COST		$	307,000.00
Construction			
Clearing and Grubbing		$	$55,000.00
Earthwork		$	$1,886,000.00
Pavement Removal		$	$11,000.00
Drainage (Includes Erosion Control)		$	$1,006,000.00
Structures		$	$2,275,000.00
Railroad Crossing or Separation		$	-
Paving		$	$2,351,000.00
Retaining Walls		$	$4,063,000.00
Maintenance of Traffic		$	$51,000.00
Topsoil		$	$12,000.00
Seeding		$	$11,000.00
Sodding		$	$78,000.00
Signing		$	$32,000.00
Lighting		$	-
Signalization		$	$400,000.00
Fence		$	$21,000.00
Guardrail		$	$111,000.00
Rip Rap or Slope Protection		$	-
Other Construction Items (8.5%)		$	$1,050,000.00
Mobilization		$	$549,000.00
10% Engineering and Contingencies		$	1,396,000.00
TOTAL CONSTRUCTION COST		$	15,358,000.00
Preliminary Engineering (15%)		$	$2,094,000.00
TOTAL PROJECT COST		$	$18,742,000.00

CHAPTER 4

PLANNING PARTNERSHIPS WITH LOCAL STAKEHOLDERS

A. Affected Organizations/Individuals

Because this interchange location lies in the midst of and serves traffic bound for three major destinations, TDOT with the consulting firm of Neel-Schaffer, Inc. sought partnership and input from those institutions listed below:

Walters State Community College
Tennessee Board of Regents
CBL and Associates (owners of College Square Mall)
Holrob Investments, LLC (owners of Crockett Square shopping center outparcels)
Certified Properties, LLC (lease-holder for Crockett Square outparcels)
Wal-Mart Stores, Inc.
City of Morristown Engineering Department
City of Morristown Planning Department
City of Morristown, Office of the Mayor
City of Morristown, Office of the City Administrator
Lakeway Area Metropolitan Transportation Planning Organization
Morristown Chamber of Commerce
Morristown Industrial Board
Office of Tennessee State Senate, District One
Office of Tennessee State Representative, District Ten

Drawings, documents, and information were also shared with the Morristown Citizen-Tribune newspaper for publication.

In the development of all alternatives, TDOT and the consultant worked with officials from the Federal Highway Administration. FHWA served to guide acceptable design of the interchange layout and provide information regarding construction funding.

B. Stakeholder Meetings

In order to gather information from and distribute information to affected local groups concerning the interchange planning process, a series of three meetings was held. Each progressive session was designed to narrow in scope as alternate layouts were introduced and evaluated. Other meetings by telephone were also participated in by TDOT and/or the consultant at which individual stakeholders discussed specific issues faced at their location with respect to the interchange proposal. A chronological listing of major communications between TDOT and local stakeholders is provided below:

May 9, 2003: TDOT received endorsement of the interchange project from the Mayor of Morristown and chairman of the Lakeway Area MPO.

May 23, 2003: Correspondence from Walters State provided campus long-range planning information.

July 1, 2003: Stakeholder Meeting #1. The purpose of the project along with the role of the APD route was established. Presentation of preliminary interchange schemes initiated participation from local groups.

July 2, 2003: Citizen-Tribune article detailed events of first stakeholder meeting. City approval of the access-control was documented.

July 3, 2003: Comments from the Lakeway Area MPO detailed the interchange's possible relation to other planning initiatives.

August 4, 2003: Correspondence from CBL proposed an alternate interchange configuration. Impacts of this proposal to the campus were found to be prohibitive.

August 12, 2003: Citizen-Tribune article detailed an alternative interchange proposal.

August 20, 2003: Conference call with leaders of Walters State detailed concerns of campus in having interchange location at current WSCC entrance. Additional long-range campus plans were received.

August 29, 2003: Citizen-Tribune article presented an alternative proposal, detailing approval by Walters State.

August 29, 2003: Telephone discussion with CBL official detailed mall's concerns with an alternative proposal.

September 3, 2003: Telephone discussion with Morristown engineer answered questions about an alternative proposal and prompted further investigation of a northern mall/shopping center connection.

September 26, 2003: Stakeholder Meeting #2. New alternatives based on input were presented.

September 27, 2003: Citizen-Tribune article discussed impacts to retail developments east of US 25E stemming from an alternative proposal.

December 11, 2003: a TDOT-sponsored "Public information and input session" was held at Walters State. Information concerning the project purpose and progress was presented.

December 12, 2003: the Morristown city engineer provided an alternative interchange proposal. Due to insufficient weaving distances and vertical ramp grades, this proposal was deemed inadequate.

December 14, 2003: Citizen-Tribune article detailed events of public meeting and city-sponsored alternative proposal.

January 12, 2004: Stakeholder Meeting #3. Information was given detailing the design deficiencies of the city proposal. The current proposed alternative was presented with those in attendance favoring it.

In addition to the meetings, summaries and drawings presented at the meetings were distributed to a 32-person list via e-mail. This correspondence allowed those unable to attend meetings to be kept informed of the planning progress and allowed an avenue for questions or concerns to be communicated.

C. Public Meeting

A valuable component of this planning process, Morristown residents were invited to attend an advertised "public information and input session" on the Walters State campus. As part of the public meeting, TDOT and the consultant presented the background and purpose of the study as well as progress made. An alternative proposal was shown and explained. Comments were received in writing and orally by means of a court reporter. This meeting was held on December 11, 2003 and comments received by TDOT for approximately two weeks thereafter.

D. Selection of Alternate

The purpose of all the public and stakeholder involvement was to solicit feedback from and assistance in formulating workable interchange configurations. Because of the potential impacts to adjacent lands in construction, detailed knowledge of the current and expected future land uses was needed. By bringing the most affected and interested parties together, the needs of this area were better understood prior to developing the interchange to serve it. Then, throughout the process, this local group was used to critique and modify the proposal where appropriate.

CHAPTER 5

SUMMARY AND CONCLUSIONS

The preceding study was conducted to evaluate current and future traffic operations on Appalachian Development Route US 25E within the proposed interchange area and determine the effects of modified and more structured access to US 25E at this location. Existing US 25E is currently a four-lane divided highway with partial access control but having three at-grade intersections within the proposed interchange limits. With continued development in this area these at-grade intersections will be operating at an unacceptable level of service and/or requiring signalization in the near future. In order to protect the mobility integrity of the APD route and increase the safety of this location, it has been proposed to implement the interchange here originally proposed by the Appalachian Development Act of 1965.

Through the analysis of no less than ten distinct interchange configurations and in partnership of affected local stakeholders, the proposed interchange configuration and location has been shown to be the most desirable. All proposed intersections, ramps, weaving areas, and mainline sections have been shown to significantly improve operations in both AM and PM peak periods through the 2026 design year.

The analysis indicates that the proposed split single-point interchange with one-way frontage roads at the recommended location is in conformity with transportation plans of the area and will meet established objectives of the study.

Index of Sheets

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	TYPICAL SECTIONS
2A	TYPICAL SECTIONS
3	PROPOSED LAYOUTS
4	PROPOSED LAYOUTS
5	PROPOSED LAYOUTS

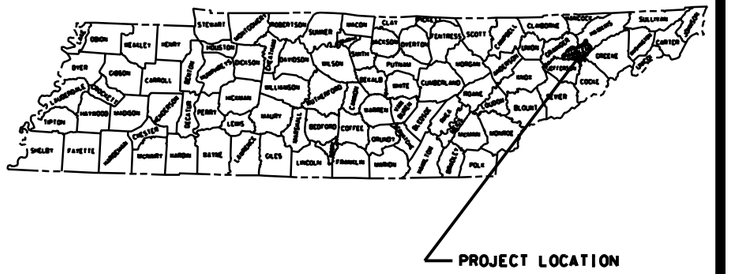
TENN.	YEAR	SHEET NO.
	2004	1
FED. AID PROJ. NO.		
STATE PROJ. NO.		

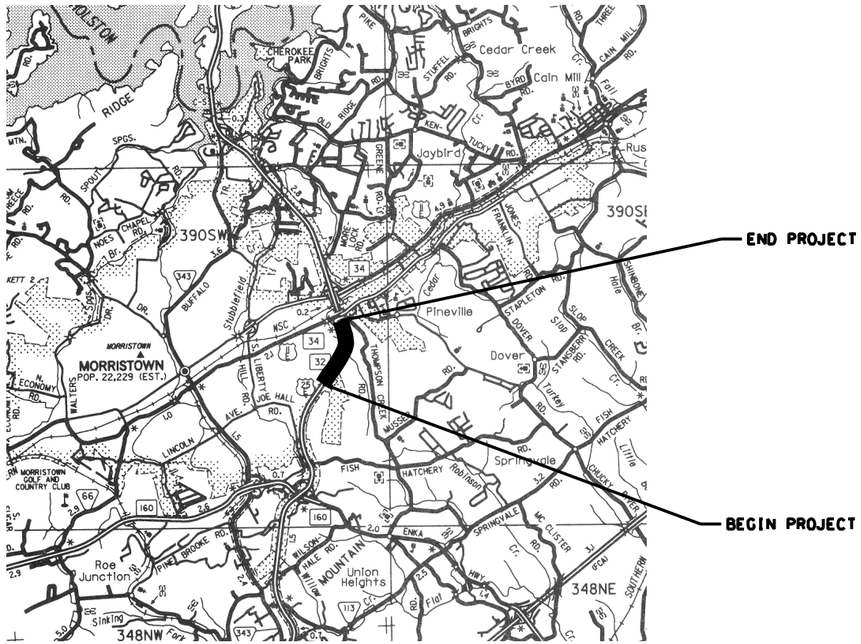
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
PLANNING DIVISION

HAMBLEN COUNTY

INTERCHANGE JUSTIFICATION STUDY
STATE ROUTE 32 (US 25E, DAVY CROCKETT PKWY.)
AT COLLEGE PARK DRIVE

STATE HIGHWAY NO. 32 F.A.H.S. NO. N/A





N.T.S.

SPECIAL NOTES

PROPOSALS MAY BE REJECTED BY THE COMMISSIONER IF ANY OF THE UNIT PRICES CONTAINED THEREIN ARE OBVIOUSLY UNBALANCED, EITHER EXCESSIVE OR BELOW THE REASONABLE COST ANALYSIS VALUE.

THIS PROJECT TO BE CONSTRUCTED UNDER THE STANDARD SPECIFICATIONS OF THE TENNESSEE DEPARTMENT OF TRANSPORTATION DATED MARCH 1, 1995 AND ADDITIONAL SPECIFICATIONS AND SPECIAL PROVISIONS CONTAINED IN THE PLANS AND IN THE PROPOSAL CONTRACT

TDOT CIVIL ENGINEERING MANAGER 1 _____

DESIGNED BY NEEL-SCHAFFER, INC.

DESIGNER _____ CHECKED BY _____

P.E. NO. _____

APPROVED: _____
DESIGN DIVISION

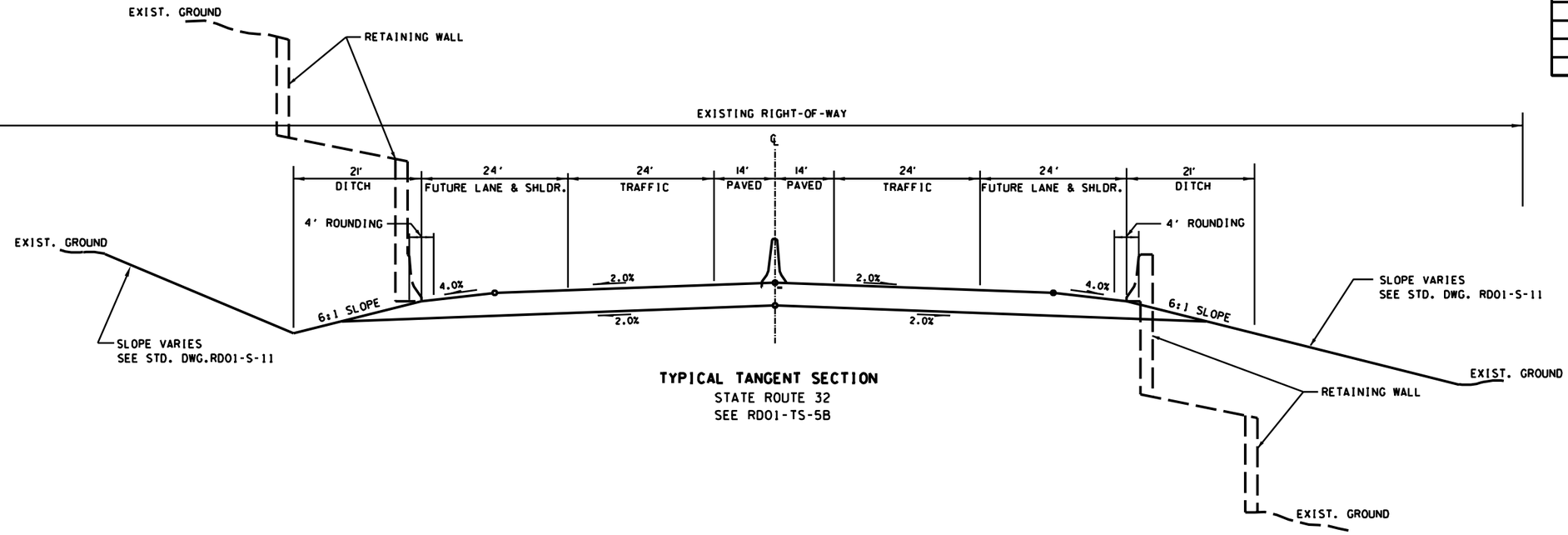
DATE: _____

APPROVED: _____
COMMISSIONER

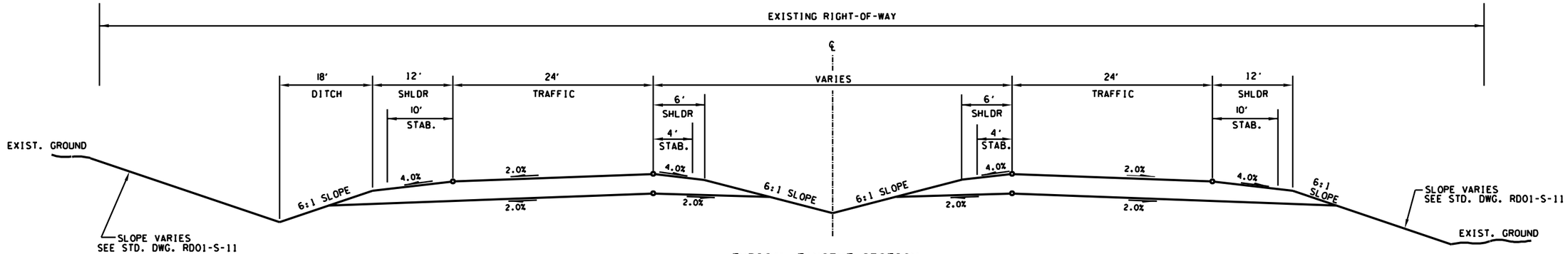
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED: _____ _____
DIVISION ADMINISTRATOR DATE

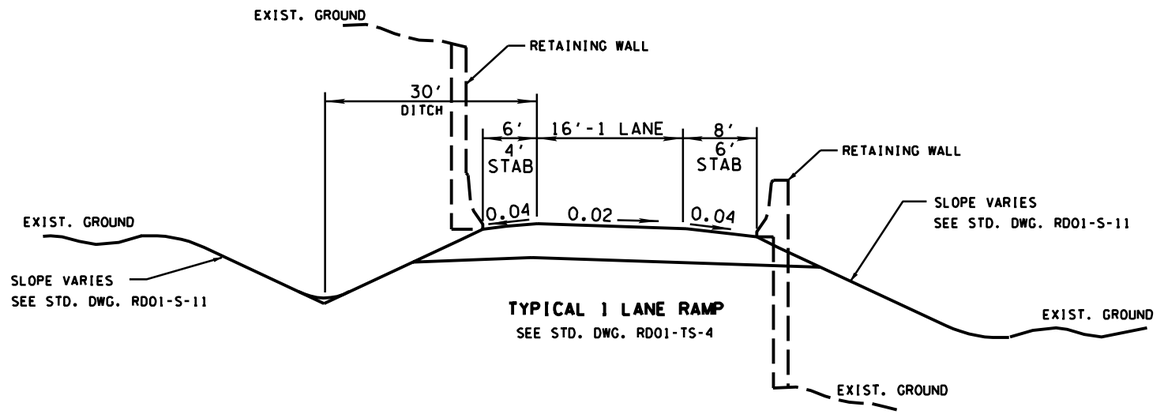
TYPE	YEAR	PROJECT NO.	SHEET NO.
APR	2004		2



TYPICAL TANGENT SECTION
STATE ROUTE 32
SEE RD01-TS-5B



TYPICAL TANGENT SECTION
STATE ROUTE 32 TRANSITION
SEE RD01-TS-5



TYPICAL 1 LANE RAMP
SEE STD. DWG. RD01-TS-4

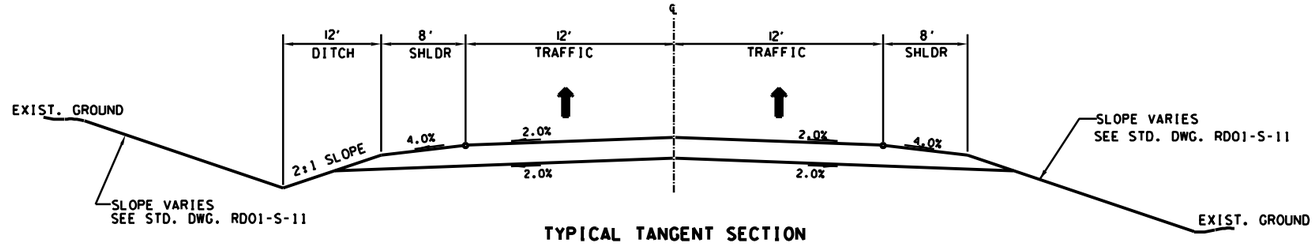
NOT TO SCALE

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

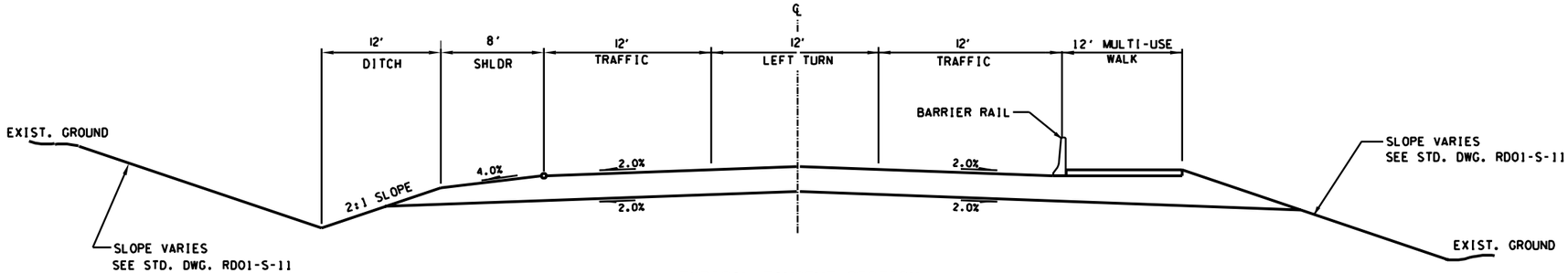
HAMBLEN COUNTY

INTERCHANGE JUSTIFICATION STUDY STATE ROUTE 32 AT COLLEGE PARK DRIVE

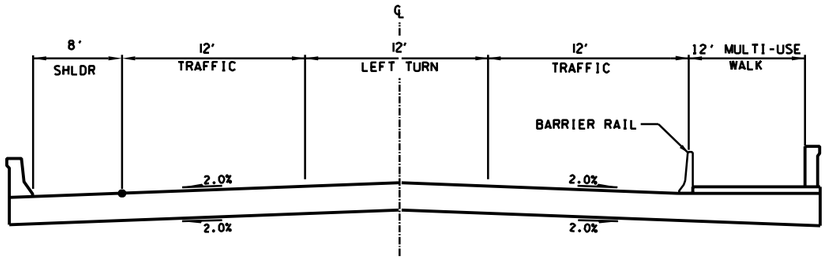
TYPE	YEAR	PROJECT NO.	SHEET NO.
APR	2004		2A



TYPICAL TANGENT SECTION
ONE WAY FRONTAGE ROAD



TYPICAL TANGENT SECTION
COLLEGE PARK DRIVE
RETAIL DRIVE



TYPICAL TANGENT SECTION
COLLEGE PARK DRIVE
RETAIL DRIVE
ON STRUCTURE

NOT TO SCALE

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HAMBLEN COUNTY

INTERCHANGE JUSTIFICATION STUDY STATE ROUTE 32 AT COLLEGE PARK DRIVE

TYPE	YEAR	PROJECT NO.	SHEET NO.
APR	2004		3

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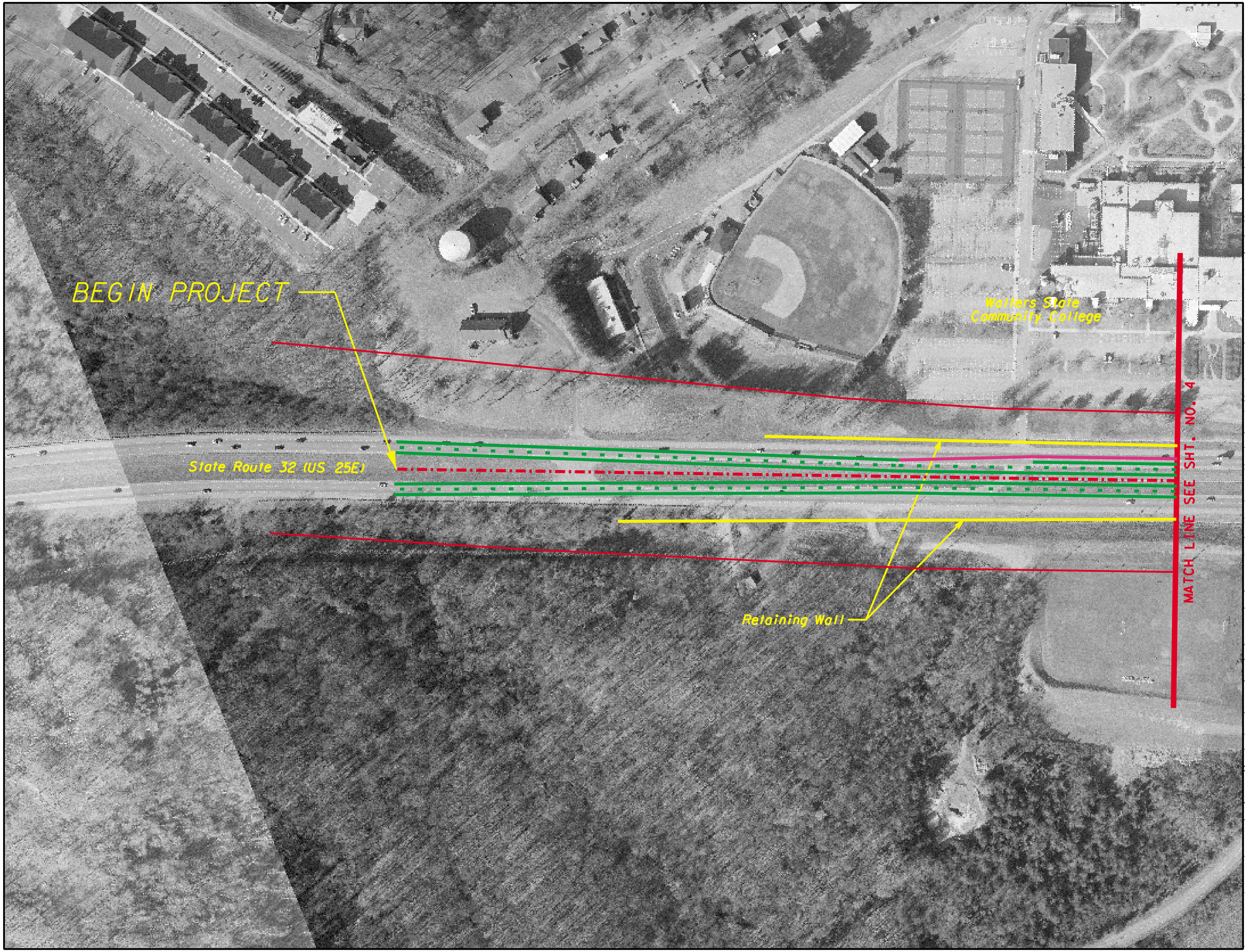

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INTERCHANGE JUSTIFICATION STUDY
STATE ROUTE 32 AT
COLLEGE PARK DRIVE

