ICF INTERNATIONAL

Transportation Study of the U.S. Route 1 College Park Corridor

Final Report

With:

Nelson\Nygaard Consulting Associates
Reid Ewing

Contact: William Schroeer
ICF International
4316 Upton Ave. S, #304
Minneapolis, MN 55410

Tel (612) 928-0788
Fax (612) 928-0782

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EXECUTIVE SUMMARY

Background

This report builds on the findings from an earlier study, "Existing Conditions and Stakeholder Input," to explore ways to create a transportation environment that supports more mixed-use land development along Route 1 in College Park. The project team—ICF International, Nelson\Nygaard Consulting Associates, and Reid Ewing—collected data from a variety of stakeholders on population, land use, transit service, and bicycle and pedestrian conditions. The team then led a day-long workshop on January 22, 2007 with local, county, and state agencies to discuss goals and objectives for the corridor, as well as current conditions, and prepared the Existing Conditions report.

This report draws on the comments from the January 22, 2007 meeting, the data collected, our own observations regarding the corridor, and case studies from elsewhere in the region and country to develop specific recommendations.

On the evening of November 29, 2007, the City of College Park and the local County Councilmembers held a meeting with transit agencies to review and discuss the transit recommendations of the draft version of the report. This meeting was chaired by the County Councilmember Eric Olson and the Mayor of College Park. The transit recommendations of the US1 draft report were reviewed and the group agreed with the recommended changes to the existing bus services along US1, and asked for additional detail. This final report attempts to provide as much additional detail as was possible under the scope of the project.

The Vision for Route 1: Obstacles and Opportunities

The 2002 Sector Plan envisions a Route 1 that is an attractive gateway into College Park and the University of Maryland. In this vision the roadway provides for safe and easy pedestrian and bicycle travel as well as effective management of vehicular traffic. The Sector Plan also envisions Route 1 as the city's Main Street—a lively, unique, destination corridor that is home to a mix of offices, residences, shops, and eateries. Participants in the January workshop reinforced this vision by identifying their goals and objectives for the corridor:

- Create a place;
- Make city and county development processes more predictable;
- Ensure that transit supports additional development and is easy to use;
- Provide the right amount and type of parking;
- Provide safe, accessible, and convenient pedestrian infrastructure, and;
- Accommodate bicyclists throughout the corridor.

While segments of the Route 1 corridor have achieved portions of this vision, most have not. Previous reports suggest several reasons:

- Too much land is available for mixed-use development. The corridor would be better served by clustering commercial uses in three nodes, instead of allowing it along the entire length of the corridor.

- Route 1 does not accommodate pedestrians well. A "main street" feel requires changes to parking, sidewalks, and access management.

- The development process is too unpredictable. If the city and county wants to encourage certain types of development in certain locations, the process must be more predictable.

In order to get the kind of development that the community wants, a better Route 1 is needed. Quality development comes to a quality street. The present corridor conditions are not conducive to supporting high quality development. Given the need for the transportation conditions to support the community's land use goals, this report is focused on the transportation policies, projects, and programs needed to make Route 1 a great street.

First Step: Agreement on priorities, methods, and issues

This report identifies key actions aimed at creating a transportation environment that supports the overall vision for Route 1. Many of these actions will need the support and resources of multiple parties. The first step in implementing these recommendations is to design and carry out a consensus-building process to reach agreement on priorities, methods, and issues. The City of College Park, Prince George's County, the Maryland National Capital Parks and Planning Commission, the University of Maryland, the Maryland State Highway Administration, Maryland Transit Administration, Washington Metropolitan Area Transit Authority, and private transit providers all play major roles in the corridor and the ability of these entities to move forward together is crucial. Depending on what stakeholders deem necessary, this process could include modeling to address technical issues and/or facilitated discussions to reach consensus on the path for moving forward.

Implementation Recommendations

Using local data and input along with experience from other areas of the country, the consultant team has developed recommendations to address the stakeholder goals and objectives. These recommendations are organized around seven functional areas: adequate public facilities ordinance (APFO), Transportation Demand Management (TDM) district, transit and shuttle service, parking, bicycle facilities, pedestrian facilities, and access management. This summary, as well as the implementation matrix, also organizes the recommendations according to their implementation time frame: short, medium, or longer term and includes a low, medium, or high cost estimate and list of responsible parties.

Depending on resources and priorities, many of these actions can be pursued simultaneously. Some involve changes in existing policy, some may be pursued as part of on-going reconstruction and planning efforts, and most will need the partnership of several agencies in order to be implemented.

ADEQUATE PUBLIC FACILITIES ORDINANCE

As described in Chapter 3, the goal of an APFO is to ensure that adequate levels of service are in place before new development arrives. Along Route 1, any development projected to produce more than 50 trips during either the morning or evening peak must demonstrate that it will not worsen the level of service (LOS) standard in a given roadway segment. M-NCPPC's "Guidelines for the Analysis of the Traffic Impact of Development Proposals" provides direction to developers conducting these traffic studies. Changing some of the current methods and practices in the Guidelines will support greater multi-modalism along Route 1.

<u>Short Term Actions</u>

- **Develop corridor specific trip generation rates and require their use for traffic impact studies** (low/medium $) [PGC, CP, MNCPPC, SHA][1]

[1]Abbreviations used: WMATA=Washington Metropolitan Area Transit Authority, PGC=Prince George's County, MTA=Maryland Transit Administration, UM=University of Maryland, SHA=Maryland State Highway Administration; CP=City of College Park, MNCPPC=Maryland National Capital Parks and Planning Commission.

Medium Term Actions

- **Update "Guidelines for the Analysis of the Traffic Impact of Development Proposals" to include updated trip generation rates and trip reduction credits for various mitigation measures** (low/medium $) [PGC, CP, MNCPPC, SHA]

- **Make trip reduction plans as easy an option as roadway changes for APFO compliance** (Low $) [CP, PGC, MNCPPC]

- **Within TDM District, allow trip reduction offsets for reduced parking (and other techniques) for developments unable to meet LOS E.** (Low $) [CP, PGC, MNCPPC]

TRANSPORTATION DEMAND MANAGEMENT (TDM) DISTRICT

A TDM district, administered by a Transportation Management Association (TMA), could implement strategies along Route 1 to reduce demand for parking and single occupant vehicle trips. Chapter 4 notes that the TMA could provide residential and employer transit passes, set up workplace carpools, improve transit signage, and advocate for improved pedestrian and bicycle facilities. According to an existing Prince George's County TDM ordinance, a TDM district can be established through petition or an Area Master Plan. Once in place, a College Park TMA can coordinate services with the regional Commuter Connections program and the highly successful Transit Services and Alternative Transportation program at the University of Maryland.

Medium Term Actions

- **Establish corridor-wide TDM District and a self-sustaining TMA to manage it** [Medium $] [PG, MNCPPC, CP, other cities, businesses]

TRANSIT AND SHUTTLE SERVICE

Route 1 is served by multiple transit agencies, including WMATA, Prince George's County, the Maryland Transit Administration, the University of Maryland, and private providers affiliated with condominiums and hotels. To boost ridership, improve transit service efficiencies, and beautify the streetscape, Chapter 5 suggests three major areas of transit improvement:

1) Improve transit coordination and transit identity
2) Improve shuttle services, and
3) Create a pass for University of Maryland students to use on WMATA buses.

Short Term Actions

- **Improve amenities at bus stops** (Low $: $2,000-$3,000 per shelter)[2] [WMATA, PGC, MTA, UM, private providers]

- **Increase transit service frequency and add longer service hours** (Medium $) [WMATA, UM, PGC, MTA, private providers]

- **Create University Pass Transit Program** (Low $, no cost to municipality) [UM, WMATA]

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[2] Transportation Research Board, TCRP Report 46, "The Role of Transit Amenities and Vehicle Characteristics in Building Transit Ridership—Part 3," 1999. http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_46-f.pdf.

Medium Term Actions

- **Create Transit Super Stops** (Medium $: $3.55 million for pilot program)3 [WMATA, PGC, MTA, UM, private providers]
- **Fold Transit Services of Private Operators** (Low $) [WMATA, PGC, CP, MTA, UM, private providers]
- **Coordinate fare collection and scheduling** (Med $: $1-$2 million for first year)[4] [WMATA, PGC, MTA, UM, private providers]
- **Create Unified Transit Identity for Corridor** (Medium $) [WMATA, PGC, MTA]

Long Term Actions

- **Consolidate Bus Routes** (Medium $) [WMATA, PGC, CP, MTA, UM, private providers]
- **Promote alternatives to SOV usage through transit investments** (High $) [WMATA, PGC, MTA, UM, private providers]

PARKING POLICIES

Addressing parking policies, management strategies and design guidelines is essential to improving both the transportation performance and the urban design of the Route 1 Corridor. Section 6 details the existing parking conditions in the corridor and how the recommended actions will support the land use vision. The report recommends a number of parking strategies for the city (who would be the primary implementer of any changes) to pursue and suggests that prior to implementation, the city and others host a public meeting to solicit input and feedback.

Short Term Actions

- **Launch an upfront public participation charrette re: parking policies** (listed below) (Medium $) [CP, PGC, State, transit providers]
- **Retain existing maximum parking standards & eliminate minimum parking standards** (Low $) [CP]
- **If eliminating parking minimums is not acceptable, allow developers to pay in lieu fees** (Low $) [CP, private developers]
- **By right reduction off-street parking requirements** (Low $) [CP, private developers]
- **Regulatory incentives for underground parking** (Low $) [CP]
- **Change zoning to discourage stand alone parking** (Low $) [CP]
- **Surface parking prohibition after demolition of historic structure** (Low $) [CP]

[3] Cost for program on Columbia Pike in Arlington County, VA.
[4] Transportation Research Board, TCRP Report 94, "Fare Policies, Structures, Technologies Update", 2003, pg. C-3. This estimate describes yearly costs for a small bus agency (100 vehicles, 20,000 avg. weekday ridership) in a regional fare program.

- **Prohibit surface parking in main street and town center areas** (Low $) [CP, private developers]
- **Locate parking between/behind buildings** (Low $) [CP]
- **Emphasize rear access through service lanes or alleys** (Low $) [CP]
- **Price parking to discourage long-term commuter parking** (Low $) [CP]
- **Build active uses around base of University View development** (Medium $, cost borne by developer) [CP, developer]

Medium Term Actions

- **Strengthen parking design guidelines** (Low $) [CP]
- **Façade mitigation for any parking garage on Route 1** (Low $) [CP, SHA]
- **Promote technologies that facilitate drivers finding parking spaces quickly** (Medium $: approximately $450/space) [CP, private agencies]
- **Consider regulating meter fees to encourage turnover** (Low $) [CP]
- **Explore parking meter pay stations and advanced meter technology** (Medium $: $6000-$6,500/station)[5] [CP]
- **Utilize electronic parking guidance system** (Medium $: approximately $450/space) [CP, private agencies]
- **Encourage shared parking** (Low $) [CP, private developers]
- **Establish development impact fees that relate type/number of parking spaces** (Low $) [CP, PGC]

BICYCLE FACILITIES

Accommodating cyclists on Route 1 is central to the vision of stakeholders and the 2002 Sector Plan. Given the challenging conditions along the corridor, Chapter 7 proposes innovative design techniques and changes to roadway configuration in order to provide good cycling facilities. Recommendations also include making additional strategic investments in bicycle infrastructure and parking.

Short Term Actions

- **Require more bicycle parking** (Low $) [CP, PGC, developers]
- **Install additional lighting along Paint Branch Trail** (Medium $) [CP, PGC, MNCPPC, UM]
- **Install "sharrows" markings, set-back stop lines, intersection-only bike lanes** (Low $: part of general maintenance budget) [CP, SHA]

[5] DKS Associates. "Smart Parking Meters Take Over the West."
http://www.dksassociates.com/admin/paperfile/Smart_Parking_Meters_Take_Over_the_West.pdf

- **Encourage more use of the Paint Branch Trail through better maintenance and policing** (Medium $) [CP, PGC, MNCPPC, UM, Police]

Medium Term Actions

- **Additional bicycle facilities along Route 1 between Beltway and College Avenue** (Low $ - Part of SHA improvements) [SHA]
- **Install bicycle facilities on Route 1 from College Avenue to Guilford Road (0.3 mi)** (Medium $: ~$93,000)[6] [SHA, CP]
- **Install bicycle facilities on Route 1 from Guilford Road to the District line (3.3mi)** (High $: $982,000) [SHA, CP, PGC, other cities as needed]
- **Install bicycle facilities on Route 1 north from the SHA project to the existing bike lanes north of IKEA (0.5mi)** (Medium $: $157,000) [SHA, PGC]
- **Install additional bridges along Paint Branch Trail** (High $) [CP, PGC, MNCPPC, UM]
- **Develop a campus bicycle master plan by the University** (Medium $: $200,000) [UM]

Long Term Actions

- **Install bicycle facilities in Cherry Hill Road corridor** (High $: $1 million for Paint Branch Trail Extension) [CP, MNCPPC]
- **Install bicycle facilities on Metzerott Road (.1mi)** (Low $: $9,000) [CP, MNCPPC]

PEDESTRIAN FACILITIES

Using the 2005 SHA Route 1 report as a starting point, Chapter 8 addresses the changing pedestrian conditions along the corridor and provides recommendations to improve the pedestrian environment. South of Berwyn Road, Route 1 is envisioned as a traditional main street—characterized by low speeds, substantial commerce, frequent street crossings and good bicycle facilities. This section of roadway would have wider sidewalks, bike lanes, and median than the northern segment of the corridor. North of Berwyn Road, narrower lanes, a wider median and a wider buffer between the road and the sidewalk are recommended to improve pedestrian safety. Detailed cross-section dimensions are provided in Section 8.1.1. Pedestrian design elements are included in the appendix.

Medium Term Actions

- **Adopt two Route 1 re-design cross-sections (with Berwyn Road breakpoint) reflecting the differences in character** (Low $ - Part of SHA improvements) [SHA]
- **Redesign Route 1 with target speeds of 30 mph, turning speeds of 10 mph, and use signal timing to maintain appropriate travel speeds** (Low $ - Part of SHA improvements) [SHA]
- **Additional pedestrian facilities (crosswalks, additional signalized intersections, stop lines, etc.) along Route 1 between Beltway and College Avenue** (Low $ - Part of SHA improvements) [SHA]

[6] All calculations are included as endnotes in the Implementation Matrix, which follows this Executive Summary.

ACCESS MANAGEMENT

Employing access management techniques such as driveway controls, medians, optimal signal spacing, corner clearances, and frontage and backage roads can improve safety along the corridor and change the urban fabric. Chapter 9 illustrates the safety benefits of access management approaches and identifies specific techniques to employ along Route 1.

Medium Term Actions

- **Additional access management measures along Route 1 between Beltway and College Avenue** (Low $ - Part of SHA improvements) [SHA]

Existing Proposals and Other Conditions for Success

In addition to the recommendations discussed above, there are several existing proposals that will have an impact on the future function and design of Route 1. As discussed in Chapter 10, the University of Maryland Connector is a proposed roadway that would connect the campus directly to the Beltway. Construction of this roadway may work at cross-purposes with the community's desire to make Route 1 more attractive to pedestrian, bicycle, and transit users. We recommend that plans for the Connector be closely coordinated with the land use plans for the entire area—especially since it may be difficult to fund both the Route 1 improvements and the proposed new roadway. Second, the Purple Line transit project proposed to connect Prince George's and Montgomery counties in the environmental review stage. We support continuation of this study as our transit analysis showed a significant east-west transit demand. The project will also create a direct transit link to the center of campus.

In addition to these existing proposals, Chapter 3 also acknowledges that there are broader issues for the city and county to address to implement the corridor vision.

- Make Route 1 a high priority for funding.
- Ensure that elected officials and the County Planning Board are involved with and aware of these reports and recommendations.
- Adopt a formal "complete street" policy for Route 1—making clear the intention to give all transportation modes priority.

Conclusion

Creating a place is the community's overall goal for the corridor. To some this means improving safety and enhancing quality of life, to others it means integrating transportation and land use. The transportation recommendations in this report are centered on creating a better Route 1—a roadway that will support all modes, efficiently manage traffic, and create an environment supportive of vibrant, mixed use development. Implementing these recommendations is a necessary step in creating a quality street that will support quality, place-making, development.

Route 1 Recommendations: Implementation Matrix

This matrix includes all of the recommendations the Final Report. It organizes recommendations according to their cost category (capital, operating, or policy) and the timetable in which they can be completed (short, medium, or long term). Where easily calculated, specific costs are estimated; in other instances, costs are indicated as either low, medium or high. Last, responsible parties are listed for each recommendation.

Time Frame	Type of Cost		
	Capital	**Operating**	**Policy**
Short Term	• **Build active uses around base of University View development** (Medium $, cost borne by developer) [CP, developer][i] • **Improve amenities at bus stops** (Low $: $2,000-$3,000 per shelter)[ii] [WMATA, PGC, MTA, UM, private providers] • **Install additional lighting along Paint Branch Trail** (Medium $) [CP, PGC, MNCPPC, UM]	• **Increase transit service frequency and add longer service hours** (Medium $) [WMATA, UM, PGC, MTA, private providers] • **Create University Pass Transit Program** (Low $, no cost to municipality) [UM, WMATA] • **Install "sharrows" markings, set-back stop lines, intersection-only bike lanes** (Low $: part of general maintenance budget) [CP, SHA] • **Encourage more use of the Paint Branch Trail through better maintenance and policing** (Medium $) [CP, PGC, MNCPPC, UM, Police]	• **Create process to build agency consensus on corridor recommendations** (low $) [CP, SHA, PGC, MNCPPC, UM, others] • **Launch an upfront public participation charrette re: parking policies** (Medium $) [CP, PGC, State, transit providers] • **Retain existing maximum parking standards & eliminate minimum parking standards** (Low $) [CP] o **If eliminating parking minimums is not acceptable, allow developers to pay in lieu fees** (Low $) [CP, private developers] • **By right reduction off-street parking requirements** (Low $) [CP, private developers] • **Regulatory incentives for underground parking** (Low $) [CP] • **Change zoning to discourage stand alone parking** (Low $) [CP] • **Surface parking prohibition after demolition of historic structure** (Low $) [CP] • **Prohibit surface parking in main street and town center areas** (Low $) [CP, private developers] • **Locate parking between/behind buildings** (Low $) [CP] • **Emphasize rear access through service lanes or alleys** (Low $) [CP] • **Price parking to discourage long-term commuter parking** (Low $) [CP] • **Require more bicycle parking** (Low $) [CP, PGC, developers] • **Develop corridor specific trip generation rates and require their use for traffic impact studies** (low/medium $) [PGC, CP, MNCPPC, SHA]

Time Frame	Type of Cost		
	Capital	**Operating**	**Policy**
Medium Term	• **Create Transit Super Stops** (Medium $: $3.55 million for pilot program)[iii] [WMATA, PGC, MTA, UM, private providers] • **Additional bicycle facilities along Route 1 between Beltway and College Ave.** (Low $ - Part of SHA improvements) [SHA] • **Adopt two Route 1 cross-sections (with Berwyn Rd. breakpoint) reflecting the differences in character** (Low $ - Part of SHA improvements) [SHA] • **Redesign Route 1 with target speeds of 30 mph, turning speeds of 10 mph, and appropriate signal timing** (Low $ - Part of SHA improvements) [SHA] • **Additional pedestrian facilities (crosswalks, etc.) along Route 1 between Beltway and College Ave.** (Low $ - Part of SHA improvements) [SHA] • **Additional access management measures along Route 1 between Beltway and College Ave**(Low $ - Part of SHA improvements) [SHA] • **Install additional bridges along Paint Branch Trail** (High $) [CP, PGC, MNCPPC, UM] • **Install bicycle facilities on Route 1 from College Ave to Guilford Rd. (.3 mi)** (Medium $: ~$93,000)[iv] [SHA, CP] • **Install bicycle facilities on Route 1 from Guilford Rd to the District line (3.3mi)** (High $: $982,000)[v] [SHA, CP, PGC, other cities as needed] • **Install bicycle facilities on Route 1 north from SHA project to existing bike lanes north of IKEA (.5mi)** (Medium $: $157,000)[vi] [SHA, PGC]	• **Establish corridor-wide TDM District and a self-sustaining TMA to manage it** [Medium $] [PG, MNCPPC, CP, Other cities, businesses] • **Fold Transit Services of Private Operators** (Low $) [WMATA, PGC, CP, MTA, UM, private providers] • **Coordinate fare collection and scheduling** (Med $: $1-$2 million for first year)[vii] [WMATA, PGC, MTA, UM, private providers]	• **Update "Guidelines for the Analysis of the Traffic Impact of Development Proposals" to include updated trip generation rates and trip reduction credits for various mitigation measures** (low/medium $) [PGC, CP, MNCPPC, SHA] • **Make trip reduction plans as easy an option as roadway changes for APFO compliance** (Low $) [CP, PGC, MNCPPC] • **Within TDM District, allow trip reduction offsets for reduced parking (and other techniques) for developments unable to meet LOS E.** (Low $) [CP, PGC, MNCPPC] • **Create Unified Transit Identity for Corridor** (Medium $) [WMATA, PGC, MTA] • **Strengthen parking design guidelines** (Low $) [CP] • **Façade mitigation for any parking garage on Route 1** (Low $) [CP, SHA] • **Promote technologies that facilitate drivers finding parking spaces quickly** (Medium $: approximately $450/space) [CP, private agencies] • **Consider regulating meter fees to encourage turnover** (Low $) [CP] • **Explore parking meter pay stations and advanced meter technology** (Medium $: $6000-$6,500/station)[viii] [CP] • **Utilize electronic parking guidance system** (Medium $: approximately $450/space) [CP, private agencies] • **Encourage shared parking** (Low $) [CP, private developers] • **Establish development impact fees that relate type/number of parking spaces** (Low $) [CP, PGC] • **Develop a campus bicycle master plan by the University** (Medium $: $200,000) [UM]

Time Frame	Type of Cost		
	Capital	**Operating**	**Policy**
Long Term	• **Install bicycle facilities in Cherry Hill Road corridor** (High $: $1 million for Paint Branch Trail Extension) [CP, MNCPPC] • **Install bicycle facilities on Metzerott Road (.1mi)** (Low $: $9,000)[ix] [CP, MNCPPC]	• **Consolidate Bus Routes** (Medium $) [WMATA, PGC, CP, MTA, UM, private providers]	• **Promote alternatives to SOV usage through transit investments** (High $) [WMATA, PGC, MTA, UM, private providers]

NOTES

[i] Abbreviations used: WMATA=Washington Metropolitan Area Transit Authority, PGC=Prince George's County, MTA=Maryland Transit Administration, UM=University of Maryland, SHA=Maryland State Highway Administration, CP=City of College Park, MNCPPC=Maryland National Capital Parks and Planning Commission.

[ii] Transportation Research Board, TCRP Report 46, "The Role of Transit Amenities and Vehicle Characteristics in Building Transit Ridership—Part 3," 1999. http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_46-f.pdf.

[iii] Cost for program on Columbia Pike in Arlington County, VA.

[iv]Cost analysis based on figures from: http://www.walkinginfo.org/de/curb1.cfm?codename=8b&CM_maingroup=Roadway%20Design.

$50,000/lane mile x 2 lanes: $35,000; $5,000/lane mile for lane restriping x 2 lanes: $3,500; $35,000/lane mile scarifying existing lanes: $20,000; Signs, $100 every 0.25 miles: $800; Markings, $150 every 200 feet: $2400; Sum total plus 50% contingency: $93,000.

[v] Cost analysis based on figures from: http://www.walkinginfo.org/de/curb1.cfm?codename=8b&CM_maingroup=Roadway%20Design.

$50,000/lane mile for bike lane x 2 lanes: $330,000; $5,000/lane mile for lane restriping x 4 lanes: $66,000; $35,000/lane mile scarifying existing lanes: $231,000; Signs, $100 every 0.25 miles: $1600; Markings, $150 every 200 feet: $26,000; Total plus 50% contingency: $982,000.

[vi] Cost analysis based on figures from: http://www.walkinginfo.org/de/curb1.cfm?codename=8b&CM_maingroup=Roadway%20Design.

$50,000/lane mile for bike lane x 2 lanes: 50,000; $5,000/lane mile for lane restriping x 6 lanes: $15,000; $35,000/lane mile scarifying existing lanes: $35,000

Signs, $100 every 0.25 miles: $400; Markings, $150 every 200 feet: $4000; Total plus 50% contingency: $157,000.

[vii] Transportation Research Board, TCRP Report 94, "Fare Policies, Structures, Technologies Update", 2003, pg. C-3. This estimate describes yearly costs for a small bus agency (100 vehicles, 20,000 avg. weekday ridership) in a regional fare program.