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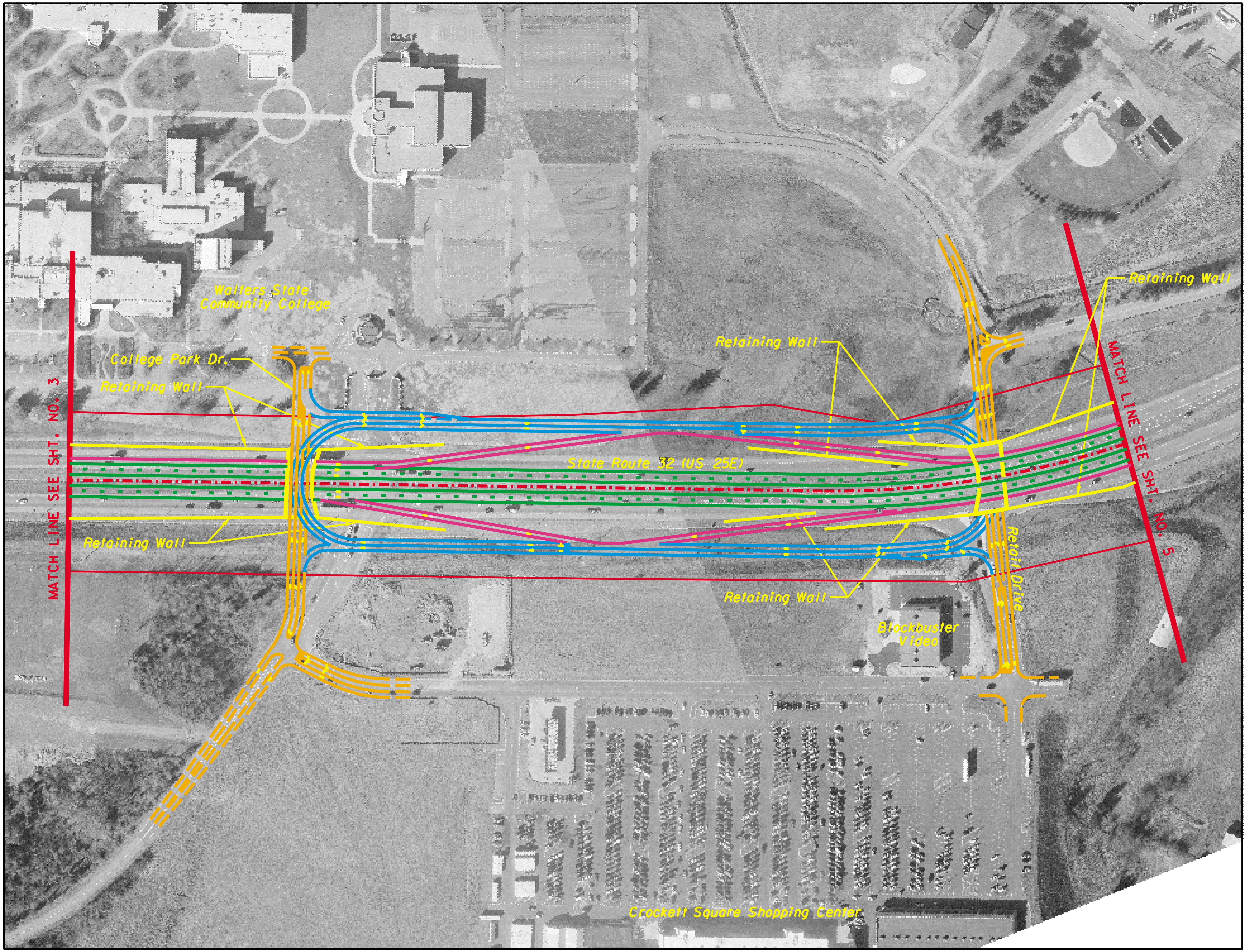

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INTERCHANGE JUSTIFICATION STUDY STATE ROUTE 32 AT COLLEGE PARK DRIVE

TYPE	YEAR	PROJECT NO.	SHEET NO.
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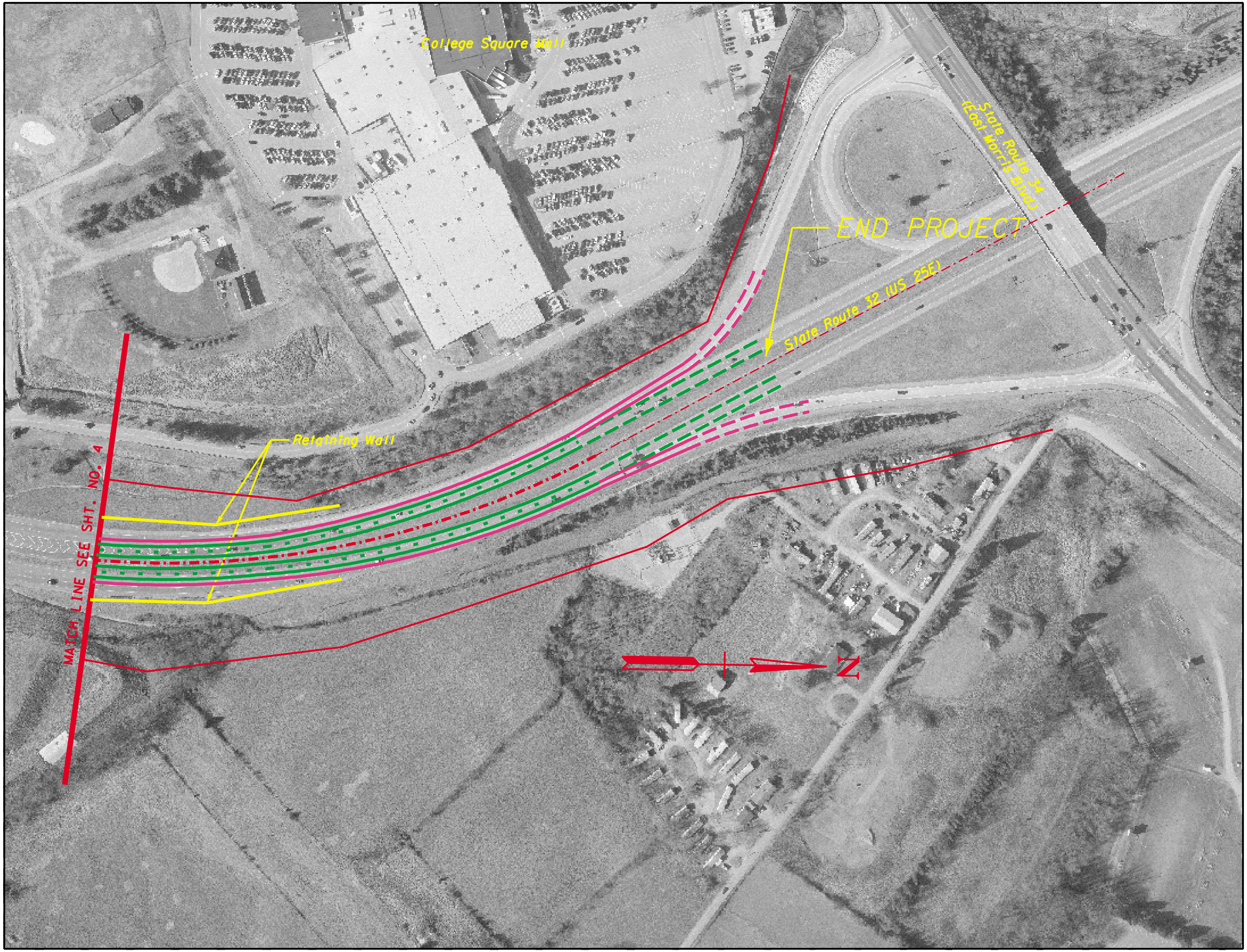

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

Hamblen County

INTERCHANGE JUSTIFICATION STUDY STATE ROUTE 32 AT COLLEGE PARK DRIVE

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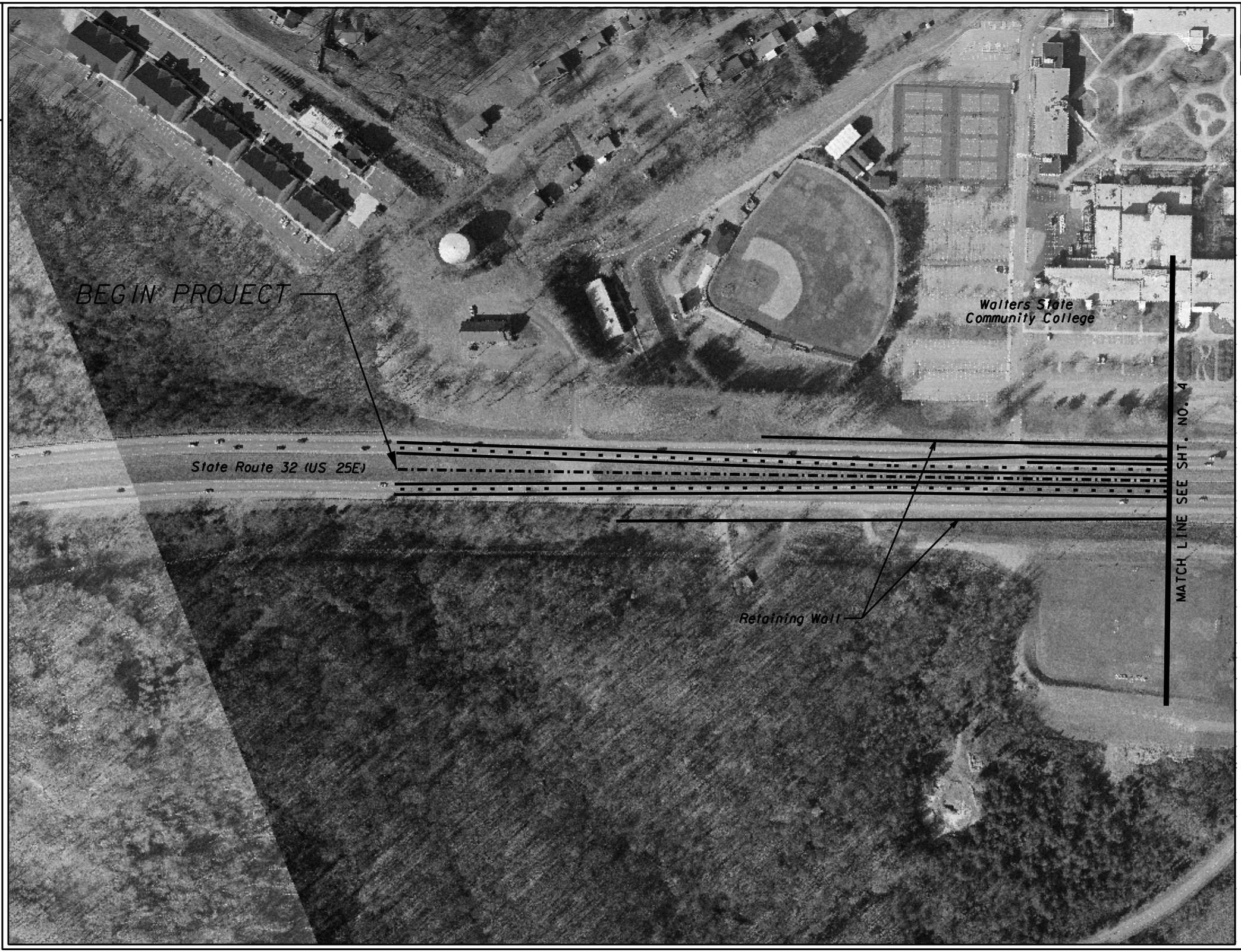

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STATE ROUTE 32 AT
COLLEGE PARK DRIVE

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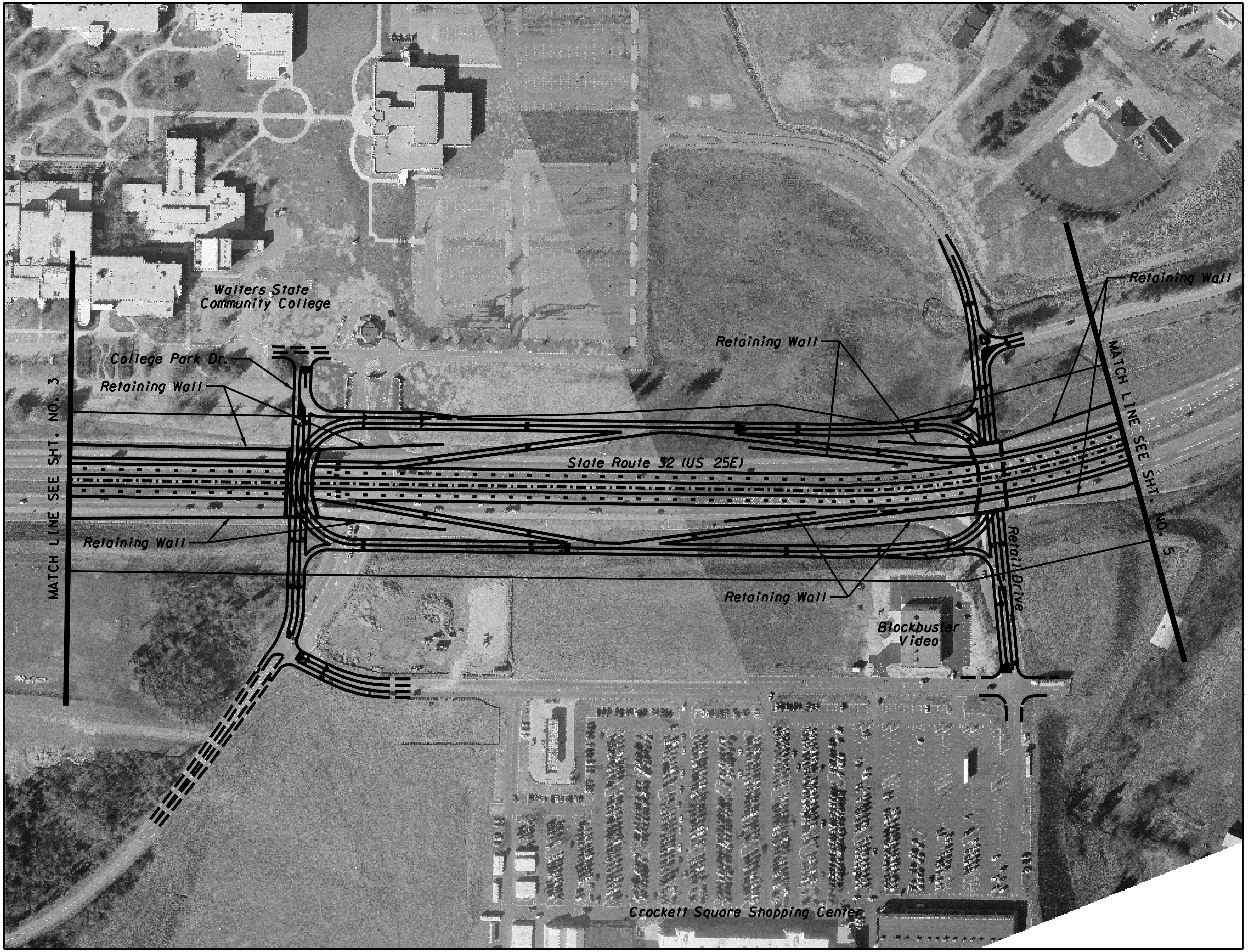

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INTERCHANGE JUSTIFICATION STUDY STATE ROUTE 32 AT COLLEGE PARK DRIVE

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TENNESSEE D.O.T.
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TYPE	YEAR	PROJECT NO.	SHEET NO.
APR	2004		5

College Square Mall

State Route 34
(East Morris Blvd)

END PROJECT

State Route 32 (US 25E)

Retaining Wall

MATCH LINE SEE SHT. NO. 4

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STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

Hamblen County

INTERCHANGE
JUSTIFICATION STUDY
STATE ROUTE 32 AT
COLLEGE PARK DRIVE

SYTME
DCWSPEC

APPENDIX

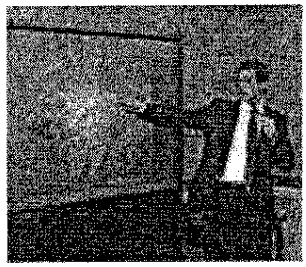
Top Stories

State reveals 25E interchange plans

By:, From Staff Reports

July 02, 2003

Morristown community leaders got their first glimpse of the proposed traffic interchange on Highway 25E Tuesday.



Road consultant Rick Hammond outlined Highway 25E traffic interchange options at a meeting Tuesday at Walters State Community College with Morristown community leaders.

The interchange would eliminate the lone traffic light on the thoroughfare in Hamblen County and create a single access point to Walters State Community College, College Square Mall and the Wal-Mart dominated Crockett Square.

Tennessee Department of Transportation officials unveiled their proposals at WSCC Tuesday afternoon. Those in attendance included officials from the college, College Square Mall, Crockett Square and the Morristown Area Chamber of Commerce.

Perhaps not surprisingly, the option favored by a majority of the affected parties is the most expensive.

The most-favored plan calls for raising the elevation of Highway 25E in front of the college to a sufficient height to install two underpasses, or small tunnels, beneath the roadway.

The two underpasses would link Crockett Square to both the mall and WSCC.

"We would want to sit down and review what we've seen here today before we commented on particular options, but (the elevated-highway) option was of interest to us," said Mike Kaufman, general manager of College Square Mall.

Mall officials openly expressed displeasure when the city of Morristown elected

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- Subscribe
- Tennessee Smokies Baseball
- Tennessee State News
- Administrative
- Fun and Games

to limit access between the mall and Crockett Square.

Funding for the project - $5 million initially - comes through the Appalachian Regional Commission. Additional funding could be available through the ARC if $5 million is not enough to complete the project, a TDOT official said.

Morristown City Administrator Jim Crumley says city staff member likely will "tweak" TDOT's raised-road proposal. The TDOT plan calls for a "flyway" bridge from an access road on the east side of Highway 25E back onto the highway.

Crumley says he favors nixing the flyway onto the northbound lane, and instead direct traffic onto Thompson Creek Road. This would both eliminate a costly bridge and open up property north of Crockett Square Mall to commercial development.

Some of the proposals presented Tuesday would require taking significant amounts of WSCC-owned property.

"I think the city's interest is to see that we continue to have a full access road that takes care of our commercial developers and improves traffic flow through and into Morristown," said Morristown Mayor Gary R. Johnson. "We want people to be able to get here as easily as they can.

It's going to be a balancing act of trying to do both of those things."

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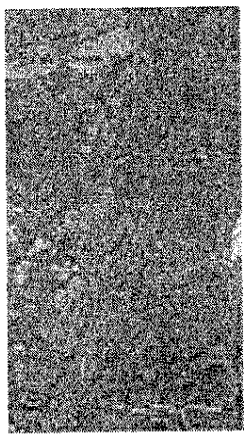
Top Stories

Plan to aid 25E traffic proposed

By: ROBERT MOORE, Tribune Staff Writer

August 12, 2003

A trip back to the drawing board produced a redesigned road-improvement plan for Highway 25E near Walters State Community College in Morristown.



After receiving input from the three principal stakeholders, state transportation officials redesigned proposed changes to Highway 25E near Walters State Community College. The design depicted above is not final.

The goal is to facilitate traffic flow on Highway 25E and increase accessibility to the college, College Square Mall and Crockett Square, the Wal-Mart dominated shopping center east of the thoroughfare, officials say.

Most or all of the options would eliminate the traffic light between the college and Crockett Square.

Ron Baker, a roadway specialist with the Tennessee Department of Transportation, emphasizes nobody has made a final decision on road design.

TDOT plans to conduct a public hearing on different options "in the near future," Baker said Monday. Baker says it's far too early to estimate when construction could begin or when the roadway will be complete.

The latest redesign is a modification of an initial proposal that found favor with the college, both shopping centers and city officials.

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The broad framework remains the same, but engineers added one key access road and nixed others.

The new plan calls for raising the elevation of Highway 25E a sufficient height to install two underpasses, or small tunnels, beneath the roadway.

The two underpasses would link Crockett Square with both the college and mall.

Road-design engineer Jeff Hammond estimates the roadbed would rise by approximately 23 feet.

Entrance and exit ramps near the Highway 25E-College Park Drive would provide access to the northbound and southbound lanes of Highway 25E.

Perhaps the biggest addition in the highway redesign is a roadway linking College Square Mall and the College Park Drive intersection. The recently released proposal shows the new access road traveling across property owned by Walters State.

The principal entrance from College Park Drive to Crockett Square would be southeast of the gasoline station, according to the proposal.

The new design also includes a pedestrian walkway between the WSCC College Center and the baseball field, on the southernmost portion of the campus.

Possibly the largest downsizing modification of the most recent proposals would be the elimination of a bridged on-ramp called a "flyway," linking Crockett Square and the northbound lanes of Highway 25E.

After seeing the flyway proposal, city officials essentially dismissed the idea as cost-prohibitive and unnecessary.

Another traffic-flow modification in the new plan involves the southern entry point to Crockett Square.

Currently traffic siphons onto the property via the frontage road or directly onto the Wal-Mart parking lot.

The new proposal calls for directing all traffic on the south end of Crockett Square onto the frontage road.

The underpass linking WSCC and Crockett Square would be for motorized vehicles only, according to Hammond.

Hammond says the underpass linking College Square Mall and Crockett Square would be able to accommodate foot traffic.

The initial completion date mentioned was 2008.

CBL & Associates Properties Inc., College Square Mall's parent company, wants a solution to its traffic-flow concerns before 2008, according to Mike Kaufman, mall manager.

For several months, College Square Mall lobbied for a traffic light between the mall and Crockett Square.

Until the entire Highway 25E road-improvement project is complete, College Square still wants a traffic light, according to Kaufman.

"Over the past six months, we have spoken at length with the city council and the mayor-elect, lobbying for those efforts and generating some support within the council," Kaufman said. "We feel we've got some pretty solid support there.

Kaufman says CBL & Associates is working closely with Holrob Investments, the company in charge of Crockett Square development "to build support with our neighbor."

"We feel that due to the convoluted intersection between us that the safety factor is an issue also ... We feel that signalization of that intersection would alleviate traffic concerns that currently exist," Kaufman said.

A Holrob Investments representative could not be reached for comment.

Baker says TDOT doesn't currently have an official position on the interim traffic light.

"It really hasn't been addressed at this point," Baker said. "You can't say it's a possibility unless it's been
addressed."

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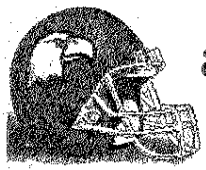

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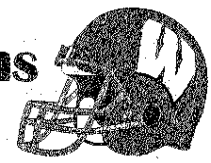
Sports B-1



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Opinion A-4

Citizen TRIBUNE

Lakeway Region

www.citizentribune.com

Vol. 37 No. 306 Friday, August 29, 2003 Morristown

Revised road plan approved by WSCC

BY ROBERT MOORE
Tribune Staff Writer

The Tennessee Department of Transportation's latest design proposal for road improvements near Walters State Community College scores points with the college.

The draft proposal would move the tunnel linking WSCC with Crockett Square to a point well north of current buildings, creating a new entrance for the college.

"I like the changes they made," WSCC President Dr. Jack Campbell said Thursday. "I think we can work with this proposal."

Highway 25E traffic bound for College Square Mall would access the property through a roundabout and roadway system on property currently owned by WSCC.

The tunnel linking the northern portion of Crockett Square with College Square Mall remains in the latest proposal.

Mike Kaufman, College Square Mall manager, said this morning the mall's parent company, CBL & Associates Properties, hasn't yet developed a position on TDOT's latest design scheme.

Holrob Investments, the Knoxville-based company developing Crockett Square, could not be reached for comment.

The revised road plan is not final. TDOT plans to conduct a public hearing in Morristown some time in October, but the date has not been determined, according to Campbell.

Campbell expressed strong reservations about a previous TDOT plan that would have emptied hundreds of vehicles per day near the main college campus.

The college president says he still has some issues he plans to raise with TDOT before construction begins.

Both plans call for raising Highway 25E approximately 25 feet, a height sufficient to construct tunnels under the roadway. Both plans also eliminate the traffic light between WSCC and Crockett Square.

Under the new proposal, traffic coming to Crockett Square would enter the property at a "T" intersection onto the current three-lane access road.

Moving the interchange north of the campus would shorten the distance between the ramps entering and exiting Morris Boulevard.

To compensate for this, TDOT proposes building two auxiliary lanes between the interchange and the Morris Boulevard ramps.

The auxiliary lanes would allow traffic to enter and exit Highway 25E more easily.

A pedestrian walkway across Highway 25E on the south side of the WSCC campus would provide another avenue for foot traffic.

Both proposals included the pedestrian walkway.

This represents the latest Tennessee Department of Transportation proposal for the interchange linking Walters State Community College, Crockett Square and College Square Mall. The plan is not final.

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Top Stories

Road plan hits bump

By: ROBERT MOORE, Tribune Staff Writer September 27, 2003

The generally cordial debate about the proposed new interchange on Highway 25E near Walters State Community College ended Friday, but discussions now include significant new commercial development in the area.

William 'Chip' Slagle, owner of Knoxville-based Certified Properties LLC - one of the two companies developing the Wal-Mart-dominated Crockett Square site - says current plans would rob him of high-dollar real estate.

State transportation officials propose building an interchange that would include a five-lane roadway linking Walters State to Crockett Square.

The five-lane roadway would bisect one or more frontage lots on Highway 25E in front of Wal-Mart, according to Slagle.

The latest proposal would move the interchange approximately 700 feet north of the current Walters State main entrance.

The proposal also would maintain a Highway 25E entrance for College Square Mall.

Tunnels would be dug underneath Highway 25E linking Crockett Square with both Walters State and College Square Mall.

"I'm all for compromise, and everybody in our organization is all for making this work for the benefit of everyone," Slagle said. "I've heard this word 'compromise,' but I don't think there's been anybody giving more than what we have.

"I don't think there's been a lot of compromise," Slagle added. "I think it's a great word and it's a good catch word to throw out, but it seems like things are pretty well set, regardless of what Wal-Mart or anyone else thinks."

Johnny Graves, a representative of the Tennessee Department of Transportation planning office, says all proposals are tentative at this point.

"We will not make a decision on how to move forward until we resolve all these issues," Graves said during a meeting in Strawberry Plains Friday.

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In raising objections to the latest TDOT proposal, Slagle mentioned plans exist for an "additional 100,000 square feet of retail space" on the 16 acres of land south of Crockett Square.

Slagle indicated he has letters of intent for retailers to locate on the 16 acres but fears the proposed interchange could jeopardize tentative agreements. "Quite frankly, if (the retailers) catch wind of this, I'm quite certain most of them will not commit at this point in time," Slagle said.

He declined to comment publicly about the possible new retailers.

The developer also added the proposed access restriction could violate access-related provisions with existing tenants, and hinted at legal action if the state decides to move forward with its latest plan.

"If our tenants vacate, we've got mortgage payments to meet, things of that nature," Slagle said. "If we incur those types of damages because of being thrown into default of our leases, then we've got to look somewhere for damages."

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Top Stories

Morristown offers new plan for 25E

By: Robert Moore, Tribune Staff Writer

December 13, 2003

The city of Morristown recently pitched a radically different plan to Tennessee Department of Transportation officials involving improvements to Highway 25E near Walters State Community College.

The city-proposed plan varies significantly in at least three ways from the plan outlined by TDOT officials at a public hearing at the college Thursday, according to Bryan Fowler, Morristown city engineer.

Both plans call for raising the roadway approximately 25 feet and installing access roads underneath, but the city plan has only one tunnel linking the Wal-Mart-dominated Crockett Square and properties on the west side of Highway 25E, according to Fowler.

The tunnel under the raised thoroughfare would be at the current intersection of College Park Drive and Highway 25E.

The most-favored proposal being considered by TDOT up until last week calls for two tunnels beneath the roadway.

One tunnel proposed by TDOT would run from north of the WSCC parking lots and bisect the Crockett Square frontage lot, a plan that drew opposition from Holrob Associates, the Knoxville-based development company selling and leasing the frontage lots.

The second TDOT-proposed tunnel would link the north entrance of Crockett Square with College Square Mall. The proposed city design would eliminate this tunnel.

The city plan also includes another link between East Morris Boulevard and Crockett Square.

The city engineer says the plan is to extend the westernmost East Morris Boulevard entrance to College Square Mall - at Haun Drive - through property south of the mall.

The city-proposed roadway would intersect with the lone roadway and tunnel linking WSCC with Crockett Square.

- Classifieds
- Community Links
- Community News
- Consumer Guide
- Festivals & Events
- Regional Travel
- Info-Connect
- Lakeway Publishers Inc.
- Lifestyles Wire
- Local Internet Access
- Medical Directory
- Morristown Radio
- Online Bookstore
- Our Newspaper
- Parade Magazine
- PARADE MAGAZINE CLASSROOM
- Personal Finance
- Photo Memories
- Smoky Mountain Marketplacce
- Subscribe
- Tennessee Smokies Baseball
- Tennessee State News
- Administrative
- Fun and Games

Fowler says he envisions a divided "four-lane, boulevard-type" connector between East Morris Boulevard and the Highway 25E tunnel to Crockett Square.

Fowler says the plan surfaced following consultations between city officials and representatives of the college and College Square Mall's parent company, CBL Associates Properties.

"We feel like it would be in the best interest of everyone," Fowler said. "It would have the least impact on Walters State, and would allow them do to things that work better for them ... It's a win-win situation for everyone."

The precise path of the connector south of the mall has not been determined, according to Fowler.

Fowler presented the city's latest proposal to TDOT officials following Thursday's public meeting.

The Appalachian Regional Commission allocated $5 million for the highway improvements.

The $5 million is for construction on Highway 25E, and would not pay for the city-proposed connecting boulevard between the mall and college, according to Fowler.

The city engineer says money for this project would have to come from a "partnership" between the city, college and mall.

Jim Hammond, a TDOT engineer, says the department will consider all viable plans.

The project likely will not be let for bid before late 2007 or early 2008, according to Hammond, who did not offer a prediction on how long construction would take.

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COST ESTIMATE WORKSHEETS

COST DATA SHEET

Project Total

PROJECT: College Park Drive at US 25E Interchange

LENGTH: _____ CROSS-SECTION: _____

Right-of-Way			
Land, Improvements and Damages (4.78± Acres)		$	$937,000.00
Incidentals (12 Tracts)		$	$46,000.00
Relocation Payments:	(0 Residences)	$	-
	(0 Business)		
	(0 Non-Profits)		
TOTAL RIGHT-OF-WAY COST		$	983,000.00
Utility Relocation			
Reimbursable		$	$8,000.00
Non-Reimbursable		$	$299,000.00
TOTAL ADJUSTMENT COST		$	307,000.00
Construction			
Clearing and Grubbing		$	$55,000.00
Earthwork		$	$1,886,000.00
Pavement Removal		$	$11,000.00
Drainage (Includes Erosion Control)		$	$1,006,000.00
Structures		$	$2,275,000.00
Railroad Crossing or Separation		$	-
Paving		$	$2,351,000.00
Retaining Walls		$	$4,063,000.00
Maintenance of Traffic		$	$51,000.00
Topsoil		$	$12,000.00
Seeding		$	$11,000.00
Sodding		$	$78,000.00
Signing		$	$32,000.00
Lighting		$	-
Signalization		$	$400,000.00
Fence		$	$21,000.00
Guardrail		$	$111,000.00
Rip Rap or Slope Protection		$	-
Other Construction Items (8.5%)		$	$1,050,000.00
Mobilization		$	$549,000.00
10% Engineering and Contingencies		$	1,396,000.00
TOTAL CONSTRUCTION COST		$	15,358,000.00
Preliminary Engineering (15%)		$	$2,094,000.00
TOTAL PROJECT COST		$	$18,742,000.00

UTILITY COST ESTIMATE WORKSHEET

ROUTE: 25E	ALTERNATE				SECTION			
		(Off) ROW	(On) ROW			Reimb. (Off R/W)	Non-Reimb. (On R/W)	TOTAL
Electric								
	Two Phase	0	0	poles @	$1,400	$0	$0	$0
	Three Phase	0	17	poles @	$1,800	$0	$30,600	$30,600
	Luminaires	0	32	poles @	$2,200	$0	$70,400	$70,400
	Transformer	0	5	@	$1,000	$0	$5,000	$5,000
	TVA Lines	0	0	tw/poles @	$60,000	$0	$0	$0
Telephone								
	Owned	0	0	poles @	$1,000	$0	$0	$0
	Shared	0	17	poles @	$600	$0	$10,200	$10,200
	Service Drop	0	0	poles @	$900	$0	$0	$0
Underground								
	Direct Bury	0	0	feet @	$7	$0	$0	$0
	In Conduit	0	0	feet @	$15	$0	$0	$0
	Closures	0	0	@	$150	$0	$0	$0
	Terminals	0	0	@	$250	$0	$0	$0
	Manholes	0	0	@	$2,500	$0	$0	$0
AT&T Toll Cable		0	0	feet @	$50	$0	$0	$0
Water								
	2"	0	0	feet @	$5	$0	$0	$0
	4"	0	0	feet @	$7	$0	$0	$0
	6"	0	0	feet @	$10	$0	$0	$0
	16"	0	4100	feet @	$30	$0	$123,000	$123,000
	Hydrants	0	0	@	$500	$0	$0	$0
	Meters	0	0	@	$400	$0	$0	$0
Sanitary Sewer								
	6"	0	0	feet @	$14	$0	$0	$0
	8"	0	0	feet @	$22	$0	$0	$0
	12"	0	0	feet @	$32	$0	$0	$0
	Manholes	0	0	@	$1,000	$0	$0	$0
Natural Gas								
	2"	0	0	feet @	$8	$0	$0	$0
	4"	0	0	feet @	$10	$0	$0	$0
	6"	400	0	feet @	$17	$6,800	$0	$6,800
	Valves/Tap	0	0	@	$600	$0	$0	$0
Pipelines (Petroleum)								
	12"	0	0	feet @	$250	$0	$0	$0
Cable TV								
	Owned	0	0	poles @	$1,000	$0	$0	$0
	Shared	0	17	poles @	$600	$0	$10,200	$10,200
	Total Estimated Cost					$6,800	$249,400	$256,000
Per TDOT ROW Division, 20% increases =						$8,000	$299,000	$307,000

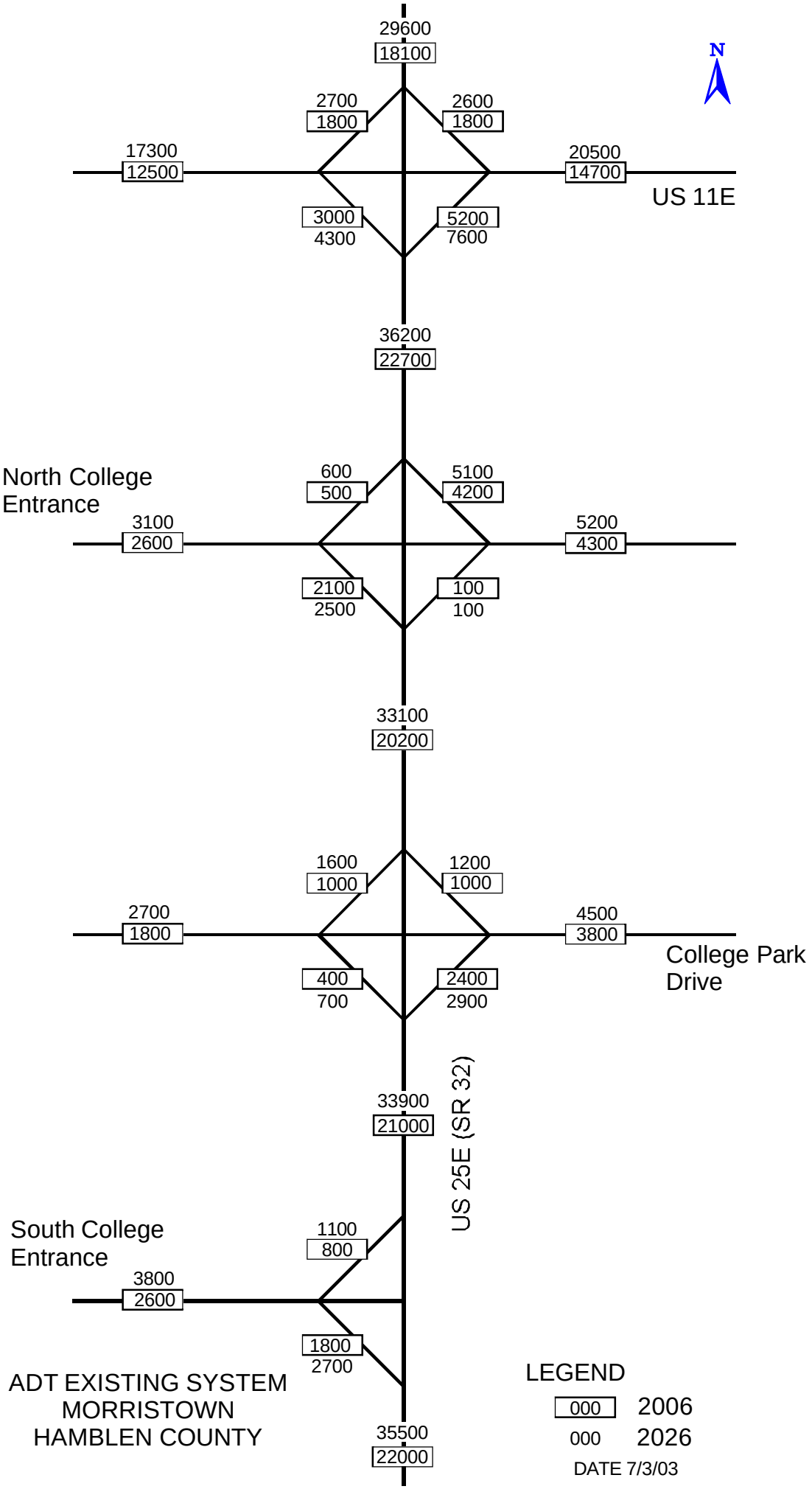
ADVANCE PLANNING REPORT
RIGHT-OF-WAY COST ESTIMATE WORKSHEET

Route No.: US 25E **County:** Hamblen **From:** ______________________ **To:** ______________________

Project	No.	Land Required		Improvements Taken		Damages	Total	Incidentals	Residential Relocations				Bus. & Farm Reloc.		Total ROW
Sections	**Tracts**	**Acres**	**Cost**	**Number**	**Cost**	**Cost**	**Cost**	**Cost**	**Houses**	**Cost**	**Trailers**	**Cost**	**Number**	**Cost**	**Cost**
			$0				$0	$0		$0		$0		$0	$0
All	12	4.78	$526,000			$20,000	$781,000	$38,000		$0		$0		$0	$819,000
			$0				$0	$0		$0		$0		$0	$0
Per TDOT ROW, increase total estimate by 20%															
			$0				$937,200	$45,600		$0		$0		$0	$983,000
			$0				$0	$0		$0		$0		$0	$0
			$0				$0	$0		$0		$0		$0	$0
			$0				$0	$0		$0		$0		$0	$0
			$0				$0	$0		$0		$0		$0	$0
			$0				$0	$0		$0		$0		$0	$0
			$0				$0	$0		$0		$0		$0	$0
			$0				$0	$0		$0		$0		$0	$0
			$0				$0	$0		$0		$0		$0	$0
			$0				$0	$0		$0		$0		$0	$0
			$0				$0	$0		$0		$0		$0	$0
			$0				$0	$0		$0		$0		$0	$0
			$0				$0	$0		$0		$0		$0	$0
			$0				$0	$0		$0		$0		$0	$0
			$0				$0	$0		$0		$0		$0	$0
			$0				$0	$0		$0		$0		$0	$0
			$0				$0	$0		$0		$0		$0	$0
			$0				$0	$0		$0		$0		$0	$0
			$0				$0	$0		$0		$0		$0	$0
			$0				$0	$0		$0		$0		$0	$0
			$0				$0	$0		$0		$0		$0	$0
			$0				$0	$0		$0		$0		$0	$0
			$0				$0	$0		$0		$0		$0	$0

Land Cost $110,000 **/ ACRE** **Incidentals** $3,200 **/ Tract**

TRAFFIC COUNTS AND PROJECTIONS
EXISTING AND PROPOSED CONDITIONS


29600
18100
N
2700
1800
2600
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17300
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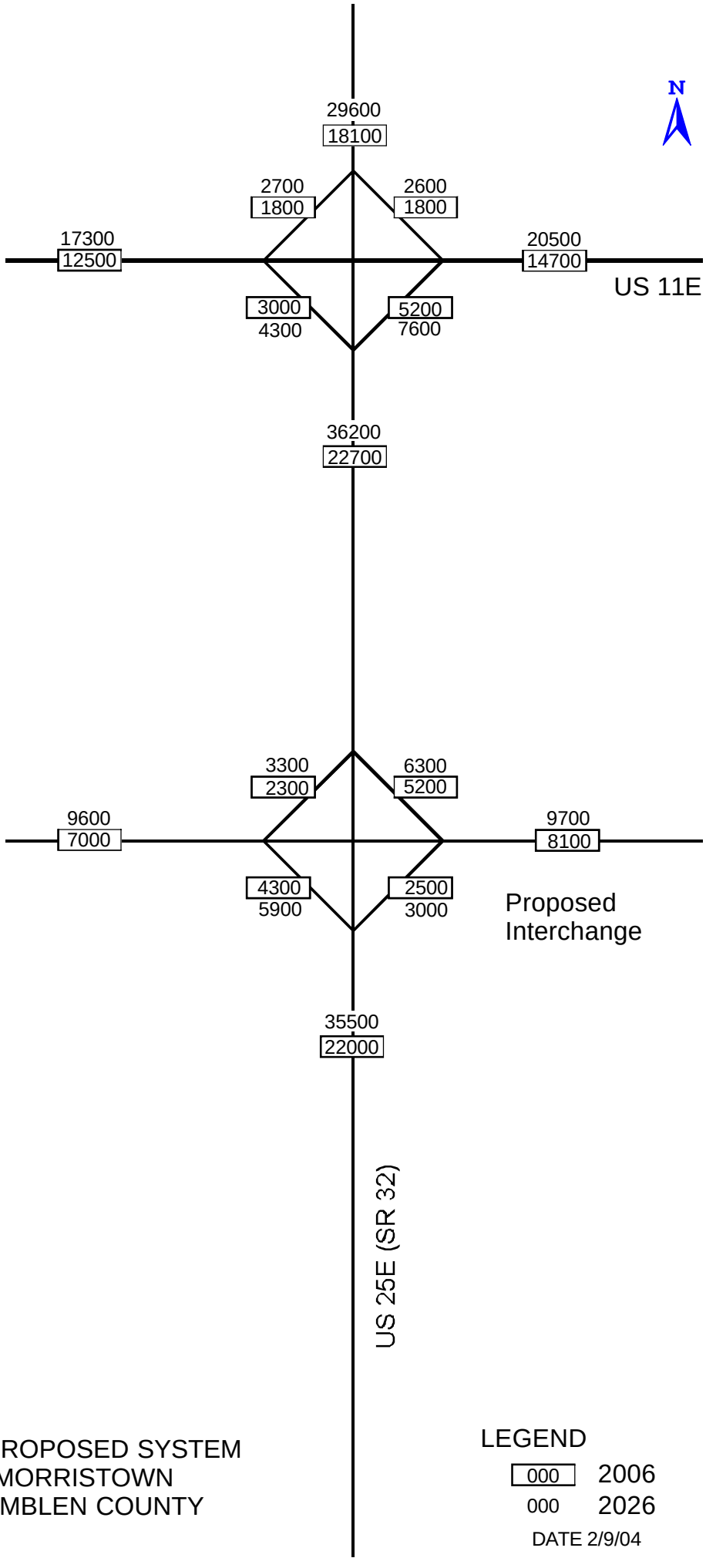
14700
US 11E
3000
4300
5200
7600
36200
22700
North College
Entrance
600
500
5100
4200
3100
2600
5200
4300
2100
2500
100
100
33100
20200
1600
1000
1200
1000
2700
1800
4500
3800
College Park
Drive
400
700
2400
2900
US 25E (SR 32)
33900
21000
South College
Entrance
1100
800
3800
2600
1800
2700
ADT EXISTING SYSTEM
MORRISTOWN
HAMBLEN COUNTY
35500
22000
LEGEND
000 2006
000 2026
DATE 7/3/03



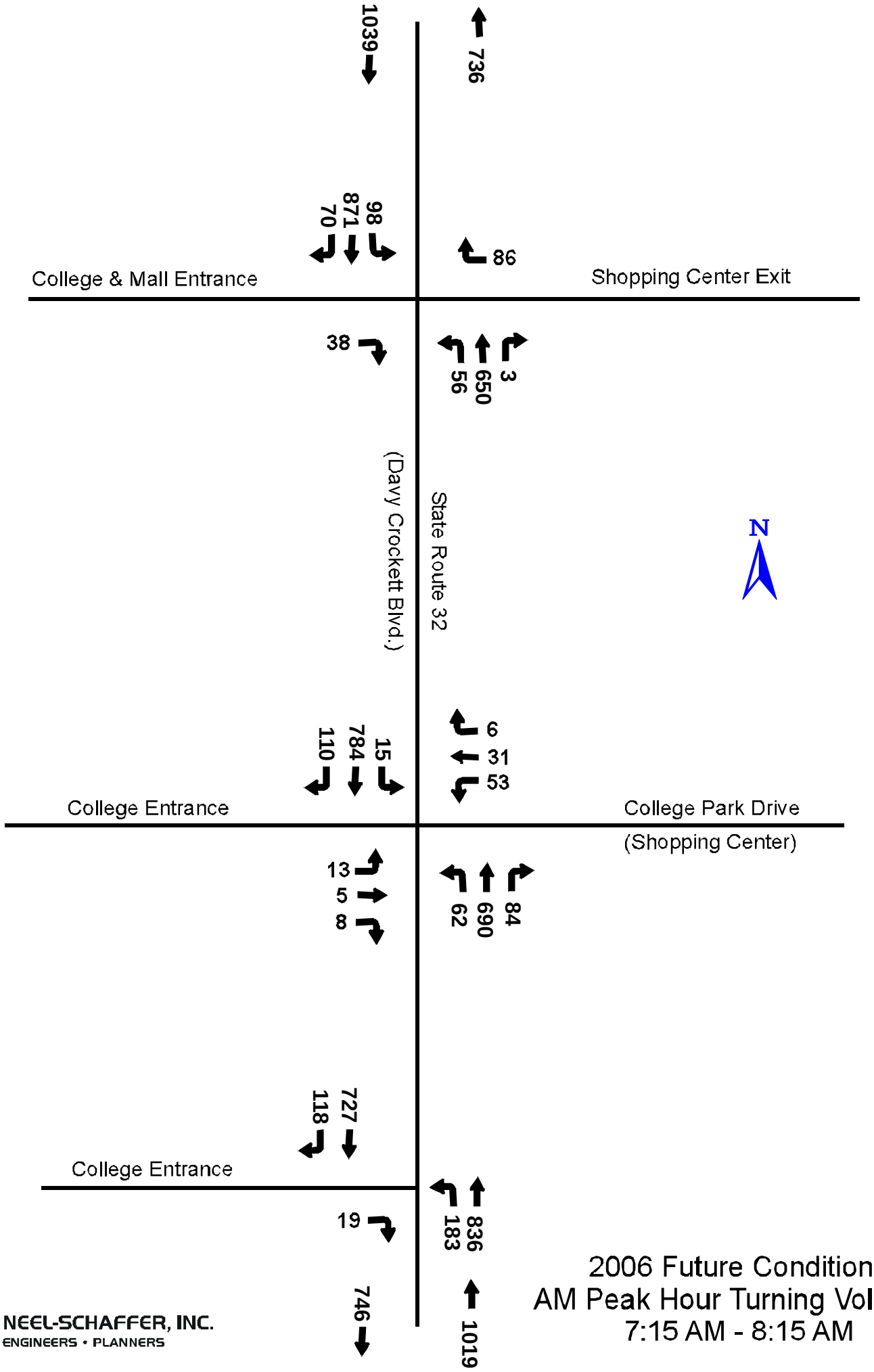
ADT PROPOSED SYSTEM
MORRISTOWN
HAMBLEN COUNTY

LEGEND

000 2006

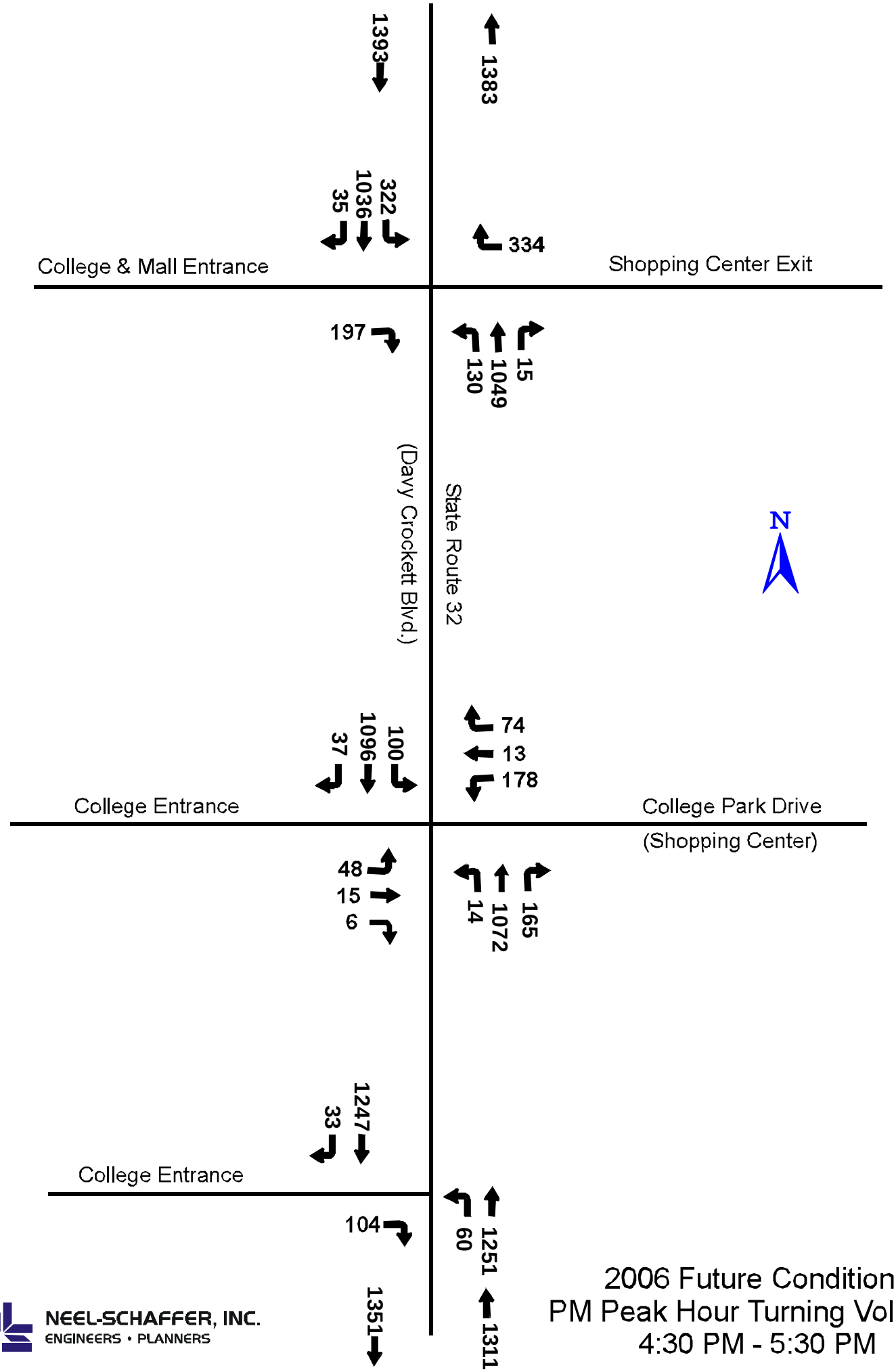
000 2026

DATE 2/9/04



2006 Future Conditions
AM Peak Hour Turning Volumes
7:15 AM - 8:15 AM

NEEL-SCHAFFER, INC.
ENGINEERS • PLANNERS



NEEL-SCHAFFER, INC.
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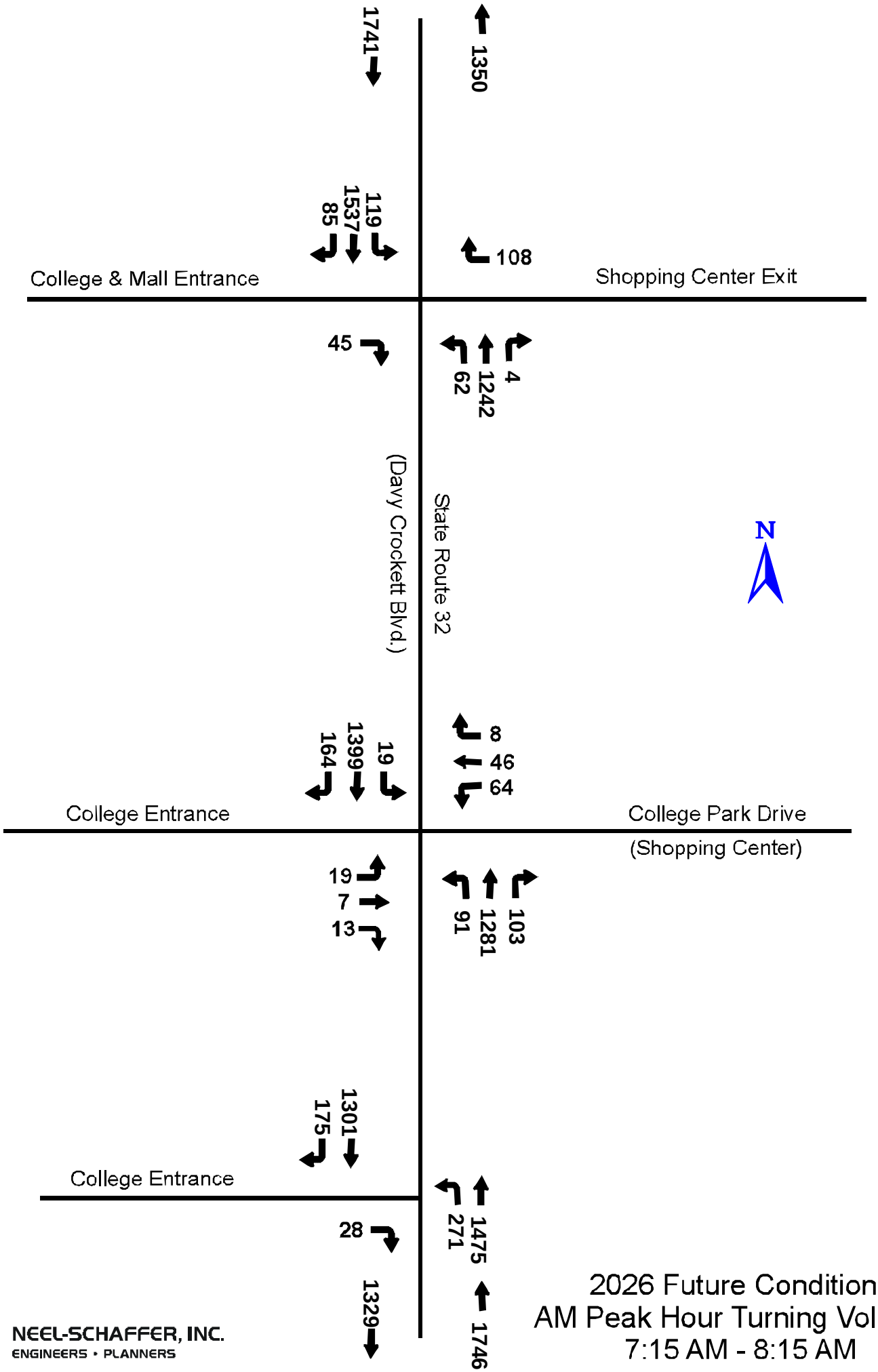
2006 Future Conditions
PM Peak Hour Turning Volumes
4:30 PM - 5:30 PM