[viii] DKS Associates. "Smart Parking Meters Take Over the West." http://www.dksassociates.com/admin/paperfile/Smart_Parking_Meters_Take_Over_the_West.pdf

[ix]Cost analysis based on figures from: http://www.walkinginfo.org/de/curb1.cfm?codename=8b&CM_maingroup=Roadway%20Design

$50,000/lane mile for bike lane x 2 lanes: $5,000; Signs, $100 every 0.25 miles: $200; Markings, $150 every 200 feet: $800; Total plus 50% contingency: $9000.

1 Goals, Objectives, Performance Measures

The recommendations contained in this report are based on the goals for the Route 1 corridor that were developed during the January 22, 2007 meeting and subsequently refined.

The main goals and objectives for the Route 1 corridor, summarized from the first report, are as follows:

Create a Place. Route 1 should function as a place, with its own identity. While some progress has been made in this regard, the corridor is still more a collection of independent entities than a location in and of itself. Stakeholders understood "creating a place" to enhance the quality of life and to improve safety and security. Stakeholders further understood "creating a place" to mean "integrating transportation with land use." The stakeholders see transportation and land use in the Route 1 corridor as currently fundamentally disconnected, and understand that in order to become a place, they need to become connected.

"Create a Place" summarizes the community's overall goal for the corridor. Several other goals are necessary to achieving this overall goal, although they are not listed as sub-elements. Earlier work by this consultant team focused on the community's land use goals, and made several recommendations more focused on the land use side of the integration, chiefly that given current demand patterns, the whole corridor could not support mixed use, and that the city and county should instead pursue a strategy of developing vibrant, mixed-use nodes.

Subsequent work by this consultant team has focused on the transportation side of the integration, for two reasons. First, if the nodal strategy is pursued on the land use side, it will need a supportive transportation system to succeed. Second, in order for the community to get essentially any of the new types of land development that it wants, it needs a better Route 1. Quality development comes to a quality street. Quality development very rarely comes to the kind of transportation corridor that Route 1 currently is.

Finally, many transportation-related goals are also land use goals. For example, providing the right amount and type of parking sounds transportation-focused, but is arguably at least as important to land use by freeing up land for development, and allowing buildings to move toward the street.

Thus, keep in mind that the following goals and objectives, although largely transportation-oriented, are necessary to achieving the community's land use goals, and the overall goal of creating a place.

Make City and County Development Processes More Predictable. The Adequate Public Facilities Ordinance (APFO) can hinder, not help, the cause of mixed-use development. Outside the sector plan area, where capacity is evaluated for a fairly small area, if developers' projects use up the available capacity, it can prevent further development, which is not the intent of the APFO. Within the sector plan area, there is no prescribed mechanism for developers to reduce their predicted traffic, with the result that developments do not necessarily support the overall goals for the corridor as laid out in the *Sector Plan*. The APFO should be revised to support the *Sector Plan* goals and ensure that developers have a set of guidelines to follow.

Have Transit Support Additional Development and be Easy to Use. To support the kind of growth in the corridor envisioned in the Sector Plan, transit providers must anticipate future demands and develop transit in coordination with development, rather than catching up after the fact. Area transit providers support developing a high-frequency, "branded" service along the corridor. Good coordination of services will be a key to success.

Provide the Right Amount and Type of Parking. Parking varies along the corridor, with more urban parking patterns to the south and more suburban ones to the north. As a component of new development, parking should fit the type and amount of development rather than fulfill an arbitrary quota. Mixed-use development should incorporate shared parking and parking behind buildings rather than in front of them.

Provide Safe, Accessible and Convenient Pedestrian Infrastructure. There is high demand for better pedestrian facilities. Route 1 has some good accommodation for pedestrians, especially in the downtown College Park area, but facilities towards the Beltway are lacking. There are crosswalks and pedestrian islands in some locations, but ramps are often poorly positioned or blocked, and intersection geometry is generally designed to facilitate automobile movements, not pedestrian safety. If Route 1 is to become a place with its own identity, the corridor must give pedestrians safe and convenient access.

Accommodate Bicyclists Throughout the Corridor. Located adjacent and through the University of Maryland, Route 1 could help meet the substantial University-based bicycle demand. However, there are no bicycle lanes, sporadic bicycle parking, and poor wayfinding signage to existing trails. Existing trails in the corridor can serve as needed transportation facilities as well as recreational trails, especially for students, but are currently not made part of the system.

Performance measures were not discussed in detail during the January meeting.

2 CONDITIONS FOR SUCCESS

The City of College Park and Prince George's County jointly developed the *Sector Plan* with the hope of encouraging mixed-use development along the corridor. However, five years later, the results have not met expectations. According to the *Achieving the Vision* report, commissioned with the goal of learning why the Sector Plan was not producing the anticipated results and obtaining suggestions for changes, there are several reasons why the Plan has not been successful:

- Too much land available for mixed-use development. The corridor would be better served by clustering commercial uses in three nodes, instead of allowing it along the entire length of the corridor.

- Route 1 does not accommodate pedestrians well. A "main street" feel requires changes to parking, sidewalks, and access management.

- The development process is too unpredictable. If the city and county wants to encourage certain types of development in certain locations, the process must be more predictable.

This report addresses the second and to some extent the third of these points, with specific suggestions related to a variety of transportation issues, as well as the APFO that developers must contend with. However, there are broader issues for the city and county to address that are also essential to the process.

- *Make Route 1 a high priority for funding.* The State Highway Administration (SHA) has already developed a plan for reconstructing Route 1, which we address in Section 8. In many places, this type of public investment in making a roadway more inviting for pedestrians has reaped substantial benefits in terms of private investment. (For example, the highly successful Barracks Row project in Washington, DC began as a District-funded streetscape improvement, and private investors followed with retail and restaurants.) This may require significant cooperation between the city, county, and state. If it is not possible to implement the entire plan, it may be possible to tackle one segment at a time.

- *Ensure that elected officials and the County Planning Board are involved with and aware of these reports and recommendations*. The County Planning Board is the ultimate decision-maker for development proposals, which also includes review of the APFO adequacy tests. If the City and County are in agreement about the preferred type of development, then the approvals process should be set up such that those developments speed through with as little uncertainty as possible, and undesirable developments are not approved.

- *Adopt a formal "complete street" policy*. Such a policy would make clear the city's and county's intention to give all transportation modes priority. At the moment, policies seem to favor personal vehicles over pedestrians, bicycles, and transit. This will give credence to the desire to make Route 1 a Main Street and individual place, as opposed to a through route to the District and Beltway.

3 ADEQUATE PUBLIC FACILITIES ORDINANCE

Prince George's County has an Adequate Public Facilities Ordinance (APFO) that requires all new development to meet adequacy measures for various types of public facilities. While the ordinance covers most public infrastructure, including roadways, water and sewer, police/rescue services, and schools, this report only considers tests of roadway adequacy. Essentially, the ordinance requires that all new development proposed in those areas over which the county has zoning jurisdiction (including College Park) show that the proposed development will either not adversely impact existing roadways and intersections, or that the impacts can be sufficiently mitigated.

3.1 Goals and Drawbacks of APFOs

The goal of an APFO is to ensure that the jurisdiction has adequate levels of services in place before development arrives, to avoid straining existing resources and decreasing existing levels of performance. For example, an APFO might require that enough school capacity exists before allowing a new residential development that would attract residents with school-age children. Otherwise, the school system would end up overcrowded.

In terms of transportation, APFOs commonly use tests of roadway and intersection capacity. Engineers use a determination of level of service (LOS), which is based on a ratio of traffic volume to capacity. For a given segment of road or intersection, the higher the number of vehicles, generally the worse the LOS. LOS extends from A to F, like grades in school. LOS A means that traffic is entirely free-flowing; LOS F is essentially gridlock. These determinations are based on specific engineering measures, which is why they are considered an objective test of local congestion. There are different measures for roadway segments than intersections; however, measures for both are site-specific and do not address regional vehicular flows.

However, the flip side is that APFOs have occasionally been so effective at slowing development in certain areas that they force new development to the outskirts of a region, in many cases exacerbating regional traffic problems. A point arrives at which any new development would push the existing congestion into unacceptable levels, and therefore effectively shuts down development. Once all of the roadway and intersection capacity is "taken" by existing traffic, no new development is allowed. This situation can be at odds with a jurisdiction's desire to encourage development in specific areas.

Another drawback of APFOs is that they rely on projections of future traffic, which can be less than fully accurate. Many APFOs rely on estimates of vehicular trips created by the Institute of Transportation Engineers (ITE),[7] which publishes a guidebook, updated occasionally, that contains a range and average for the number of trips that would be expected based on a particular land use. Some observers have criticized these rates, since they are often based on a small number of observations and lumped together with no explanation about why they vary so widely.

The reliability of the trip predictions varies to a large extent by category. For example, the category for low-rise apartments shows a range for morning peak hour trips between 0.25 and 0.86 trips per dwelling unit, with an average of 0.46. ITE's statistical analysis shows that there seems to be a reasonably strong relationship between the number of dwelling units and the number of trips, (R^2 of 0.81).[8] This figure is also based on 27 studies. In contrast, a category such as "quality restaurant," while based on 21 studies,

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[7] Institute of Transportation Engineers, *Trip Generation*, 7th edition. 2003.

[8] R^2 is a statistical measure of the relationship between two variables. The highest possible value is 0.99, which would mean a near perfect relationship between them in terms of the value of one predicting the value of the other. The lower the R^2, the weaker the relationship.

has a range from 2.42 to 18.64 trips per 1,000 square feet during the evening peak hour, and the statistics show that there is essentially no relationship between the size of the restaurant and the number of trips it generates (the R^2 is not even calculated). While it is fairly predictable that some number of people living in an apartment building will leave each morning to go to work or school, it is far less predictable that a large restaurant will draw crowds on a given weeknight. Even for an apartment complex, it seems logical to assume that the size of the units will have some impact on the number of trips, since a two-bedroom apartment would accommodate more people than a studio.

The ITE *User's Guide* also notes that, "Data were collected primarily at suburban locations having little or no transit service, nearby pedestrian amenities, or travel demand management (TDM) programs."[9] Therefore these rates are not appropriate for use in more urban locations where residents and visitors have a wider range of travel options (such as the majority of Route 1).

Finally, the last problem that can occur with APFOs is that the remedy for traffic congestion is to widen the road or create more turn lanes at an intersection. While this approach may well improve the LOS for a given segment or intersection, creating wider or more lanes has a generally negative impact on pedestrians and bicyclists, and erodes the urban fabric. As a result, more traffic may be inadvertently generated because conditions for alternative modes have deteriorated.

3.2 Implementation of Existing APFO

Throughout the county, new development must meet the "adequacy" test that nearby roadways and intersections will not operate worse than a certain LOS under future conditions. Along Route 1, the standard is LOS E. Elsewhere in the county, the LOS is calculated for specific roadway links and intersections. However, along the section of Route 1 covered by the Sector Plan, the LOS is calculated by an average within a segment: north, middle, and south. LOS is defined using a measure of congestion at each intersection, average critical lane volume (CLV). The average CLV over the segment is 1,600 vehicles per hour; the CLV is defined as the sum of all through- and left-turn movements in both directions in one hour. CLV is generally a shorthand for wait times at an intersection.

This segment-wide approach avoids the pitfall of making new development—in an area that city and county agree should be further developed—dependent on the functioning of a few intersections, and we recommend its continuation. It could even be possible to extend this averaging concept to the entire corridor.

In Prince George's County, the APFO requires that any development projected to produce more than 50 trips during either morning or evening peak hour be subject to a traffic impact analysis. The developer (or the developer's engineer) conducts the analysis. Before the analysis begins, the traffic engineer submits a scope to M-NCPPC detailing the area to be studied. If approved, the study is completed and then reviewed by both the City of College Park as well as the Prince George's M-NCPPC Planning Department. The Planning Department makes a recommendation to the County's Planning Board whether to accept the results of the study and allow the development to proceed or whether the developer needs to incorporate changes to the development.

M-NCPPC has issued *Guidelines for the Analysis of the Traffic Impact of Development Proposals*, last updated in September 2002.[10] These guidelines explain to developers and their traffic engineers how the traffic impact study should be conducted. Table 4 of the Guidelines contains a set of trip generation rates

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[9] *Trip Generation, User's Guide*, p. 1.

[10] Maryland-National Capital Park and Planning Commission, *Guidelines for the Analysis of the Traffic Impact of Development Proposals*. Updated September 2002. www.mncppc.org/county/Traffic_Impact_Guidelines.pdf.

that are based on similar projects in Prince George's County. While the trip rates are for vehicle trips only, they are based on areas of the county "where public transit service may have been available."[11] According to conversations with Planning staff, these rates are intended to predict vehicle trips only, as transit or non-motorized trips are considered to have already been accounted for.

In general, developers are required to use the County's established rates. For land uses not listed in the County's guide (miscellaneous commercial, shopping center, warehouse), the Guidelines direct developers to use ITE rates. In this case, the expectation is that average rates will be used (as noted above, ITE provides a range). Developers are also able to estimate higher levels of vehicle use than these two sources, however. For example, a study of traffic for the Mazza Grandmarc development in the north segment of Route 1 referenced a study conducted by an engineering firm of a high-rise college apartment complex in North Carolina. This resulted in a far higher number of trips (193 during evening peak) than the Guidelines would have projected (88 trips).

Also for some land uses, developers are allowed to discount for "passby" trips, meaning that they can assume that some percentage of trips are made en route to another destination, and thus do not represent additional traffic. Allowances for passby trips are given in Table 4 of the Guidelines.

The analysis also includes traffic that is expected to be generated by other proposed development along the segment, as well as any planned roadway changes that have committed funding. Funding could be public or private (such as a new lane funded by another developer).

M-NCPPC Planning staff may either accept or reject these alternate rates and the resulting traffic projections. Their main concern is that new vehicle trips not be underestimated. Therefore their tendency is to accept traffic impact studies with higher-than-anticipated trips but question studies with lower trips.

A review of three traffic impact analysis studies—one each from the three segments—found several inconsistencies in how the *Guidelines* were applied. In one example, two studies of retail trips reached differing conclusions about whether the developments would generate trips during the morning peak hour. One study assumed it would be zero while the other assumed there would be 57 trips, an even higher rate than during the evening. In another example, a study used the same trip generation rate for two different land uses (high-rise condo and fast-food restaurant) with no explanation; we could not independently confirm how the number of trips was calculated. While it is possible that these studies were not accepted by M-NCPPC, it points out that there seems to be a fair amount of leeway on how these trip rates are applied, and that questionable assumptions may be accepted.

If the study shows that traffic will not cause the segment in which the development is located to become worse than LOS E, the study is accepted and no further action is needed by the developer in this regard. However, there may be a number of outcomes if the study shows that traffic will operate below LOS E:

- The developer can reduce congestion to LOS E through changing the roadway geometry.[12] For example, the Mazza Grandmarc study found that traffic in the north segment would not continue to meet the LOS E standard during the evening peak hour. To reduce congestion, they suggest a second westbound turn lane along a side street. According to the analysis, this would alleviate the anticipated congestion at this particular intersection and conditions would be better than LOS E.

[11] *Guidelines*, p. 31.

[12] We deliberately do not use the standard engineering term "improvement," since as noted earlier in the section, what constitutes an improvement for drivers may equally be a denigration for pedestrians and bicyclists.

- The developer can offer a plan to reduce anticipated vehicle trips. The process for doing so is described in the *Guidelines*: "Assumptions regarding future travel to the site with the use of trip reduction strategies must be based on regional or local survey data, the proximity of various other land uses, and the trip reduction strategies to be implemented by the applicant or under the authority of a Transportation Demand Management District pursuant to Subtitle 20A of the County Code (Appendix A). Local data may be collected and utilized if the collection method is agreed to by TPS staff prior to conducting such surveys."[13] The Planning Board decides whether to accept the suggested trip reduction plan; if yes, the development is conditional on the plan being implemented. In theory, the developer's failure to implement such a plan, or the plan's lack of success in reducing trips by the required amount, could constitute the basis for future legal action. We are not aware of any examples of this process that have occurred in the County.

- If neither a roadway geometry change nor a trip reduction plan would improve operations to LOS E, and the development would generate at least 50 new trips, the developer can prepare a Transportation Facilities Mitigation Plan (TFMP). Although this is not permitted throughout the entire county, Route 1 is an eligible area. The TFMP has to commit to specific roadway changes, to be funded by the developer, to reduce the traffic impacts associated with the development. However, the standard is somewhat more relaxed; the relevant CLV at critical intersections is 1,813, rather than 1,600. The *Guidelines* do not suggest how these impacts can be mitigated; the developer must suggest a strategy. TFMPs are then reviewed by County staff before final review by the Planning Board.

3.3 APFO Coordination with TDM District

While it is outside the scope of this report to draft a new APFO, the following observations may help identify some areas of change.

3.3.1 Trip Generation Rates

Since so much future decision-making depends on the number of trips that are projected to be generated by a specific development and the share of trips accommodated by each mode, it is of utmost importance that these figures be as accurate as possible. While trip generation projection can never be an exact science, it is important that trip generation be both consistent and evidence-based.

The Guidelines should be regularly updated with studies relevant to the County and more specifically to the Route 1 corridor. As an area with substantial transit, pedestrian, and bicycle infrastructure, the Route 1 modal split characteristics applied to the corridor should project continued use of all modes, and shift from significant reliance on auto travel. Ideally, applicants would use trip generation rates based on studies conducted in the corridor, which would be the best predictors of future travel behavior. In particular, the Guidelines should develop a rate for retail uses based on County observations, as ITE rates for retail are based on auto-dependent locations.

These rates could also incorporate general measures for transit, pedestrian, and bicycle friendliness, as discussed below in Section 3.3.2. Since these trip reductions are not developer-specific, any developer in an area with high rates of these services should be allowed some type of credit for a Route 1 location. The rates currently account for differences in density, which in some cases coincide with multi-modal facilities, but this could be expanded upon. One option is to require traffic modeling based on the URBEMIS model, described in more detail below. This model allows the analyst to use basic ITE rates and expand on them with multi-model availability information.

[13] *Guidelines*, p. 31.

Developers should be given updated traffic generation rates, based on the most recent data for the Route 1 corridor. This would make trip generation more consistent and specific to the corridor. In addition, developers should be held to the specified rates. While developers are supposed to explain any deviations from trip rates in Table 4, the studies we reviewed did not comment on this issue, even though they did not all use the recommended rates.

From the transportation side, the County's preference seems to be that developers make conservative estimates, erring on the high side or expecting more traffic than may actually come about. This results in a situation where roadway reconfigurations and other mitigations, such as adding lanes, are a likely result, to avoid congestion worsening beyond LOS E. If developers perceive a Planning Board bias in favor of high estimates, they are over time more likely to use higher trip generation rates to avoid additional scrutiny, thus resulting in a continuing pressure for more reconfigured intersections. Instead, the County should encourage consistency in trip generation rates so that all development applications are evaluated fairly.

If trip generation rates are fixed, the review process should be easier, since there is no discretion involved in whether an appropriate rate was used. Review can then focus on whether appropriate rates were accurately applied.

3.3.2 Accommodating New Trips

Route 1, with its multiple transit operators, mixed uses, and high population of students with bicycles, can clearly accommodate some new trips by modes other than driving. The APFO should account for this and encourage more use of trip reduction plans and TDM strategies, rather than assuming that all new trips must be accommodated by automobile.

While developers do have the option of creating a trip reduction plan to address their projected new traffic, a host of formal and informal factors make this a less likely outcome than suggesting roadway geometry changes:

- Traffic impact studies are generally conducted by engineering firms, who are more familiar with roadway geometry than with TDM.
- If the Planning Board has a track record of approving roadway geometry changes, and little or no history with trip reduction plans, the "safer" course for a developer is to suggest a roadway change.
- Since the *Guidelines'* trip generation rates are said to incorporate areas with transit, it suggests that all new trips are assumed to be vehicular. Applicants are subtly discouraged from assuming that any new trips could be pedestrian, bicycle, or transit.
- The *Guidelines* have a higher standard for trip reduction plans than for roadway changes. The Guidelines suggest that trip reduction plans be tied to the phasing of development, and approval of a second stage of development be contingent on the first phase demonstrating the efficacy of the trip reduction plan. However, breaking a development into phases is not necessarily cost-effective for a developer, and may not be possible with a single building. In addition, if roadway changes are proposed, no such test must be met; the Guidelines assume that the changes will be effective and the developer is not encouraged to split a development into phases to prove it will work. So the "burden of proof" is far higher for a trip reduction plan.

So while nothing prevents a developer from putting forward a trip reduction plan, from a developer's standpoint it is inherently more risky to do so.

The APFO, through the Guidelines or *Sector Plan*, could encourage the use of trip reduction plans by making them easier to use for developers, and showing that TDM plans help win project approval. Right now the “path of least resistance” for a developer to obtain Planning Board approval for a traffic impact study is through a roadway approach, while a trip reduction strategy is risky because some of the parameters are uncertain. We recommend reversing the two, such that a trip reduction plan is the default mode, and roadway changes (other than those discussed elsewhere in this report to support pedestrian activity and bicycling) are only a last resort. The parameters for trip reduction can be strengthened by implementing the principles outlined below and codifying them for future developments.

3.3.3 Principles of Trip Reduction Credits

While perhaps not all of these ideas can be incorporated, here are some ways to reverse this situation and provide credits to developers. The following sections are based on the report *Crediting Low-Traffic Developments: Adjusting Site-Level Vehicle Trip Generation Using URBEMIS*,[14] which discusses research on the impact of various measures on trip rates. The California Air Resources Board (CARB) developed the “Urban Emissions Model” (URBEMIS), a computer modeling tool to assist local public agencies with estimating air quality impacts from land use projects when preparing an environmental analysis. The model identifies mitigation measures and emission reductions associated with specific mitigation measures, which can be applied to calculate the reduction in trips generated due to specific factors. This report found that the greatest reductions in trips for residential developments occurred with higher densities, and for commercial developments with transit service and paid parking (See Figure 1).

[14] Nelson\Nygaard Consulting Associates. *Crediting Low-Traffic Developments: Adjusting Site-Level Vehicle Trip Generation Using URBEMIS*. August 2005. Available at www.nelsonnygaard.com/articles/urbemis.pdf

Figure 1: Summary of Trip Reduction Credits

	Residential[1]	Non-Residential
Physical Measures		
Net Residential Density	Up to 55%	N/A
Mix of Uses	Up to 9%	Up to 9%
Local-Serving Retail	2%	2%
Transit Service	Up to 15%	Up to 15%
Pedestrian/Bicycle Friendliness	Up to 9%	Up to 9%
Physical Measures Subtotal	Up to 90%	Up to 35%
Demand Management and Similar Measures		
Affordable Housing	Up to 4%	N/A
Parking Supply[2]	N/A	No limit
Parking Pricing/Cash-Out	N/A	Up to 25%
Free Transit Passes	25% of the reduction for transit service	25% of the reduction for transit service
Telecommuting[3]	N/A	No limit
Other TDM Programs	N/A	Up to 2%, plus 10% of the credit for transit and ped/bike friendliness
Demand Management Subtotal[4]	Up to 7.75%	Up to 31.65%

Source: *Crediting Low-Traffic Developments: Adjusting Site-Level Vehicle Trip Generation Using URBEMIS*, Figure 1

Notes: 1) For residential uses, the percentage reductions shown apply to the ITE average trip generation rate for single-family detached housing. For other residential land use types, some level of these mitigation measures is implicit in ITE average trip generation rates, and the percentage reduction will be lower.

2) Only if greater than sum of other trip reduction measures.

3) Not additive with other trip reduction measures.

4) Excluding credits for parking supply and telecommuting, which have no limit.

Most experience with TDM is with employer- and/or transit-based programs. But as this table shows, there are a wide variety of actions that can help reduce traffic generation from residential, including single-family residential.

Several of these measures are more or less beyond the control of individual developers, such as the level of transit service provided. For these cases, a general trip reduction factor for Route 1 could be created, and this would be applied to all development within the corridor (see previous section). The following sections discuss some of these measures in detail.

3.3.3.1 Parking Reduction Offsets

As recommended in section 6.1.1 of this report, Route 1 should not have parking minimums. Providing a parking minimum creates a built-in incentive for automobile use and a disincentive for other modes of travel; developers should be free to target the non-driving population if they so choose. If developers want to provide the maximum parking allowable, they would receive no offset against their trips generated. However, if they choose to provide less than the maximum amount of parking, they would receive credit against some percentage of their trips generated.

Based on research showing that reducing parking availability reduces automobile use,[15] URBEMIS grants a credit of 50 percent of the difference between actual parking supply and values reported in ITE's *Parking Generation*, based on the following trip reduction credit calculation for providing reduced parking at commercial land uses:

Trip Reduction Credit = (Provided parking rate - ITE parking rate) * 0.5

For example, if the ITE parking rate is 1 space per 1,000 square feet, and the parking provided is 0.75 spaces per square feet, that constitutes a 25 percent reduction. Half of 25 percent is 12.5 percent, so the formula says that trips will be reduced by 12.5 percent.