NEEL-SCHAFFER, INC.
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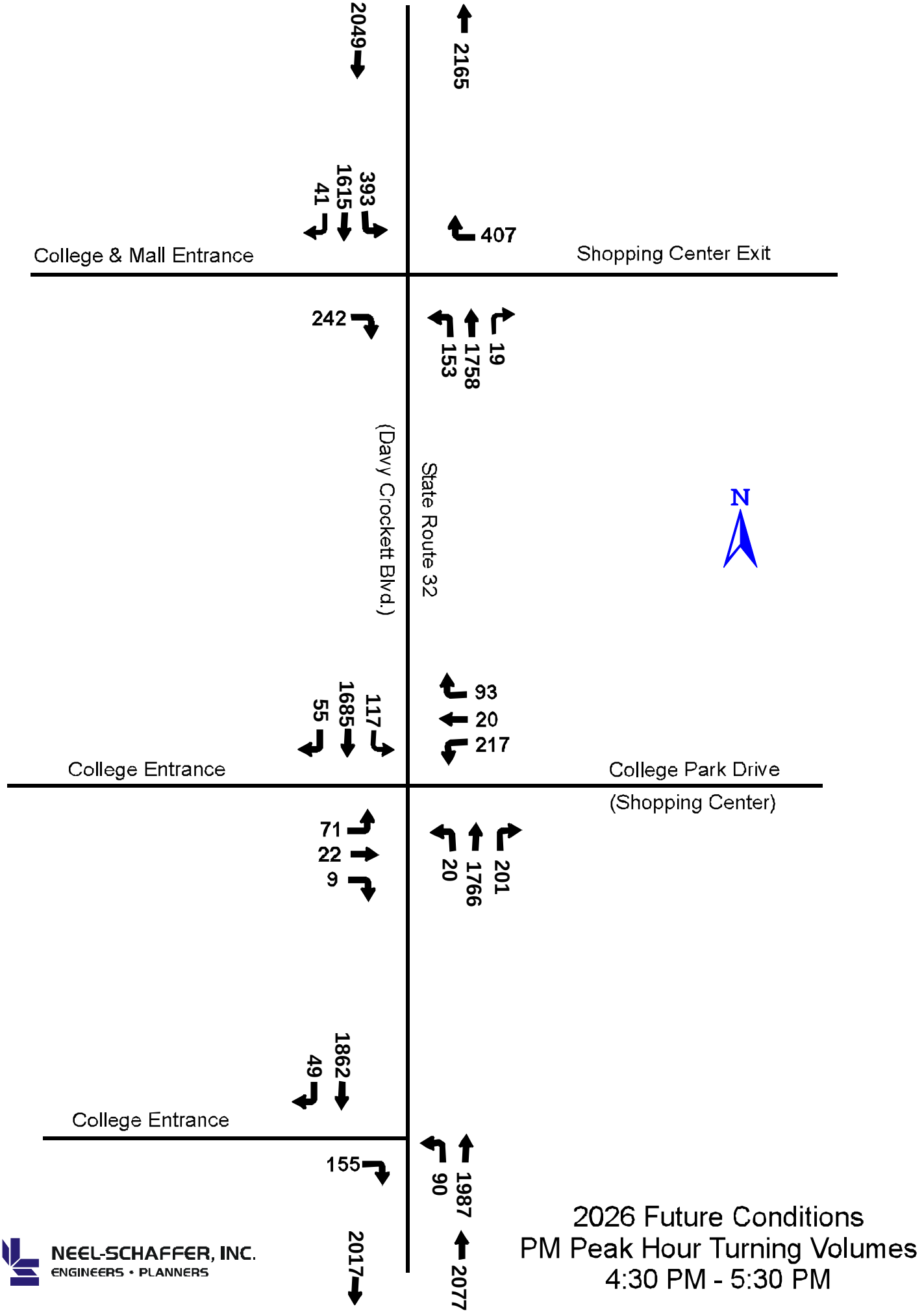
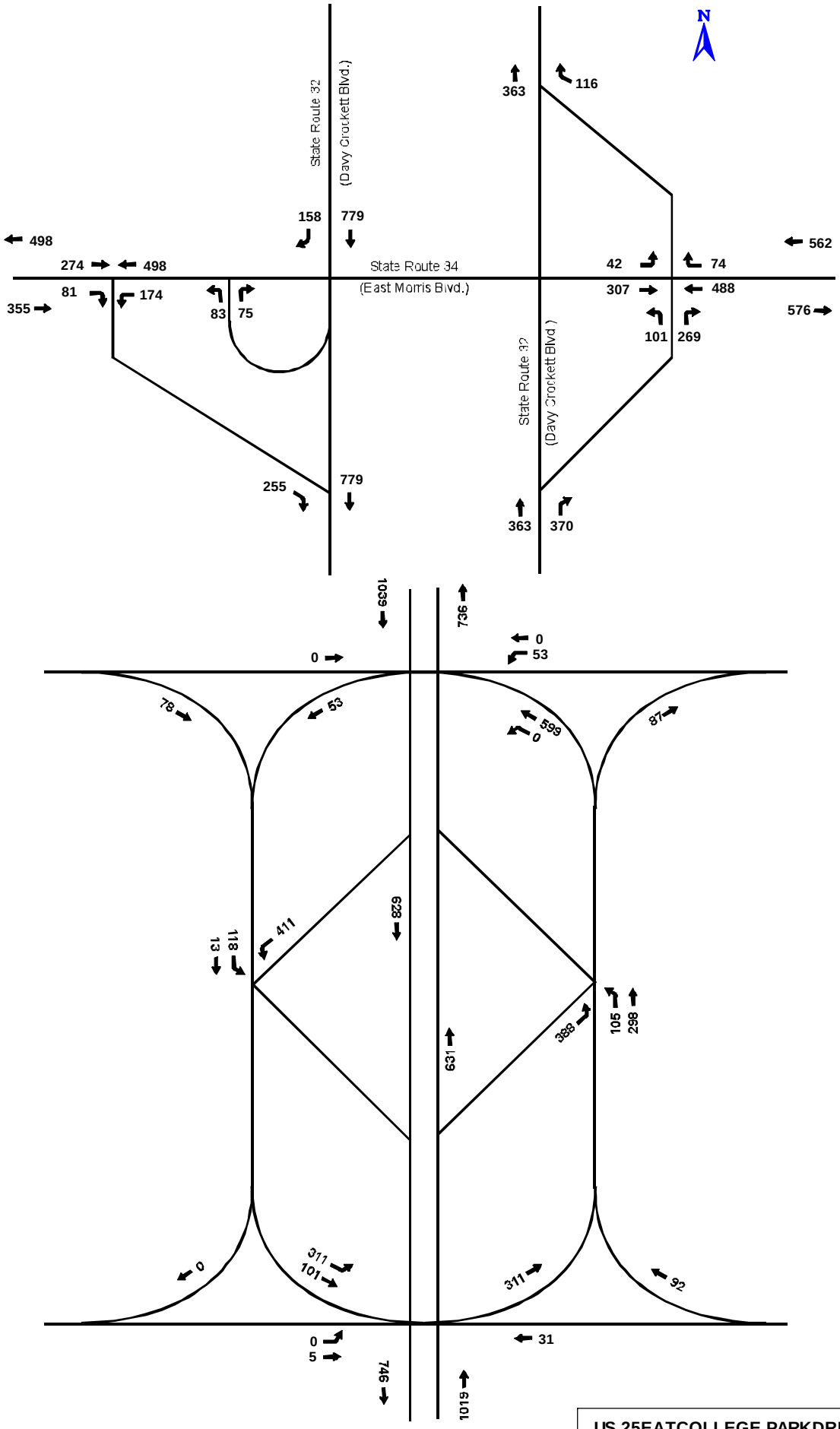
2026 Future Conditions
AM Peak Hour Turning Volumes
7:15 AM - 8:15 AM

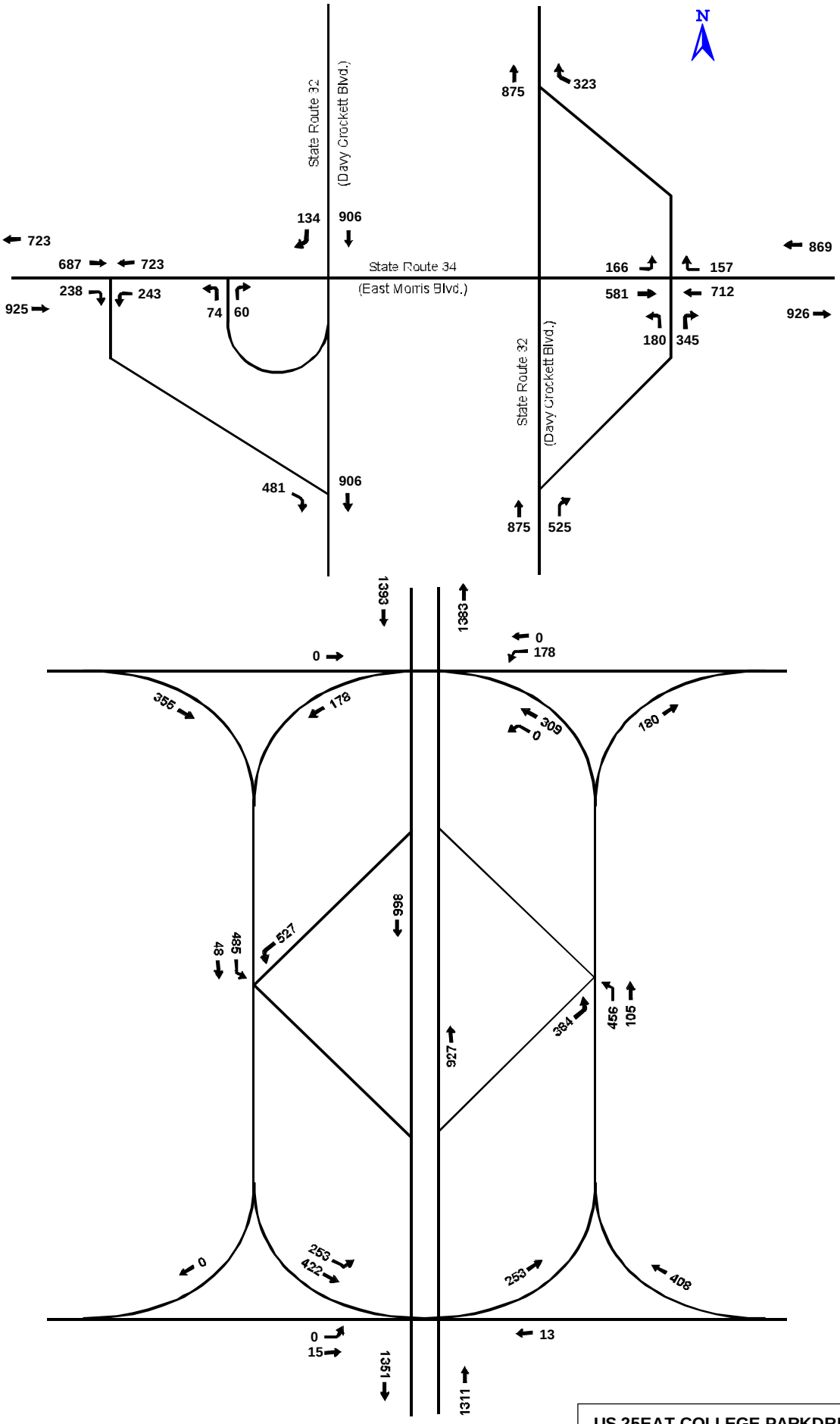


NEEL-SCHAFFER, INC.
ENGINEERS • PLANNERS

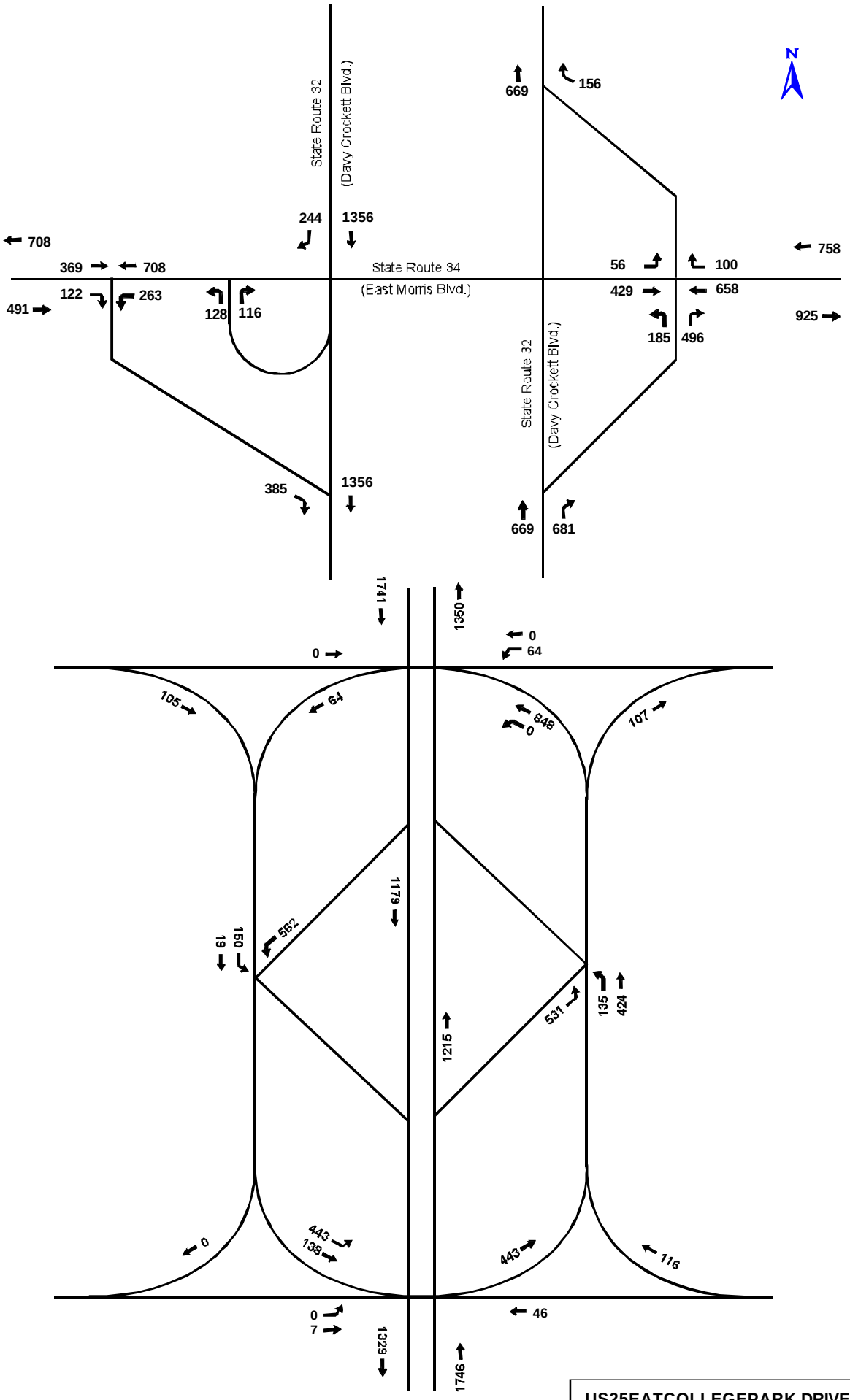
2026 Future Conditions
PM Peak Hour Turning Volumes
4:30 PM - 5:30 PM



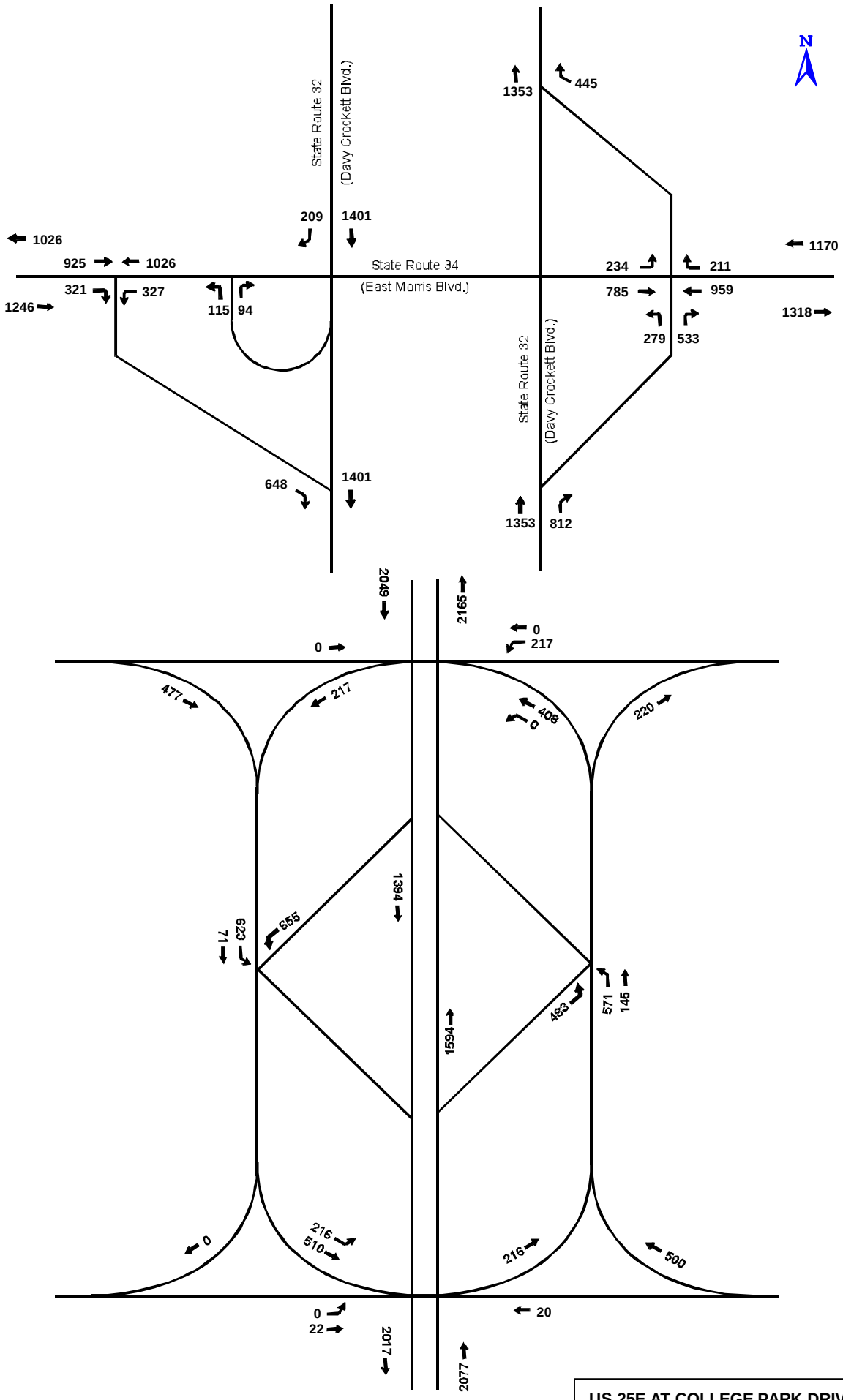
US 25EATCOLLEGE PARKDRIVE
MORRISTOWN,HAMBLENCOUNTY
PROPOSED SYSTEM
AM PEAK 2006



US 25EAT COLLEGE PARKDRIVE
MORRISTOWN,HAMBLENCOUNTY
PROPOSED SYSTEM
PM PEAK2006



US25EATCOLLEGEPARK DRIVE
MORRISTOWN,HAMBLENCOUNTY
PROPOSED SYSTEM
AM PEAK 2026



US 25E AT COLLEGE PARK DRIVE
MORRISTOWN,HAMBLENCOUNTY
PROPOSED SYSTEM
PM PEAK 2026

TRAFFIC ANALYSES

(OUTPUT FILES FROM HCS 2000, VERSION 4.1D)

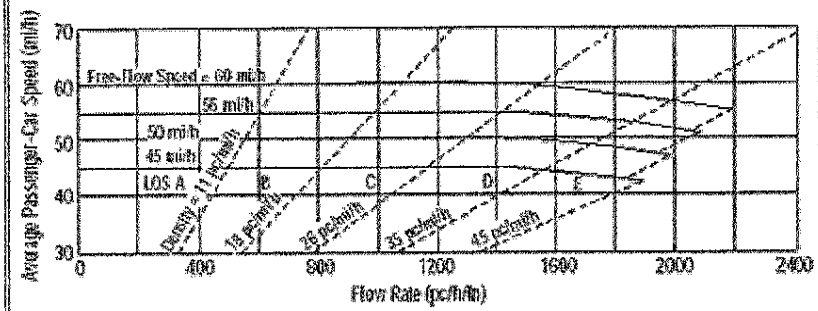
SUMMARY OF CAPACITY ANALYSES
PROPOSED INTERSECTIONS

Intersection	Condition	Traffic Control	Time Period	Year	Average Delay (sec.) / Level of Service																								Overall LOS
					Eastbound						Westbound						Northbound						Southbound						
					LT		Thru		RT		LT		Thru		RT		LT		Thru		RT		LT		Thru		RT		
Frontage @ College Park Dr (South)	Proposed	Signalized	AM Peak	2003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	N/A
Frontage @ College Park Dr (South)	Proposed	Signalized	PM Peak	2003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	N/A
Frontage @ College Park Dr (South)	Proposed	Signalized	AM Peak	2006	11	B	10	B	-	-	-	-	20	B	-	-	-	-	-	-	-	-	11	B	11	B	-	-	B
Frontage @ College Park Dr (South)	Proposed	Signalized	PM Peak	2006	11	B	10	B	-	-	-	-	19	B	-	-	-	-	-	-	-	-	11	B	15	B	-	-	B
Frontage @ College Park Dr (South)	Proposed	Signalized	AM Peak	2026	11	B	10	B	-	-	-	-	20	B	-	-	-	-	-	-	-	-	12	B	11	B	-	-	B
Frontage @ College Park Dr (South)	Proposed	Signalized	PM Peak	2026	11	B	10	B	-	-	-	-	20	B	-	-	-	-	-	-	-	-	11	B	18	B	-	-	B
Frontage @ NB Ramps (East)	Proposed	Signalized	AM Peak	2003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	N/A
Frontage @ NB Ramps (East)	Proposed	Signalized	PM Peak	2003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	N/A
Frontage @ NB Ramps (East)	Proposed	Signalized	AM Peak	2006	17	B	-	-	-	-	-	-	-	-	-	-	10	A	10	A	-	-	-	-	-	-	-	-	B
Frontage @ NB Ramps (East)	Proposed	Signalized	PM Peak	2006	13	B	-	-	-	-	-	-	-	-	-	-	13	B	13	B	-	-	-	-	-	-	-	-	B
Frontage @ NB Ramps (East)	Proposed	Signalized	AM Peak	2026	17	B	-	-	-	-	-	-	-	-	-	-	14	B	14	B	-	-	-	-	-	-	-	-	B
Frontage @ NB Ramps (East)	Proposed	Signalized	PM Peak	2026	12	B	-	-	-	-	-	-	-	-	-	-	19	B	19	B	-	-	-	-	-	-	-	-	B
Frontage @ Retail Dr (North)	Proposed	Signalized	AM Peak	2003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	N/A
Frontage @ Retail Dr (North)	Proposed	Signalized	PM Peak	2003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	N/A
Frontage @ Retail Dr (North)	Proposed	Signalized	AM Peak	2006	-	-	19	B	-	-	11	B	10	B	-	-	10	B	13	B	-	-	-	-	-	-	-	-	B
Frontage @ Retail Dr (North)	Proposed	Signalized	PM Peak	2006	-	-	19	B	-	-	12	B	10	B	-	-	10	B	11	B	-	-	-	-	-	-	-	-	B
Frontage @ Retail Dr (North)	Proposed	Signalized	AM Peak	2026	-	-	19	B	-	-	11	B	10	B	-	-	10	B	15	B	-	-	-	-	-	-	-	-	B
Frontage @ Retail Dr (North)	Proposed	Signalized	PM Peak	2026	-	-	19	B	-	-	13	B	10	B	-	-	10	B	12	B	-	-	-	-	-	-	-	-	B
Frontage @ SB Ramps (West)	Proposed	Signalized	AM Peak	2003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	N/A
Frontage @ SB Ramps (West)	Proposed	Signalized	PM Peak	2003	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	N/A
Frontage @ SB Ramps (West)	Proposed	Signalized	AM Peak	2006	-	-	-	-	-	-	11	B	-	-	-	-	-	-	-	-	-	-	14	B	14	B	-	-	B
Frontage @ SB Ramps (West)	Proposed	Signalized	PM Peak	2006	-	-	-	-	-	-	13	B	-	-	-	-	-	-	-	-	-	-	17	B	17	B	-	-	B
Frontage @ SB Ramps (West)	Proposed	Signalized	AM Peak	2026	-	-	-	-	-	-	14	B	-	-	-	-	-	-	-	-	-	-	14	B	14	B	-	-	B
Frontage @ SB Ramps (West)	Proposed	Signalized	PM Peak	2026	-	-	-	-	-	-	19	B	-	-	-	-	-	-	-	-	-	-	19	B	19	B	-	-	B

MAINLINE ANALYSES
EXISTING AND PROPOSED CONDITIONS

(OUTPUT FILES FROM HCS 2000, VERSION 4.1d)

MULTILANE HIGHWAYS WORKSHEET(Direction 1)



Application	Input	C
Operational (LOS)	FFS, N, v_p	L
Design (N)	FFS, LOS, v_p	N
Design (v_p)	FFS, LOS, N	v_p
Planning (LOS)	FFS, N, AADT	L
Planning (N)	FFS, LOS, AADT	N
Planning (v_p)	FFS, LOS, N	v_p

General Information

Analyst	JH
Agency or Company	
Date Performed	8/7/2003
Analysis Time Period	AM PEAK - NO BUILD

Site Information

Highway/Direction to Travel	US 25E, SR 32
From/To	COLLEGE PARK DR / SI
Jurisdiction	MORRISTOWN
Analysis Year	2006

Project Description

☒ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	709	Peak-Hour Factor, PHF	0.90
AADT(veh/h)		%Trucks and Buses, P_T	8
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Rolling
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	2.0
E_T	2.5	f_{HV}	0.893

Speed Inputs

Lane Width, LW (ft)	12.0
Total Lateral Clearence, LC (ft)	12.0
Access Points, A (A/mi)	0
Median Type, M	
FFS (measured)	50.0
Base Free-Flow Speed, BFFS	

Calc Speed Adj and FFS

f_{LW} (mi/h)	
f_{LC} (mi/h)	
f_A (mi/h)	
f_M (mi/h)	
FFS (mi/h)	50.0

Operations

Operational (LOS)

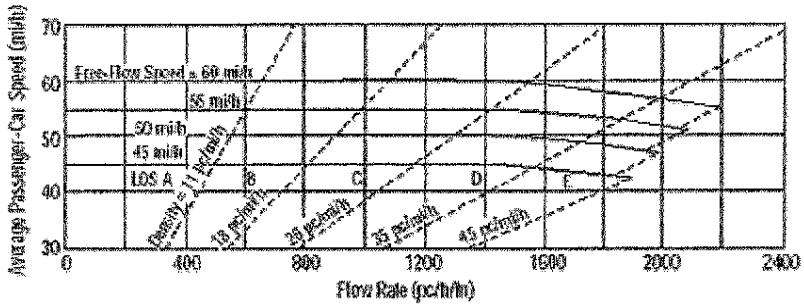
Flow Rate, v_p (pc/h/ln)	441
Speed, S (mi/h)	50.0
D (pc/mi/ln)	8.8
LOS	A

Design

Design (N)

Required Number of Lanes, N	
Flow Rate, v_p (pc/h)	
Max Service Flow Rate (pc/h/ln)	
Design LOS	

MULTILANE HIGHWAYS WORKSHEET(Direction 1)



Application	Input	O
Operational (LOS)	FFS, N, v_p	L
Design (N)	FFS, LOS, v_p	N
Design (v_p)	FFS, LOS, N	v_p
Planning (LOS)	FFS, N, AADT	L
Planning (N)	FFS, LOS, AADT	N
Planning (v_p)	FFS, LOS, N	v_p

General Information

Analyst	JH
Agency or Company	
Date Performed	8/7/2003
Analysis Time Period	PM PEAK - NO BUILD

Site Information

Highway/Direction to Travel	US 25E, SR 32
From/To	COLLEGE PARK DR / SI
Jurisdiction	MORRISTOWN
Analysis Year	2006

Project Description

☒ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	1194	Peak-Hour Factor, PHF	0.90
AADT(veh/h)		%Trucks and Buses, P_T	8
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Rolling
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	2.0
E_T	2.5	f_{HV}	0.893

Speed Inputs

Lane Width, LW (ft)	12.0
Total Lateral Clearence, LC (ft)	12.0
Access Points, A (A/mi)	0
Median Type, M	
FFS (measured)	50.0
Base Free-Flow Speed, BFFS	

Calc Speed Adj and FFS

f_{LW} (mi/h)	
f_{LC} (mi/h)	
f_A (mi/h)	
f_M (mi/h)	
FFS (mi/h)	50.0

Operations

Operational (LOS)

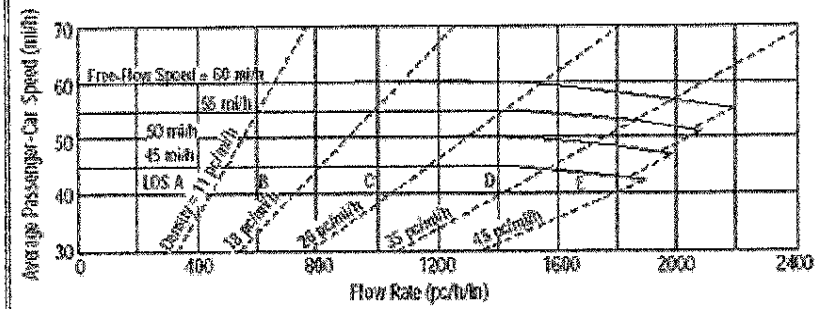
Flow Rate, v_p (pc/h/ln)	742
Speed, S (mi/h)	50.0
D (pc/mi/ln)	14.8
LOS	B

Design

Design (N)

Required Number of Lanes, N	
Flow Rate, v_p (pc/h)	
Max Service Flow Rate (pc/h/ln)	
Design LOS	

MULTILANE HIGHWAYS WORKSHEET(Direction 1)



Application	Input	C
Operational (LOS)	FFS, N, v_p	L
Design (N)	FFS, LOS, v_p	N
Design (v_p)	FFS, LOS, N	v_p
Planning (LOS)	FFS, N, AADT	L
Planning (N)	FFS, LOS, AADT	N
Planning (v_p)	FFS, LOS, N	v_p

General Information

Analyst	JH
Agency or Company	
Date Performed	8/7/2003
Analysis Time Period	AM PEAK - NO BUILD

Site Information

Highway/Direction to Travel	US 25E, SR 32
From/To	COLLEGE PARK DR / SI
Jurisdiction	MORRISTOWN
Analysis Year	2026

Project Description

☒ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	1308	Peak-Hour Factor, PHF	0.90
AADT(veh/h)		%Trucks and Buses, P_T	8
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Rolling
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	2.0
E_T	2.5	f_{HV}	0.893

Speed Inputs

Lane Width, LW (ft)	12.0
Total Lateral Clearence, LC (ft)	12.0
Access Points, A (A/mi)	0
Median Type, M	
FFS (measured)	50.0
Base Free-Flow Speed, BFFS	

Calc Speed Adj and FFS

f_{LW} (mi/h)	
f_{LC} (mi/h)	
f_A (mi/h)	
f_M (mi/h)	
FFS (mi/h)	50.0

Operations

Operational (LOS)

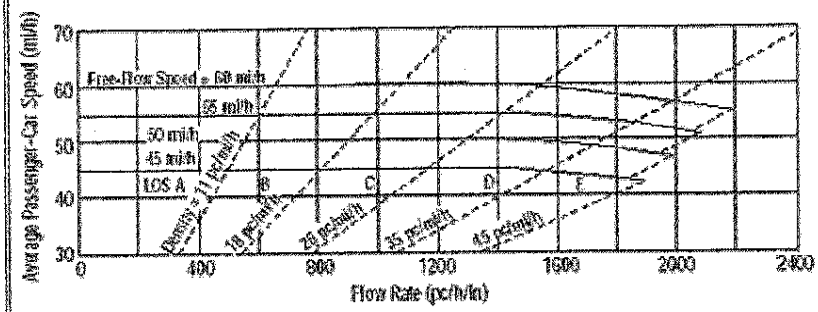
Flow Rate, v_p (pc/h/ln)	813
Speed, S (mi/h)	50.0
D (pc/mi/ln)	16.3
LOS	B

Design

Design (N)

Required Number of Lanes, N	
Flow Rate, v_p (pc/h)	
Max Service Flow Rate (pc/h/ln)	
Design LOS	

MULTILANE HIGHWAYS WORKSHEET(Direction 1)



Application	Input	C
Operational (LOS)	FFS, N, v_p	L
Design (N)	FFS, LOS, v_p	N
Design (v_p)	FFS, LOS, N	v_p
Planning (LOS)	FFS, N, AADT	L
Planning (N)	FFS, LOS, AADT	N
Planning (v_p)	FFS, LOS, N	v_p

General Information

Analyst	JH
Agency or Company	
Date Performed	8/7/2003
Analysis Time Period	PM PEAK - NO BUILD

Site Information

Highway/Direction to Travel	US 25E, SR 32
From/To	COLLEGE PARK DR / SI
Jurisdiction	MORRISTOWN
Analysis Year	2026

Project Description

☒ Oper.(LOS) ☐ Des. (N) ☐ Plan. (vp)

Flow Inputs

Volume, V (veh/h)	1877	Peak-Hour Factor, PHF	0.90
AADT(veh/h)		%Trucks and Buses, P_T	8
Peak-Hour Prop of AADT (veh/d)		%RVs, P_R	0
Peak-Hour Direction Prop, D		General Terrain:	Rolling
DDHV (veh/h)		Grade Length (mi)	0.00
Driver Type Adjustment	1.00	Up/Down %	0.00
		Number of Lanes	2

Calculate Flow Adjustments

f_p	1.00	E_R	2.0
E_T	2.5	f_{HV}	0.893

Speed Inputs

Lane Width, LW (ft)	12.0
Total Lateral Clearence, LC (ft)	12.0
Access Points, A (A/mi)	0
Median Type, M	
FFS (measured)	50.0
Base Free-Flow Speed, BFFS	

Calc Speed Adj and FFS

f_{LW} (mi/h)	
f_{LC} (mi/h)	
f_A (mi/h)	
f_M (mi/h)	
FFS (mi/h)	50.0

Operations

Operational (LOS)

Flow Rate, v_p (pc/h/ln)	1167
Speed, S (mi/h)	50.0
D (pc/mi/ln)	23.3
LOS	C

Design

Design (N)

Required Number of Lanes, N	
Flow Rate, v_p (pc/h)	
Max Service Flow Rate (pc/h/ln)	
Design LOS	

UNSIGNALIZED INTERSECTION ANALYSES
EXISTING CONDITIONS

(OUTPUT FILES FROM HCS 2000, VERSION 4.1d)

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	JH	Intersection	S. Campus & US 25E
Agency/Co.		Jurisdiction	MORRISTOWN
Date Performed	07/31/2003	Analysis Year	2006
Analysis Time Period	AM PEAK - NO BUILD		

Project Description	
East/West Street: S. CAMPUS DRIVE	North/South Street: US 25E
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	183	836	0	0	727	118
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	203	928	0	0	807	131
Percent Heavy Vehicles	8	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	0	2	1
Configuration	L	T			T	R
Upstream Signal		0			0	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	0	0	19
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	0	0	0	0	0	21
Percent Heavy Vehicles	0	0	0	2	0	8
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L							R
v (vph)	203							21
C (m) (vph)	690							580
v/c	0.29							0.04
95% queue length	1.23							0.11
Control Delay	12.4							11.4
LOS	B							B
Approach Delay	--	--				11.4		
Approach LOS	--	--				B		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	JH	Intersection	S. Campus & US 25E
Agency/Co.		Jurisdiction	MORRISTOWN
Date Performed	07/31/2003	Analysis Year	2006
Analysis Time Period	PM PEAK - NO BUILD		
Project Description			
East/West Street:	S. CAMPUS DRIVE	North/South Street:	US 25E
Intersection Orientation:	North-South	Study Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	57	1096	0	0	1121	31
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	63	1217	0	0	1245	34
Percent Heavy Vehicles	8	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	0	2	1
Configuration	L	T			T	R
Upstream Signal		0			0	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	0	0	98
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	0	0	0	0	0	108
Percent Heavy Vehicles	0	0	0	2	0	8
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L							R
v (vph)	63							108
C (m) (vph)	507							415
v/c	0.12							0.26
95% queue length	0.42							1.03
Control Delay	13.1							16.7
LOS	B							C
Approach Delay	--	--				16.7		
Approach LOS	--	--				C		

Version 4.1d

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	JH	Intersection	S. Campus & US 25E
Agency/Co.		Jurisdiction	MORRISTOWN
Date Performed	07/31/2003	Analysis Year	2026
Analysis Time Period	AM PEAK - NO BUILD		
Project Description			
East/West Street:	S. CAMPUS DRIVE	North/South Street:	US 25E
Intersection Orientation:	North-South	Study Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	271	1475	0	0	1301	175
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	301	1638	0	0	1445	194
Percent Heavy Vehicles	8	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	0	2	1
Configuration	L	T			T	R
Upstream Signal		0			0	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	0	0	28
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	0	0	0	0	0	31
Percent Heavy Vehicles	0	0	0	2	0	8
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L							R
v (vph)	301							31
C (m) (vph)	365							356
v/c	0.82							0.09
95% queue length	7.35							0.28
Control Delay	47.6							16.1
LOS	E							C
Approach Delay	--	--				16.1		
Approach LOS	--	--				C		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	JH	Intersection	S. Campus & US 25E
Agency/Co.		Jurisdiction	MORRISTOWN
Date Performed	07/31/2003	Analysis Year	2026
Analysis Time Period	PM PEAK - NO BUILD		
Project Description			
East/West Street:	S. CAMPUS DRIVE	North/South Street:	US 25E
Intersection Orientation:	North-South	Study Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	90	1987	0	0	1862	49
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	100	2207	0	0	2068	54
Percent Heavy Vehicles	8	--	--	0	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	0	0	2	1
Configuration	L	T			T	R
Upstream Signal		0			0	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	0	0	0	155
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	0	0	0	0	0	172
Percent Heavy Vehicles	0	0	0	2	0	8
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	0	0	0	1
Configuration						R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L							R
v (vph)	100							172
C (m) (vph)	233							219
v/c	0.43							0.79
95% queue length	2.01							5.61
Control Delay	31.6							63.4
LOS	D							F
Approach Delay	--	--				63.4		
Approach LOS	--	--				F		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	JH	Intersection	Drive & US 25E
Agency/Co.		Jurisdiction	MORRISTOWN
Date Performed	07/31/2003	Analysis Year	2006
Analysis Time Period	AM PEAK - NO BUILD		
Project Description			
East/West Street:	NORTHERN DRIVE	North/South Street:	US 25E
Intersection Orientation:	North-South	Study Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	56	650	3	98	871	70
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	62	722	3	108	967	77
Percent Heavy Vehicles	8	--	--	8	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	1	1	2	1
Configuration	L	T	R	L	T	R
Upstream Signal		0			0	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	86	0	0	38
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	0	0	95	0	0	42
Percent Heavy Vehicles	0	0	8	2	0	8
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	1	0	0	1
Configuration			R			R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L			R			R
v (vph)	62	108			95			42
C (m) (vph)	627	835			619			513
v/c	0.10	0.13			0.15			0.08
95% queue length	0.33	0.44			0.54			0.27
Control Delay	11.4	10.0			11.9			12.6
LOS	B	A			B			B
Approach Delay	--	--	11.9			12.6		
Approach LOS	--	--	B			B		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	JH	Intersection	Drive & US 25E
Agency/Co.		Jurisdiction	MORRISTOWN
Date Performed	07/31/2003	Analysis Year	2006
Analysis Time Period	PM PEAK - NO BUILD		

Project Description	
East/West Street: NORTHERN DRIVE	North/South Street: US 25E
Intersection Orientation: North-South	Study Period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	130	1049	15	322	1036	35
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	144	1165	16	357	1151	38
Percent Heavy Vehicles	8	--	--	8	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	1	1	2	1
Configuration	L	T	R	L	T	R
Upstream Signal		0			0	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	334	0	0	197
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	0	0	371	0	0	218
Percent Heavy Vehicles	0	0	8	2	0	8
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	1	0	0	1
Configuration			R			R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L			R			R
v (vph)	144	357			371			218
C (m) (vph)	550	554			442			446
v/c	0.26	0.64			0.84			0.49
95% queue length	1.04	4.58			8.16			2.63
Control Delay	13.9	22.5			43.2			20.5
LOS	B	C			E			C
Approach Delay	--	--	43.2			20.5		
Approach LOS	--	--	E			C		

Version 4.1d

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	JH	Intersection	Drive & US 25E
Agency/Co.		Jurisdiction	MORRISTOWN
Date Performed	07/31/2003	Analysis Year	2026
Analysis Time Period	AM PEAK - NO BUILD		
Project Description			
East/West Street:	NORTHERN DRIVE	North/South Street:	US 25E
Intersection Orientation:	North-South	Study Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	62	1242	4	119	1537	85
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	68	1380	4	132	1707	94
Percent Heavy Vehicles	8	--	--	8	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	1	1	2	1
Configuration	L	T	R	L	T	R
Upstream Signal		0			0	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	108	0	0	45
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	0	0	120	0	0	50
Percent Heavy Vehicles	0	0	8	2	0	8
Percent Grade (%)		0			0	
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	1	0	0	1
Configuration			R			R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L			R			R
v (vph)	68	132			120			50
C (m) (vph)	314	461			374			290
v/c	0.22	0.29			0.32			0.17
95% queue length	0.81	1.17			1.36			0.61
Control Delay	19.6	15.9			19.1			20.0
LOS	C	C			C			C
Approach Delay	--	--	19.1			20.0		
Approach LOS	--	--	C			C		

TWO-WAY STOP CONTROL SUMMARY

General Information		Site Information	
Analyst	JH	Intersection	Drive & US 25E
Agency/Co.		Jurisdiction	MORRISTOWN
Date Performed	07/31/2003	Analysis Year	2026
Analysis Time Period	PM PEAK - NO BUILD		
Project Description			
East/West Street:	NORTHERN DRIVE	North/South Street:	US 25E
Intersection Orientation:	North-South	Study Period (hrs):	0.25

Vehicle Volumes and Adjustments

Major Street	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	153	1758	19	393	1615	41
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	170	1953	21	436	1794	45
Percent Heavy Vehicles	8	--	--	8	--	--
Median Type	Undivided					
RT Channelized			0			0
Lanes	1	2	1	1	2	1
Configuration	L	T	R	L	T	R
Upstream Signal		0			0	

Minor Street	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	0	407	0	0	242
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	0	0	452	0	0	268
Percent Heavy Vehicles	0	0	8	2	0	8
Percent Grade (%)	0			0		
Flared Approach		N			N	
Storage		0			0	
RT Channelized			0			0
Lanes	0	0	1	0	0	1
Configuration			R			R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Configuration	L	L			R			R
v (vph)	170	436			452			268
C (m) (vph)	303	268			240			271
v/c	0.56	1.63			1.88			0.99
95% queue length	3.21	27.05			31.83			9.84
Control Delay	31.1	331.9			447.3			92.7
LOS	D	F			F			F
Approach Delay	--	--	447.3			92.7		
Approach LOS	--	--	F			F		

SIGNALIZED INTERSECTION ANALYSES
EXISTING CONDITIONS

(OUTPUT FILES FROM HCS 2000, VERSION 4.1d)

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	JH	Intersection	College Park Drive & US 25E
Agency or Co.		Area Type	All other areas
Date Performed	07/31/2003	Jurisdiction	MORRISTOWN
Time Period	AM PEAK - NO BUILD	Analysis Year	2006
		Project ID	

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_l	2	1	0	2	1	1	1	2	1	1	2	1
Lane group	L	TR		L	T	R	L	T	R	L	T	R
Volume, V (vph)	13	5	8	53	31	6	62	690	84	15	784	110
% Heavy vehicles, %HV	2	2	2	2	2	2	2	2	2	2	2	2
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed (P) or actuated (A)	A	A	A	A	A		A	A	A	A	A	
Start-up lost time, l_1	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of effective green, e	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival type, AT	3	3		3	3	3	3	3	3	3	3	3
Unit extension, UE	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Filtering/metering, I	1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Initial unmet demand, Q_b	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ped / Bike / RTOR volumes	0	0	0	0		0	0	0	0	0		0
Lane width	12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N_m												
Buses stopping, N_B	0	0		0	0	0	0	0	0	0	0	0
Min. time for pedestrians, G_p												

Phasing	WB Only	EW Perm	03	04	Excl. Left	NS Perm	07	08
Timing	G = 4.3	G = 11.7	G =	G =	G = 2.2	G = 23.4	G =	G =
	Y = 4	Y = 4	Y =	Y =	Y = 4	Y = 4	Y =	Y =
Duration of Analysis, T = 0.25						Cycle Length, C = 57.6		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	14	14		58	34	7	67	750	91	16	852	120
Lane group capacity, c	434	342		677	647	643	240	1438	643	279	1438	322
	0.03	0.04		0.09	0.05	0.01	0.28	0.52	0.14	0.06	0.59	0.37

v/c ratio, X												
Total green ratio, g/C	0.20	0.20		0.35	0.35	0.41	0.51	0.41	0.41	0.51	0.41	0.20
Uniform delay, d_1	18.4	18.4		12.6	12.5	10.2	8.3	12.9	10.8	7.7	13.4	19.8
Progression factor, PF	1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Delay calibration, k	0.11	0.11		0.11	0.11	0.11	0.11	0.13	0.11	0.11	0.18	0.11
Incremental delay, d_2	0.0	0.0		0.1	0.0	0.0	0.6	0.3	0.1	0.1	0.7	0.7
Initial queue delay, d_3												
Control delay	18.4	18.5		12.7	12.5	10.2	9.0	13.2	10.9	7.8	14.0	20.5
Lane group LOS	B	B		B	B	B	A	B	B	A	B	C
Approach delay	18.5			12.5			12.7			14.7		
Approach LOS	B			B			B			B		
Intersection delay	13.7			X_c = 0.51			Intersection LOS			B		

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	JH	Intersection	College Park Drive & US 25E
Agency or Co.		Area Type	All other areas
Date Performed	07/31/2003	Jurisdiction	MORRISTOWN
Time Period	PM PEAK - NO BUILD	Analysis Year	2006
		Project ID	

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_1	2	1	0	2	1	1	1	2	1	1	2	1
Lane group	L	TR		L	T	R	L	T	R	L	T	R
Volume, V (vph)	48	15	6	178	13	74	14	1072	165	100	1096	37
% Heavy vehicles, %HV	2	2	2	2	2	2	2	2	2	2	2	2
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed (P) or actuated (A)	A	A	A	A	A		A	A	A	A	A	
Start-up lost time, l_1	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of effective green, e	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival type, AT	3	3		3	3	3	3	3	3	3	3	3
Unit extension, UE	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Filtering/metering, I	1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Initial unmet demand, Q_b	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ped / Bike / RTOR volumes	0	0	0	0		0	0	0	0	0		0
Lane width	12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N_m												
Buses stopping, N_B	0	0		0	0	0	0	0	0	0	0	0
Min. time for pedestrians, G_p												

Phasing	Excl. Left	WB Only	EW Perm	04	Excl. Left	NS Perm	07	08
Timing	G = 2.1	G = 2.7	G = 9.6	G =	G = 3.3	G = 34.5	G =	G =
	Y = 4	Y = 4	Y = 4	Y =	Y = 4	Y = 4	Y =	Y =
Duration of Analysis, T = 0.25						Cycle Length, C = 72.2		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	52	23		193	14	80	15	1165	179	109	1191	40
Lane group capacity, c	397	236		738	421	756	193	1691	756	200	1691	210
	0.13	0.10		0.26	0.03	0.11	0.08	0.69	0.24	0.55	0.70	0.19

v/c ratio, X												
Total green ratio, g/C	0.16	0.13		0.31	0.23	0.48	0.58	0.48	0.48	0.58	0.48	0.13
Uniform delay, d_1	25.7	27.5		18.3	21.8	10.4	9.4	14.7	11.1	10.3	14.8	27.8
Progression factor, PF	1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Delay calibration, k	0.11	0.11		0.11	0.11	0.11	0.11	0.26	0.11	0.15	0.27	0.11
Incremental delay, d_2	0.2	0.2		0.2	0.0	0.1	0.2	1.2	0.2	3.1	1.4	0.4
Initial queue delay, d_3												
Control delay	25.9	27.7		18.5	21.8	10.4	9.5	15.9	11.3	13.4	16.2	28.3
Lane group LOS	C	C		B	C	B	A	B	B	B	B	C
Approach delay	26.4			16.4			15.2			16.3		
Approach LOS	C			B			B			B		
Intersection delay	16.1			X_c = 0.60			Intersection LOS			B		