In addition to commercial buildings, housing for student population offers significant opportunities to reduce auto ownership and potentially auto trips by reducing the number of parking spaces. Developers would still be free to provide parking if they thought the market required it, but this would provide an incentive to reduce the number of spaces. In addition, not providing free parking means that spaces can be leased. Especially within a high-density building, this is a more effective way of allocating parking than simply assigning one space per unit. Another way to conceptualize reducing free parking for multi-family buildings is to "unbundle" the parking from each unit. When parking is optional, residents can choose to purchase or lease a space, or to save money for other expenses. The City of San Francisco has gone so far as to require unbundled parking in new developments in the 2005 Rincon Hill Area Plan.[16]

A further incentive would be to reduce some number of trips for every carsharing space provided in the development. While several carsharing vehicles are currently provided at Metro stations and on the UM campus, this could be expanded by placing them in residential developments. For example, in a residential building of 100 units, instead of providing 100 spaces, a developer could provide 95 spaces for residents and one space dedicated to carsharing parking. This ratio is based on evidence from North America that one shared car replaces five private cars.[17] While carsharing is not effective for people who drive to work, carsharing can work extremely well for those who need a vehicle for occasional shopping or recreational trips. In conjunction with existing transit service, we believe this would provide multiple benefits, including reduced automobile ownership and driving along Route 1.

3.3.3.2 Bicycle Parking Credits

Because of the high potential bicycle ridership in the corridor, developers should also be able to reduce their predicted vehicle trips through provision of on-site bicycle parking, in conjunction with reducing vehicular parking. The high number of bicycles parked outdoors along Route 1 attests to the demand for off-street bicycle parking, which is safer and more convenient for cyclists.

[15] "Auto ownership is one of the principal explanatory factors of trip frequency and mode choice for work and non-work activity destinations." (Daniel Baldwin Hess and Paul M. Ong, *Traditional Neighborhoods and Auto Ownership*, The Ralph and Goldy Lewis Center for Regional Policy Studies, UCLA, School of Public Policy and Social Research, November 2001, citing Gärling *et al.* 1998, Mogridge 1989, Stopher and Lee-Gosselin 1997). Kuzmyak, J Richard; Pratt, Richard H and Douglas, G Bruce. *Traveler Response to Transportation System Changes. Chapter 15 – Land Use and Site Design.* Transportation Research Board, TCRP Report 95, 2003. Lund, Hollie; Cervero, Robert; and Willson, Richard, *Travel Characteristics of Transit-Oriented Development in California.* Final Report. January 2004.

[16] Rincon Hill Area Plan, Accessed on August 12, 2007 at http://www.sfgov.org/site/planning_index.asp?id=24894.

[17] Transit Cooperative Research Program, Report 108. *Car-Sharing: Where and How it Succeeds.* Exhibit 4-4. Transportation Research Board, 2005.

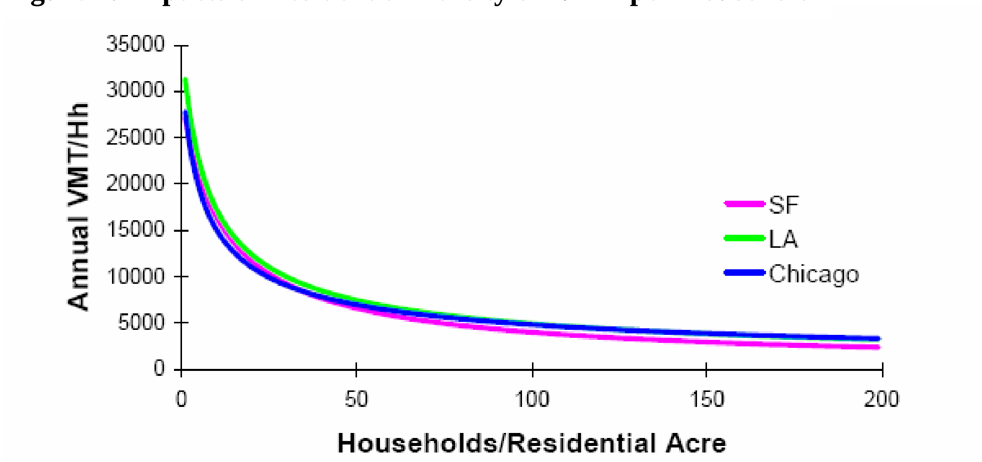
3.3.3.3 Transit Improvement Credits

Developers could also be given credit for reducing the number of predicted trips if they agree to make transit stop improvements. For example, a developer would "adopt" a bus stop along Route 1 and agree to be responsible for providing amenities (see section 5.1.1.3) and maintenance of the stop (removing trash, graffiti, etc.). This agreement would be accepted as a condition of development and the maintenance would pass to the building owner.

3.3.3.4 High-Density Housing Credits

As Figure 2 makes clear, the greatest potential trip reductions come from higher density housing. While computed according to a somewhat complex formula, in general research has found that the greater the residential density, the lower the VMT, with the largest gains possible in the shift from low- to medium-density housing. This is generally seen in the steep downward curve up to 50 households per residential acre in Figure 2.

Figure 2: Impacts of Residential Density on VMT per Household



Source: Holtzclaw, J.; R. Clear; H. Dittmar; D. Goldstein; and P. Haas, "Location Efficiency: Neighborhood and Socio-Economic Characteristics Determine Auto Ownership and Use – Studies in Chicago, Los Angeles and San Francisco," *Transportation Planning and Technology*, 25 (1): 1-27. 2002.

Current traffic generation rates in the Route 1 corridor account for density to some extent. This could be extended, possibly combined with reduced parking, provision of bicycle parking, and carsharing vehicles, as discussed above.

3.3.3.5 Mandatory Route 1 TDM District

A TDM district (discussed in more detail in Section 4 of this report) would provide implementation of many of the elements of a trip reduction strategy. It could provide residential and employer transit passes, set up carpools at workplaces, work with transit providers on signage and directions, serve as an advocate for improved facilities for pedestrians and bicyclists, and market events such as "Bike to Work Day." Developers would agree that their building owners would become TDM district members and that tenant employers would agree to participate as a term of their lease.

Setting the appropriate trip reduction target for development could be based on travel surveys of corridor residents and employees, but we offer some suggestions here. Studies have shown that TDM programs in various places have empirically reduced employee vehicle trips by up to 38 percent, with the largest reductions achieved through parking pricing.[18] URBEMIS provides credits for a range of TDM program elements, provided that they form part of a legally enforceable agreement (for example, a development agreement with a city) that guarantees that the mitigation measures will be implemented. URBEMIS provides the most credit for the three TDM elements that have the greatest impact on travel behavior:

- Parking pricing: up to 25 percent trip reduction, which is attained with a $6 daily charge. Parking cash-out programs provided by employers are granted half of the reduction for direct parking charges, in recognition of the fact that their impacts tend to be significantly lower.[19]

- Free transit passes: up to 25 percent of the trip reduction granted for transit service availability.[20] (Free transit pass programs have been shown to reduce vehicle trips by up to 19 percent.) Thus, the credit is more valuable in places that have good transit service.

- Telecommuting and compressed work schedules: employee vehicle trips are reduced by the percentage of employees that telecommute, or have a “free” day gained through a compressed schedule, on an average day.

Other TDM program elements, which do not include financial incentives, tend to have a smaller impact on travel behavior. Reductions are based on the number of the following elements incorporated into the program, as shown in Figure 3:

- Secure bicycle parking (at least one space per 20 vehicle parking spaces)
- Showers/changing facilities
- Guaranteed ride home
- Car-sharing services
- Information on transportation alternatives, such as bus schedules and bike maps
- Dedicated employee transportation coordinator
- Carpool matching programs
- Preferential carpool/vanpool parking

The impact of a TDM program will also depend on the travel alternatives available. A program will have more impact if the site is served by frequent transit, for example. For this reason, URBEMIS uses part of the TDM credit to adjust the credits granted for transit service and pedestrian/bicycle friendliness (see Figure 3).

Credits for all TDM program elements are applied only to the types of trips that the TDM program seeks to influence. For example, if only employees, and not visitors, are subject to parking charges, the credit is applied only to employee vehicle trips.

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[18] Pratt, Richard H (2000), Traveler Response to Transportation System Changes. Chapter 13 – Parking Pricing and Fees. Transportation Research Board, TCRP Report 95.

[19] Pratt, 2000.

[20] Shoup, Donald (1999). “The Trouble with Minimum Parking Requirements,” *Transportation Research Part A*, 33: 549-574.

Figure 3: TDM Program Reductions

Level	Number of Elements	Recommended Reduction
Major	At least 5 elements	2%, plus 10% of the credit for transit and pedestrian/bike friendliness
Minor	At least 3 elements	1%, plus 5% of the credit of transit and pedestrian/bike friendliness
No Program	None	None

Source: *Crediting Low-Traffic Developments: Adjusting Site-Level Vehicle Trip Generation Using URBEMIS*, Figure 5

Pedestrian and bicycle supportiveness could be determined along the entire corridor; URBEMIS suggests a maximum of nine percent credit. If the corridor achieved this nine percent, then a developer who puts a major program into place would receive an additional credit of 0.9 percent, for a total of 2/9 percent trip reduction. URBEMIS has isolated three factors to measure pedestrian and bicycle supportiveness: intersection density/street connectivity; sidewalk completeness; and bicycle network completeness. The "ideal" intersection density would be a grid with an intersection every 300 feet, or a total of 1300 intersection legs per square mile. Sidewalk and bicycle network completeness are defined as the percentage of all roadways with facilities on both sides of the street (or half credit for facilities on one side).[21]

If the *Guidelines* are amended to incorporate some of these suggestions, a table can be provided detailing exactly how many trips a developer can offset through these various means. That will make the development process more predictable than if it is left up to the developer's discretion to create a trip reduction plan, since there will be no debate on whether to accept it. These trip reduction measures should be mandatory. Roadway geometry changes and the mitigation process could still be used if the number of trips to be generated would still push the segment out of LOS E. The predictability of the process will likely make development along Route 1 more attractive for developers.

[21] Nelson\Nygaard Consulting Associates, 2005.

4 TDM DISTRICT

4.1 Overview and Goals

Transportation Demand Management (TDM), if implemented strategically, can have a significant impact on reducing trips along this corridor. TDM by definition includes various strategies that produce a more efficient use of transportation resources and increase a transportation system's efficiency. The University of Maryland, serving the campus community, has had much success with its Transit Services and Alternative Transportation programs, which include their shuttle, charter, paratransit, NITE Ride and taxi services, as well as their Flexcar (carshare), Smart Park Carpool, Metrochek and SmarTrip programs. Additionally, their Department of Transportation Services provides a clearinghouse for information on park-and-rides, bicycling, and public transportation.

Establishing a TDM district is not a one-size-fits-all solution, since there are various issues that contribute to the traffic problem in the Route 1 Corridor.

4.1.1 Sources of Traffic on Route 1

4.1.1.1 Thru Traffic to the Beltway

Studies have shown that 15 to 20 percent of traffic on Route 1 is pass-through traffic; typically, a TDM district will not affect this type of traffic. Some of this traffic might be alleviated through more robust transit service along the entire corridor, as discussed in section 5, or corridor vanpooling can be established. In New York, the New York State Department of Transportation implemented a pilot vanpool program for three years to mitigate traffic in the I-287 corridor during a major construction project. The goal of the pilot was to establish 75 new vanpools and remove more than 600 vehicles from the corridor's congested roadways. Appropriate goals for this type of pilot or potentially ongoing program could be established based on the number of pass-through drivers and riders, depending on funding, which will discussed in Section 4.2. The program could be implemented through Commuter Connections or through a newly formed local College Park TMA.

4.1.1.2 University of Maryland Students, Faculty, Staff, and Visitors

The University of Maryland (UM) has a comprehensive and successful TDM program with a variety of services and incentives for students, faculty, and staff. Of the 50,000 staff and students at UM, nearly 80 percent commute to campus. 5,000 are currently using the University shuttle system. Nearly half of the population of College Park (about 13,000 residents) are between the ages of 18-24, and it is probably fair to say that many of them are UM students. 8,250 students live on campus, so it is safe to estimate that upwards of 5,000 live off campus and perhaps outside the City of College Park, a short driving distance from UM.

There are clearly some substantial numbers still driving to campus, given the convenience and availability of affordable parking. The City of College Park should continue to foster open communication and collaboration with UM, as they further improve their own shuttle system through the UM Master Plan. Additionally, College Park could work with UM to offer resources in assisting in promoting UM's existing TDM program through a newly formed TMA.

4.1.1.3 Local Employers—Commuting Employees

The Route 1 corridor is lined with dispersed commercial and retail employment. Although TDM strategies are typically a challenge in this type of setting, there are some possibilities. For example, University Village in Seattle, Washington has been designated as a Best Workplaces for Commuters District by taking commuter benefits to a new level, providing a valuable advantage to local businesses and the people who work there. University Village provides the 1,800 employees who work in the district with the following commuter benefits: discounted transit passes, carpool matching, preferred parking for carpools, secure bike parking, showers and lockers, and a Guaranteed Ride Home program. These programs can have a significant impact on vehicle traffic and can be offered through a new TDM district.

4.1.1.4 Residential Traffic

Residents contribute to the traffic congestion along the Route 1 corridor. One method to help reduce residential trips is carsharing. It provides flexible transportation and instant access to a network of cars throughout the corridor, 24 hours-a-day. Customers pay per trip, without commitment or inconvenience. Carsharing has been used as a successful TDM strategy, in support of a variety of transportation options and alternative arrangements. Possible benefits include:

- Typically, one shared car replaces 6 or more individually owned cars.
- Some members give up their cars when joining
- Other members avoid buying a new one because they joined
- Typically members use transit more often

Currently the two carshare providers that serve the Washington region have a total of nine vehicles in College Park. Flexcar has five on the UM campus and two at the College Park Metrorail station, while Zipcar has two cars at the Metrorail station. Additional carshare parking spaces could be located within new development along Route 1. Arlington County and Washington, DC both provide reserved on-street spaces for carshare vehicles; while Route 1 does not have on-street parking, space could be reserved at public lots or side streets.

4.2 Implementation

A TDM district can be a key component in a comprehensive and integrated basket of solutions.

4.2.1 Existing Ordinance

According to the Prince George’s County Transportation Demand Management District ordinance, a TDM District can be established within the County through petition or through the implementation of an Area Master Plan, with the purpose of reducing vehicular traffic in areas where the highway system is built out. Within six months of the date of notification of the establishment of a Transportation Demand Management District (TDMD), each property owner within the district must submit a Transportation Demand Management Plan (TDMP). This becomes more and more relevant, given the expectations of future development along the corridor in College Park.

The Transportation Demand Management Technical Advisory Committee (TDMTAC) reviews each TDMP submitted for consistency with the goals of the TDMD, consistency with the requirements of the enabling legislation, completeness, reasonableness, feasibility, ability to achieve the quantified goal for trip reduction, and other issues, as appropriate. If the proposed TDMP is found to be acceptable, the TDMTAC will enter into an agreement with the property owner or designee. The Council will be advised of progress concerning the TDM Agreement (TDMA) by the TDMTAC.

4.2.2 Comparison to Other TDM Districts

To provide context for comparison, we reviewed the ordinances of other peer municipalities.

4.2.2.1 Case Study: Montgomery County, MD

In November, 2002, the Montgomery County Council passed legislation to help reduce the number of drive-alone commuting trips into and out of the County’s four Transportation Management Districts (TMD): Downtown Bethesda, North Bethesda, Friendship Heights, and Downtown Silver Spring. The new law requires that every employer within a TMD with 25 or more full- or part-time employees submit a Traffic Mitigation Plan (TMP) within 90 days of notification from the Department of Public Works and Transportation. Employers must also participate in the TMD's annual commuter survey and submit an annual report of activities.

Commuting goals have been identified for each TMD, stated as the percentage of commuters not driving to work during peak times. Goals for each TMD are as follows:

- Bethesda: 37%
- North Bethesda: 39%
- Friendship Heights: 39%
- Silver Spring: 46%, and 50% for new development

4.2.2.2 Case Study: Arlington County, VA

Arlington County's TDM Program for Site Plan Development is an Arlington County Commuter Services (ACCS) program that coordinates site plan development with commuter and transit services. The initial TDM Policy was adopted in 1990 and focuses on commuter travel. It reduces peak-hour travel by reducing single-occupant vehicle trips. It seeks to accomplish this goal by encouraging the use of transit, ridesharing, biking, walking or travel outside of peak hours. Development projects with TDM-related site-plan conditions have evolved over the years to include both commercial and residential development.

Today, over 60 site plans have been approved by the County board with TDM plans and ACCS now includes a ten-person sales team that serves 600 businesses. Successful implementation has revealed three key obstacles which limit the effectiveness of the County's initiatives: 1) funding; 2) procedures of the site plan review process; and 3) voluntary participation in the site plan review process.

4.2.2.3 Case Study: Cambridge, MA

In 1992, the Cambridge City Council passed the Vehicle Trip Reduction Ordinance (VTRO) as part of an effort to address simultaneous community concerns about increasing traffic congestion and environmental pollution. The ordinance required the City government to begin implementing policies and programs that would reduce vehicle trips by City staff. The most significant policy effort was led by the Environmental and Transportation Planning Division of the City's Community Development Department, which began working cooperatively with citizens, businesses, and institutions in Cambridge and the Boston area to implement TDM. In 1998, a formalized TDM program for businesses in Cambridge was approved by the City Council with the passage of the Parking & Transportation Demand Management (PTDM) Ordinance.

The goals of the VTRO and the PTDM Ordinance are to improve mobility and access, reduce congestion and air pollution, and increase safety for the residents of Cambridge. These programs work to reduce the level of drive-alone travel by promoting walking, bicycling, carpooling, vanpooling, public transportation, and other sustainable modes.

The PTDM Ordinance has been very successful. Nearly 100 businesses have detailed monitoring plans and dozens of other smaller landowners have implemented one-time TDM measures. The regular monitoring requirement has also demonstrated much success. Over 85 percent of the monitored businesses have met or exceeded their mode split goal. The average drive-alone mode split for monitored businesses by 2004 dropped from 68% to 55%, removing an estimated 7,000 vehicle trips from Cambridge roads each day.

4.2.2.4 Case Study: Portland, OR

The Lloyd District in Portland, OR, a transportation management district, has seen a remarkable decline in single occupancy vehicle (SOV) commute trips coupled with a rapid rise in bus and light rail use.

Between 1997 and 2006, drive alone trips among all Lloyd District employees (including non-TMA employers) fell almost 29 percent. Meanwhile, transit ridership among all employees has increased more than 86 percent over the same period. Employees of TMA-member companies have demonstrated even more remarkable results: some TMA-member businesses have achieved a transit and bike mode share of nearly 65 percent, while the overall TMA-member business average is 39 to 40 percent transit mode share. Non-TMA employees range between 20 and 25 percent transit mode share. Over the last nine years, TMA programs account for a reduction of four million peak-hour vehicle miles traveled. In today's terms, this represents 1,008 vehicles per day removed from peak-hour traffic.[22] Revenue from the district's meters goes to the TMA, providing the funding needed to support the district's universal transit pass program and TDM program for its member employees.

4.2.3 Transportation Management Associations

Many parts of TDM programs cannot be implemented effectively without a support mechanism of some sort. In most cases, using a Transportation Management Association (TMA) is a cost-effective strategy in implementing a TDM district. TMAs are private, non-profit, member-controlled organizations that provide transportation services in a particular area, such as a commercial district, mall, medical center, industrial park, county, or region. TMAs provide a centralized framework to support TDM strategies. A 1996 study by the TDM Resource Center estimates that TMAs can reduce total commute trips by 6 to 7 percent if implemented alone, and significantly more if implemented with other TDM strategies.[23] The existing College Park downtown development office is one possible candidate to become the designated TMA function.

Start-up and program funding can come from various sources, including federal Congestion Mitigation Air Quality (CMAQ) funds for initial start-up, TMA membership fees, and support from the University of Maryland. Additionally, county and municipal funding, through parking fees and local business development district taxes/assessments, can support the programs. For example, in New Jersey the Governor signed legislation in 2005 designed to ensure the development of a long-term transportation plan in the Meadowlands Region, seven miles outside of New York City. It also ensures that developers in the region pay their fair share to ease future traffic that their developments will create. The funding mechanism allows for road improvements and other projects, like new or expanded shuttle services, and increased demand for TMA services. The bill, now known as the Hackensack Meadowlands Transportation Planning District, levies fees (per square foot) against each proposed development and raises only those amounts reasonably related to the development's impact on the Meadowlands District's transportation system.

Additionally, Tax Increment Financing (TIF) on new or redevelopment is a common way of funding urban economic development. TIF is a development tool designed to help finance certain eligible improvements to property in designated redevelopment areas (TIF districts) by utilizing the new, or incremental, tax revenues generated by the project after completion. TIF creates funding for public projects that may otherwise be unaffordable to localities.

Municipalities typically use TIF to finance public, land acquisition, demolition, planning costs, and other improvements such as curb and sidewalk improvements, street construction and expansion, street lighting, landscaping, park improvements, parking structures, and traffic controls. Although typically used for infrastructure improvements, a case could be made for using TIF for TDM district programs, as they could indeed be considered part of the traffic controls in a community improvement project.

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[22] Nelson/Nygaard telephone interview with Rick Williams, Executive Director, Lloyd Transportation Management Association, March 2006.

[23] Victoria Transport Policy Institute TDM Encyclopedia, www.vtpi.org/tdm/tdm44.htm

4.3 Recommendations

We recommend establishing a TDM district through Prince George's County TDM District ordinance, and supporting it with a newly formed or designated TMA. The TMA's mission should be to provide short- and long-term planning and implementation of TDM strategies that reduce parking demand and single-occupant vehicle trips along the Route 1 corridor. As part of its initial charter, a College Park TMA would be charged with providing assistance to businesses and/or property owners in developing a TDM plan. Additionally, the TMA would aid the businesses and/or property owners in implementing TDM programs to meet the quantified goals of trip reduction and to ensure compliance with the TDM Agreement.

We recommend that a new TMA be formed as a non-profit, public-private partnership through the County, College Park, UM, and local businesses as members of the initial Board of Trustees. Obviously, this requires buy-in from local businesses, and there will be some set-up costs. Once in existence, the TMA can coordinate provision of TDM services throughout the corridor and work with the regional Commuter Connections program when there are region-wide initiatives. These TDM measures should appropriately serve the diverse populations that utilize this corridor, including students, faculty, residents, employees, and the general public. The TDM District and the formation of a TMA are interrelated and should be presented as a package. Some of the services supported by the TMA, such as shuttles, should be coordinated closely with UM. The next section addresses some of the coordination that is already necessary between existing transit service operators.

5 TRANSIT AND SHUTTLE SERVICE

Route 1 serves as a major connector between Washington, D.C. and surrounding areas, with a stable long-term residential community, as well as a large population of college students, many of whom do not own cars. In sum, it has essentially all the characteristics of a community that can be well-served by transit. In order to take advantage of the potential for high ridership and lower traffic congestion, however, transit service needs improvements in several areas. This section outlines three major areas for transit improvement: transit coordination and transit identity, shuttle services, and a pass for UM students for use on WMATA buses.

5.1 Transit Coordination and Corridor Identity

Several transit agencies currently operate service in the Route 1 area, as described in the Existing Conditions report. These agencies include WMATA, Prince George's County, the Maryland Transit Administration, the university, and private providers such as condominiums and hotels. With multiple operators offering services that duplicate in some cases, the number of riders utilizing each service is not at optimal levels. Coordinating transit routes and marketing the Route 1 bus lines will boost ridership through increased awareness coupled with improved service.

5.1.1 Transit Coordination

Transit passengers have one prime objective: to travel from their starting point to ending point in as simple a trip as possible. They will utilize any transit services, routes, and schedules on which they are allowed to ride, and tend not to care who provides what service. The issue is travel, the priority is ease. Multiple operators, uncoordinated schedules, and different payment systems only hinder their ability to use transit, and result in fewer transit trips with less satisfied customers.

Coordinating transit services to share resources and information decreases costs, improves user friendliness, and avoids excessive service overlaps. Methods of coordinating service include bus stop and route consolidation, implementing "Super Stops," and offering additional station amenities.

5.1.1.1 Route Consolidation

Bus stop consolidation is one effective way to coordinate service and simplify the process for riders. For example, if several agencies all stop at one location, the agencies need to build only one bus stop instead of one for each individual provider. By sharing bus stop amenities, transit agencies also save money by splitting capital and maintenance costs. On the user side, consolidated stops make routes easier for passengers to remember. Instead of wondering where Bus A and Bus B stop, the user knows that at a certain intersection, transfers between different lines are a simple process.

The services in the study area currently operate alone, rather than coordinating to maximize their effectiveness. They maintain different fare systems, different stops, and some are exclusive to UM students and staff. This lack of coordination serves some riders well but wastes resources and severely limits the potential of the transit network as a whole to serve the community and maximize ridership.

Existing transit systems and services, including fare collection and scheduling, can be strategically coordinated to maximize service efficiency and customer convenience. Allowing customers to board all transit vehicles with the same fare card would encourage transfers between services, extending the effective service coverage area. Coordinated schedules can also increase effective levels of service, especially on weekends when headways on individual routes are longer. For example, if two bus routes operate at 30-minute headways, an attempt should be made to coordinate schedules so as to reduce effective headways. Thus one bus would arrive every 15 minutes. Another impediment to efficient travel speeds is frequent stopping. By consolidating stops and providing boarding opportunities every 1/4- to 1/3-mile in the study area, buses can travel much more quickly, improving trip times. While bus stops on every block may seem ideal, spreading out stops greatly improves productivity, and reduces the notion that bus trips take “forever.”

Folding services offered by private operators like area hotels and condominiums into the mix of consolidated services will also help improve overall transit efficiency. These private services undercut ridership on WMATA and The Bus routes, and thus reduce the quantity of transit service available to the general public. Coordinating private services with public transit providers could also allow for an expansion of services currently serving private locations later into the evening, or on Sundays. Public transit providers would have to work with private operators to ensure that the latter’s riders are supportive of any service changes, as well as commit to no reduction in service than that provided by the private operator. The benefit to both the private and public operator is increased financial and service efficiency, translating into lower costs for all without reduction of service.

Transit routes can also be consolidated by analyzing ridership and reallocating resources. If WMATA and UM, for example, run along the same route and have just empty seats on either bus, the two routes can be consolidated into one, freeing up resources to start service in an unserved area or increase service on an existing line. One caveat that should be noted is that liability issues may exist for sharing of some UM shuttles. Opening them up to all riders may require a change in state law. Coordination also entails providing station amenities to make transit riders feel safe, secure, and comfortable, as described below.

5.1.1.2 Super Stops

In any transit network, some stops have higher numbers of boardings and alightings than others. These stops may be near high concentrations of employment and/or housing, at higher volume intersections, or may serve a major trip generator. To distinguish major stops from regular stops, basic bus stops at high ridership locations should be replaced by “Super Stops.” Super Stops will have longer street frontage for queuing at least two buses at a time, attractive shelters for 10-15 passengers, radiant heaters, lighting, passenger information displays with static and real-time bus arrival information, stop request lighting (by which passengers waiting at the stop signal that they want a particular bus to stop; otherwise, the bus will not pull over), security call boxes, ticket vending machines, closed circuit video, and other passenger amenities. At intermodal centers, Super Stops will have platforms divided into zones and use real-time information to alert passengers about which bus will arrive at which boarding area. For example, in Boulder, CO Super Stops make up an important part of the city’s Community Transit Network, a high-frequency system with 13 routes. Super stops provide pleasant and convenient transfers between services, and include both bus station amenities like seating and lighting as well as surrounding retail, crosswalks, and wayfinding (see Figure 4). [24]

Figure 4: Boulder Super Stop

Possible areas along Route 1 for locating Super Stops include mixed-use nodes such as major intersections, areas with good parcel depths on both sides of Route 1, and a spot close to the UM campus. The Route 1 corridor can support three Super Stop locations. The first two potential locations include the intersections of Route 1 at Hartwick Road and Paint Branch Road/Campus Drive. A third potential location could be either near Route 193 (possibly at Greenbelt Road) or near the Beltway (see Figure 5).

[24] *City of Boulder Transportation Master Plan*. 2003. p. 24.

It should be noted that the proposed locations are recommendations. Final Super Stop locations should be based on passenger boardings, alightings, and transfers. Combined with bus stop consolidation, these measures will improve travel times and help define the major activity centers along the corridor. Super Stops tell the community and prospective developers that the area around the station is well-used and vibrant. Demarcating certain areas along the corridor as focal points by providing prominent and attractive transit facilities creates an economic development tool that further encourages development at these well-served points.

Along the Columbia Pike in Arlington County, the cost of the Super Stop pilot program is estimated at $3.55 million, of which $2.84 million will come from federal funding and $710,000 from the county government. Any cost overruns will be the responsibility of the local government. The enhanced bus stops will include a shelter structure to accommodate up to 15 people, along with better lighting, more seating, heating and electronic schedule information.[25]

The stops will be located on Columbia Pike at the northwest and southwest corners of South Dinwiddie Street and the southeast corner of South Walter Reed Drive. Each stop averages more than 700 passenger boardings per day, county officials said. The stops are the second phase of transportation improvements for the Columbia Pike corridor, which, with 12,000 passengers per day, has the highest bus ridership in Virginia.

5.1.1.3 Bus Stop Amenities

A clean, well-lit, informative bus stop with shelters and seating greatly improves the image of the transit serving a community. Station amenities make taking the bus a comfortable experience, while proper maintenance tells people that transit makes up an important part of the neighborhood. Protection from the weather is especially important for bus riders, since they must wait outside. Stops must be easy to find and use; adequate pedestrian accessibility to and enhanced passenger amenities at transit stops and stations are critical to attracting people to use transit. This includes an evaluation of sidewalk connections around existing and planned bus stops to eliminate instances where bus stops are served by incomplete or non-existent sidewalks. All stops should have the following elements:

- A level concrete pad, consisting of a 20 feet by 4 feet clear zone at each stop, unobstructed by street furniture, landscaping, or signage
- Reliable pedestrian access with clear sidewalks providing direct access to the bus loading area
- Clear sight lines allowing travelers to see around the stop and drivers to see around corners to make turns
- Adequate lighting
- Bench
- Trash receptacle
- Route, schedule, and system information

Super Stops should also contain:

- Real time travel information
- Bicycle rack

Stops also require safety measures; people will not wait at a bus stop where they feel vulnerable. Safety and security requires transit operators to provide for a predominantly controlled environment, so riders perceive the agency is protecting them. In addition, it also requires emergency planning for when

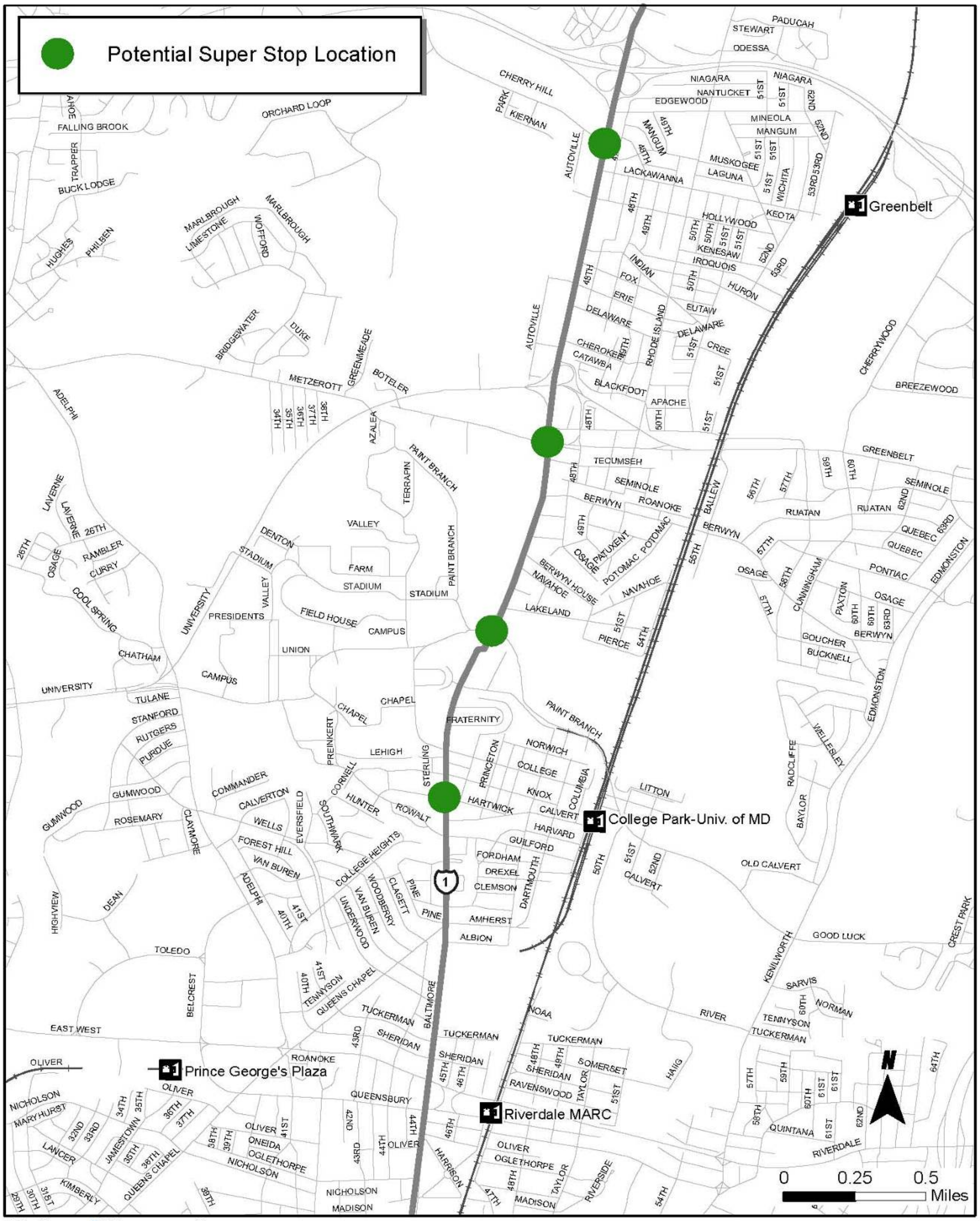
[25] James Hamre, WMATA, e-mail 6/18/07.

uncontrolled events occur, so that responses are planned and procedures are in place to answer unforeseen incidents. These preparations provide riders with both an actual and perceived safe environment, addressing public concerns that limit the effectiveness of the transit system. Providing a safe and secure environment requires a combination of design features, response plans, evaluation of public perception, and coordination between the multiple transit services and levels of government. All bus stops should be well-lit and provide clear sight lines with no "blind spots." Placement of stops in view of active uses is recommended. Stations and stops should be accompanied by clearly marked crosswalks and traffic control devices, to provide a safe, controlled roadway crossing.

5.1.1.4 Existing Plans for Expanded Route 1 Service

The Corridor Transportation Corporation (CTC) is an existing bus system that serves Howard County, Anne Arundel County, and Prince George's County. CTC's Connect-a-Ride G Route provides service between Laurel and College Park. While Route G does not travel along Route 1, it does operate along Kenilworth Ave. and Paint Branch Parkway to access the Metro Station and the UM campus. Metrobus has proposed increasing its service between College Park and Laurel along the same route. A Metrobus route would be anticipated to operate as an all-day service with 30-minute frequencies during the peak periods and hourly service during the off-peak. Augmenting the existing service and consolidating it into a Metrobus route would support two of the recommendations of this report: improve east-west connectivity and improve customer convenience by supporting route consolidation.

Figure 5: Potential Super Stop Locations



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consulting associates

the route system and map; however, the rest of the space may be used for advertising. According to Attention Transit, which has installed bus shelters with advertising in the city of Nogales, AZ, a typical bus shelter costs $1,000 through a contract with the City of Nogales.[26] Costs are recouped through advertising revenue, with a portion of the surplus going to the city and the rest kept by the Attention Transit. Costs vary based on the size of the order, materials, and other factors. For example, Portland's Tri-Met bought 800 shelters made of weather-resistant materials and panels reaching the ground to block out wind and rain at a cost of $2,400 each. Tri-Met administers its own advertising program rather than contracting out to an agency, and the program created $1 million in annual revenue (in 1999 dollars).[27]

WMATA, on the other hand, contracts out its advertising. According to the TCRP report *Transit Advertising Revenue*, ads on Metrobus and Metrorail were provided through Transportation Displays, Inc. (TDI) WMATA's contract with TDI stated provisions for minimum guarantee and a percent of annual net billings at 58 percent for Metrobus and 60 percent for Metrorail. In 1997, WMATA reported its advertising income at $7.7 million.[28] In an RFP released in 1994 for a new advertising contract, WMATA stated that its minimum guarantee in 1994 paid to the ad agency was $4.5 million.[29] Today, WMATA contracts advertising on bus interiors and exteriors to CBS Outdoor. The agency has pursued an aggressive advertising campaign, with ads now sold on farecards, timetables, and brochures. Thus it makes sense for all of the transit agencies serving the study area to pursue a contract for bus shelter ads to boost revenue even further.

5.1.2 Transit Identity

Like any other product, transit requires marketing to communicate its value to the public. Image casts a long shadow, and the predominant view of buses in particular is that of a ponderous, unfashionable vehicle for travel, far less attractive than its sleeker cousin, the train. People also dislike buses because the routes are so numerous, making it difficult to remember which route goes where. By creating a marketing strategy and making sure to provide ample service information at bus stops and at community facilities, buses in College Park can emphasize their value as user-friendly community amenities. Branding of buses has worked well along Arlington's Columbia Pike, discussed below. However, limiting of buses to certain areas due to branding has proven difficult for WMATA. Buses cannot be utilized at other places when needed and maintaining an adequate spare ratio becomes an expensive proposition. Removable branding (magnet, etc.) has recently become popular and is recommended to maximize flexibility of the vehicle fleet.

5.1.2.1 Case Study: Pike Ride, Arlington, VA

A successful example of a service in the region that implemented the principles outlined above is the Pike Ride service in Arlington. The service began through a yearlong study by WMATA, working from principles adopted in the 2002 *Columbia Pike Initiative – A Revitalization Plan for the Columbia Pike Corridor*, produced by the Arlington County Department of Community Planning, Housing, and Development. WMATA's Pike Transit Initiative called for high-quality and high-capacity transit along Columbia Pike. The name "Pike Ride" was given to the 16 Metrobus lines serving the corridor, as well as the Arlington Transit (ART) lines serving surrounding neighborhoods. The service began in September

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[26] *City of Nogales Transit Feasibility and Implementation Study*, 2006.

[27] TCRP Report 46: *Amenities for Transit Handbook Part B*, 1999. pp. 45-56.

[28] TCRP Synthesis 32: *Transit Advertising Revenue: Traditional and New Sources and Structures*, 1998. pp. 28-29.

[29] TCRP Synthesis 32, p. 58.

2003 and increased weekday ridership by 45 percent, doubled Sunday ridership, and Saturday ridership 64 percent.[30]

Key components of Pike Ride include high frequency service (every 5 minutes), limited stops, and prominent branding (each bus has the logo on its side and marquee). Another user-friendly aspect of Pike Ride is that all buses go to the Metrorail station at Pentagon City, a high volume destination. Thus riders know that if they board a Pike Ride bus, they can get to the Metro, a fact that greatly eases customer anxiety when trying to discern the usefulness of all the various bus routes in an area.

Complementing this service, Arlington County also initiated several related transportation projects in the corridor, including the improvement of several key intersections along Columbia Pike and the installation of a transit signal priority system to help speed buses down the Pike. Twenty-two Super Stops are also planned to support transit service along Columbia Pike. Pike Ride buses run on clean-burning compressed natural gas, while the new bus stops were designed with community input and will offer real-time arrival and departure information, wireless Internet access, contain and vendor box corrals. Construction was set to begin at the end of 2006. The cost of design, procurement, and construction for 22 Super Stops was estimated at $8 million.[31] Figure 6 shows one design for a Super Stop.

Figure 6: Rendering of a Super Stop along the Pike Ride Route

5.2 Shuttle Services

Several shuttles operate through the University of Maryland, but these are restricted to UM students. The City of College Park has proposed implementing a shuttle service that will operate just on Route 1 between the City's southern border just south of Albion Road and northern border at Ikea Center Boulevard, a distance of 3.5 miles. A rough estimate of travel times on the corridor reveals a travel time of approximately nine minutes per direction.[32]

While this service would provide circulation up and down Route 1, it would not connect the corridor to any surrounding destinations. Anyone wishing to go beyond the Route 1 corridor would have to transfer to another bus. As described in the Existing Conditions report, the key trip generators currently unserved by transit are located either off of the Route 1 Corridor, or outside of the College Park borders. Instead of adding new service, efforts should focus on improving frequencies on existing services within the

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[30] http://www.commuterpage.com/PikeRide/. Sponsored by Arlington, VA, this web site provides data on transportation options in the Washington, D.C. metro region.

[31] *Columbia Pike Super Stops*. Program brochure. Available for download at www.commuterpage.com/PikeRide/superstop.htm.

[32] Estimated based on travel speed of 30 mph, plus 25 percent extra time for bus stops.

Corridor, and therefore increasing customer convenience and ridership. Having many buses with a few riders each costs more than operating a few full buses. Adding a new service which services locations already receiving transit services would shift some passengers from the current routes, lowering ridership. For example, many students already ride WMATA's 81, 83, or 86 buses to the Rhode Island Avenue station on the Red Line rather than using the College Park Metro. A shuttle service sponsored by College Park would be anticipated to shift some riders from WMATA, undercutting the goal of overall high ridership transit service in the study area, without providing service to any new locations. The idea of a shuttle service along Route 1should be revisited in the future, if conditions warrant.

At the present time, instead of a Route 1-specific shuttle, existing service should operate more frequently with longer service hours. The College Park area has good transit service east/west between College Park Metro and UM, and now improvements must focus on increasing north/south service along Route 1. Buses should operate at least every 15 minutes over an 18-hour day, seven days per week. Several routes already operate at this level or better during peak times, but others do not and none combine for this frequency over an 18-hour span, seven days per week. From the passenger side, frequent service makes transit much more attractive and feasible; passengers know that if they miss a bus, another will arrive within 15 minutes. Figure 7 lists the current headways and service hours and days for area buses, along with recommended service changes. (Certain routes, such as those designed just to handle peak period overflow, are not listed here, since they serve a rush hour market only. Also, the 81, which runs on Sundays only, is not listed.)

By decreasing headways and staggering scheduling, the Corridor can achieve headways as frequently as every 7.5 minutes on paired routes—the 83/86, C2/C4, and F4/F6—that follow nearly the same exact course. Three WMATA routes do not run on Sunday, a day when many people shop and run errands. Adding service on this day is especially important on the C2; although the C2 and C4 are sister routes, the C4 does not run through the UM campus while the C2 does. WMATA has been asked to examine what possibilities may exist or could be developed for Sunday service from UM to Prince George's Plaza. In the case of The Bus, this service currently operates as a commuter route, but at long headways of 45 minutes. The goal is to reduce headways to 30 minutes. DPW&T has requested funding from the state for improve service frequencies within the county.

Service on the university-run shuttles generally covers a long service day, reflecting the unique schedules of student life. The university runs shuttles connecting to area park-and-ride lots, Metro stops, and around campus itself; however, several locations remain unserved. Many of the shuttle services run by UM follow a loop around Campus Drive, University Boulevard, and Paint Branch Drive, a route measuring approximately 3.7 miles. Given the size of this prime service area, the University should reconsider operating a new shuttle service circulating inside the campus, serving buildings and athletic fields along roads near Farm Drive and President's Drive. (This would be consistent with a recommendation from the University's Facilities Master Plan.) Also, only one route, the 113 University Town Center Supplemental Saturday Service, goes to the large shopping district at Prince George's Plaza. The University should offer Sunday service to this district as well, as it is a significant trip generator.

Figure 7: Recommended Transit Service Improvements

Route	Relationship to Route 1	Current Span* Current Peak Headway	Recommended Span* Recommended Peak Headway
WMATA 83	Along Route 1	16/7	+2 hours/No change
		15	No change
WMATA 86	Along Route 1	16/7	+2 hours/No change
		30	Cut headways 15 minutes
WMATA C2	Runs along Route 1 between University Blvd and Campus Drive	16/6	+2 hours/+ Sunday
		15	No change
WMATA C4	None	20/7	No change/No change
		20	Cut headways 5 minutes
WMATA C8	Crosses Route 1 at junction of Campus Drive and Paint Branch Parkway	14/6	+4 hours/+ Sunday
		35	Cut headways 20 minutes
WMATA F4	Crosses Route 1 at Queensbury Road	16/7	+2 hours/No change
		15	No change
WMATA F6	Crosses Route 1 at Campus Drive/ Paint Branch Parkway	17/5	+1 hour/No change
		30	Cut headways 15 minutes
WMATA R3	Runs along University Blvd and crosses Route 1	16/7	+2 hours/No Change
		30	Cut headways 15 minutes
WMATA R12	Runs roughly parallel to Route 1 between Greenbelt and College Park Metrorail Stations	16/6	+2 hours/+ Sunday
		30	Cut headways 15 minutes
THE BUS 14	Crosses Route 1 at Queensbury Road	14/5	+4 hours/No change
		45	Cut headways 30 minutes
THE BUS 17	Crosses Route 1 at Campus Drive	14/5	+4 hours/No change
		45	Cut headways 30 minutes

*Hours per day/ days per week

5.3 University Pass

Fare structures that vary between transit services act as a barrier to riders, who may be uneasy about using transportation with an unknown payment system. This apprehension is especially relevant to bus riders, who have little time to produce whatever fare the driver asks for. WMATA and UM have recognized this, and are working on an agreement to implement a university bus pass.

Through a university pass program, students would pay a flat annual fee to the university, who would then buy unlimited passes at a bulk discount from WMATA. Then students could simply show their pass and board WMATA buses for unlimited rides for the year.

This type of program is already in place at other institutions. Many U.S. and Canadian universities use a Universal Transit Pass (U-Pass) program, which gives students enrolled in participating post-secondary institutions unlimited access to local transit.[33] Programs are typically funded through mandatory fees that eligible students pay each term in which they are registered. Fees are transferred to the local transit authority to fund the transit service. Because fees are collected from a large participant base, U-Pass prices are lower than the amount students would otherwise pay for monthly passes or tickets over the course of a term.

Many U.S. universities have successfully implemented U-Pass programs. We use as an example results at the University of British Columbia (UBC) because it is in a roughly comparable situation as UM in terms of size and urban location, and has evaluated results recently. UBC began its U-Pass program in 2003 and recently produced a transportation report detailing the effects of the discount transit pass. UBC enrolled 44,150 students in fall 2006, and charges $22/month for a package of unlimited rides on local buses and trains as well as discounts at area retail. Transit ridership increased significantly to and from UBC's campus as a result of U-Pass implementation, from 29,700 weekday trips in fall 2002 to 45,400 trips in fall 2003. This equates to an increase in transit mode share from 26 percent to 39 percent. Since 2003, this mode share has remained steady at around 40-42 percent.[34]

This substantial increase in transit use is producing equally substantial benefits. U-Pass saves UBC students $3 million per month and has also saved the university substantial capital funds by avoiding the need to build 1,500 parking spaces. When compared to other modes of travel and full-price transit passes over an eight-month period, U-Pass costs significantly less:[35]

- U-Pass: $176
- One-zone transit pass: $552
- Driving (parking pass, insurance, gas): $1,000

U-Pass programs produce a number of benefits, including:

- Additional transportation choices via transit routes serving the institution;
- Reduced traffic congestion around the campus and local community;
- Fewer air emissions from vehicles; and
- Reduced demand for campus parking facilities.

UM and WMATA should continue negotiating an agreement for a similar type of program at the university. Since students own cars at a lower rate than full time residents, a university pass will increase ridership on WMATA buses, while enhancing mobility for students by giving them access to the WMATA network. While a U-Pass program could start by focusing on students, the program could be expanded in the long-term to include faculty and staff, thereby offering employee benefits while reducing the vehicular demand accessing the study area. Once a Universal Transit Pass is available, discounted farecards can be purchased for any group, including residents of an apartment building, and paid for by either the property owner or the residents. This would result in no additional cost to municipalities.

6 PARKING

This chapter recommends parking strategies that support the vision for the Route 1 corridor. If the City is to use future growth to not just manage but fundamentally improve the transportation performance of the

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[33] Jeffrey Brown, Daniel Hess, and Donald Shoup, "Fare-Free Public Transit at Universities: An Evaluation", *Journal of Planning Education and Research*, 23:69-82 (2003).

[34] University of British Columbia, *Transportation Status Report: Fall 2006*. February 2007, p. 16.

[35] www.upass.ubc.ca/upass/upassindex.html

corridor, parking strategies must continue to be a fundamental part of its approach. With attention to parking policy, management strategies, and design guidelines, College Park can guide the development of an efficient, multimodal transportation network along Route 1.