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	JH	Intersection	College Park Drive & US 25E
Agency or Co.		Area Type	All other areas
Date Performed	07/31/2003	Jurisdiction	MORRISTOWN
Time Period	AM PEAK - NO BUILD	Analysis Year	2026
		Project ID	

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_1	2	1	0	2	1	1	1	2	1	1	2	1
Lane group	L	TR		L	T	R	L	T	R	L	T	R
Volume, V (vph)	19	7	13	64	46	8	91	1281	103	19	1399	164
% Heavy vehicles, %HV	2	2	2	2	2	2	2	2	2	2	2	2
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed (P) or actuated (A)	A	A	A	A	A		A	A	A	A	A	
Start-up lost time, l_1	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of effective green, e	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival type, AT	3	3		3	3	3	3	3	3	3	3	3
Unit extension, UE	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Filtering/metering, I	1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Initial unmet demand, Q_b	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ped / Bike / RTOR volumes	0	0	0	0		0	0	0	0	0		0
Lane width	12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N_m												
Buses stopping, N_B	0	0		0	0	0	0	0	0	0	0	0
Min. time for pedestrians, G_p												

Phasing	Excl. Left	WB Only	EW Perm	04	Excl. Left	NS Perm	07	08
Timing	G = 1.4	G = 1.6	G = 14.0	G =	G = 4.0	G = 45.2	G =	G =
	Y = 4	Y = 4	Y = 4	Y =	Y = 4	Y = 4	Y =	Y =
Duration of Analysis, T = 0.25						Cycle Length, C = 86.2		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	21	22		70	50	9	99	1392	112	21	1521	178
Lane group capacity, c	391	274		610	424	830	168	1856	830	170	1856	257
	0.05	0.08		0.11	0.12	0.01	0.59	0.75	0.13	0.12	0.82	0.69

v/c ratio, X												
Total green ratio, g/C	0.18	0.16		0.29	0.23	0.52	0.62	0.52	0.52	0.62	0.52	0.16
Uniform delay, d_1	29.3	30.6		22.3	26.4	9.8	14.7	16.1	10.5	11.3	17.1	34.1
Progression factor, PF	1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Delay calibration, k	0.11	0.11		0.11	0.11	0.11	0.18	0.31	0.11	0.11	0.36	0.26
Incremental delay, d_2	0.1	0.1		0.1	0.1	0.0	5.4	1.7	0.1	0.3	3.0	7.8
Initial queue delay, d_3												
Control delay	29.3	30.8		22.4	26.6	9.8	20.1	17.8	10.6	11.6	20.1	41.8
Lane group LOS	C	C		C	C	A	C	B	B	B	C	D
Approach delay	30.1			23.1			17.5			22.3		
Approach LOS	C			C			B			C		
Intersection delay	20.2			X_c = 0.75			Intersection LOS			C		

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	JH	Intersection	College Park Drive & US 25E
Agency or Co.		Area Type	All other areas
Date Performed	07/31/2003	Jurisdiction	MORRISTOWN
Time Period	PM PEAK - NO BUILD	Analysis Year	2026
		Project ID	

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_1	2	1	0	2	1	1	1	2	1	1	2	1
Lane group	L	TR		L	T	R	L	T	R	L	T	R
Volume, V (vph)	71	22	9	217	20	93	20	1713	201	117	1672	55
% Heavy vehicles, %HV	2	2	2	2	2	2	2	2	2	2	2	2
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Pretimed (P) or actuated (A)	A	A	A	A	A		A	A	A	A	A	
Start-up lost time, l_1	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Extension of effective green, e	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Arrival type, AT	3	3		3	3	3	3	3	3	3	3	3
Unit extension, UE	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Filtering/metering, I	1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Initial unmet demand, Q_b	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ped / Bike / RTOR volumes	0	0	0	0		0	0	0	0	0		0
Lane width	12.0	12.0		12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N	0	N
Parking maneuvers, N_m												
Buses stopping, N_B	0	0		0	0	0	0	0	0	0	0	0
Min. time for pedestrians, G_p												

Phasing	Excl. Left	WB Only	EW Perm	04	Excl. Left	NS Perm	07	08
Timing	G = 3.1	G = 3.1	G = 8.9	G =	G = 4.4	G = 50.4	G =	G =
	Y = 4	Y = 4	Y = 4	Y =	Y = 4	Y = 4	Y =	Y =
Duration of Analysis, T = 0.25						Cycle Length, C = 89.9		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	77	34		236	22	101	22	1862	218	127	1817	60
Lane group capacity, c	345	176		647	332	887	170	1984	887	170	1984	157
	0.22	0.19		0.36	0.07	0.11	0.13	0.94	0.25	0.75	0.92	0.38

v/c ratio, X												
Total green ratio, g/C	0.13	0.10		0.26	0.18	0.56	0.65	0.56	0.56	0.65	0.56	0.10
Uniform delay, d_1	34.5	37.2		26.7	30.7	9.3	16.9	18.3	10.1	19.9	17.8	37.9
Progression factor, PF	1.000	1.000		1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Delay calibration, k	0.11	0.11		0.11	0.11	0.11	0.11	0.45	0.11	0.30	0.43	0.11
Incremental delay, d_2	0.3	0.5		0.4	0.1	0.1	0.3	9.4	0.1	16.5	7.2	1.6
Initial queue delay, d_3												
Control delay	34.9	37.7		27.1	30.8	9.3	17.3	27.7	10.2	36.5	25.0	39.5
Lane group LOS	C	D		C	C	A	B	C	B	D	C	D
Approach delay	35.7			22.3			25.7			26.2		
Approach LOS	D			C			C			C		
Intersection delay	25.9			X_c = 0.83			Intersection LOS			C		

SIGNALIZED INTERSECTION ANALYSES
PROPOSED CONDITIONS

(OUTPUT FILES FROM HCS 2000, VERSION 4.1d)

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	JH	Intersection	NORTH INTERSECTION
Agency or Co.		Area Type	All other areas
Date Performed	1/14/2004	Jurisdiction	MORRISTOWN
Time Period	AM PEAK	Analysis Year	2006
		Project ID	

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_1	0	1	0	1	1	0	1	2	0	0	0	0
Lane group		T		L	T		L	T				
Volume, V (vph)		5		53	5		5	599				
% Heavy vehicles, %HV		2		0	2		0	0				
Peak-hour factor, PHF		0.90		0.90	0.90		0.90	0.90				
Pretimed (P) or actuated (A)		A		A	A		A	A				
Start-up lost time, l_1		2.0		2.0	2.0		2.0	2.0				
Extension of effective green, e		2.0		2.0	2.0		2.0	2.0				
Arrival type, AT		3		3	3		3	3				
Unit extension, UE		3.0		3.0	3.0		3.0	3.0				
Filtering/metering, I		1.000		1.000	1.000		1.000	1.000				
Initial unmet demand, Q_b		0.0		0.0	0.0		0.0	0.0				
Ped / Bike / RTOR volumes	0									0		
Lane width		12.0		12.0	12.0		12.0	12.0				
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N		N
Parking maneuvers, N_m												
Buses stopping, N_B		0		0	0		0	0				
Min. time for pedestrians, G_p	3.2									3.2		

Phasing	WB Only	EW Perm	03	04	NB Only	06	07	08
Timing	G = 8.0	G = 12.0	G =	G =	G = 25.0	G =	G =	G =
	Y = 5	Y = 5	Y =	Y =	Y = 5	Y =	Y =	Y =
Duration of Analysis, T = 0.25					Cycle Length, C = 60.0			

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v		6		59	6		6	666				
Lane group capacity, c		373		527	776		752	1504				
v/c ratio, X		0.02		0.11	0.01		0.01	0.44				
Total green ratio, g/C		0.20		0.42	0.42		0.42	0.42				
Uniform delay, d_1		19.3		10.8	10.2		10.2	12.5				

Progression factor, PF		1.000		1.000	1.000		1.000	1.000				
Delay calibration, k		0.11		0.11	0.11		0.11	0.11				
Incremental delay, d_2		0.0		0.1	0.0		0.0	0.2				
Initial queue delay, d_3												
Control delay		19.3		10.9	10.2		10.2	12.7				
Lane group LOS		B		B	B		B	B				
Approach delay	19.3			10.8			12.7					
Approach LOS	B			B			B					
Intersection delay	12.6			X_c = 0.29			Intersection LOS			B		

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	JH	Intersection	NORTH INTERSECTION
Agency or Co.		Area Type	All other areas
Date Performed	1/14/2004	Jurisdiction	MORRISTOWN
Time Period	PM PEAK	Analysis Year	2006
		Project ID	

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_1	0	1	0	1	1	0	1	2	0	0	0	0
Lane group		T		L	T		L	T				
Volume, V (vph)		5		178	5		5	309				
% Heavy vehicles, %HV		2		0	2		0	0				
Peak-hour factor, PHF		0.90		0.90	0.90		0.90	0.90				
Pretimed (P) or actuated (A)		A		A	A		A	A				
Start-up lost time, l_1		2.0		2.0	2.0		2.0	2.0				
Extension of effective green, e		2.0		2.0	2.0		2.0	2.0				
Arrival type, AT		3		3	3		3	3				
Unit extension, UE		3.0		3.0	3.0		3.0	3.0				
Filtering/metering, I		1.000		1.000	1.000		1.000	1.000				
Initial unmet demand, Q_b		0.0		0.0	0.0		0.0	0.0				
Ped / Bike / RTOR volumes	0									0		
Lane width		12.0		12.0	12.0		12.0	12.0				
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N		N
Parking maneuvers, N_m												
Buses stopping, N_B		0		0	0		0	0				
Min. time for pedestrians, G_p	3.2									3.2		

Phasing	WB Only	EW Perm	03	04	NB Only	06	07	08
Timing	G = 8.0	G = 12.0	G =	G =	G = 25.0	G =	G =	G =
	Y = 5	Y = 5	Y =	Y =	Y = 5	Y =	Y =	Y =

Duration of Analysis, T = 0.25 | Cycle Length, C = 60.0

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v		6		198	6		6	343				
Lane group capacity, c		373		527	776		752	1504				
v/c ratio, X		0.02		0.38	0.01		0.01	0.23				
Total green ratio, g/C		0.20		0.42	0.42		0.42	0.42				
Uniform delay, d_1		19.3		11.7	10.2		10.2	11.3				

Progression factor, PF		1.000		1.000	1.000		1.000	1.000				
Delay calibration, k		0.11		0.11	0.11		0.11	0.11				
Incremental delay, d_2		0.0		0.5	0.0		0.0	0.1				
Initial queue delay, d_3												
Control delay		19.3		12.2	10.2		10.2	11.4				
Lane group LOS		B		B	B		B	B				
Approach delay	19.3			12.1			11.3					
Approach LOS	B			B			B					
Intersection delay	11.7			X_c = 0.28			Intersection LOS			B		

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	JH	Intersection	NORTH INTERSECTION
Agency or Co.		Area Type	All other areas
Date Performed	1/14/2004	Jurisdiction	MORRISTOWN
Time Period	AM PEAK	Analysis Year	2026
		Project ID	

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_1	0	1	0	1	1	0	1	2	0	0	0	0
Lane group		T		L	T		L	T				
Volume, V (vph)		5		64	5		5	848				
% Heavy vehicles, %HV		2		0	2		0	0				
Peak-hour factor, PHF		0.90		0.90	0.90		0.90	0.90				
Pretimed (P) or actuated (A)		A		A	A		A	A				
Start-up lost time, l_1		2.0		2.0	2.0		2.0	2.0				
Extension of effective green, e		2.0		2.0	2.0		2.0	2.0				
Arrival type, AT		3		3	3		3	3				
Unit extension, UE		3.0		3.0	3.0		3.0	3.0				
Filtering/metering, I		1.000		1.000	1.000		1.000	1.000				
Initial unmet demand, Q_b		0.0		0.0	0.0		0.0	0.0				
Ped / Bike / RTOR volumes	0									0		
Lane width		12.0		12.0	12.0		12.0	12.0				
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N		N
Parking maneuvers, N_m												
Buses stopping, N_B		0		0	0		0	0				
Min. time for pedestrians, G_p	3.2									3.2		

Phasing	WB Only	EW Perm	03	04	NB Only	06	07	08
Timing	G = 8.0	G = 12.0	G =	G =	G = 25.0	G =	G =	G =
	Y = 5	Y = 5	Y =	Y =	Y = 5	Y =	Y =	Y =

Duration of Analysis, T = 0.25 | Cycle Length, C = 60.0

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v		6		71	6		6	942				
Lane group capacity, c		373		527	776		752	1504				
v/c ratio, X		0.02		0.13	0.01		0.01	0.63				
Total green ratio, g/C		0.20		0.42	0.42		0.42	0.42				
Uniform delay, d_1		19.3		10.8	10.2		10.2	13.8				

Progression factor, PF		1.000		1.000	1.000		1.000	1.000				
Delay calibration, k		0.11		0.11	0.11		0.11	0.21				
Incremental delay, d_2		0.0		0.1	0.0		0.0	0.8				
Initial queue delay, d_3												
Control delay		19.3		11.0	10.2		10.2	14.6				
Lane group LOS		B		B	B		B	B				
Approach delay	19.3			10.9			14.6					
Approach LOS	B			B			B					
Intersection delay	14.4			X_c = 0.40			Intersection LOS			B		

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	JH	Intersection	NORTH INTERSECTION
Agency or Co.		Area Type	All other areas
Date Performed	1/14/2004	Jurisdiction	MORRISTOWN
Time Period	PM PEAK	Analysis Year	2026
		Project ID	

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_1	0	1	0	1	1	0	1	2	0	0	0	0
Lane group		T		L	T		L	T				
Volume, V (vph)		5		217	5		5	408				
% Heavy vehicles, %HV		2		0	2		0	0				
Peak-hour factor, PHF		0.90		0.90	0.90		0.90	0.90				
Pretimed (P) or actuated (A)		A		A	A		A	A				
Start-up lost time, l_1		2.0		2.0	2.0		2.0	2.0				
Extension of effective green, e		2.0		2.0	2.0		2.0	2.0				
Arrival type, AT		3		3	3		3	3				
Unit extension, UE		3.0		3.0	3.0		3.0	3.0				
Filtering/metering, I		1.000		1.000	1.000		1.000	1.000				
Initial unmet demand, Q_b		0.0		0.0	0.0		0.0	0.0				
Ped / Bike / RTOR volumes	0									0		
Lane width		12.0		12.0	12.0		12.0	12.0				
Parking / Grade / Parking	N	0	N	N	0	N	N	0	N	N		N
Parking maneuvers, N_m												
Buses stopping, N_B		0		0	0		0	0				
Min. time for pedestrians, G_p	3.2									3.2		

Phasing	WB Only	EW Perm	03	04	NB Only	06	07	08
Timing	G = 8.0	G = 12.0	G =	G =	G = 25.0	G =	G =	G =
	Y = 5	Y = 5	Y =	Y =	Y = 5	Y =	Y =	Y =
Duration of Analysis, T = 0.25						Cycle Length, C = 60.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v		6		241	6		6	453				
Lane group capacity, c		373		527	776		752	1504				
v/c ratio, X		0.02		0.46	0.01		0.01	0.30				
Total green ratio, g/C		0.20		0.42	0.42		0.42	0.42				
Uniform delay, d_1		19.3		12.0	10.2		10.2	11.7				

Progression factor, PF		1.000		1.000	1.000		1.000	1.000				
Delay calibration, k		0.11		0.11	0.11		0.11	0.11				
Incremental delay, d_2		0.0		0.6	0.0		0.0	0.1				
Initial queue delay, d_3												
Control delay		19.3		12.7	10.2		10.2	11.8				
Lane group LOS		B		B	B		B	B				
Approach delay	19.3			12.6			11.8					
Approach LOS	B			B			B					
Intersection delay	12.1			X_c = 0.35			Intersection LOS			B		

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	JH	Intersection	SOUTH INTERSECTION
Agency or Co.		Area Type	All other areas
Date Performed	1/14/2004	Jurisdiction	MORRISTOWN
Time Period	AM PEAK	Analysis Year	2006
		Project ID	

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_1	1	1	0	0	1	0	0	0	0	2	1	0
Lane group	L	T			T					L	T	
Volume, V (vph)	5	5			31					311	101	
% Heavy vehicles, %HV	2	2			2					2	2	
Peak-hour factor, PHF	0.90	0.90			0.90					0.90	0.90	
Pretimed (P) or actuated (A)	A	A			A					A	A	
Start-up lost time, l_1	2.0	2.0			2.0					2.0	2.0	
Extension of effective green, e	2.0	2.0			2.0					2.0	2.0	
Arrival type, AT	3	3			3					3	3	
Unit extension, UE	3.0	3.0			3.0					3.0	3.0	
Filtering/metering, I	1.000	1.000			1.000					1.000	1.000	
Initial unmet demand, Q_b	0.0	0.0			0.0					0.0	0.0	
Ped / Bike / RTOR volumes				0			0					
Lane width	12.0	12.0			12.0					12.0	12.0	
Parking / Grade / Parking	N	0	N	N	0	N	N		N	N	0	N
Parking maneuvers, N_m												
Buses stopping, N_B	0	0			0					0	0	
Min. time for pedestrians, G_p				3.2			3.2					

Phasing	EB Only	EW Perm	03	04	SB Only	06	07	08
Timing	G = 8.0	G = 12.0	G =	G =	G = 25.0	G =	G =	G =
	Y = 5	Y = 5	Y =	Y =	Y = 5	Y =	Y =	Y =
Duration of Analysis, T = 0.25						Cycle Length, C = 60.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	6	6			34					346	112	
Lane group capacity, c	510	776			373					1430	776	
v/c ratio, X	0.01	0.01			0.09					0.24	0.14	
Total green ratio, g/C	0.42	0.42			0.20					0.42	0.42	
Uniform delay, d_1	10.5	10.2			19.6					11.4	10.9	

Progression factor, PF	1.000	1.000			1.000					1.000	1.000		
Delay calibration, k	0.11	0.11			0.11					0.11	0.11		
Incremental delay, d_2	0.0	0.0			0.1					0.1	0.1		
Initial queue delay, d_3													
Control delay	10.5	10.2			19.7					11.4	10.9		
Lane group LOS	B	B			B					B	B		
Approach delay	10.4				19.7					11.3			
Approach LOS	B				B					B			
Intersection delay	11.9				X_c = 0.16			Intersection LOS		B			

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	JH	Intersection	SOUTH INTERSECTION
Agency or Co.		Area Type	All other areas
Date Performed	1/14/2004	Jurisdiction	MORRISTOWN
Time Period	PM PEAK	Analysis Year	2006
		Project ID	

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_1	1	1	0	0	1	0	0	0	0	2	1	0
Lane group	L	T			T					L	T	
Volume, V (vph)	5	15			13					253	422	
% Heavy vehicles, %HV	2	2			2					2	2	
Peak-hour factor, PHF	0.90	0.90			0.90					0.90	0.90	
Pretimed (P) or actuated (A)	A	A			A					A	A	
Start-up lost time, l_1	2.0	2.0			2.0					2.0	2.0	
Extension of effective green, e	2.0	2.0			2.0					2.0	2.0	
Arrival type, AT	3	3			3					3	3	
Unit extension, UE	3.0	3.0			3.0					3.0	3.0	
Filtering/metering, I	1.000	1.000			1.000					1.000	1.000	
Initial unmet demand, Q_b	0.0	0.0			0.0					0.0	0.0	
Ped / Bike / RTOR volumes				0			0					
Lane width	12.0	12.0			12.0					12.0	12.0	
Parking / Grade / Parking	N	0	N	N	0	N	N		N	N	0	N
Parking maneuvers, N_m												
Buses stopping, N_B	0	0			0					0	0	
Min. time for pedestrians, G_p				3.2			3.2					

Phasing	EB Only	EW Perm	03	04	SB Only	06	07	08
Timing	G = 8.0	G = 12.0	G =	G =	G = 25.0	G =	G =	G =
	Y = 5	Y = 5	Y =	Y =	Y = 5	Y =	Y =	Y =
Duration of Analysis, T = 0.25						Cycle Length, C = 60.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	6	17			14					281	469	
Lane group capacity, c	515	776			373					1430	776	
v/c ratio, X	0.01	0.02			0.04					0.20	0.60	
Total green ratio, g/C	0.42	0.42			0.20					0.42	0.42	
Uniform delay, d_1	10.5	10.3			19.3					11.1	13.6	

Progression factor, PF	1.000	1.000			1.000					1.000	1.000	
Delay calibration, k	0.11	0.11			0.11					0.11	0.19	
Incremental delay, d_2	0.0	0.0			0.0					0.1	1.3	
Initial queue delay, d_3												
Control delay	10.5	10.3			19.4					11.2	15.0	
Lane group LOS	B	B			B					B	B	
Approach delay	10.4			19.4						13.6		
Approach LOS	B			B						B		
Intersection delay	13.6			X_c = 0.35			Intersection LOS			B		

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	JH	Intersection	SOUTH INTERSECTION
Agency or Co.		Area Type	All other areas
Date Performed	1/14/2004	Jurisdiction	MORRISTOWN
Time Period	AM PEAK	Analysis Year	2026
		Project ID	

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_1	1	1	0	0	1	0	0	0	0	2	1	0
Lane group	L	T			T					L	T	
Volume, V (vph)	5	7			46					443	138	
% Heavy vehicles, %HV	2	2			2					2	2	
Peak-hour factor, PHF	0.90	0.90			0.90					0.90	0.90	
Pretimed (P) or actuated (A)	A	A			A					A	A	
Start-up lost time, l_1	2.0	2.0			2.0					2.0	2.0	
Extension of effective green, e	2.0	2.0			2.0					2.0	2.0	
Arrival type, AT	3	3			3					3	3	
Unit extension, UE	3.0	3.0			3.0					3.0	3.0	
Filtering/metering, I	1.000	1.000			1.000					1.000	1.000	
Initial unmet demand, Q_b	0.0	0.0			0.0					0.0	0.0	
Ped / Bike / RTOR volumes				0			0					
Lane width	12.0	12.0			12.0					12.0	12.0	
Parking / Grade / Parking	N	0	N	N	0	N	N		N	N	0	N
Parking maneuvers, N_m												
Buses stopping, N_B	0	0			0					0	0	
Min. time for pedestrians, G_p				3.2			3.2					

Phasing	EB Only	EW Perm	03	04	SB Only	06	07	08
Timing	G = 8.0	G = 12.0	G =	G =	G = 25.0	G =	G =	G =
	Y = 5	Y = 5	Y =	Y =	Y = 5	Y =	Y =	Y =

Duration of Analysis, T = 0.25 | Cycle Length, C = 60.0

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	6	8			51					492	153	
Lane group capacity, c	506	776			373					1430	776	
v/c ratio, X	0.01	0.01			0.14					0.34	0.20	
Total green ratio, g/C	0.42	0.42			0.20					0.42	0.42	
Uniform delay, d_1	10.5	10.3			19.7					11.9	11.1	

Progression factor, PF	1.000	1.000			1.000					1.000	1.000	
Delay calibration, k	0.11	0.11			0.11					0.11	0.11	
Incremental delay, d_2	0.0	0.0			0.2					0.1	0.1	
Initial queue delay, d_3												
Control delay	10.5	10.3			19.9					12.1	11.2	
Lane group LOS	B	B			B					B	B	
Approach delay	10.3			19.9						11.9		
Approach LOS	B			B						B		
Intersection delay	12.4			X_c = 0.23			Intersection LOS			B		

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	JH	Intersection	SOUTH INTERSECTION
Agency or Co.		Area Type	All other areas
Date Performed	1/14/2004	Jurisdiction	MORRISTOWN
Time Period	PM PEAK	Analysis Year	2026
		Project ID	

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_1	1	1	0	0	1	0	0	0	0	2	1	0
Lane group	L	T			T					L	T	
Volume, V (vph)	5	22			20					216	510	
% Heavy vehicles, %HV	2	2			2					2	2	
Peak-hour factor, PHF	0.90	0.90			0.90					0.90	0.90	
Pretimed (P) or actuated (A)	A	A			A					A	A	
Start-up lost time, l_1	2.0	2.0			2.0					2.0	2.0	
Extension of effective green, e	2.0	2.0			2.0					2.0	2.0	
Arrival type, AT	3	3			3					3	3	
Unit extension, UE	3.0	3.0			3.0					3.0	3.0	
Filtering/metering, I	1.000	1.000			1.000					1.000	1.000	
Initial unmet demand, Q_b	0.0	0.0			0.0					0.0	0.0	
Ped / Bike / RTOR volumes				0			0					
Lane width	12.0	12.0			12.0					12.0	12.0	
Parking / Grade / Parking	N	0	N	N	0	N	N		N	N	0	N
Parking maneuvers, N_m												
Buses stopping, N_B	0	0			0					0	0	
Min. time for pedestrians, G_p				3.2			3.2					

Phasing	EB Only	EW Perm	03	04	SB Only	06	07	08
Timing	G = 8.0	G = 12.0	G =	G =	G = 25.0	G =	G =	G =
	Y = 5	Y = 5	Y =	Y =	Y = 5	Y =	Y =	Y =
Duration of Analysis, T = 0.25						Cycle Length, C = 60.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	6	24			22					240	567	
Lane group capacity, c	513	776			373					1430	776	
v/c ratio, X	0.01	0.03			0.06					0.17	0.73	
Total green ratio, g/C	0.42	0.42			0.20					0.42	0.42	
Uniform delay, d_1	10.5	10.3			19.4					11.0	14.7	