Currently each office, residence, business or retail establishment along Route 1 provides its own parking. As described in *Achieving the Vision: Options for the College Park US Route 1 Corridor*,[36] this system interferes with several of the City's goals:

- The parking is almost always located between the sidewalk and the store, creating a barrier to pedestrians and substantially affecting the aesthetics of the corridor.

- Parking requirements substantially affect the economic viability of new and rehabilitated development both by constraining potential building footprints, and by increasing the cost of development. On many lots, the only way to provide a viable floor plan and meet parking requirements on-site is to build structured parking. Structured parking is prohibitively expensive for many businesses, takes space away from productive use of space, and unless done extremely well, again interferes with corridor aesthetics.

- Because parking is expensive to provide, if businesses provide their own on-site parking there is no incentive to allow or to help drivers to park once and then walk to other locations. This further increases the number of short auto trips, with their attendant turns and congestion.

- Although self-parking does not necessarily require multiple curb cuts, its current implementation in College Park has produced many curb cuts, again to the detriment of both traffic flow and the safe and comfortable use of sidewalks.

Many places around the country are realizing that it makes sense to meet parking needs through a shared parking strategy. Shared parking can mean sharing it between uses with different peak demand times, such as a church and a movie theater, or office and residential. Shared parking can mean on-street or shared garages. But shared parking always means managing parking for joint goals, rather than requiring each use to provide a fixed amount on-site. Sharing parking reduces the cost of providing parking, and frees up additional land for development. This is critical for getting high quality development, particularly given the parcel shapes and sizes in the corridor. Shared parking is already in place in downtown College Park, where developers can pay fees in lieu of building parking spaces and allow their customers to use municipal lots

6.1 Parking Policy

6.1.1 Parking Ratios

Minimum parking requirements are adopted by cities with the goal of alleviating or preventing traffic congestion and shortages of curbside parking spaces. The theory of minimum parking requirements is that if each destination provides ample parking, with enough spaces available so that even when parking is free there would be room, then there would be plenty of spaces at the curb. Motorists would no longer need to circle the block looking for a space, so traffic congestion would be lessened. But minimum parking requirements have not worked. For half a century, communities all over the country with minimum parking requirements have seen traffic congestion get progressively worse.

[36] ICF Consulting, Bay Area Economics, Reid Ewing, Ferrell Madden Associates, and Nelson\Nygaard. *Achieving the Vision: Options for the College Park US Route 1 Corridor*. Report funded by U.S. EPA Smart Growth Implementation Assistance. Available at www.epa.gov/dced/pdf/collegepark.pdf.

Minimum parking requirements worsen traffic congestion through three steps:

1) Minimum parking requirements are set high enough to provide more than enough parking in locations where parking is free, even at isolated suburban locations with little or no transit. That is the same standard that is used in more urban locations, despite compact, mixed-use land patterns and close proximity to transit.

2) Parking is then provided for free at most destinations, and its costs hidden.

3) Bundling the cost of parking into higher prices for rents, goods, and services skews travel choices toward cars and away from public transit, cycling, and walking.

Minimum parking requirements also discourage developers, employers, residents, and other property owners from implementing strategies that reduce traffic and parking demand.

Parking maximums, on the other hand, have been shown to successfully reduce traffic congestion. For example, Pasadena, CA, has successfully used parking maximums to reduce congestion in its transit-oriented development zones. Maximum parking requirements generally alleviate traffic congestion and reduce auto use through three steps:

1) Maximum parking requirements are set low enough so that if parking at a location is given away for free, there will be a shortage.

2) Parking at these locations is then provided to the people who use it for a price that covers at least part of its costs, so the true cost of parking is revealed. Alternately, employers and other parking providers provide strong subsidies for alternative transportation (such as free transit passes or a parking cash out program), to avoid a shortage while remaining popular with their drivers.

3) Removing parking subsidies (or providing equally strong subsidies for other modes) then brings travel choices back into balance, toward public transit, cycling, and walking.

The Sector Plan[37] goes a long way towards refocusing parking regulations in the City's zoning code. The change was made to encourage redevelopment and support Route 1 as a transit corridor where alternative forms of transportation are readily available. However, there are further opportunities for improvement. The Sector Plan establishes a new maximum and reduced minimum off-street parking requirement ratio in areas 1, 3, 4, 5, and 6.[38] The maximum off-street parking spaces allowed equals the minimum required in the Zoning Ordinance (see Figure 8). The minimum is reduced to 10 percent of the maximum. We recommend that College Park further support this policy by eliminating minimum off-street parking requirements and adopt the maximum requirements in the Route 1 corridor.

Figure 8: Selected Sector Plan Parking Requirements

TYPE OF USE	NUMBER OF SPACES	UNIT OF MEASUREMENT
(1) RESIDENTIAL:		

[37] Maryland-National Capital Park & Planning Commission. *Approved College Park US 1 Corridor Sector Plan and Sectional Map Amendment*. April 2002.

[38] Table 3: Summary of Site Regulations, p. 167. Also S2. Items S and T, Off-Street Surface Parking Requirements for all Development (except Mixed-Use Development Projects).

TYPE OF USE	NUMBER OF SPACES	UNIT OF MEASUREMENT
Multifamily dwelling:		
(A) Housing for the elderly or physically handicapped	0.66	Dwelling unit
(B) If wholly within a one mile radius of a metro station	1.33	Dwelling unit
	+0.33	Bedroom in excess of one per unit
(C) Containing at least 90% one-bedroom units	1.5	Dwelling unit
	+0.5	Bedroom in excess of one per unit
(D) All others (CB-26-1989)	2.0	Dwelling unit
	+0.5	Bedroom in excess of one per unit
One-family detached dwellings:		
(A) Cluster Development	1.5	Dwelling unit
(B) Mobile Home	2.0	Dwelling unit
(C) All others	2.0	Dwelling unit
(2) LODGING:		
Dormitory	1.0	2 residents
Hotel (not including restaurant or other accessory use requirements)	1.0	2 guest rooms
	+1.0	Employee
(4) RECREATIONAL / ENTERTAINMENT / SOCIAL / CULTURAL:		
Billiard or pool parlor	4.0	Table
	+1.0	Employee
Bowling alley, archery/batting/shooting range	5.0	Lane or target
	+1.0	2 employees
Museum, art gallery, aquarium, cultural center, library, or similar facility	2.5	1,000 sq. ft. of GFA
Theater, auditorium, or stadium	1.0	4 seats
(5) COMMERCIAL TRADE (GENERALLY RETAIL) / SERVICES:		
(C) Shopping Centers (such as integrated shopping centers, malls, and plazas):		
(i) 25,000 sq. ft. or more of GLA:		
(aa) All uses, except as provided below	1.0	250 sq. ft. of GLA (excluding theaters)
(bb) Office, Medical Practitioner's (medical clinic):		
(I) If in excess of 20% of GLA or 50,000 sq. ft. of GLA, whichever is smaller	1.0	200 sq. ft. of GLA
(II) If not in excess	1.0	250 sq. ft. of GLA
(cc) Office, all others:		
(I) If in excess of 20% of GLA or 50,000 sq. ft. of GLA, whichever is smaller	1.0	250 sq. ft. of the first 2,000 sq. ft.
	+1.0	400 sq. ft. of GLA above the first 2,000 sq. ft.

TYPE OF USE	NUMBER OF SPACES	UNIT OF MEASUREMENT
(II) If not in excess	1.0	250 sq. ft. of GLA
(dd) Theaters	1.0	4 seats
(D) Miscellaneous:		
Drive-in or fast-food restaurant	1.0	3 seats
	+1.0	50 sq. ft. of GFA (excluding any area used exclusively for storage or patron seating, and any exterior patron service area)
Eating or drinking establishment (not including drive-in or fast-food restaurant) (CB-89-1993)	1.0	3 seats
Eating or drinking establishment, permitting live entertainment or patron dancing, with hours of operation that extend beyond 11:00 P.M. (CB-89-1993)	1.0	3 seats or 3 persons legal occupancy, whichever is greater
Gas station or vehicle repair and service station:		
(i) Not self-serve	3.0	Service bay or similar service area
(ii) Self-serve	1.0	Each employee
(6) OFFICES:		
Office building or office building complex (except medical practitioners' offices) (CB-38-1988)	1.0	250 sq. ft. of the first 2,000 sq. ft. of GFA
	+1.0	400 sq. ft. above the first 2,000 sq. ft. of GFA

Source: Prince George’s County Zoning Ordinance, Section 27-568(a).

Notes: Land uses shown in the table are those found within the Sector Plan.

Where numbers are indicated with a “+”, that indicates cumulative parking requirements. For example, a hotel requires one space per every two guest rooms, plus one space per employee.

Policy standards for parking should also include:

- By-right reduction of some or all of a project’s off-street parking requirements to be met using on-street or other available parking spaces within 500 feet of the development (as opposed to special approval condition described in Zoning Ordinance Sec. 27-514.07);
- Regulatory incentives for underground parking;
- Change in zoning code to discourage standalone parking facilities that do not involve any mix of uses; and
- Prohibition of surface parking on sites after demolition of historic property.

It is outside the scope of this study to conduct a detailed parking inventory, but such an inventory could make a valuable contribution to setting parking standards.

6.2 Design

Parking facilities are frequently visually unappealing, interfering with the pedestrian environment, and result in dead urban spaces. However, many of the negative aspects of parking facilities – from a one-car garage in the front of a rowhouse to a large commercial facility – can be mitigated by balanced design, helping to enhance College Park's walkability.

One existing building, in particular, could be aesthetically improved by hiding four levels of parking beginning on the ground level (see Figure 9). As noted in the existing conditions report, the University View development impedes the potential for pedestrian scale and orientation in the neighborhood. The proposal to build active uses (specifically retail) around the lower levels to shield the parking from view should be implemented.

One objective in the Sector Plan "strongly encourages" the use of parking garages in the main street and town center areas. This guidance should go further, by explicitly affirming that no surface parking should be allowed in these two critical areas of the development district. The rationale behind this direction is to ensure that valuable, highly visible land is used to its highest and best use. Parking lots disrupt traditional urban fabric and have given many American cities a forgettable landscape. By expanding the distances between destinations and increasing the number of curb cuts disrupting the sidewalk, surface lots are a detriment to pedestrians.

The Sector Plan also recommends minimizing the number of parking spaces located between buildings and the street frontage of roadways. Throughout any portion of the corridor where surface parking is permitted, it should be limited to locations between and behind buildings. This would further connect land uses to their adjacent sidewalks, and minimize the impacts of parking on the pedestrian realm. Locating parking between and behind buildings also provides a valuable opportunity to share parking between adjacent properties.

Figure 9: University View, College Park

The Sector Plan states, "The façade of a parking garage should not be sited directly on US 1 throughout the development district. If no other location is feasible, the façade(s) sited on US 1 shall be mitigated through innovated architectural façade treatments which enhance the pedestrian environment."[39] Façade mitigation for any parking garage sited on Route 1 should include incentives to occupy the ground floor with retail or restaurant uses. Where possible, the retail uses should occupy the entire the ground floor, instead of simply wrapping the first floor of the parking structure. (The wrap approach can result in small store dimensions, which attracts mostly lower quality shops.) In addition, building entrances should remain on the public side of the building that faces Route 1 to bring people into the public realm between their private cars and their

[39] *Sector Plan*, Section 2, "O"- Parking Garage Design.

private destinations. The more people are directed onto the street, the more the corridor will develop a stronger sense of place.

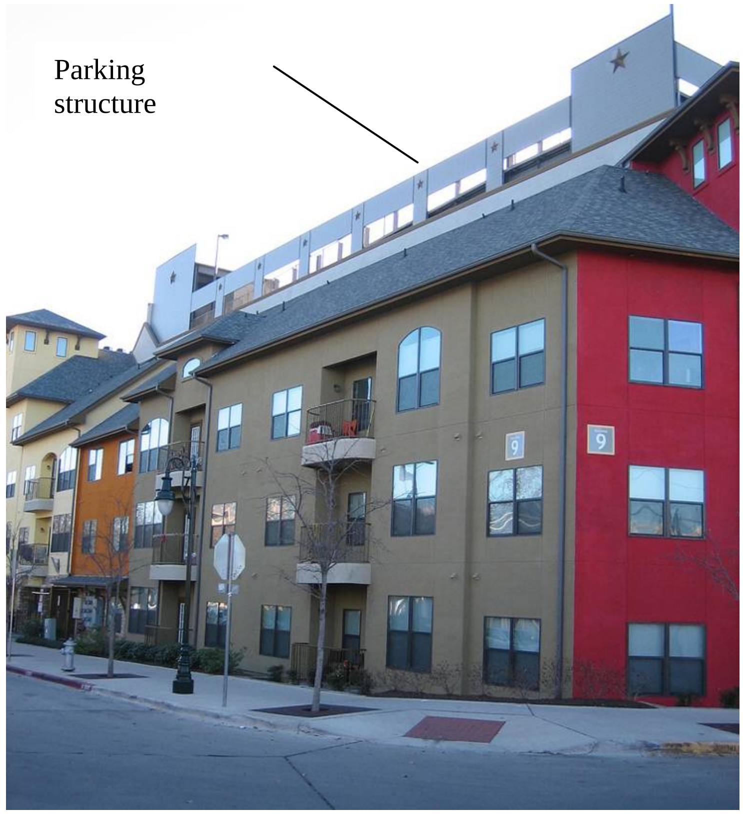

Figure 10: Parking Structures Wrapped by Liner Building

Residential garage doors should also be located on back alleys to prevent the storage space and stored vehicle from dominating the front of the house. Driveway control also plays a major role in mitigating traffic congestion as well as pedestrian safety. To minimize access directly from Route 1, the City should emphasize rear access through service lanes or alleys, as well as locate surface lots in the rear of buildings (as discussed above). See Section 9, Access Management.

Design standards for surface parking lots should also include:

- Requirement of raised pedestrian walkways for parking lots with more than 50 spaces
- Maximum driveway widths, as discussed below in the Access Management section
- Prohibition of at- and above-grade parking within 25 feet of a required building line (which in effect forbids surface parking at the street and indirectly requires parking structures wrapped by liner buildings; see Figure 10)

On-street parking design standards will be useful for side streets that lead into Route 1, which has no on-street spaces of its own. For example, Lowell, MA, requires parallel parking spaces to be at least 8 feet wide and 22 feet long.[40] For each parallel parking space, the adjacent drive lane must be at least 10 feet wide and must provide at least 20 feet of clear maneuvering area in front of the space in the drive lane adjacent to the space.

6.2.1 New Parking Garage

The Existing Conditions report[41] outlines important opportunities for improvement of the proposed downtown parking garage. The downtown parking garage and redevelopment project listed in that report's Figure 6: Planned and Approved Development Projects is slated to provide 300 spaces for 165 condominium units and 40,450 square feet of commercial space. That number exceeds the amount

[40] *Lowell, MA, Zoning Ordinance: 6.1.11 Notes to Table of Dimensional Requirements for Off-Street Parking, #3.*

[41] ICF International, Nelson\Nygaard Consulting Associates, and Reid Ewing. *Transportation Study of the U.S. Route I College Park Corridor Report I: Existing Conditions and Stakeholder Input.* March 6, 2007.

recommended to pursue a smart growth vision of the area (which would be closer to 250),[42] but might be justified if nearby developments were granted use of some garage spaces in lieu of providing other on-site parking. In addition, there are 11 bus routes and one rapid rail line within a half a mile of the proposed garage site. Given that research shows that people are willing to walk half a mile to transit,[43] drivers might be tempted to park here and then board transit, which would contradict the objective of the new garage (i.e., to provide local parking within the Route 1 corridor). A pricing policy, as described below, should be put in place to discourage long-term commuter parking in this garage, which would otherwise take the place of valuable short-term customer parking.

6.3 Management Strategies

To ensure good management of the parking supply, the City will need to consider more than just the number of spaces provided; it should also take the following actions:

- Prioritize parking resources;
- Optimize use of existing spaces;
- Promote alternatives to single occupancy vehicle travel;
- Protect existing single-family neighborhoods from overflow parking; and
- Recognize the reduced parking demand at student housing and reduce parking requirements to match.

6.3.1 Prioritize Parking Resources

In all mixed-use districts, some parking spaces are more desirable than others. To determine how to allocate the most and least desirable spaces, the City should consider two key factors:

6.3.1.1 Type of Parking

While this report supports shifting employee trips to transit, it recognizes that many customer trips, which are critical to Route 1 businesses, will continue to be made by personal automobile. As such, strategies proposed in this report attempt to prioritize parking for motorists who are short-term customers rather than long-term commuters. This can be accomplished by developing measures to ensure that short-term customer parking is priced more affordably than daily, weekly, or monthly parking. For example, if meter fees are $0.50 per hour, daily parking could cost $6.00. In addition, by improving the accessibility and legibility of the Route 1 corridor customer parking system, the City can cut down on the amount of spaces provided because each space will be used more efficiently. The correct price for parking should be based on demand (as explained below); the parking demand should be regularly determined through area-wide surveys, with prices adjusted to match.

6.3.1.2 Price

Pricing and management policies should be used to support healthy business districts and transit use. This can be achieved by using a market approach to allocate spaces. For example, the City could set a maximum hourly rate for short-term parking or a maximum percentage of long-term parking, or require that the hourly rates increase with time. A simplified rate structure could include an all-day rate that is at

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[42] This number was calculated assuming 1 space per dwelling unit and 2 spaces per 1,000 square feet of commercial space. These ratios are used in Chicago's D-3 zoning district and are more conservative than Philadelphia's Center City ratio: 0.57 spaces per dwelling unit and 0.89 spaces per 1,000 square feet of commercial space.

[43] Mineta Transportation Institute, Project Number 2406. Marc Schlossberg. "How Far, by Which Route, and Why? A Spatial Analysis of Pedestrian Preference." 2006.

least 25 percent higher than the market-rate to discourage long-term parking; the short-term rate could be discounted for the first one to two hours, if supported by the community.

Curb spaces on the side streets should be metered with prices high enough to ensure that 85 to 90 percent of the spaces are available at peak demand.[44] If curb spaces are always full, the city should consider regulating meter fees to encourage more turnover. Parking meter pay stations have become more sophisticated, and can provide flexible payment options and variable fees.[45] Advanced meter technology can allow parking rates to by adjusted to meet demand, so prices may vary by time of day, day of week, season, etc.

6.3.2 Optimize Use of Existing Spaces

Because parking construction can be prohibitively expensive, it makes financial sense to optimize the use of existing parking facilities before building new spaces. This means keeping careful track of actual utilization rates to make sure that all lots are approximately 85 percent occupied at peak.

The City could provide an electronic parking guidance system that uses variable messaging signs to direct visitors and commuters to specific parking areas and access routes. Previous parking demand studies (including the *Structured Parking Site Selection and Preliminary Feasibility Study for the City of College Park, MD, Final Report*)[46] analyzed parking utilization on a block-by-block basis, noting available capacity at the Bookstore lot and a deficit at lots along Lehigh Road. However, the parking facilities analyzed were no farther than a quarter-mile away from each, which is a distance most drivers will travel if they know parking is available. If parkers are not using facilities within a quarter-mile, the hindrance may be lack of information. An electronic parking guidance system could significantly increase the efficiency of the inventory, by directing parkers to nearby locations with available supply.

Variable message signs (as shown in Figure 11) are especially valuable for locations operated as permit-only parking during the workday, but hourly parking in the evening. The signs outside the garage say "Permit Parking Only" and inside the garage the signs report how many spaces are available. When parking is open to all parkers, all signs say "General Parking Available: XX spaces available." Another system used effectively in some new parking structures[47] is an electronic space count system, which can sense individual space availability and direct users to open spaces. Online space finders are another option—Santa Monica recently unveiled a website (parkingspacenow.smgov.net) that shows drivers where there are available spaces in surface lots and garages. Sensors at entry and exit points in every lot and structure send information to a server in the city's parking office, which updates the website every five seconds. A combination of these systems and others can serve to greatly extend the perceived availability and actual utilization of parking in today's market where construction costs have greatly increased.

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[44] Shoup, Donald. *The High Cost of Free Parking*. American Planning Association, 2005, p. 38.

[45] See www.parkeon.com for one example.

[46] Desman Associates, March 14, 2003.

[47] *Alaskan Way Viaduct and Seawall Replacement Parking Assessment, Appendix B: Electronic Parking Guidance Systems*, Nelson\Nygaard, March 2007.

6.3.3 Promote Alternatives to Single-Occupancy Vehicle

When considering whether to construct new parking, it is important first to ask whether promoting transportation alternatives would be more cost effective. For example, if the annualized cost per net new parking space is $1,000, and the annualized cost per net new transit rider is $500, then the city should first consider investing in transit improvements. As the potential transit market is captured, however, the cost per new rider escalates quickly; soon it becomes more cost-effective to build parking. To make effective comparisons across various access modes, it is important for the City to understand its mode split and program costs and, most importantly, measure the performance of new programs.

Figure 11: Electronic parking guidance system

6.3.4 Require New Parking Facilities to be Shared

The Route 1 corridor is typical of many retail corridors in that people will often stop and park at one business, then drive a little farther and park at a second or third stop. This pattern of many short trips, and frequent turns into and out of parking lots, can substantially worsen traffic in the corridor. The resulting congestion is a direct effect of single-use parcels with individual curb cuts and no interconnectivity. Shared parking offers the chance to efficiently use the same parking spaces for multiple land uses and complementary peak demand times, therefore reducing the number of total spaces needed in an area. The Urban Land Institute's *Shared Parking*[48] demonstrates how shared parking contributes to a mixed-use area's economic viability by creating a "park-once" environment, where visitors can park and then either walk or take transit or shuttles between destinations. In fact, shared parking is a necessary prerequisite for creating a park-once environment. With a coordinated public parking system, the City would be taking the critical step towards circulating people rather than vehicles in College Park, and allow planners to make better-informed district-wide assessments for where to allow parking and how much is really necessary. The city is currently working to increase use of their structured parking by changing the price structure of metered parking versus the garage fee.

Shared parking cannot be required in a zoning code, but it can be required as part of any type of conditional-use permit or negotiated plan approval process, as Arlington County, VA, does. At a minimum, shared parking needs to be allowed as a way of meeting or reducing parking requirements.

Several communities have successfully interconnected parking and cross-access among parcels through their access management plans. For instance, the Genesee/Finger Lakes Regional Council in New York has developed a guidebook for enhancing access management for several of high-volume commercial corridors in the region. Their plan promotes safety of pedestrians and efficiency of travel. Curb cuts are limited, shared parking is required, and cross access points have been identified.[49]

A TMA, Business Improvement District, or other third-party incorporated entity could negotiate for shared parking, manage parking, and hold liability. Making shared parking work requires a forum for addressing disputes or concerns among various property owners and ensuring consistent management practices. A third-party entity could also lease parking lots from individual property owners and manage

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[48] Urban Land Institute, *Shared Parking, Second Edition*, 2005.

[49] www.gflrpc.org/Publications/AccessManagement/GuidebookNarrative.pdf.

them so that motorists perceive all the parking in the district as a common pool. More important, by leasing the parking lots, the third party entity can assume all liability for incidents that occur in the parking lots, relieving individual businesses and property owners from that burden.

6.3.5 Accept In-Lieu Fees

The shallow lots on the east side of the Route 1 corridor limit a developer's ability to provide parking on-site. If the community is not ready to eliminate minimum parking requires, a second option to encourage development on these shallow parcels and elsewhere would be to accept fees paid in lieu of building the required amount of parking. In-lieu fees may be discounted rates compared to the full capital cost of building parking, specifically to encourage new developments to pay into the shared-parking system, instead of providing individual parking supplies. Successful in-lieu fees are set low enough to encourage their use, but not so low as to make it impossible to construct shared garages. In-lieu fees are a good fit for College Park's design ideals and support developer and economic development goals. They should be allowed to fund not only parking, but also multimodal improvements including transit and streetscape.

6.3.5.1 Case Study: Montgomery County, MD

Montgomery County has two different types of districts to address transportation management—Transportation Management Districts (TMD) and Parking Lot Districts (PLD). The Parking Lot Districts are governed by Chapter 60 of the County code and have some overlapping boundaries with the TMDs.

There are two primary, and at times opposing, purposes for creating the PLDs:

1) To build, manage and provide public parking to encourage economic development
2) To manage parking in a way that encourages the use of other modes of transportation

In other words, the County seeks to provide enough parking so as not to choke off economic development while encouraging access by other modes.

The Bethesda, Montgomery Hills, Silver Spring and Wheaton Parking Lot Districts were all created between 1947 and 1951. According to Rick Siebert, Montgomery County's Chief of Parking Operations, after WWII the County anticipated that certain areas in the largely rural and agricultural county would begin urbanizing, especially where it borders Washington, DC.[50]

All parking revenue collection—from individual meters, electronic pay stations, cashiered facilities, sale of parking permits, parking fines, and the parking ad valorem tax—is managed through the PLD, which is also responsible for keeping accurate records in the County accounting system. In addition, it manages all parking databases and the appeal process for County parking tickets. That includes evaluating and resolving parking issues in designated areas, maintaining inventories of public and private parking spaces, and collecting statistics on which to project future County parking needs.

This program provides the maintenance and security of all parking lots and garages. Maintenance includes snow and ice removal; equipment repairs for elevators, electrical systems and HVAC systems; repairs of damage; and grounds keeping services. In addition, part of the PLD revenue gets transferred to the administration of the TMDs to fund carpooling and other TDM programs.

[50] Information for this case study from a personal communication between Nelson\Nygaard and Rick Siebert, April 19, 2007.

The annual operating budget for Fiscal Year (FY) 2005 was $19.7 million, an increase 4.1 percent over the FY 2004 budget of $19 million. Fourteen percent of the budget is for personnel costs (47 full-time and two part-time positions). The remaining 86 percent of the budget are operating expenses and debt service.

Annual revenue for 2003 varied by district. At $16.1 million, the Bethesda Parking District earned the highest income, as well as the highest percentage of profit over expenditures. Montgomery Hills Parking District brought in the least revenue at $137,000, but ranked second when compared to expenditures. See Figure 12 for details.

Figure 12: Montgomery Parking District Services Expenditures and Revenues in 2003

Parking District	Revenues	Expenditures	Profit	Percent
Bethesda	$16,100,000	$9,800,000	$6,300,000	64%
Montgomery Hills	$137,000	$97,000	$40,000	41%
Wheaton	$1,200,000	$976,000	$224,000	23%
Silver Spring	$9,400,000	$8,600,000	$800,000	9%

Siebert thinks that PLDs have been extremely effective, and points to the level of economic activity in Bethesda as proof. The real issue in the future, he says, is that the program worked well based on the idea that there would be a limited number of urbanized areas in the County. Now the whole county is becoming urbanized, so the County is reevaluating their system. The county is currently debating whether to create more parking districts or rethink the concept and create a countywide district.

6.3.6 Consider Impact Fees

Automobile trip generation varies more strongly with the provision of parking than with square footage of development. The City and County could consider establishing development impact fees that relate not to type of use and developed area, but rather to type and number of parking spaces. This will forge a connection between shared and non-shared parking spaces and auto trip generation. These impact fees could then generate revenue for mitigating the traffic impacts of new development and at the same time encourage the sharing of parking. It would be important to ensure that the impact fees could be spent on all types of projects that cost-effectively mitigate traffic, including transit improvements and TDM, along with roadway auto capacity increases.

6.3.7 Implementation

However College Park decides to pursue its parking strategy, it will be most successful if it launches an upfront public participation charrette process to solidify community support and coordinate multiple government entities (due to multiple parcels and property owners, numerous stakeholders, and involvement of multiple levels of government). The City might also consider producing a form-based code as a regulatory document—part of the zoning ordinance rather than a set of guidelines. This provides predictability for citizens and developers. Lastly, parking that is managed as part of a comprehensive community plan, not delegated to individual property owners, will better serve the community's economic development and quality of life goals. This requires implementation to be done by an interdisciplinary team from multiple agencies at both the city and county level.

7 BICYCLE FACILITIES

This section addresses bicycle issues along the corridor. Principally we are concerned with bicycle facilities along Route 1 and propose colored and perhaps raised bike lanes along the length of the corridor. Accommodating cross-bicycle traffic and linking to the overall network is also a concern, so we discuss how those corridors interact with Route 1 and specific issues with regard to the University of Maryland.

7.1 Bicycle Improvements to Route 1

In the Existing Conditions report we analyzed the existing bicycle facilities using the Bicycle Compatibility Index (BCI), developed by the Federal Highway Administration.[51] The BCI takes into account factors such as roadway width, vehicle volume and speed, and on-street parking to illustrate a road's bicycle friendliness. The BCI rating is converted to a level of service (from A (most friendly) to F (failure) which is comparable to vehicle LOS. The average score between the Beltway and Guilford Drive was 5.60, or LOS-F (see Figure 18).

7.1.1 SHA Proposal

To accommodate cyclists, SHA proposes 16-foot wide outside lanes (technically a 15-foot lane with 1-foot gutter pan). Our analysis shows this yields an average BCI score of 5.12, or LOS-E, given the same traffic configuration. However, the LOS north of Melbourne Place remains at F (see Figure 18). Furthermore we understand that a 16-foot outside lane does not qualify as "full accommodation" as defined by the SHA Engineering Access Permits Division.

The Sector Plan calls for LOS-E for motorized traffic along the corridor.[52] During the January 2007 workshop it was suggested that this minimum standard be extended to bicycle traffic as well. To see what minimum facilities would be necessary to achieve this, the project team tested various bike lane scenarios using the BCI model. Below University Boulevard (Route 193) LOS-E or better could be achieved with a 12-foot outside lane, a 6-foot bicycle lane and no shoulder, all other conditions being equal. Above University Boulevard the volume of motorized traffic would need to be reduced to 30-35,000 ADT before the BCI rises above LOS-F. Currently the volume is 42-55,000 vehicles per day.

Thus we have a quandary. Most of the stakeholders agree that, at a minimum, bike lanes should be placed on Route 1. Yet, the volume of traffic precludes any sort of satisfactory compatibility; even with a lower speed limit. Some sort of separation between bicycles and vehicles – either lateral or vertical – is needed. Working within the given right-of-way we see two options:

1.) constructing a raised bike lane within the roadbed, or

2) narrowing the roadbed further and locating the bike lane adjacent to the sidewalk.

At this stage in the process we recommend the former, but would like to keep the latter open for discussion. Integrating bicycle facilities in heavily trafficked commercial corridors is always a challenge, and one that warrants considerable discussion.

Accordingly we suggest a green-colored, 3-inch high bicycle lane. Above Berwyn Road the bike lane would be 5 feet wide adjacent to an 11-foot vehicle lane. Below Berwyn Road it would be 6 feet wide

[51] Federal Highway Administration. *The Bicycle Compatibility Index: A Level of Service Concept, Implementation Manual*, 1998.

[52] *Sector Plan*, p. 66.

adjacent to a 12-foot vehicle lane.[53] Colored bicycle lanes will increase visibility and communicate to drivers that these are not de-facto passing or parking lanes; and make enforcement easier. Raising the bicycle lane will further reduce the likelihood that motorist/bicyclist conflicts will arise.

Figure 13: Raised Bike Lane, Bend OR[54]

7.1.2 Beyond SHA Proposal

The SHA proposal only extends from the Beltway to College Avenue. To ensure high quality cycling facilities throughout the Route 1 corridor, bicycle lanes should be included to the south, possibly to the District line, and to the north to join with the existing lanes north of IKEA.

Between College Avenue and Guilford Drive we propose striping bicycle lanes within the existing roadway. Presently the curb-to-median dimension is roughly 24 to 26 feet, with two vehicle lanes. With a 4-foot wide bike lane, the vehicle lane widths would narrow to between nine and 11 feet, see Figure 14 below. A 9-foot wide lane is sure to raise objections, yet we note that, including the gutter, the effective width is 10 feet. Narrowing inside lanes to accommodate cyclists is consistent with AASHTO polices.[55]

In the 24-foot sections the outside lane would also need to drop to nine feet. While this is narrower than AASHTO policies, the alternative would be to narrow the bike lane to three feet, or not stripe the bike lane. Given the position of the city and county about providing a continuous bicycle route along Route 1, these types of tradeoffs have to be made. Lowering the speed limit to 25 mph will assist considerably in justifying this design. The bike lane would be colored as above.

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[53] For information on a recently installed raised bicycle lanes in Bend, Oregon, see http://www.bikeleague.org/programs/communities/bfc_bend.php

[54] http://www.bikeleague.org/programs/communities/bfc_bend.php

[55] AASHTO. *A Policy on Geometric Design of Highways and Streets*, 2004. p. 312.

Figure 14: Route 1, College Avenue and Guilford Drive curb to median cross-section

	Gutter	Bicycle	Vehicle	Vehicle	Gutter	Total
Existing Condition (ft)	1	--	11-12	11-12	1	24 – 26
Proposed Dimension A (ft)	1	4	9	9	1	24
Proposed Dimension B (ft)	1	4	10	9	1	25
Proposed Dimension C (ft)	1	4	11	9	1	26

Figure 15: Route 1 looking north at Hartwick Road

South of Guilford the minimum curb-to-curb dimension is about 52 feet, with a shoulder, four travel lanes and a two-way-left-turn lane. To introduce bike lanes we see two options. Option A would be to eliminate the two-way-left-turn lane which leaves 5-foot bike lanes, 11-foot outside lanes and 10-foot inside lanes. If the two-way-left-turn lane remains, then one could have 6-foot bike lanes, one 12-foot lane and a 16-foot wide two-way-left-turn lane. Either option provides good cycling facilities; colored as above.

Figure 16: Route 1, south of Guilford Drive cross-section

	Shoulder	Bicycle	Vehicle	Vehicle	TWLTL	Vehicle	Vehicle	Bicycle	Shoulder	Total
Existing Dimension (ft)	1	--	10	10	10	10	10	--	1	52
Proposed Dimension A (ft)	--	5	11	10	--	10	11	5	--	52
Proposed Dimension B (ft)	--	6	12	--	16	--	12	6	--	52

Figure 17: Route 1 looking south at Guilford Road

About ½ mile north of the Beltway bike lanes exist on Route 1. We suggest that these be connected to the new bike lanes south of the Beltway. Care will need to be taken in routing the lanes through the Beltway interchange and entrance to IKEA. We suggest these lanes be similarly colored.

In sum, the bicycle facilities proposed in this report represent a higher level of compatibility along Route 1 than currently exists or as proposed by SHA, see Figure 18. It is also consistent with the "complete street" called for in *Achieving the Vision*. While the BCI does not have a factor for raised bike lanes, one can assume that the separation raises compatibility.

Figure 18: Comparison of Bicycle Level of Service along Route 1

		Existing				SHA Proposal				Proposed			
		Northbound		Southbound		Northbound		Southbound		Northbound		Southbound	
From	To	BCI	LOS	BCI	LOS	BCI	LOS	BCI	LOS	BCI	LOS	BCI	LOS
Beltway	Cherry Hill Road	6.03	F	6.03	F	5.42	F	5.42	F	5.18	E	5.18	E
Cherry Hill Road	Fox Street	6.90	F	6.98	F	6.22	F	6.22	F	5.98	F	5.98	F
Fox Street	Route 193 / University Blvd	6.55	F	6.55	F	5.87	F	5.87	F	5.98	F	5.98	F
Route 193 / University Blvd	Greenbelt Road / Metzerott Road	5.97	F	6.12	F	5.36	F	5.36	F	5.47	F	5.47	F
Greenbelt Rd / Metzerott Road	Berwyn Road	6.12	F	5.97	F	5.36	F	5.36	F	5.47	F	5.47	F
Berwyn Road	Navahoe Street	6.05	F	5.97	F	5.36	F	5.36	F	5.02	E	5.02	E
Navahoe Street	Melbourne Place	6.12	F	5.97	F	5.36	F	5.36	F	5.02	E	5.02	E
Melbourne Place	Lakeland Road	6.12	F	5.43	F	5.36	F	4.67	E	5.02	E	4.33	D
Lakeland Road	Campus Drive / Paint Branch Pkwy	5.97	F	4.73	E	5.36	F	4.12	D	5.02	E	3.78	D
Campus Drive / Paint Branch Pkwy	Rossborough Lane	5.36	F	5.36	F	4.90	E	4.90	E	4.56	E	4.56	E
Rossborough Lane	College Avenue / Regents Drive	5.36	F	5.36	F	4.90	E	4.90	E	4.56	E	4.56	E
College Avenue / Regents Drive	Knox Road	4.70	E	4.70	E	4.70	E	4.70	E	4.07	D	4.07	D
Knox Road	Hartwick Road	4.62	E	4.24	D	4.62	E	4.24	D	4.07	D	4.07	D
Hartwick Road	Calvert Road	4.47	E	4.24	D	4.47	E	4.24	D	4.07	D	4.07	D
Calvert Road	Guilford Drive	4.47	E	4.47	E	4.47	E	4.47	E	4.07	D	4.07	D
	Average	BCI: 5.60 LOS: F				BCI: 5.12 LOS: E				BCI: 4.85 LOS: E			

Note: Higher LOS shown in green.

7.2 *Links to Regional Bicycle Corridors*

7.2.1 Routes that Intersect Route 1

The Sector Plan calls for numerous bicycle facilities in the area.[56] From that we note the following streets that intersect Route 1 where on-street facilities are proposed. In future iterations of the plans for Route 1, these facilities need to be included.

- Cherry Hill Road (improvements planned)
- Hollywood Road
- Fox Street
- University Boulevard
- Greenbelt Road / Metzerott Road
- Berwyn Road

[56] *Sector Plan*, p. 64.

- Lakeland Road
- Campus Drive / Paint Branch Parkway
- Rossborough Lane
- College Avenue / Regents Drive

Figure 19: "Sharrow" Bicycle Marking

We have identified these streets in the appendix and discuss some below. They are also shown in Figure 19 of the in the Existing Conditions report.

Cherry Hill Road is an intriguing choice, for it connects across the Beltway (offering an enviable option to Route 1) and connects to the Paint Branch Trail (and a possible extension to the north). However, it is a heavily trafficked street, and the planned facilities will need to be robust. The Sector Plan identifies a possible route just to the south of Cherry Hill Road, dependent on development in the area. We suggest that dual routes would complement each other, just as the Paint Branch Trail offers an alternative to Route 1.

Metzerott Road will be useful in connecting Route 1 to the Paint Branch Trail, especially for those not wishing to tackle Route 193.

Campus Drive / Paint Branch Parkway is adjacent to where the Paint Branch Trail crosses Route 1. We note that three desire lines cross at this juncture. First there is the north-south movement along Route 1. Second there is the northwest-southeast movement along the Paint Branch Trail. There is a tunnel under Route 1 which facilitates this movement. Third are the students who travel southwest-northeast between Campus Drive and Lakeland Road. Recently the median at Lakeland Road was widened to facilitate this crossing. And as noted by the SHA, a plurality of cyclists along the corridor can be found in this stretch.[57] The Sector Plan calls for strong bicycle and pedestrian connections here, and specifically for a sidewalk on the north side of Paint Branch Parkway.[58] A 2004 study of pedestrian facilities along Route 1 noted the strong southwest-northeast desire line.[59] Also, The provision of pedestrian safety enhancements should be included to improve the safety of the at-grade crossing of the "Trolley Trail", a 2.6 mile trail on a former trolley line running from Paint Branch Parkway to Paducah Road, with further expansions planned.[60] Improved lighting, signage, traffic calming, and a pedestrian refuge may be appropriate.

We suggest that Route 1 between Campus Drive and Lakeland Road (at the bridge over Paint Branch Creek) be made as narrow as possible, with the balance of the bridge structure be given over to sidewalk. Elsewhere we describe a 74-foot typical cross-section. The SHA report shows double left turns and right turn lanes which would necessitate a wider cross-section. We question these and instead would prioritize the cross-traffic here (not all of which is vehicle).

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[57] Maryland State Highway Administration. *Finding of No Significant Impact, US 1 College Park from College Avenue to Sunnyside Avenue*, 2005. p. III-6.

[58] *Sector Plan*, pp. 38-39.

[59] The RBA Group. *US 1 (Baltimore Avenue) Pedestrian Facilities and Operations Evaluation Technical Memorandum*, 5 April 2004, p. 1.

[60] http://rethinkcollegepark.net/blog/2007/259/

On other streets, bicyclists need to be accommodated with signed routes, facilities at critical junctures, links to the trails in the area, and parking at residences, businesses, schools and transit. Some of our favorites include:

- "sharrows"—street markings that signal to drivers that cyclists are expected and encouraged (see Figure 19);
- intersection-only bike lanes—akin to turn lanes, these lanes begin about 50 feet ahead of an intersection. They organize drivers and cyclists and allow cyclists to pass vehicle queued at signals (see Figure 20); and
- set-back stop lines, discussed in Section 8.8.2.

Figure 20: Intersection-only Bicycle Lane

Finally, we support connecting the two halves of Autoville Road, as proposed in the Sector Plan.[61] This will provide a quite alternative to Route 1 for local cyclists, and has access management benefits as well.

7.2.2 University of Maryland Bicycle Program

That Route 1 passes through the University of Maryland campus presents interesting opportunities and challenges for cycling. College students are typically the most apt population group to ride bikes. The cities around the country with the highest non-motorized mode splits are college towns: Davis CA, Madison WI, and Cambridge MA, to name a few. Yet jurisdictional boundaries restrict the University from implementing a more robust bicycle program.

The University's Facilities Master Plan 2001-2020 calls for a more walkable and bikable campus. Every day 3,000-4,000 bikes can be found on campus, a number that may seem high but represents only a small percentage of the daytime population of 50,000. As more and more students and faculty ride bikes, a more robust system of paths, limited-access roadways and pedestrian-only walkways will need to be created.

[61] *Sector Plan*, p. 61.

For example, the campus of the University of California at Santa Barbara has a series of separate bikeways and walkways.

The following points can be made to support both this study and the university's efforts to increase bicycle use.

- This study supports the development of a campus bicycle master plan by the University, as a way to coordinate efforts.

- The Paint Branch Trail is a key component in the area bicycle network. Three issues need to be resolved: the lack of lights, the lack of snow and ice removal, and additional bridges.

    - Lights will allow the trail to be better utilized after sunset, which occurs when many students are in class late fall through early spring. We suggest that the County light the trail from Route 1 north to University Boulevard and maintenance coordination should be undertaken with the M-NCPPC Department of Parks and Recreation, the County Department of Public Works, and other relevant agencies.

    - Better snow and ice removal will increase student use of the trail during the winter months. This is imperative for a year-round bicycle program. We suggest that the County either agree to remove snow and ice, or accept the University's offer to do so.

    - Better drainage along the trail – it has been noted that there are numerous puddles along the trail.

    - Additional bridges will create better connections between campus and the neighborhoods to the north and east. We suggest additional bridges be required for new development along Route 1.

    - Regular policing of the trail, including coordination between the Park Police and County Police for maximum effectiveness.

- Bicycle facilities need to be continuous, regardless of jurisdiction or traffic concerns. Gaps in the network are real impediments to increasing bicycle mode share.

- While the University's bicycle parking program regularly installs bike racks and covered, secure parking, others must follow suit. Students need bicycle storage at residences, customers need to racks near store entrances, and new developments should trade vehicle for bicycle parking.

8 PEDESTRIAN FACILITIES

This section addresses pedestrian conditions along the corridor. Since pedestrian facilities are directly related to other modes, we begin by looking at the overall corridor design and cross-section proposed by the Maryland State Highway Administration. Then we look at specific design elements and how they have been applied in the *Sector Plan* and SHA Report.

8.1 Corridor Design

8.1.1 Cross Section

The *Sector Plan* calls for Route 1 to be designed as a traditional main street south of Berwyn Road.[62] This stretch contains the downtown area, the University, and the commercial/residential areas to the north of the school. The grid structure is relatively tight, with cross streets every 300-400 feet. Compared to the area north of Berwyn Road, this stretch is primed to become a low-speed, high-commerce main street with frequent street crossings and good bicycle facilities.

To that end we propose two cross-sections for the corridor, both based on the SHA proposed cross-section. The northern stretch would have narrower lanes, a wider median, and a wider buffer between the road and the sidewalk, all in the same 72-foot curb-to-curb width. The southern section would have wider sidewalks, wider bike lanes and a wider median. This would necessitate a wider (74-foot) curb-to-curb width. The break would be at Berwyn Road. This is also where Route 1 bends, which provides a nice place to alter the cross-section. The dimensions of the cross-section are shown in Figure 21.

The *Sector Plan* calls for wider sidewalks along main streets and those in downtown areas. *Achieving the Vision* suggests the minimum width be 15 feet, with the preferred width 20-25 feet.[63] Our cross-section shows 10-13 feet in the "main street" section. While this is less than the minimum, we do not recommend narrowing the roadway further, given the bicycle LOS and pedestrian refuge width requirements (discussed in Section 8.2.1). Instead we suggest that building setback limits be established to provide additional sidewalk area. Property owners could be given credit for the more space provided.

The following should be noted with respect to the 2005 SHA report:[64]

- The 16-foot wide median proposed contains a 12-foot turn lane and a 4-foot refuge. Recent American Association of State Highway and Transportation Officials (AASHTO) publications call for a minimum 6-foot wide refuge, which SHA will acknowledge in future iterations.
- The 16-foot wide outside lanes are intended to be shared by motorists and cyclists, but a bike lane is not proposed to be striped.

[62] *Sector Plan*, pp. 26-27.

[63] *Achieving the Vision*, p. 22.

[64] Conversations with Jane Wagner, Maryland State Highway Administration, February 22, 2007.

Figure 21: Comparison of Cross-section Dimensions along Route 1

	SHA Proposal		Proposed			
			From the Beltway to Berwyn Road		From Berwyn Road to College Avenue	
Element	min	max	min	max	min	max
Frontage Area	3	3	1	1	1	1
Walkway	5	5	5	5	6	7
Landscape Zone	3	6	5	8	4	5
Bike Lane	16	16	5	5	6	6
Outside Vehicle Lane			11	11	12	12
Inside Vehicle Lane	12	12	11	11	10	10
Left Turn Lane	12	12	11	11	10	10
Median	4	4	7	7	6	8
Inside Vehicle Lane	12	12	11	11	10	10
Outside Vehicle Lane	16	16	11	11	12	12
Bike Lane			5	5	6	6
Landscape Zone	3	6	5	8	4	5
Sidewalk	5	5	5	5	6	7
Frontage Area	3	3	1	1	1	1
Roadway (curb to curb)	72	72	72	72	74	74
Sidewalk area	11	14	11	14	10	13
Total	94 feet	100 feet	94 feet	100 feet	94 feet	100 feet

Notes: All dimensions in feet; max = maximum dimension, min = minimum dimension.

Proposed widths greater than SHA proposal shown in green; less than SHA proposal shown in red.

Note that the *Achieving the Vision* report recommended on-street parking, but a more detailed look suggests that doing would likely mean taking away the median, left-turn lanes, or bike lanes. This issue requires further discussion.

8.1.2 Target Speed

Achieving the Vision recommends that Route 1 be redesigned with a 30 mph target speed. Target speeds are different from speed limits, in that a speed limit is often set lower than what a road is designed to allow. The result is that running speeds are typically about 5-10 mph above the speed limit. Accordingly, the speed limit on Route 1, at least in the "main street" section, should be set at 25 mph, with a design speed of 30 mph. This will go a long way in justifying the narrower lanes we have proposed.

Since Route 1 is essentially a level, straight roadway in the study area, there are no natural design features to control vehicle speeds. The design proposed by SHA and augmented in this report will add features – median, bike lane, narrower lanes, trees – which will have limited effect on speeds. As such, it will be incumbent on the operational plan – the signal timing – to maintain appropriate travel speeds. The relationship between vehicle speed, signal spacing and signal cycle length is further discussed in the Access Management section.

A local antecedent is the George Washington Memorial Parkway as it transitions to North Washington Street in Alexandria VA. The limited access Parkway becomes the main street through Old Town

Alexandria with a 25 mph speed limit and signals on every block. Another example is East Main Street (Route 32) in Westminster, MD, which was rebuilt in 1994 with narrower lanes and midblock crosswalks.[65]

Figure 22: Washington Street, Alexandria VA

A target speed needs also to be established for turning movements. As documented in the Existing Conditions report, current geometries along Route 1 permit high turning speeds. For example, the slip lane from Greenbelt Road to northbound Route 1 has a design speed of 35 mph.[66] At this speed, any pedestrian unlucky enough to be hit while in the crosswalk would have about a 60 percent chance of being killed and 80 percent chance of being seriously injured.[67] Notwithstanding the legal requirements of drivers yielding to people in crosswalks and pedestrian obeying signals, this design is not pedestrian-supportive.

We recommend a design speed of 10 mph for turns along the "main street" section of Route 1, and 20 mph elsewhere. At 10 mph the risk of pedestrian fatality is practically nil. At 20 mph the risk of pedestrian fatality is about 5 percent.[68] In practical terms, a 12-foot radius yields 10 mph for passenger vehicles and 52 feet yields 20 mph.[69] With tighter turning radii, the yielding behavior of drivers tends to increase.