Progression factor, PF	1.000	1.000			1.000					1.000	1.000	
Delay calibration, k	0.11	0.11			0.11					0.11	0.29	
Incremental delay, d_2	0.0	0.0			0.1					0.1	3.5	
Initial queue delay, d_3												
Control delay	10.5	10.4			19.5					11.0	18.2	
Lane group LOS	B	B			B					B	B	
Approach delay	10.4				19.5					16.1		
Approach LOS	B				B					B		
Intersection delay	16.0				X_c = 0.43		Intersection LOS			B		

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	JH	Intersection	EAST INTERSECTION
Agency or Co.		Area Type	All other areas
Date Performed	1/14/2004	Jurisdiction	MORRISTOWN
Time Period	AM PEAK	Analysis Year	2006
		Project ID	

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_1	1	0	0	0	0	0	0	2	0	0	0	0
Lane group	L							LT				
Volume, V (vph)	388						105	298				
% Heavy vehicles, %HV	2						2	2				
Peak-hour factor, PHF	0.90						0.90	0.90				
Pretimed (P) or actuated (A)	A						A	A				
Start-up lost time, l_1	2.0							2.0				
Extension of effective green, e	2.0							2.0				
Arrival type, AT	3							3				
Unit extension, UE	3.0							3.0				
Filtering/metering, I	1.000	1.000						1.000				
Initial unmet demand, Q_b	0.0							0.0				
Ped / Bike / RTOR volumes				0						0		
Lane width	12.0							12.0				
Parking / Grade / Parking	N	0	N	N		N	N	0	N	N		N
Parking maneuvers, N_m												
Buses stopping, N_B	0							0				
Min. time for pedestrians, G_p				3.2						3.2		

Phasing	EB Only	02	03	04	NB Only	06	07	08
Timing	G = 20.0	G =	G =	G =	G = 25.0	G =	G =	G =
	Y = 5	Y =	Y =	Y =	Y = 5	Y =	Y =	Y =
Duration of Analysis, T = 0.25						Cycle Length, C = 55.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	431							448				
Lane group capacity, c	644							1588				
v/c ratio, X	0.67							0.28				
Total green ratio, g/C	0.36							0.45				
Uniform delay, d_1	14.7							9.4				
Progression factor, PF	1.000							1.000				

Delay calibration, k	0.24							0.11				
Incremental delay, d_2	2.7							0.1				
Initial queue delay, d_3												
Control delay	17.4							9.5				
Lane group LOS	B							A				
Approach delay	17.4						9.5					
Approach LOS	B						A					
Intersection delay	13.4			X_c = 0.45			Intersection LOS			B		

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	JH	Intersection	EAST INTERSECTION
Agency or Co.		Area Type	All other areas
Date Performed	1/14/2004	Jurisdiction	MORRISTOWN
Time Period	PM PEAK	Analysis Year	2006
		Project ID	

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_1	1	0	0	0	0	0	0	2	0	0	0	0
Lane group	L							LT				
Volume, V (vph)	384						256	105				
% Heavy vehicles, %HV	2						2	2				
Peak-hour factor, PHF	0.90						0.90	0.90				
Pretimed (P) or actuated (A)	A						A	A				
Start-up lost time, l_1	2.0							2.0				
Extension of effective green, e	2.0							2.0				
Arrival type, AT	3							3				
Unit extension, UE	3.0							3.0				
Filtering/metering, I	1.000	1.000						1.000				
Initial unmet demand, Q_b	0.0							0.0				
Ped / Bike / RTOR volumes				0						0		
Lane width	12.0							12.0				
Parking / Grade / Parking	N	0	N	N		N	N	0	N	N		N
Parking maneuvers, N_m												
Buses stopping, N_B	0							0				
Min. time for pedestrians, G_p				3.2						3.2		

Phasing	EB Only	02	03	04	NB Only	06	07	08
Timing	G = 27.0	G =	G =	G =	G = 23.0	G =	G =	G =
	Y = 5	Y =	Y =	Y =	Y = 5	Y =	Y =	Y =

Duration of Analysis, T = 0.25 | Cycle Length, C = 60.0

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	427							401				
Lane group capacity, c	796							1310				
v/c ratio, X	0.54							0.31				
Total green ratio, g/C	0.45							0.38				
Uniform delay, d_1	12.0							12.9				
Progression factor, PF	1.000							1.000				

Delay calibration, k	0.14							0.11					
Incremental delay, d_2	0.7							0.1					
Initial queue delay, d_3													
Control delay	12.7							13.1					
Lane group LOS	B							B					
Approach delay	12.7						13.1						
Approach LOS	B						B						
Intersection delay	12.9			X_c = 0.43			Intersection LOS			B			

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	JH	Intersection	EAST INTERSECTION
Agency or Co.		Area Type	All other areas
Date Performed	1/14/2004	Jurisdiction	MORRISTOWN
Time Period	AM PEAK	Analysis Year	2026
		Project ID	

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_1	1	0	0	0	0	0	0	2	0	0	0	0
Lane group	L							LT				
Volume, V (vph)	531						135	424				
% Heavy vehicles, %HV	2						2	2				
Peak-hour factor, PHF	0.90						0.90	0.90				
Pretimed (P) or actuated (A)	A						A	A				
Start-up lost time, l_1	2.0							2.0				
Extension of effective green, e	2.0							2.0				
Arrival type, AT	3							3				
Unit extension, UE	3.0							3.0				
Filtering/metering, I	1.000	1.000						1.000				
Initial unmet demand, Q_b	0.0							0.0				
Ped / Bike / RTOR volumes				0						0		
Lane width	12.0							12.0				
Parking / Grade / Parking	N	0	N	N		N	N	0	N	N		N
Parking maneuvers, N_m												
Buses stopping, N_B	0							0				
Min. time for pedestrians, G_p				3.2						3.2		

Phasing	EB Only	02	03	04	NB Only	06	07	08
Timing	G = 27.0	G =	G =	G =	G = 23.0	G =	G =	G =
	Y = 5	Y =	Y =	Y =	Y = 5	Y =	Y =	Y =

Duration of Analysis, T = 0.25 | Cycle Length, C = 60.0

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	590							621				
Lane group capacity, c	796							1341				
v/c ratio, X	0.74							0.46				
Total green ratio, g/C	0.45							0.38				
Uniform delay, d_1	13.6							13.9				
Progression factor, PF	1.000							1.000				

Delay calibration, k	0.30							0.11					
Incremental delay, d_2	3.7							0.3					
Initial queue delay, d_3													
Control delay	17.4							14.1					
Lane group LOS	B							B					
Approach delay	17.4						14.1						
Approach LOS	B						B						
Intersection delay	15.7			X_c = 0.61			Intersection LOS			B			

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	JH	Intersection	EAST INTERSECTION
Agency or Co.		Area Type	All other areas
Date Performed	1/14/2004	Jurisdiction	MORRISTOWN
Time Period	PM PEAK	Analysis Year	2026
		Project ID	

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_1	1	0	0	0	0	0	0	2	0	0	0	0
Lane group	L							LT				
Volume, V (vph)	483						571	145				
% Heavy vehicles, %HV	2						2	2				
Peak-hour factor, PHF	0.90						0.90	0.90				
Pretimed (P) or actuated (A)	A						A	A				
Start-up lost time, l_1	2.0							2.0				
Extension of effective green, e	2.0							2.0				
Arrival type, AT	3							3				
Unit extension, UE	3.0							3.0				
Filtering/metering, I	1.000	1.000						1.000				
Initial unmet demand, Q_b	0.0							0.0				
Ped / Bike / RTOR volumes				0						0		
Lane width	12.0							12.0				
Parking / Grade / Parking	N	0	N	N		N	N	0	N	N		N
Parking maneuvers, N_m												
Buses stopping, N_B	0							0				
Min. time for pedestrians, G_p				3.2						3.2		

Phasing	EB Only	02	03	04	NB Only	06	07	08
Timing	G = 30.0	G =	G =	G =	G = 20.0	G =	G =	G =
	Y = 5	Y =	Y =	Y =	Y = 5	Y =	Y =	Y =

Duration of Analysis, T = 0.25 | Cycle Length, C = 60.0

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v	537							795				
Lane group capacity, c	885							1135				
v/c ratio, X	0.61							0.70				
Total green ratio, g/C	0.50							0.33				
Uniform delay, d_1	10.8							17.4				
Progression factor, PF	1.000							1.000				

Delay calibration, k	0.19							0.27				
Incremental delay, d_2	1.2							1.9				
Initial queue delay, d_3												
Control delay	12.0							19.3				
Lane group LOS	B							B				
Approach delay	12.0						19.3					
Approach LOS	B						B					
Intersection delay	16.4			X_c = 0.64			Intersection LOS			B		

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	JH	Intersection	WEST INTERSECTION
Agency or Co.		Area Type	All other areas
Date Performed	1/14/2004	Jurisdiction	MORRISTOWN
Time Period	AM PEAK	Analysis Year	2006
		Project ID	

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_1	0	0	0	1	0	0	0	0	0	0	2	0
Lane group				L							LT	
Volume, V (vph)				411						118	13	
% Heavy vehicles, %HV				2						2	2	
Peak-hour factor, PHF				0.90						0.90	0.90	
Pretimed (P) or actuated (A)				A						A	A	
Start-up lost time, l_1				2.0							2.0	
Extension of effective green, e				2.0							2.0	
Arrival type, AT				3							3	
Unit extension, UE				3.0							3.0	
Filtering/metering, I				1.000	1.000						1.000	
Initial unmet demand, Q_b				0.0							0.0	
Ped / Bike / RTOR volumes	0						0					
Lane width				12.0							12.0	
Parking / Grade / Parking	N		N	N	0	N	N		N	N	0	N
Parking maneuvers, N_m												
Buses stopping, N_B				0							0	
Min. time for pedestrians, G_p	3.2						3.2					

Phasing	WB Only	02	03	04	SB Only	06	07	08
Timing	G = 30.0	G =	G =	G =	G = 20.0	G =	G =	G =
	Y = 5	Y =	Y =	Y =	Y = 5	Y =	Y =	Y =

Duration of Analysis, T = 0.25 | Cycle Length, C = 60.0

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v				457							145	
Lane group capacity, c				885							1129	
v/c ratio, X				0.52							0.13	
Total green ratio, g/C				0.50							0.33	
Uniform delay, d_1				10.1							13.9	
Progression factor, PF				1.000							1.000	

Delay calibration, k				0.12							0.11	
Incremental delay, d_2				0.5							0.1	
Initial queue delay, d_3												
Control delay				10.6							14.0	
Lane group LOS				B							B	
Approach delay				10.6							14.0	
Approach LOS				B							B	
Intersection delay	11.4			X_c = 0.36			Intersection LOS			B		

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	JH	Intersection	WEST INTERSECTION
Agency or Co.		Area Type	All other areas
Date Performed	1/14/2004	Jurisdiction	MORRISTOWN
Time Period	PM PEAK	Analysis Year	2006
		Project ID	

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_1	0	0	0	1	0	0	0	0	0	0	2	0
Lane group				L							LT	
Volume, V (vph)				527						485	48	
% Heavy vehicles, %HV				2						2	2	
Peak-hour factor, PHF				0.90						0.90	0.90	
Pretimed (P) or actuated (A)				A						A	A	
Start-up lost time, l_1				2.0							2.0	
Extension of effective green, e				2.0							2.0	
Arrival type, AT				3							3	
Unit extension, UE				3.0							3.0	
Filtering/metering, I				1.000	1.000						1.000	
Initial unmet demand, Q_b				0.0							0.0	
Ped / Bike / RTOR volumes	0						0					
Lane width				12.0							12.0	
Parking / Grade / Parking	N		N	N	0	N	N		N	N	0	N
Parking maneuvers, N_m												
Buses stopping, N_B				0							0	
Min. time for pedestrians, G_p	3.2						3.2					

Phasing	WB Only	02	03	04	SB Only	06	07	08
Timing	G = 30.0	G =	G =	G =	G = 20.0	G =	G =	G =
	Y = 5	Y =	Y =	Y =	Y = 5	Y =	Y =	Y =
Duration of Analysis, T = 0.25						Cycle Length, C = 60.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v				586							592	
Lane group capacity, c				885							1128	
v/c ratio, X				0.66							0.52	
Total green ratio, g/C				0.50							0.33	
Uniform delay, d_1				11.2							16.2	
Progression factor, PF				1.000							1.000	

Delay calibration, k				0.24							0.13	
Incremental delay, d_2				1.9							0.5	
Initial queue delay, d_3												
Control delay				13.1							16.6	
Lane group LOS				B							B	
Approach delay				13.1							16.6	
Approach LOS				B							B	
Intersection delay	14.9			X_c = 0.61			Intersection LOS			B		

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	JH	Intersection	WEST INTERSECTION
Agency or Co.		Area Type	All other areas
Date Performed	1/14/2004	Jurisdiction	MORRISTOWN
Time Period	AM PEAK	Analysis Year	2026
		Project ID	

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_1	0	0	0	1	0	0	0	0	0	0	2	0
Lane group				L							LT	
Volume, V (vph)				562						150	19	
% Heavy vehicles, %HV				2						2	2	
Peak-hour factor, PHF				0.90						0.90	0.90	
Pretimed (P) or actuated (A)				A						A	A	
Start-up lost time, l_1				2.0							2.0	
Extension of effective green, e				2.0							2.0	
Arrival type, AT				3							3	
Unit extension, UE				3.0							3.0	
Filtering/metering, I				1.000	1.000						1.000	
Initial unmet demand, Q_b				0.0							0.0	
Ped / Bike / RTOR volumes	0						0					
Lane width				12.0							12.0	
Parking / Grade / Parking	N		N	N	0	N	N		N	N	0	N
Parking maneuvers, N_m												
Buses stopping, N_B				0							0	
Min. time for pedestrians, G_p	3.2						3.2					

Phasing	WB Only	02	03	04	SB Only	06	07	08
Timing	G = 30.0	G =	G =	G =	G = 20.0	G =	G =	G =
	Y = 5	Y =	Y =	Y =	Y = 5	Y =	Y =	Y =
Duration of Analysis, T = 0.25						Cycle Length, C = 60.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v				624							188	
Lane group capacity, c				885							1130	
v/c ratio, X				0.71							0.17	
Total green ratio, g/C				0.50							0.33	
Uniform delay, d_1				11.6							14.1	
Progression factor, PF				1.000							1.000	

Delay calibration, k				0.27							0.11	
Incremental delay, d_2				2.6							0.1	
Initial queue delay, d_3												
Control delay				14.2							14.2	
Lane group LOS				B							B	
Approach delay				14.2							14.2	
Approach LOS				B							B	
Intersection delay	14.2			X_c = 0.49			Intersection LOS			B		

HCS2000™ DETAILED REPORT

General Information		Site Information	
Analyst	JH	Intersection	WEST INTERSECTION
Agency or Co.		Area Type	All other areas
Date Performed	1/14/2004	Jurisdiction	MORRISTOWN
Time Period	PM PEAK	Analysis Year	2026
		Project ID	

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Number of lanes, N_1	0	0	0	1	0	0	0	0	0	0	2	0
Lane group				L							LT	
Volume, V (vph)				655						623	71	
% Heavy vehicles, %HV				2						2	2	
Peak-hour factor, PHF				0.90						0.90	0.90	
Pretimed (P) or actuated (A)				A						A	A	
Start-up lost time, l_1				2.0							2.0	
Extension of effective green, e				2.0							2.0	
Arrival type, AT				3							3	
Unit extension, UE				3.0							3.0	
Filtering/metering, I				1.000	1.000						1.000	
Initial unmet demand, Q_b				0.0							0.0	
Ped / Bike / RTOR volumes	0						0					
Lane width				12.0							12.0	
Parking / Grade / Parking	N		N	N	0	N	N		N	N	0	N
Parking maneuvers, N_m												
Buses stopping, N_B				0							0	
Min. time for pedestrians, G_p	3.2						3.2					

Phasing	WB Only	02	03	04	SB Only	06	07	08
Timing	G = 30.0	G =	G =	G =	G = 20.0	G =	G =	G =
	Y = 5	Y =	Y =	Y =	Y = 5	Y =	Y =	Y =
Duration of Analysis, T = 0.25						Cycle Length, C = 60.0		

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Adjusted flow rate, v				728							771	
Lane group capacity, c				885							1129	
v/c ratio, X				0.82							0.68	
Total green ratio, g/C				0.50							0.33	
Uniform delay, d_1				12.7							17.3	
Progression factor, PF				1.000							1.000	

Delay calibration, k				0.36							0.25	
Incremental delay, d_2				6.3							1.7	
Initial queue delay, d_3												
Control delay				19.1							19.0	
Lane group LOS				B							B	
Approach delay				19.1							19.0	
Approach LOS				B							B	
Intersection delay	19.0			X_c = 0.77			Intersection LOS			B		

RAMP ANALYSES
PROPOSED CONDITIONS
(OUTPUT FILES FROM HCS 2000, VERSION 4.1d)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	JH	Freeway/Dir of Travel	SB US 25E
Agency or Company		Junction	OFF RAMP CPD
Date Performed	8/8/2003	Jurisdiction	MORRISTOWN
Analysis Time Period	AM PEAK - FULL BUILD	Analysis Year	2026

Project Description

Inputs

Upstream Adj Ramp: ☒ Yes ☒ On ☐ No ☒ Off

L_{up} = 1500 ft

Vu = 342 veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp: ☐ Yes ☐ On ☒ No ☐ Off

L_{down} = ft

VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	1547	0.90	Level	0	0	1.000	1.00	1719
Ramp	562	0.90	Level	0	0	1.000	1.00	624
UpStream	342	0.90	Level	0	0	1.000	1.00	380
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}		See Exhibit 25-7	
V_{R12}		4600:All	

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S= mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} =1.000 using Equation (Exhibit 25-11)

V_{12} = 1719 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	1719	4500	No
V_{12}	1719	4400:All	No
$V_{FO} = V_F - V_R$	1095	4500	No
V_R	624	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = 14.5 (pc/ mi /ln)

LOS= B (Exhibit 25-4)

Speed Estimation

D_s = 0.484 (Exhibit 25-19)

S_R= 48.7 mph (Exhibit 25-19)

S_0= N/A mph (Exhibit 25-19)

S = 48.7 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	JH	Freeway/Dir of Travel	SB US 25E
Agency or Company		Junction	OFF RAMP CPD
Date Performed	8/8/2003	Jurisdiction	MORRISTOWN
Analysis Time Period	PM PEAK - FULL BUILD	Analysis Year	2026

Project Description

Inputs

Upstream Adj Ramp: ☒ Yes ☒ On ☐ No ☐ Off

L_{up} = 1500 ft

Vu = 648 veh/h

Terrain: Level

S_{FF} = 55.0 mph S_{FR} = 35.0 mph

Sketch (show lanes, L_A, L_D, V_R, V_f)

Downstream Adj Ramp: ☐ Yes ☐ On ☒ No ☒ Off

L_{down} = ft

VD = veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	2049	0.90	Level	0	0	1.000	1.00	2277
Ramp	655	0.90	Level	0	0	1.000	1.00	728
UpStream	648	0.90	Level	0	0	1.000	1.00	720
DownStream								

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= using Equation (Exhibit 25-5)

V_{12}= pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}		See Exhibit 25-7	
V_{R12}		4600:All	

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = (pc/ mi /ln)

LOS = (Exhibit 25-4)

Speed Estimation

M_S = (Exibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= mph (Exhibit 25-19)

S= mph (Exhibit 25-14)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} =1.000 using Equation (Exhibit 25-11)

V_{12} = 2277 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$	2277	4500	No
V_{12}	2277	4400:All	No
$V_{FO} = V_F - V_R$	1549	4500	No
V_R	728	2000	No

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = 19.3 (pc/ mi /ln)

LOS= B (Exhibit 25-4)

Speed Estimation

D_s = 0.494 (Exhibit 25-19)

S_R= 48.6 mph (Exhibit 25-19)

S_0= N/A mph (Exhibit 25-19)

S = 48.6 mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	JH	Freeway/Dir of Travel	NB US 25E
Agency or Company		Junction	ON RAMP CPD
Date Performed	8/8/2003	Jurisdiction	MORRISTOWN
Analysis Time Period	AM PEAK - FULL BUILD	Analysis Year	2006

Project Description

Inputs

01 Upstream Adj Ramp ☒ Yes ☒ On ☒ No ☒ Off L_{up} = ft Vu = veh/h	Terrain Level S_{FF} = 55.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D,V_R,V_f)	Downstream Adj Ramp ☒ Yes ☒ On ☒ No ☒ Off L_{down} = 1500 ft VD = 360 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	733	0.90	Level	8	0	0.962	1.00	847
Ramp	102	0.90	Level	8	0	0.962	1.00	118
UpStream								
DownStream	360	0.90	Level	8	0	0.962	1.00	416

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 1.000 using Equation (Exhibit 25-5)

V_{12}= 847 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	965	4500	No
V_{R12}	965	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 9.8 (pc/ mi /ln)

LOS = A (Exhibit 25-4)

Speed Estimation

M_S = 0.296 (Exibit 25-19)

S_R= 51.1 mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$		See Exhibit 25-14	
V_{12}		4400:All	
$V_{FO} = V_F - V_R$		See Exhibit 25-14	
V_R		See Exhibit 25-3	

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ mi /ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph (Exhibit 25-19)

S_0=	N/A mph (Exhibit 25-19)	S_0=	mph (Exhibit 25-19)
S=	51.1 mph (Exhibit 25-14)	S =	mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information		Site Information	
Analyst	JH	Freeway/Dir of Travel	NB US 25E
Agency or Company		Junction	ON RAMP CPD
Date Performed	8/8/2003	Jurisdiction	MORRISTOWN
Analysis Time Period	PM PEAK - FULL BUILD	Analysis Year	2006

Project Description

Inputs

01 Upstream Adj Ramp ☒ Yes ☒ On ☒ No ☒ Off L_{up} = ft Vu = veh/h	Terrain Level S_{FF} = 55.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D,V_R,V_f)	Downstream Adj Ramp ☒ Yes ☒ On ☒ No ☒ Off L_{down} = 1500 ft VD = 525 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	1400	0.90	Level	8	0	0.962	1.00	1618
Ramp	456	0.90	Level	8	0	0.962	1.00	527
UpStream								
DownStream	525	0.90	Level	8	0	0.962	1.00	607

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 1.000 using Equation (Exhibit 25-5)

V_{12}= 1618 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	2145	4500	No
V_{R12}	2145	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 18.8 (pc/ mi /ln)

LOS = B (Exhibit 25-4)

Speed Estimation

M_S = 0.319 (Exibit 25-19)

S_R= 50.8 mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$		See Exhibit 25-14	
V_{12}		4400:All	
$V_{FO} = V_F - V_R$		See Exhibit 25-14	
V_R		See Exhibit 25-3	

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ mi /ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph (Exhibit 25-19)

S_0=	N/A mph (Exhibit 25-19)	S_0=	mph (Exhibit 25-19)
S=	50.8 mph (Exhibit 25-14)	S =	mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / **Site Information**

Analyst	JH	Freeway/Dir of Travel	NB US 25E
Agency or Company		Junction	ON RAMP CPD
Date Performed	8/8/2003	Jurisdiction	MORRISTOWN
Analysis Time Period	AM PEAK - FULL BUILD	Analysis Year	2026

Project Description

Inputs

01 Upstream Adj Ramp ☒ Yes ☐ On ☒ No ☐ Off L_{up} = ft Vu = veh/h	Terrain Level S_{FF} = 55.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D,V_R,V_f)	Downstream Adj Ramp ☒ Yes ☐ On ☒ No ☐ Off L_{down} = 1500 ft VD = 571 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	1132	0.90	Level	8	0	0.962	1.00	1308
Ramp	135	0.90	Level	8	0	0.962	1.00	156
UpStream								
DownStream	571	0.90	Level	8	0	0.962	1.00	660

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 1.000 using Equation (Exhibit 25-5)

V_{12}= 1308 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	1464	4500	No
V_{R12}	1464	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 13.7 (pc/ mi /ln)

LOS = B (Exhibit 25-4)

Speed Estimation

M_S = 0.303 (Exibit 25-19)

S_R= 51.1 mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$		See Exhibit 25-14	
V_{12}		4400:All	
$V_{FO} = V_F - V_R$		See Exhibit 25-14	
V_R		See Exhibit 25-3	

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ mi /ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph (Exhibit 25-19)

S_0= N/A mph (Exhibit 25-19)	S_0= mph (Exhibit 25-19)
S= 51.1 mph (Exhibit 25-14)	S = mph (Exhibit 25-15)

RAMPS AND RAMP JUNCTIONS WORKSHEET

General Information / **Site Information**

Analyst	JH	Freeway/Dir of Travel	NB US 25E
Agency or Company		Junction	ON RAMP CPD
Date Performed	8/8/2003	Jurisdiction	MORRISTOWN
Analysis Time Period	PM PEAK - FULL BUILD	Analysis Year	2026

Project Description

Inputs

01 Upstream Adj Ramp ☒ Yes ☒ On ☒ No ☒ Off L_{up} = ft Vu = veh/h	Terrain Level S_{FF} = 55.0 mph S_{FR} = 35.0 mph Sketch (show lanes, L_A, L_D, V_R, V_f)	Downstream Adj Ramp ☒ Yes ☒ On ☒ No ☒ Off L_{down} = 1500 ft VD = 812 veh/h

Conversion to pc/h Under Base Conditions

(pc/h)	V (Veh/hr)	PHF	Terrain	Truck	%Rv	f_{HV}	f_p	v=V/PHF f_{HV} f_p
Freeway	2165	0.90	Level	8	0	0.962	1.00	2502
Ramp	571	0.90	Level	8	0	0.962	1.00	660
UpStream								
DownStream	812	0.90	Level	8	0	0.962	1.00	938