At all locations with truck traffic, turning movement designs should balance the needs of heavy vehicles and bicycle and pedestrian safety. The southbound US 1 to Cherry Hill Road right turn may need a retaining wall to adequately accommodate all users. The MD 193 to northbound US 1 turn is already being proposed by the developer at that location. Finally, closing the slip ramp from eastbound MD 193 to

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[65] Ewing, R. and King, M. *Flexible Design of New Jersey's Main Streets*, Voorhees Transportation Policy Institute for the New Jersey Department of Transportation, 2002, pp. 111-122.

[66] The RBA Group. *US 1 (Baltimore Avenue) Pedestrian Facilities and Operations Evaluation Technical Memorandum*, 5 April 2004, p. 10.

[67] Gute Argument, *Verkehr*, 1991, in *Mobilizing the Region*, No. 68, March 1, 1996.

[68] Leaf, W. and Preusser, D. *Literature Review on Vehicle Travel Speeds and Pedestrian Injuries*, US DOT NHTSA (DOT HS 809 021), 1999, p.4.

[69] American Association of State and Highway and Transportation Officials. *A Policy on Geometric Design of Highways and Streets*, 2004, Formula 3-10 and Exhibit 3-11.

southbound US 1 was not included in the original public involvement process. Its impacts on traffic circulation would need to be evaluated before its closure can receive the support of the SHA.

8.1.3 Crossing Opportunities

One key to a successful main street is the ability to cross it at regular intervals. The 2004 AASHTO Pedestrian Guide suggests crossing facilities every 330 feet.[70] The 2006 ITE Context Sensitive Solutions report suggests a spacing of 200 to 300 feet where there is heavy pedestrian activity.[71] To that end we analyzed the corridor's existing crossing opportunities, those proposed in the *Sector Plan* and the SHA Report, and make recommendations for more crossings.

The existing segment lengths are shown in Figure 23. The distance between intersections documents the grid structure. Above Berwyn Road the distance between intersections averages 585 feet, but with only four signals the distance between crossing opportunities is 1,900 feet. Between Berwyn and Lakeland Roads the distance is 375 feet, while through the campus it averages 630 feet.

Figure 23: Segment Lengths along Route 1—Existing

From	To	Distance between intersections, ft.	Distance between signals, ft.
Edgewood Road	Cherry Hill Road	650	634
Cherry Hill Road	Lackawanna Street	525	2323
Lackawanna Street	Hollywood Road	550	
Hollywood Road	Indian Lane	1000	
Indian Lane	Fox Street	280	
Fox Street	Erie Street	425	3590
Erie Street	Delaware Street	450	
Delaware Street	Cherokee Street	700-850	
Cherokee Street	University Blvd	300-450	
University Blvd	Branchville Road	1250	
Branchville Road	Greenbelt Road / Metzerott Road	280	
Greenbelt Road / Metzerott Road	Tecumseh Street	360	1056
Tecumseh Street	Berwyn Road	700	
Berwyn Road	Quebec Street	380	1373
Quebec Street	Pontiac Street	450	
Pontiac Street	Midblock Crossing	125	
Midblock Crossing	Berwyn House Road	225	
Berwyn House Road	Navahoe Street	270	
Navahoe Street	Melbourne Place	415	475
Melbourne Place	Lakeland Road	375	370
Lakeland Road	Campus Drive /	500	475

70 American Association of State Highway and Transportation Officials. *Guide for the Planning, Design, and Operation of Pedestrian Facilities*, 2004, p. 90.

71 Institute of Transportation Engineers. *Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities*, 2006, p. 138.

From	To	Distance between intersections, ft.	Distance between signals, ft.
	Paint Branch Parkway		
Campus Drive / Paint Branch Parkway	Rossborough Lane	1250	1200
Rossborough Lane	Fraternity Row North	420	1250
Fraternity Row North	Fraternity Row South	355	
Fraternity Row South	College Avenue / Regents Drive	500	

Notes: Distances between intersections measured from centerlines of cross streets; may not equal distances between signals. Distances between signals taken from SHA 2005 report.

As shown in Figure 24 there are 13 existing (or soon to be installed) signalized intersections and 1 midblock crossing between Edgewood Road and College Avenue. The *Sector Plan* shows 16 signals, many placed to the north end. The SHA Proposal shows 10 signals, but we assume that this will be amended to include those signals recently added.

We essentially agree with the number of signals but would hope to add other crossing opportunities to take advantage of the median proposed by SHA. We focus on the campus area and just to the north, consistent with the "main street" concept advanced in the *Sector Plan* and *Achieving the Vision*, recognize the latent pedestrian demand that already exists. Our proposal has a crossing every 479 feet between Berwyn Road and College Avenue. Between Berwyn and Lakeland Roads there is a crossing every 375 feet, mirroring the grid structure.

At the signalized intersections there would be marked crosswalks and pedestrian signals on *all* legs. For the other crossing opportunities, each would need to be individually assessed. Given the vehicle volumes on Route 1, marked crosswalks at unsignalized locations are not recommended.[72] Instead, we offer three alternatives:

- A midblock pedestrian signal timed with other signals along the stretch.
- A pedestrian activated signal such as a HAWK (High-intensity Activated crossWalK) which is dark when the pedestrian button has not been pushed.[73]
- No marked crosswalk where the adjacent intersections are signalized. For example at Navahoe Street, there would be signals at both Melbourne Place and Berwyn House Road. When these signals are red, then the only traffic on Route 1 would be turning from the cross-streets. If this traffic were slight, then crossing via the median would be relatively safe.

In all instances pedestrians should be directed to the most convenient, direct and safest crossing locations.

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[72] Zegeer, C., et al, *Safety Effects Of Marked vs. Unmarked Crosswalks At Uncontrolled Locations*, US DOT FHWA (FHWA-RD-01-075), 2001.

[73] www.saferoutesinfo.org/guide/case_studies/case_study.cfm?CS_ID=CS651&CHAPTER_ID=C353, accessed 15 April 2007.

Figure 24: Comparison of Crossing Opportunities along Route 1

Intersection	Existing & Planned	2002 Sector Plan	2005 SHA Proposal	Proposed
Edgewood Road	S	S	S	S
Cherry Hill Road	S	--	S	S
Lackawanna Street				
Hollywood Road	S	S		S
Indian Lane				
Fox Street	S	S	S	S
Erie Street				
Midblock Crossing		S		
Delaware Street				
Midblock Crossing		S		XW
Cherokee Street	S	S		S
University Blvd				XW
Branchville Road				
Greenbelt Road / Metzerott Road	S	S	S	S
Tecumseh Street				
Berwyn Road	S	S	S	S
Quebec Street				XW
Midblock Crossing		S		
Pontiac Street				XW
Midblock Crossing	XW	--	--	--
Berwyn House Road		S		S
Navahoe Street	S	--	--	XW
Melbourne Place	S	S	S	S
Lakeland Road	S	S	S	S
Campus Drive / Paint Branch Parkway	S	S	S	S
Midblock Crossing		S		XW
Rossborough Lane	S	S	S	S
Fraternity Row North				XW
Fraternity Row South				
College Avenue / Regents Drive	S	S	S	S
Signals	13	16	10	13
Midblock Crossings	1	0	0	7
Total	14	16	10	20

Notes: S = signalized intersection; XW = mid-block crossing

The SHA report states that "closely aligned signalized intersections have been known to contribute to traffic congestion."[74] We take issue with the statement, given the County's and City's goals for Route 1. While it is true that signals reduce the capacity of a roadway (typically a road with signals carries half the volume of a road without signals), they also serve many other functions. They allow cross-traffic to enter the traffic stream, they create gaps for drivers exiting driveways, they allow pedestrians to cross the street, they can be timed to moderate vehicle speed, and they make a street accessible to those with limited vision. We would prefer to evaluate design features based on overall project goals, not limited objectives favoring one mode.

The SHA proposal only extends from the Beltway to College Avenue and we understand that to be the priority. South of College Avenue the pedestrian facilities are fairly robust, as documented in our Existing Conditions report. Nevertheless we do feel a signal should be added at Hartwick Road, the only intersection in the downtown area without one. As the corridor sees more pedestrian activity there will be impetus to revisit the issue.

8.2 Design Elements

Design elements and their application are critical to pedestrian safety. As a point of departure we reviewed the SHA proposal for Route 1, using as our guide the report *Flexible Design of New Jersey's Main Streets*. This review is not meant to be exhaustive and we understand that the ultimate design for Route 1 will probably undergo many iterations. Furthermore we do not intend to be unnecessarily critical of the SHA plans. Rather we find that by locating specific issues on paper, we get away from the rhetoric of policy and prescription. Design is a series of trade-offs, compromises and priorities. Our priority is pedestrians, a high-quality main street environment (as described in the *Sector Plan*), and sustainable transportation systems.

Below we discuss certain elements. In the appendix we graphically present the elements on the SHA plans for Route 1. This includes:

- Crosswalks
- New signals
- New crossing locations
- New bicycle lanes
- Realigned intersections
- Realigned slip lanes
- Removed bus bays
- Removed double left turns

In 2004 the SHA commissioned an evaluation of the pedestrian facilities and operations on Route 1.[75] This study resulted in the wider island and less pedestrian delay at the Lakeland Road intersection, the new refuge island between Pontiac Street and Berwyn House Road, and other improvements. In addition, note the following with respect to the 2005 SHA report:

- Crosswalks are typically proposed only at signalized intersections.
- The ramp from University Boulevard to Route 1 northbound is to be redesigned as a T-intersection.
- The pedestrian desire line at Fraternity Row (north) where the paths from campus converge will need to be addressed.

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[74] *Finding of No Significant Impact,*. p. III-4.

[75] The RBA Group.

8.2.1 Crosswalks and Medians

The general rule for crosswalks is they should be on all legs of all intersections, they should be as short as possible and make use of refuge islands and medians, and they should align with the sidewalk. Medians used as refuge for pedestrians should be at least six feet wide.[76] In six feet one can easily wait with a bicycle or a child's stroller. Eight feet is preferred to allow sufficient "shy" distance between those waiting and moving traffic.

Figure 25: Set-back Stop Line

8.2.2 Stop Lines

We recommend that stop lines be included at all controlled intersections along the corridor, regardless of whether there is a crosswalk or not. A typical stop line is set back from the crosswalk four feet; however, we suggest this distance is insufficient. Recent research[77] suggests that placing the stop line between five and 20 feet from the crosswalk results in:

- Fewer vehicles stopped in the crosswalk
- Reduced vehicle-pedestrian conflicts
- Reduced vehicle-bicycle conflicts,
- Reduced right-turn-on-red crashes
- Opportunities for pedestrians to cross perpendicular to traffic (if the crosswalk is askew)
- Opportunities for cyclists to queue ahead of waiting vehicles at signals

To that end we recommend stop lines placed 10 feet from the crosswalk and perpendicular to the travel lane (see Figure 25).

8.2.3 Double Left Turns

The SHA report calls for double left turn lanes on Route 1 at Cherry Hill Road and Campus Drive / Paint Branch Parkway, with the former being recently implemented. Designed to facilitate high-volume turns, double left turns can be problematic for pedestrians. First, with two vehicles turning, the chance that both with yield to people in the crosswalk is greatly minimized. Turning movements are a primary cause of pedestrian injury, and failure to yield is a principal culprit. A counter-measure is to organize the signal phases so that pedestrians do not cross during the left turn phase, but this can add delay to all users. Second, two left turn lanes usually means a narrower pedestrian refuge area. One can widen the median, but then the crossing distance is longer. In some locations pedestrian crossings are banned to accommodate the turns.

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[76] AASHTO. *Guide for the Planning, Design, and Operation of Pedestrian Facilities*, 2004, p. 75.

[77] Retting, R and Van Houten, R. "Safety Benefits of Advance Stop Lines at Signalized Intersections: Results of a Field Evaluation." *ITE Journal*, September 2000.

We suggest double left turn lanes receive extra scrutiny, especially in the "main street" section and offer the following:

- the decision to implement a double left turn be made not solely to accommodate vehicle volume, especially if it increases pedestrian delay;
- the pedestrian crossing should not be banned;
- the turn and walk phase should be separate, with the walk phase occurring first;
- the turning radius and entry throat be designed to manage turning speeds and vehicle alignment; and
- a 6-foot wide pedestrian refuge be maintained

8.2.4 Cherry Hill Intersection

The Sector Plan recommends a flyover to facilitate traffic flow at the Cherry Hill intersection.[78] The SHA report rejects this option based on design and property displacement issues, and the fact that the operational benefits would not extend to adjacent intersections.[79] We agree with the SHA stance on this issue, and add that a flyover runs completely counter to the notion of a Route 1 main street. Historically flyovers have been added as a roadway is upgraded from street to highway; a precursor to limited-access. It is our understanding that the direction for Route 1 is the opposite: road diet, traffic calming, traditional main street, etc. To expend scarce government resources on a flyover whose main attribute is to facilitate vehicle flow at the expense of others is dubious.

At the May 2007 public meeting we were asked to speak to the existing conditions of the Route 1 – Cherry Hill Road intersection. It has recently been "improved" by the SHA, but not necessarily for the benefit of pedestrians. The crossing of nine lanes of traffic to deposit checks at the bank on a daily basis was pointed out as a specific negative. Elsewhere we have called for crosswalks on all legs, further analysis of the double left turn lane, and a realignment of the slip lane. The proposed signal at Hollywood Road will also help to control drivers. While we are sympathetic to the need to process vehicles, it is exactly intersections like this which befuddle communities wishing to "improve" their public realm. Whatever happens in the "main street" section in College Park, one must not forget the real safety and access issues elsewhere.

8.2.5 Bus Bays

The Sector Plan calls for bus bays along Route 1.[80] The SHA report shows 14 bus pull off locations and seven on-street bus stops. Although bus bays can assist in the separation of vehicle/bus conflicts, the re-entry of buses into the traffic stream remains an issue, particularly where there is high vehicle volume.

A Transit Cooperative Research Program report[81] outlined several important points regarding the location and design of bus bays. It suggested that bus bays be considered along arterial streets where:

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[78] *Sector Plan*, p. 59.

[79] *Finding of No Significant Impact*, p. III-21.

[80] *Sector Plan*, p. 63.

- Traffic in the curb lane exceeds 250 vehicles during the peak period
- Traffic speed along the arterial road is greater than 40 mph
- Bus volumes exceed 10 vehicles per hour in the peak period

The report highlighted, however, that bus drivers will not use a bus bay when traffic volumes exceed 1,000 vehicles per hour per lane as this make it extremely difficult to maneuver a bus out of a bus bay, causing an unacceptable delay in service. Often drivers will stop in the travel lane specifically for this reason.

We have applied the criteria outlined above to the SHA proposal for Route 1 (Figure 26). Based on this assessment, we conclude that bus bays are not warranted on this stretch of Route 1. In essence the criteria suggest that bus bays are appropriate on low volume, high speed roadways with high transit. Route 1 simply has too much vehicle volume.

Figure 26: Bus Bay Criteria By Roadway Segment along Route 1

<table>
<tr><th colspan="2">Location</th><th colspan="3">Existing Traffic Operations Data</th></tr>
<tr><th>From</th><th>To</th><th>Vehicles per lane in peak period</th><th>Vehicle speed (speed limit plus 5 mph)</th><th>Peak transit headways (bus services per hour)</th></tr>
<tr><td>Beltway</td><td>Cherry Hill Road</td><td>1,062</td><td rowspan="2">45</td><td>7</td></tr>
<tr><td>Cherry Hill Road</td><td>University Blvd</td><td>1,366</td><td rowspan="2">11</td></tr>
<tr><td>University Blvd</td><td>Greenbelt Road</td><td rowspan="2">1,174</td><td rowspan="3">35</td></tr>
<tr><td>Greenbelt Road</td><td>Campus Drive / Paint Branch Parkway</td><td>14</td></tr>
<tr><td>Campus Drive / Paint Branch Pkwy</td><td>College Avenue / Regents Drive</td><td>999</td><td>6</td></tr>
</table>

Green denotes criteria for bus bays is met.

Other than the traffic and transit criteria outlined above, there are reasons why bus bays should be considered. If buses are required to stop for extended periods of time, for a layover stop or for high volumes of wheelchair boarding, bus bays could be included.

Whatever the rationale, bus bays should not be located at intersections; this increases pedestrian crossing distance (directly adjacent to the bus stop) and allows higher speed turns (into the crosswalk). The SHA proposal shows bus bays at intersections with Edgewood Rd, Hollywood Rd, Fox St, Erie St, Navahoe St, Rossborough Lane, and College Avenue. If bus bays are to be included, we would relocate these away from the intersections.

Finally, the SHA report notes that the proposed bus bays have been located to avoid impacts on adjacent properties. Nevertheless, given the restricted right-of-way, we are concerned that sidewalks space will be compromised, given the minimal pedestrian infrastructure included along the corridor.

If bus bays are to be considered they should be located only at the locations of proposed Super Stops. This would allow the greatest number of users to utilize these bus bays, while minimizing traffic impacts on the Route 1 corridor.

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[81] Fitzpatrick, K. *TCRP Report 19: Guidelines for the Location and Design of Bus Stops*, 1996. http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_19-b.pdf.

9 ACCESS MANAGEMENT

From a traffic engineering standpoint, roads perform two distinct functions:

- providing access to property and
- accommodating through-movement of traffic.

At the extremes, expressways provide no direct access to property but move large volumes of traffic, while cul-de-sacs do just the opposite.

In theory, traffic movement is the main function of arterial highways and a major function of collector roads (Figure 27). In practice, arterials such as Route 1 often become so cluttered with driveways and other access points that they function more like local streets (Figure 28).[82]

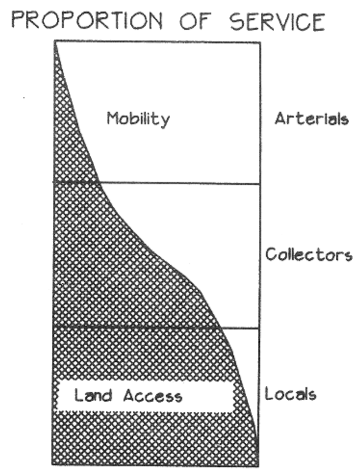

Figure 28: Functional Road Hierarchy in Theory

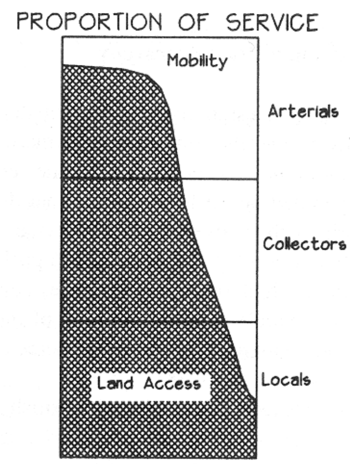

Figure 27: Functional Road Hierarchy in Practice

To counter this tendency, comprehensive access management systems establish minimum separations between driveways, traffic signals, and median openings; place restrictions on turning movements into and out of properties; and require turn/acceleration/deceleration lanes where necessary to avoid conflicts with through-traffic. Requirements vary with the type of roadway and nature of the area served.[83]

Research has shown that travel speeds fall, and accident rates rise, as the number of access points increases.[84] "…good access management practices can delay the need to widen the road for several years.

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[82] Ewing, R. "Residential Street Design: Do the British and Australians Know Something We Americans Don't?" *Transportation Research Record 1455*, 1994, pp. 42-49; and Ewing, R. "Residential Street Design: Do the British and Australians Know Something We Americans Don't?" *A Compendium of Articles on Residential Street Traffic Control*, Institute of Transportation Engineers, Washington, D.C., 1993, pp. 33-39.

[83] Access management practices around the U.S. are reviewed in Committee on Access Management, op. cit., pp. 26-40; and F.J. Koepke and H.S. Levinson, *Access Management Guidelines for Activity Centers*, National Cooperative Highway Research Program Report 348, Transportation Research Board, Washington, D.C., 1992, pp. 13-22; and W.E. Frawley and W. L. Eisele, *A Summary of Access Management Programs and Practices in the United States*, Texas Transportation Institute, Information & Technology Exchange Center, 2001; E. Perry, D. Rose and T Williamson, *Domestic Access Management Scan Tour Summary Report*, FHWA, Washington D.C, 2006.

[84] W.A. Frick, "The Effect of Major Physical Improvements on Capacity and Safety," *Traffic Engineering*, December 1968, pp. 14-20; Roy Jorgensen Associates, *Cost and Safety Effectiveness of Highway Design Elements*, National Cooperative Highway Research Program Report 197, Transportation Research Board, Washington, D.C., 1978, pp. 77-80; V.G. Stover, S.C. Tignor, and M.J. Rosenbaum, "Access Control and Driveways," *Synthesis of Safety Research Related to Traffic Control and Roadway Elements, Volume 1*, Federal Highway Administration, Washington, D.C., 1982, pp. 4-2 through 4-10; D. Ismart, "Access Management: State of the Art," *Third National Conference on Transportation Planning Applications*, Transportation Research Board, Washington, D.C., 1991; G. Long, C. Gan, and

In cases where roadways cannot be widened, good access management will help reduce congestion."[85] This is especially relevant for Route 1, as the roadway is congested today and the possibility and desire to add lanes is limited.

Below we look at the principles and safety benefits of access management. Following we discuss design features, specifically median breaks, driveways, and turn/acceleration/deceleration lanes. We offer suggestions for increased access management in certain instances and note where aggressive access management would be counter-productive in a main street setting. We graphically identify certain access management issues in the appendix.

In general, in terms of access management along Route 1, we agree with SHA's decision to propose a non-traversable median, and it appears the number of median breaks is sufficient. The number of driveways and intersecting streets is appropriate in the "main street" section, but to the north additional driveways should be closed or consolidated, or the speed limit reduced. We note there are 11 businesses that have two driveways on Route 1 or an additional access on a side street. There are also six driveways that appear wider than necessary and should be reviewed. The signal spacing appears to be reasonable, as do the corner clearances. We have reservations about the number, length and design of turn lanes, slip lanes, on-ramps and off-ramps and suggest further review.

9.1 Principles and Practices

The principles of access management can be summarized as follows:

- Limit the number of conflict points
- Separate the conflict points
- Remove turning volumes and queues from through movements[86]

Of the 100 techniques for access management,[87] those most deserving of priority are:

B.S. Morrison, *Safety Impacts of Selected Median and Access Design Features*, Transportation Research Center, University of Florida, Gainesville, 1993, pp. 36-59; P.S. Parsonson, M.G. Waters, and J.S. Fincher, "Effect on Safety of Replacing an Arterial Two-Way Left-Turn Lane with a Raised Median," *Conference Proceedings of the First National Access Management Conference*, Federal Highway Administration, U.S. Department of Transportation, 1993, pp. 265-269; W.M. Bretherton, "Are Raised Medians Safer Than Two-Way Left-Turn Lanes?" *ITE Journal*, Vol. 64, December 1994, pp. 20-25; H.S. Levinson, "Access Management on Suburban Roads," *Transportation Quarterly*, Vol. 48, 1994, pp. 315-325; Committee on Access Management, "Driveway and Street Intersection Spacing," *Transportation Research Circular*, Number 456, March 1996, pp. 5-10; Florida Department of Transportation, *Access Management: An Important Traffic Management Strategy*, Tallahassee, undated; Gluck, J., H.S. Levinson, and V. Stover. *Impacts of Access Management Techniques*, NCHRP Report 420, Transportation Research Board, 1999; W.L. Eisele and Frawley, W.E, *Safety and Operational Analyses of Access Management Treatments*, Transport Research Board, 3rd International Symposium on Highway Geometric Design, 2005; W.L. Eisele and Frawley, W.E, *Estimating the Safety and Operational Impact of Raised Medians and Driveway Density: Experiences from Texas and Oklahoma Case Studies*, Journal of the Transport Research Board No.1931, 2005; W.L. Eisele, Frawley, W.E and Toycen, C M, *Estimating the Impacts of Access Management Techniques: Final Results*, Federal Highway Administration 2004; and R. Mussa, *Analysis of Crashes Occurring on Florida Six-Lane Roadways*, 2006 Annual Meeting and Exhibit Compendium of Technical Papers.

[85] "Access Management: Balancing Access and Mobility", Florida DOT, www.dot.state.fl.us/planning/systems/sm/accman/pdfs/ampromo3.pdf, accessed 18 April 2007.

[86] "Access Management: An Important Traffic Management Strategy", FHWA, http://www.fhwa.dot.gov/realestate/am.pdf, accessed 18 April 2007.

- Installation of medians
- Driveway controls
- Optimal signal spacing
- Corner clearances
- Frontage roads
- Backage roads

This discussion of Route 1, and the SHA re-design thereof, focuses on the first two techniques. The third and fourth are applicable to Route 1, but on a limited scale, given the existing street network and traffic function. The last two techniques are not applicable due to right-of-way constraints.