Merge Areas

Estimation of v_{12}

$V_{12} = V_F (P_{FM})$

L_{EQ} = (Equation 25-2 or 25-3)

P_{FM}= 1.000 using Equation (Exhibit 25-5)

V_{12}= 2502 pc/h

Capacity Checks

	Actual	Maximum	LOS F?
V_{FO}	3162	4500	No
V_{R12}	3162	4600:All	No

Level of Service Determination (if not F)

$D_R = 5.475 + 0.00734\ v_R + 0.0078\ V_{12} - 0.00627\ L_A$

D_R = 26.7 (pc/ mi /ln)

LOS = C (Exhibit 25-4)

Speed Estimation

M_S = 0.378 (Exibit 25-19)

S_R= 50.1 mph (Exhibit 25-19)

Diverge Areas

Estimation of v_{12}

$V_{12} = V_R + (V_F - V_R)P_{FD}$

L_{EQ} = (Equation 25-8 or 25-9)

P_{FD} = using Equation (Exhibit 25-11)

V_{12} = pc/h

Capacity Checks

	Actual	Maximum	LOS F?
$V_{FI}=V_F$		See Exhibit 25-14	
V_{12}		4400:All	
$V_{FO} = V_F - V_R$		See Exhibit 25-14	
V_R		See Exhibit 25-3	

Level of Service Determination (if not F)

$D_R = 4.252 + 0.0086\ V_{12} - 0.0009\ L_D$

D_R = (pc/ mi /ln)

LOS= (Exhibit 25-4)

Speed Estimation

D_s = (Exhibit 25-19)

S_R= mph (Exhibit 25-19)

S_0=	N/A mph (Exhibit 25-19)	S_0=	mph (Exhibit 25-19)
S=	50.1 mph (Exhibit 25-14)	S =	mph (Exhibit 25-15)

WEAVING ANALYSES
PROPOSED CONDITIONS

(OUTPUT FILES FROM HCS 2000, VERSION 4.1d)

FREEWAY WEAVING WORKSHEET

General Information

Analyst	
Agency/Company	
Date Performed	11/25/2003
Analysis Time Period	AM PEAK

Site Information

Freeway/Dir of Travel	US 25E SB
Weaving Seg Location	ON SR 34 TO OFF CPD
Jurisdiction	MORRISTOWN
Analysis Year	2026

Inputs

Freeway free-flow speed, SFF (mi/h)	65	Weaving type	A
Weaving number of lanes, N	3	Volume ratio, VR	0.40
Weaving seg length, L (ft)	1250	Weaving ratio, R	0.37
Terrain	Rolling		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
Vo1	918	0.90	3	0	2.5	2.0	0.957	1.00	1065
Vo2	124	0.90	3	0	2.5	2.0	0.957	1.00	143
Vw1	438	0.90	3	0	2.5	2.0	0.957	1.00	508
Vw2	261	0.90	3	0	2.5	2.0	0.957	1.00	303
Vw				811	Vnw				1208
V									2019

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.15	0.00		
b (Exhibit 24-6)	2.20	4.00		
c (Exhibit 24-6)	0.97	1.30		
d (Exhibit 24-6)	0.80	0.75		
Weaving intensity factor, Wi	0.58	0.31		
Weaving and non-weaving speeds, Si (mi/h)	49.78	57.14		

Number of lanes required for unconstrained operation, Nw 1.26
Maximum number of lanes, Nw (max) 1.40

If Nw < Nw(max) unconstrained operation — if Nw > Nw (max) constrained operation

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment speed, S (mi/h)	53.94
Weaving segment density, D (pc/mi/ln)	12.48
Level of service, LOS	B
Capacity of base condition, c_b (pc/h)	5009
Capacity as a 15-minute flow rate, c (veh/h)	4793
Capacity as a full-hour volume, c_h (veh/h)	4314

Notes

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
b. Capacity constrained by basic freeway capacity.
c. Capacity occurs under constrained operating conditions.
d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

FREEWAY WEAVING WORKSHEET

General Information

Analyst	
Agency/Company	
Date Performed	11/25/2003
Analysis Time Period	PM PEAK

Site Information

Freeway/Dir of Travel	US 25E SB
Weaving Seg Location	ON SR 34 TO OFF CPD
Jurisdiction	MORRISTOWN
Analysis Year	2026

Inputs

Freeway free-flow speed, SFF (mi/h)	65	Weaving type	A
Weaving number of lanes, N	3	Volume ratio, VR	0.30
Weaving seg length, L (ft)	1250	Weaving ratio, R	0.50
Terrain	Rolling		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
Vo1	1849	0.90	3	0	2.5	2.0	0.957	1.00	2146
Vo2	207	0.90	3	0	2.5	2.0	0.957	1.00	240
Vw1	448	0.90	3	0	2.5	2.0	0.957	1.00	520
Vw2	441	0.90	3	0	2.5	2.0	0.957	1.00	512
Vw				1032	Vnw				2386
V									3418

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)	0.15	0.00		
b (Exhibit 24-6)	2.20	4.00		
c (Exhibit 24-6)	0.97	1.30		
d (Exhibit 24-6)	0.80	0.75		
Weaving intensity factor, Wi	0.82	0.45		
Weaving and non-weaving speeds, Si (mi/h)	45.16	52.93		

Number of lanes required for unconstrained operation, Nw 1.12
Maximum number of lanes, Nw (max) 1.40

If Nw < Nw(max) unconstrained operation — if Nw > Nw (max) constrained operation

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment speed, S (mi/h)	50.32
Weaving segment density, D (pc/mi/ln)	22.64
Level of service, LOS	B
Capacity of base condition, c_b (pc/h)	5510
Capacity as a 15-minute flow rate, c (veh/h)	5273
Capacity as a full-hour volume, c_h (veh/h)	4746

Notes

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
b. Capacity constrained by basic freeway capacity.
c. Capacity occurs under constrained operating conditions.
d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

FREEWAY WEAVING WORKSHEET

General Information

Analyst	JH
Agency/Company	
Date Performed	11/25/2003
Analysis Time Period	AM PEAK

Site Information

Freeway/Dir of Travel	US 25E NB
Weaving Seg Location	ON CPD TO OFF SR 34
Jurisdiction	MORRISTOWN
Analysis Year	2026

Inputs

Freeway free-flow speed, SFF (mi/h)	65	Weaving type	A
Weaving number of lanes, N	3	Volume ratio, VR	0.50
Weaving seg length, L (ft)	1450	Weaving ratio, R	0.10
Terrain	Rolling		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
Vo1	602	0.90	3	0	2.5	2.0	0.957	1.00	698
Vo2	68	0.90	3	0	2.5	2.0	0.957	1.00	78
Vw1	613	0.90	3	0	2.5	2.0	0.957	1.00	711
Vw2	67	0.90	3	0	2.5	2.0	0.957	1.00	77
Vw				788	Vnw				776
V									1564

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)			0.15	0.00
b (Exhibit 24-6)			4.00	4.00
c (Exhibit 24-6)			0.97	1.30
d (Exhibit 24-6)			0.80	0.75
Weaving intensity factor, Wi			1.10	0.15
Weaving and non-weaving speeds, Si (mi/h)			41.22	62.90

Number of lanes required for unconstrained operation, Nw 1.46
Maximum number of lanes, Nw (max) 1.40

If Nw < Nw(max) unconstrained operation — if Nw > Nw (max) constrained operation

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment speed, S (mi/h)	49.72
Weaving segment density, D (pc/mi/ln)	10.48
Level of service, LOS	A
Capacity of base condition, c_b (pc/h)	4835
Capacity as a 15-minute flow rate, c (veh/h)	4627
Capacity as a full-hour volume, c_h (veh/h)	4164

Notes

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
b. Capacity constrained by basic freeway capacity.
c. Capacity occurs under constrained operating conditions.
d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

FREEWAY WEAVING WORKSHEET

General Information

Analyst	
Agency/Company	
Date Performed	11/25/2003
Analysis Time Period	PM PEAK

Site Information

Freeway/Dir of Travel	US 25E NB
Weaving Seg Location	ON CPD TO OFF SR 34
Jurisdiction	MORRISTOWN
Analysis Year	2026

Inputs

Freeway free-flow speed, SFF (mi/h)	65	Weaving type	A
Weaving number of lanes, N	3	Volume ratio, VR	0.44
Weaving seg length, L (ft)	1450	Weaving ratio, R	0.37
Terrain	Rolling		

Conversions to pc/h Under Base Conditions

(pc/h)	V	PHF	Truck %	RV %	E_T	E_R	f_{HV}	f_p	v
Vo1	996	0.90	3	0	2.5	2.0	0.957	1.00	1156
Vo2	214	0.90	3	0	2.5	2.0	0.957	1.00	248
Vw1	598	0.90	3	0	2.5	2.0	0.957	1.00	694
Vw2	357	0.90	3	0	2.5	2.0	0.957	1.00	414
Vw				1108	Vnw				1404
V									2512

Weaving and Non-Weaving Speeds

	Unconstrained		Constrained	
	Weaving (i = w)	Non-Weaving (i = nw)	Weaving (i = w)	Non-Weaving (= nw)
a (Exhibit 24-6)			0.15	0.00
b (Exhibit 24-6)			4.00	4.00
c (Exhibit 24-6)			0.97	1.30
d (Exhibit 24-6)			0.80	0.75
Weaving intensity factor, Wi			1.58	0.23
Weaving and non-weaving speeds, Si (mi/h)			36.30	59.66

Number of lanes required for unconstrained operation, Nw 1.40
Maximum number of lanes, Nw (max) 1.40

☒ If Nw < Nw(max) unconstrained operation ☒ if Nw > Nw (max) constrained operation

Weaving Segment Speed, Density, Level of Service, and Capacity

Weaving segment speed, S (mi/h)	46.47
Weaving segment density, D (pc/mi/ln)	18.02
Level of service, LOS	B
Capacity of base condition, c_b (pc/h)	4878
Capacity as a 15-minute flow rate, c (veh/h)	4668
Capacity as a full-hour volume, c_h (veh/h)	4201

Notes

a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
b. Capacity constrained by basic freeway capacity.
c. Capacity occurs under constrained operating conditions.
d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

OTHER ALTERNATIVES INVESTIGATED

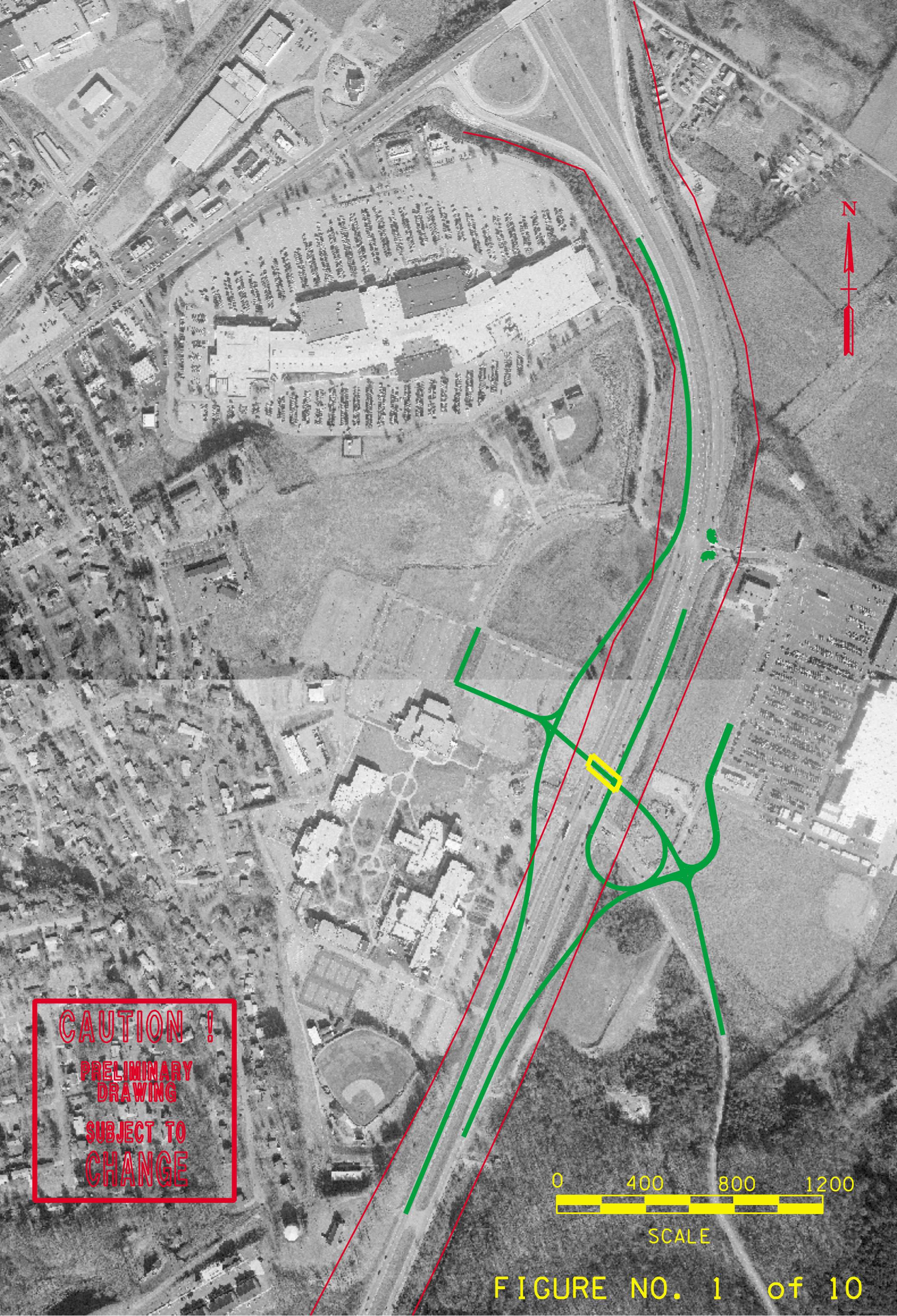


FIGURE NO. 1 of 10

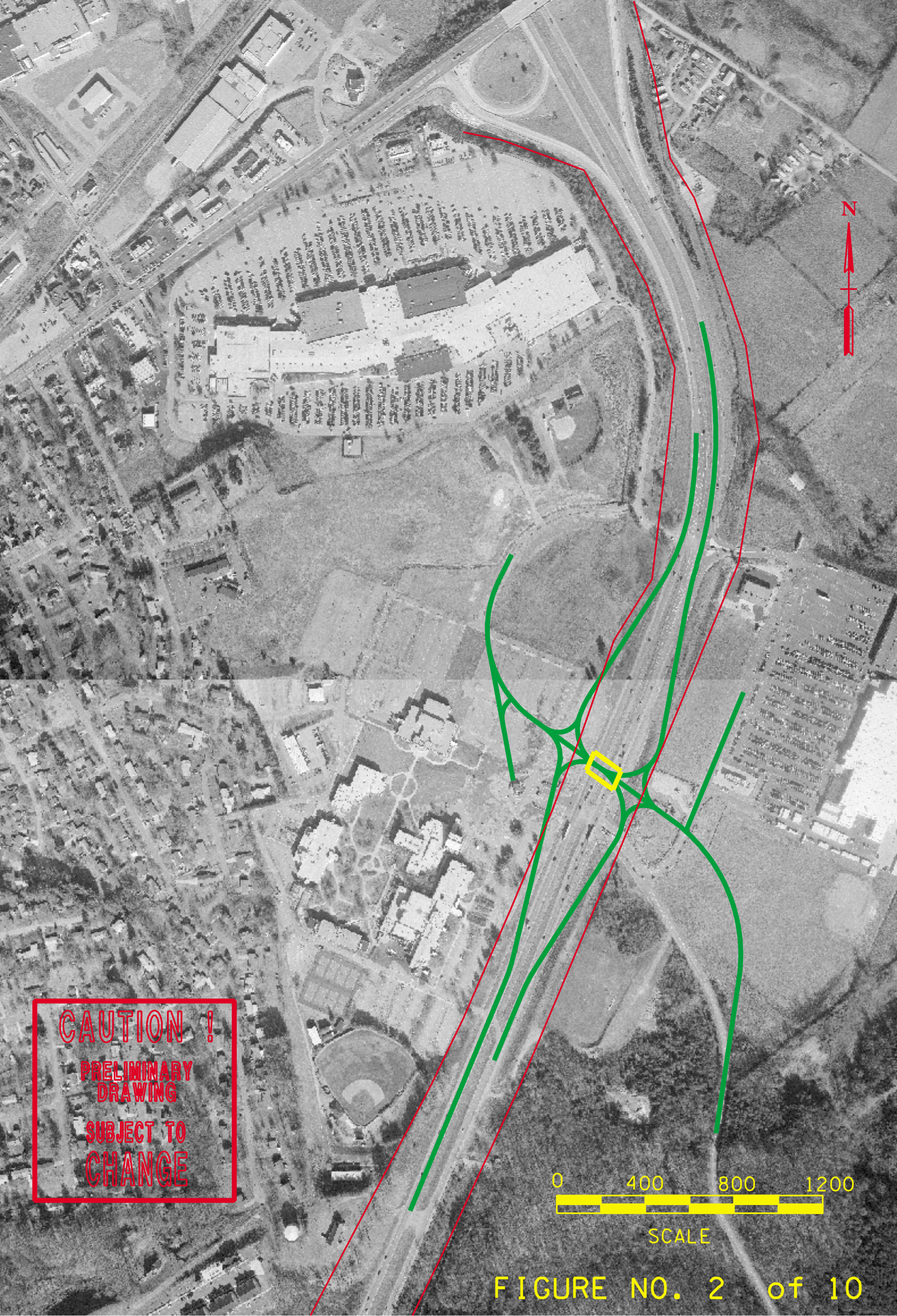


FIGURE NO. 2 of 10

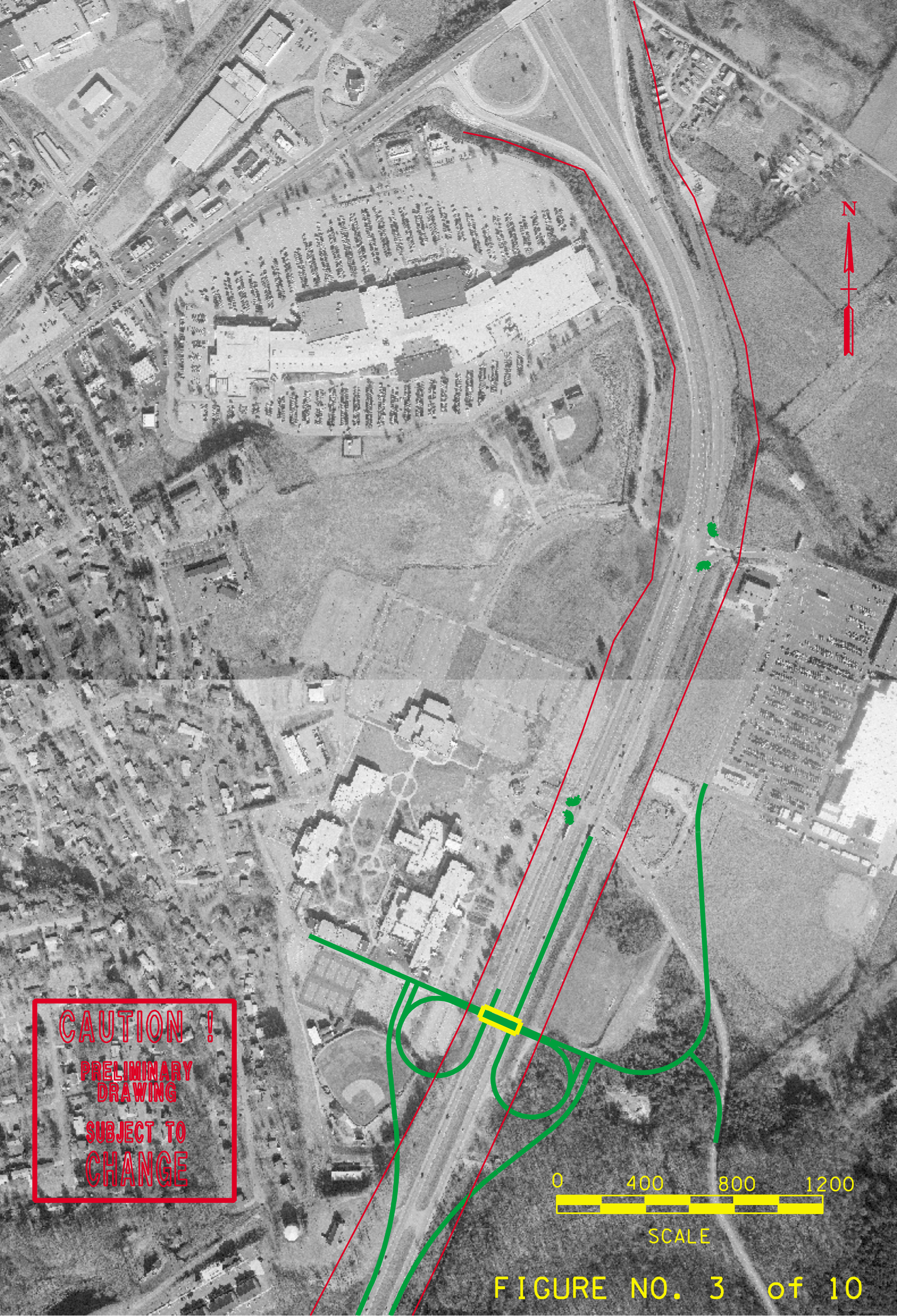


FIGURE NO. 3 of 10

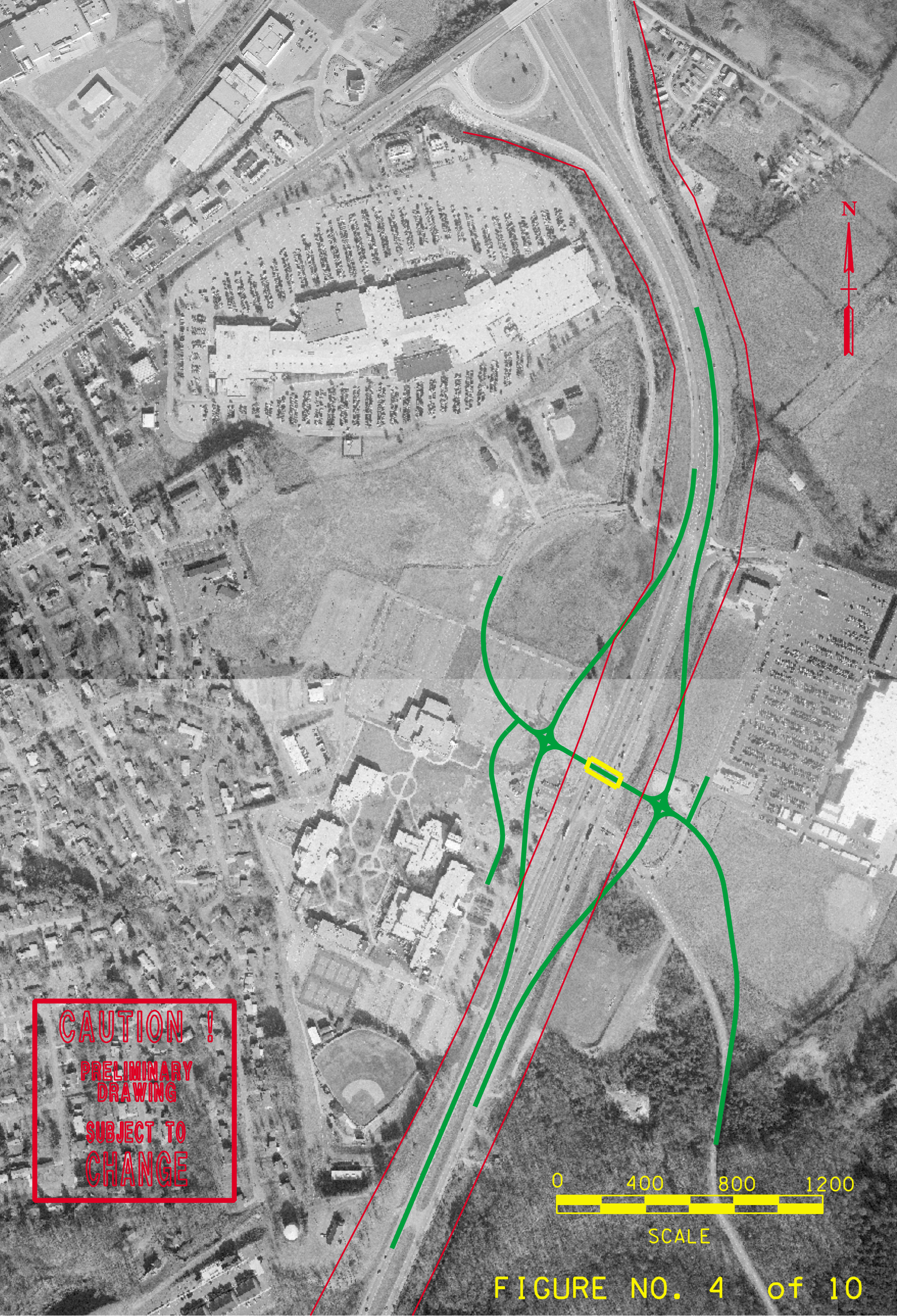


FIGURE NO. 4 of 10

FIGURE NO. 5 of 10

FIGURE NO. 6 of 10

N

CAUTION !

PRELIMINARY DRAWING

SUBJECT TO CHANGE

0 400 800 1200

SCALE

FIGURE NO. 7 of 10

N

CAUTION !

PRELIMINARY DRAWING

SUBJECT TO CHANGE

0 400 800 1200

SCALE

FIGURE NO. 8 of 10

N

CAUTION !

PRELIMINARY DRAWING

SUBJECT TO CHANGE

0 400 800 1200

SCALE

FIGURE NO. 9 of 10

N

CAUTION !

PRELIMINARY DRAWING

SUBJECT TO CHANGE

0 400 800 1200

SCALE

FIGURE NO. 10 of 10