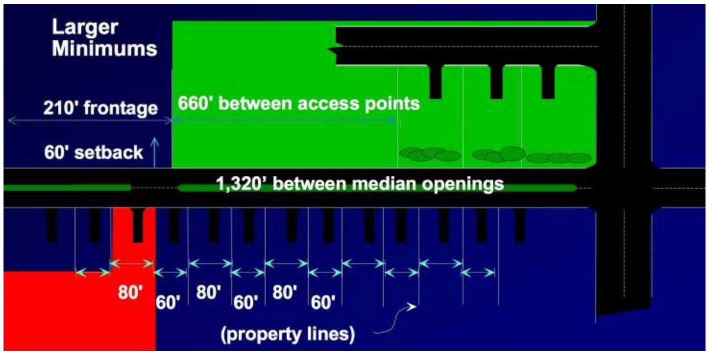


Figure 29: Model Access Management (top) vs. Traditional Driveway Layout (bottom)

Implemented together, the various techniques of access management produce a different type of roadway and urban fabric, as illustrated in Figures 29 to 31. It is our observation that Route 1 is at this stage in its development. No more can it be a laissez-faire rural highway with unregulated driveways, turns and access. The speeds, volumes and development pressures are simply too high. It needs to become a well-designed suburban arterial, and a main street in parts. Access management techniques can contribute to its success.

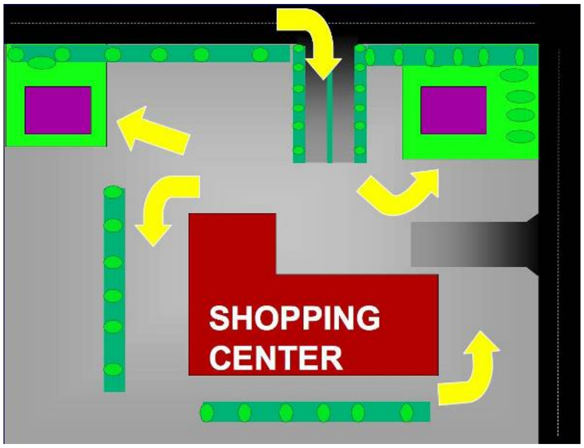


Figure 30: Example of Corner Property Access via Parking Lot

Figure 31: Visibility Does Not Require Direct Access

[87] Gluck, J., H.S. Levinson, and V. Stover. *Impacts of Access Management Techniques.* NCHRP Report 420. Washington DC: Transportation Research Board, 1999, Appendix A.

9.2 Safety Benefits

9.2.1 Minimizing Conflicts

The presence of driveways and side streets along arterials creates conflicts between through-moving vehicles and those attempting to turn into and out of adjacent driveways. Rear-end crashes are common as drivers decelerate to negotiate turns or enter the traffic stream from driveways or side streets at lower-than-prevailing speeds. Angle crashes are commonplace as drivers attempt to turn left into driveways or side streets, but have insufficient time to clear opposing traffic lanes.

Two strategies exist for moderating access-related crashes. The first is to reduce the speeds of through-moving vehicles, thereby minimizing speed differentials with turning vehicles. The second is to control turning movements, while maintaining higher speeds for through-moving vehicles, through access management. Access management is the control of the location, spacing, and operation of driveways, median openings, and street connections to a main roadway.

The traffic safety benefits associated with access management techniques are summarized by S&K Transportation Consultants.[88] They range from a 20 percent reduction in accidents associated with the addition of right turn bays, to a 67 percent reduction associated with the addition of left-turn dividers. Crash rates appear to vary with the square root of access density, up to about 40 access points per mile.[89] Crash rates are higher on roads with unlimited left turns. The dual effects of two variables—access point density and non-traversable medians—are reflected in Figure 32.

Figure 32: Crash Rates on Urban and Suburban Roads with Different Levels of Access Control (per million vehicle miles)

	Median Type		
Access Points per Mile	Undivided	Two-Way Left-Turn Lane	Non-Traversable Median
≤ 20	3.8	3.4	2.9
20-40	7.3	5.9	5.1
40-60	9.4	7.9	6.8
>60	10.6	9.2	8.2

Minimizing driveways increases the compatibility of a roadway for cyclists. Often drivers wishing to turn right will veer to the right—into the bike lane or shoulder. Drivers attempting to turn onto the roadway from driveways and side streets will often creep into the space where cyclists typically operate. With fewer conflict points, cyclists have a clearer path to travel. The Bicycle Compatibility Index found that the presence of right-turning vehicles (into either driveways or minor intersections) decreased the compatibility rating by ten percent. [90]

Raised medians, embraced by highway agencies for operational reasons, are favored for pedestrian safety as well. They provide refuge areas for pedestrians, who can cross in stages. A study of pedestrian-vehicle

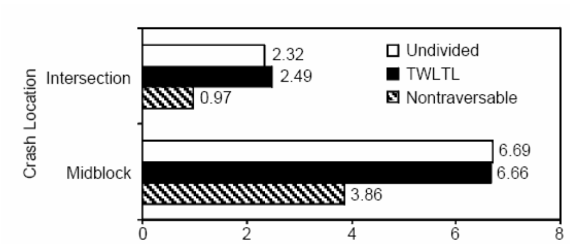
[88] S&K Transportation Consultants, Access Management, Location and Design. Participant Notebook for NHI Course 133078. Washington DC: National Highway Institute, Federal Highway Administration, 2000.

[89] Committee on Access Management (2003). *Access Management Manual*. Washington, DC: TRB, 2003.

[90] Federal Highway Administration. *The Bicycle Compatibility Index: A Level of Service Concept, Implementation Manual*, 1998, p. 7.

crash experience on arterial roadways in Atlanta, Phoenix, and Los Angeles found that crash rates were about half as high on arterials with raised medians compared to undivided roadways or roadways with center two-way left-turn lanes (see Figure 33).[91] In Section 8 we discussed ways that the median proposed by SHA for Route 1 will enhance pedestrian crossing opportunities.

Figure 33: Pedestrian Crash Rates for Suburban Arterials with Different Access Control



Source: Bowman and Vecillio, 1994.

Safety benefits of medians appear to vary by type and width. In one study, pedestrian accidents fell by 23 percent when a six-foot painted median was replaced with a wide raised median.[92] In another study, the narrowest medians (four feet) had four times the pedestrian crash rate of the widest medians (10 feet).[93] Very narrow medians may reduce vehicle-to-vehicle crashes but have no effect on pedestrian crashes.[94, 95] Raised medians and raised crossing islands may reduce vehicle-pedestrian crashes on multi-lane roads, while painted medians and two-way left turn lanes do not.[96]

9.2.2 Minimizing Speeds

Reducing speed improves safety and negates the need for fewer driveways or increased driveway spacing. Because drivers must slow to turn, they can slow an entire platoon of vehicles. As such, one tenet of access management is to limit the number of turns off a roadway, as described throughout this section. In Figure 34 we compile various data sets quantifying this relationship. In practice, many jurisdictions attempt to limit the number of conflict points solely by limited access. However, this is only one part of

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[91] Bowman, B.L. and R.L. Vecellio (1994). Effect of Urban and Suburban Median Types on Both Vehicular and Pedestrian Safety. *Transportation Research Record, Journal of the Transportation Research Board*, No. 1445, Transportation Research Board, National Research Council, 1994, pp. 169-179; Eisele, W.L and Frawley, W.E, *Safety and Operational Analyses of Access Management Treatments*, Transport Research Board, 3rd International Symposium on Highway Geometric Design, 2005; W.L and Frawley, W.E, *Estimating the Safety and Operational Impact of Raised Medians and Driveway Density: Experiences from Texas and Oklahoma Case Studies*, Journal of the Transport Research Board No.1931, 2005.

[92] Claessen, J.G. and D. R. Jones. The Road Safety Effectiveness of Raised Wide Medians. Proceedings of the 17th Australian Road Research Board Conference, Vol. 17, No. 5., 1994, pp. 269-287.

[93] Scriven, R.W. Raised Median Strips—A Highly Effective Road Safety Measure. Proceedings of the 13th Australian Road Research Board Conference, Vol. 13, No. 9, 1986, pp. 46-53.

[94] Johnston, R.E. Experience with Narrow Medians. Proceedings of the 1st Australian Road Research Board Conference, Vol. 1, No. 1, 1962, pp 489-499.

[95] Leong, H.J.W. The Effect of Kerbed Median Strips on Accidents on Urban Roads. Proceedings of the 5th Australian Road Research Board Conference, Vol. 5, No. 3, 1970, pp 338-364.

[96] Zegeer, C.V., J.R. Stewert, H.H. Huang, and P.A. Lagerwey, *Safety Effects of Marked vs. Unmarked Crosswalks at Uncontrolled Locations: Executive Summary and Recommended Guidelines*. Report No. FHWA-RD-01-075, Washington, D.C.: Federal Highway Administration, 2002.

the equation. Limiting vehicle speed is another; both achieve similar results. In approaching access management for Route 1, we bear in mind that a road with a lower travel speed allows greater access.

Figure 34: Relationship Between Speed and Access Spacing

Speed Limit	30 mph	35 mph	40 mph	45 mph
Minimum Spacing for a 10 mph Speed Differential, ft.[1]	--	300	420	550
Spacing Guideline based on a 5% Spillback Rate, ft.[2]	335	355	400	450
Spacing criteria between unsignalized median opening on divided highways, ft.[3]	370	460	530	670

Sources: 1) Stover, V. "Guideline for Spacing of Unsignalized Access to Urban Arterial Streets," 1981 as quoted in "Access Management: An Important Traffic Management Strategy", FHWA, www.fhwa.dot.gov/realestate/am.pdf, accessed April 18, 2007.

2) Gluck, J, et al. "Driveway Spacing and Traffic Operations" in TRB Circular E-C019, 2000, Tables 2 and 3.

3) F.J. Koepke and H.S. Levinson, Access Management Guidelines for Activity Centers, National Cooperative Highway Research Program Report 348, Transportation Research Board, Washington, D.C., 1992, Table 7-8.

9.2.3 Caveats

Before one declares access management a win-win for motorists and pedestrians, a few caveats should be noted. First, while medians may enhance pedestrian safety, it is not clear that access management strategies, considered as a whole, also do so. Central to the concept of access management is wide spacing of signalized intersections, preferably with distances of one-quarter mile or greater. [97] Such spacing limits the number of opportunities for pedestrians to cross with signals, thus encouraging hazardous midblock crossings. Up to 80 percent of pedestrian deaths occur at midblock, non-intersection locations.[98]

In consolidating and redesigning driveways, one needs to be careful not to create an environment where drivers fail to yield to pedestrians. Traditional driveways ramp up from the roadway to the sidewalk level, typically six inches high. Certain access management guidelines call for shallower driveway slopes, so that vehicles may exit the roadway faster. For example, the Rochester NY MPO calls for driveways on major arterials to have a slope of three to five percent.[99] In the cross-sections described by SHA the distance between curb and sidewalk would be between three and six feet. Accordingly the driveway at the sidewalk would be between one and 3.6 inches high, all lower than the typical six inches. The sidewalk would have to ramp down to meet the driveway, creating an undulating walking surface.

Similarly driveways are often widened and radii increased to permit faster turns. Yet faster turns lead to more severe injuries when crashes do happen, as discussed in the Existing Conditions report.

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[97] See Florida Department of Transportation. Median Handbook—Interim Version. Tallahassee: Florida Department of Transportation, February, 2006.; Minnesota Department of Transportation. *Access Operations Study: Analysis of Traffic Signal Spacing on Four-Lane Arterials*. Minnesota: Minnesota Department of Transportation. November, 2002; and Nevada Department of Transportation. *Access Management System and Standards*. Carson City: Nevada Department of Transportation. July, 1999.

[98] Bryer, T.E. "Safety Management." In *The Traffic Safety Toolbox A Primer on Traffic Safety*. Washington DC: Institute of Transportation Engineers, 1993, pp. 11-23; X. Chu, *Pedestrian Safety at Midblock Locations*, Center for Urban Transport Research, 2006.

[99] "Safe and Efficient Driveway Design", Genesee Transportation Council, www.gtcmpo.org/Programs/Resources/AccessManagement/Safe&EfficientDrivewayDesign.pdf, accessed April 18, 2007.

Furthermore, research has shown that drivers turn into driveways at about the same speed, regardless of driveway configuration.[100] Below we offer suggestions for driveway design along Route 1.

Finally, access management often involves the provision of service roads adjacent to the main line or parallel roads for local traffic. A portion of the reported safety benefits currently attributed to access management may be lost when access-related crashes are transferred from a main arterial to parallel roads. Given the disconnected grids adjacent to Route 1, we do not predict this to be an issue.

9.3 Median Types and Breaks

SHA proposes a non-traversable median along the length of Route 1, which will provide the highest level of safety as discussed above and this study supports. SHA proposes 15 median breaks on Route 1 between (and including) Edgewood Road and College Avenue (see Figure 35). The average distance between median breaks in the 40 mph section (above Greenbelt Road) is 1093 feet. The average in the 30 mph section is 791 feet. These distances exceed the best practices and research shown in Figure 36. As such we concur with the SHA proposal on median breaks.

In Section 8, Pedestrian Facilities, we propose additional signals and crossing opportunities, but no additional median breaks. In fact we suggest pedestrian crossing treatments that take advantage of the separation that the median affords.

Figure 35: Median Breaks along Route 1—SHA Proposal

From	To	Distance between median breaks, ft.
Edgewood Road	Cherry Hill Road	650
Cherry Hill Road	Lackawanna Street	525
Lackawanna Street	Hollywood Road	550
Hollywood Road	Fox Street	1280
Fox Street	Cherokee Street	1725
Cherokee Street	Greenbelt Road / Metzerott Road	1830
	Average	1093
Greenbelt Road / Metzerott Road	Berwyn Road	1060
Berwyn Road	Berwyn House Road	1180
Berwyn House Road	Melbourne Place	685
Melbourne Place	Lakeland Road	375
Lakeland Road	Campus Drive / Paint Branch Pkwy	500
Campus Drive /Paint Branch Pkwy	Rossborough Lane	1250
Rossborough Lane	Fraternity Row South	775
Fraternity Row South	College Avenue / Regents Drive	500
	Average	791

[100] Committee on Access Management *Access Management Manual*. Washington, DC: TRB, 2003, p. 169.

Figure 36: Relationship Between Speed and Access Spacing

Speed Limit	30 mph	35 mph	40 mph
FL DOT Median Opening Spacing (left and U-turns only)[1]	330	660	660
Spacing criteria between unsignalized median opening on divided highways, ft.[2]	370	460	530

Sources: 1) *Access Management: An Important Traffic Management Strategy*, FHWA, www.fhwa.dot.gov/realestate/am.pdf, accessed April 18, 2007.

2) F.J. Koepke and H.S. Levinson, *Access Management Guidelines for Activity Centers*, National Cooperative Highway Research Program Report 348, Transportation Research Board, Washington, D.C., 1992, Table 7-8.

9.4 Driveway Spacing, Consolidation and Design

According to the SHA report, there are 125 existing access points along Route 1 in the Study Area.[101] By our count there are 27 intersecting streets and 98 driveways. The SHA report proposes to close a number of driveways, either combining them with other access points or re-orienting the access points to adjacent side streets, leaving a total of 61 driveways. This represents a 38 percent reduction in driveways. Figure 37 shows the average distance between access points along Route 1.

Figure 37: Average Distance between Access Points along Route 1

Segment	Speed Limit, mph	Direction	Segment length, ft.	Number of driveways and intersecting streets	Average distance, ft.
Cherry Hill Road - Cherokee Street	40	Northbound	3930	17	231
		Southbound	4080	18	227
Greenbelt Road - Lakeland Road	30	Northbound	3300	14	236
		Southbound	3300	17	194
Campus Drive - College Avenue	30	Northbound	2525	6	421
		Southbound	2525	2	1263

Note: We divided the roadway into three sections to eliminate long stretches without driveways, which would adversely affect the calculations.

To analyze the proposed driveway spacing, we compared it to best practices and research, as shown in Figure 38. The 40 mph stretch of Route 1 meets the New Jersey standard, but not the others. At this speed the spillback rate would exceed 20 percent. (Spillback rate is the percentage of vehicles in the right lane that are affected by vehicles turning right from the lane.) Should the speed limit be reduced to 35 mph, then the spillback rate would fall to 10-15 percent. The stretch between Greenbelt and Lakeland Roads exceeds the three standards and the spillback rate would be around 15 percent. The stretch between Campus Drive and College Avenue exceeds all the standards and guidelines for a 30 mph street.

[101] Maryland State Highway Administration. *Finding of No Significant Impact, US 1 College Park from College Avenue to Sunnyside Avenue*, 2005, p. III-15.

Figure 38: Various Roadway Access Standards

Speed Limit	30 mph	35 mph	40 mph
Colorado DOT Spacing Standard, ft.[1]	200	250	325
Florida DOT Interim Spacing Standard, ft.[2]	125	245	440
New Jersey DOT Spacing Standard, ft.[3]	125	150	185
Spacing Guideline based on a 5% Spillback Rate, ft.[3]	335	355	400
Spacing Guideline based on a 10% Spillback Rate, ft.[3]	265	265	340
Spacing Guideline based on a 15% Spillback Rate, ft.[3]	210	210	305
Spacing Guideline based on a 20% Spillback Rate, ft.[3]	175	175	285

Sources: 1) State of Colorado, State Highway Access Code, 2002, Table 4-1.

2) "Access Management: An Important Traffic Management Strategy", FHWA, http://www.fhwa.dot.gov/realestate/am.pdf, accessed 18 April 2007.

3) Gluck, J, et al. "Driveway Spacing and Traffic Operations" in TRB Circular E-C019, 2000, Tables 2 and 3.

These findings suggest that the number of driveways and intersecting streets is appropriate south of Greenbelt Road. To the north, additional driveways should be closed or consolidated, or the speed limit be reduced.

9.4.1 Additional Driveways to Consolidate

The SHA has proposed to close or move numerous driveways; however, our review of the plans identifies a few businesses with more than one access point. Going forward we suggest further driveway consolidation, based on the lists below. We also note that a few stretches of Route 1 have driveways that are fairly closely spaced. The parking lot and access arrangements should be carefully reviewed with regard to access management.

The following businesses have two driveway access points along Route 1 in the SHA proposal.

- Taco Bell between Pontiac St and Quebec St
- Burger King between Quebec St and Berwyn Rd
- College Park Car Wash between Berwyn Rd and Tecumseh St
- Super 8 Hotel between Cherokee St and Delaware St
- Barnside Diner between Delaware St and Erie St
- Shell Auto Center between Erie St and Fox St
- College Park Honda between Indian Lane and Hollywood Rd

The following businesses have a second access point on a side-street in the SHA proposal.

- Gas Station between Berwyn Rd and Tecumseh St
- I.C.E Inc. between Delaware St and Erie St
- China Buffet between Indian Lane and Hollywood Rd
- United States Post Office between Indian and Hollywood

The following stretches of Route 1 have frequent driveways in the SHA proposal.

- Southbound between Fox St and Erie St
- Southbound between Delaware St and Cherokee St
- Southbound between Berwyn Rd and Pontiac St
- Southbound between Navahoe St and Melbourne Pl
- Northbound between Fox St and Hollywood Rd

9.4.2 Driveway Design

As discussed above, the driveway design is key to pedestrian safety. Many new driveways resemble mini-intersections, rather than the point at which drivers are legally required to yield to people on the sidewalk. To ensure smooth, low-speed 90-degree turns we recommend that the driveways along Route 1 be designed with a maximum 15-foot radius and 30-foot width. This will allow simultaneous exit and entry by passenger vehicles.[102] At driveways with separate entrances and exits, a 15 to 20-foot width is appropriate.

Of the 61 driveways shown in the SHA proposal, six are wider than 30 feet. We suggest that these driveways be carefully reviewed for impacts on pedestrian safety. Should the driveway need to be wider, we suggest medians, similar to those at the Hillcrest Hotel between Cherokee St and Delaware St. (see Figure 34 in the Existing Conditions report). The six driveways are:

- Lasick's Restaurant
- Caci
- Comfort Inn
- Mr. Sign and Competitive Concrete
- United States Post Office
- One Boulevard Plaza / Hampton Inn / I-Hop

9.5 Signal Spacing

Several studies have shown that fewer signals at uniform spacing assist greatly in improved vehicle traffic flow and reduced motorist delay. The two tables below show the relationship between vehicle speed, signal spacing and cycle length.[103] Understanding this is key to maximizing Route 1 for vehicle traffic, a key component of access management. For example, with signals every 1320 feet (one-quarter mile), the travel speed can range from 15 to 30 mph depending on the signal cycle.

Figure 39: Signal Spacing as a Function of Progression Speed and Cycle Length

	Signal Spacing in feet at Speeds of:				
Cycle Length	25 mph	30 mph	35 mph	40 mph	45 mph
60 seconds	1100	1320	1540	1760	1980
90 seconds	1630	1980	2310	2640	2970
120 seconds	2200	2640	3080	3520	3960

[102] Committee on Access Management. *Access Management Manual*. Washington, DC: Transportation Research Board, 2003, Table 10-7.

[103] *Access Management Manual*, Tables 9-1 and 9-2.

Figure 40: Progression Speed as a Function of Signal Spacing and Cycle Length

	Progression Speed (mph) at Spacing:			
Cycle Length	660 ft	1320 ft	1760 ft	2640 ft
60 seconds	15	30	40	60
90 seconds	10	20	27	40
120 seconds	7.5	15	20	30

As shown in Figure 23, Segment Lengths along Route 1 (p. 56), the SHA proposes a signal spacing of 2,323 feet in the section from Cherry Hill to Berwyn Roads, where the speed limit is 40 mph. As per Figures 39 and 40, a cycle length between 60 and 90 seconds would achieve that speed. We suggest above an additional signal at Hollywood Road. This would bring the signal spacing to 1,742 feet, and thus require a 60 second cycle for a 40 mph progression.

In the "main street" section (from Berwyn Road to College Avenue), the SHA proposal is for signals spaced at an average of 857 feet. We have proposed an additional signal at Berwyn House Road, thereby reducing the spacing to 735 feet. These dimensions suggest average speeds between 7.5 and 15 mph in this section.

Bear in mind that long signal spacing (to accommodate vehicle traffic flow) may adversely affect pedestrian traffic, especially in a main street setting. Accordingly, we have proposed mid-block crossing opportunities in Section 8, Pedestrian Facilities. Also, minimum pedestrian crossing times often require longer cycle lengths.

9.6 Corner Clearance

The basic idea behind corner clearance (in terms of access management) is that intersections operate most efficiently and safest by themselves. To wit, if a driveway is located within a queue of drivers stopped at a signal, or if a driver from a minor street interferes with another focusing on the upcoming intersection, then efficiency and safety is compromised.

The dimensions of a proper corner clearance are a function of queue length, sight distance, vehicle speed and other traffic related data; there is no set standard.[104] The SHA proposes to eliminate driveways within turn lanes and near larger intersections; however, there are instances where driveways will remain in close proximity. We suggest that further driveway consolidation and/or elimination may be necessary to achieve sufficient access management at all intersections.

9.7 Turn, Acceleration and Deceleration Lanes

While turn, acceleration and deceleration lanes are common tools for access management, they need to be properly designed for pedestrian safety, and have little place on main streets. As discussed in previous sections and the Sector Plan, the intent is to recreate the portion of Route 1 south of Berwyn Road as a main street. With this in mind, we have reviewed the SHA proposal and note where turn, acceleration, and deceleration lanes should undergo further review.

- The right turn lanes on southbound Route 1 at Campus Drive concerns us in that it occurs at a point of very high pedestrian and bicycle traffic. As discussed in the Pedestrian Section, this stretch of road is

[104] *Access Management Manual*, Figure 9-10.

key to providing non-motorized access between the University and housing just to the north. As such we suggest minimizing the roadway width in this block. We have similar concerns about the right turn lane on northbound Route 1 at this location.

- The off-ramp between eastbound University Boulevard and southbound Route 1 is troublesome because it has a high design speed and leads to a deceleration lane that extends past Tecumseh Street. It is possible for drivers to make the same maneuver via Greenbelt Road, and we suggest exploring this alternative. We understand that rerouting this traffic might cause additional congestion at the intersection of Route 1 and Greenbelt Road, but the high speed allowed by the off-ramp seriously undermines pedestrian safety. At the least we suggest realigning the off-ramp to meet Route 1 at a more acute angle and shortening the deceleration lane.

- We suggest that the acceleration and deceleration lanes northbound on Route 1 at Greenbelt Road be shortened and that the slip lanes be redesigned as per Figure 57 in the Existing Conditions report.

- We suggest redesigning the slip lanes where the University Boulevard ramps meet northbound Route 1 as per Figure 57 in the Existing Conditions report.

- We suggest redesigning the slip lane between southbound Route 1 and Cherry Hill Road as per Figure 57 in the Existing Conditions report.

- We are concerned about the impacts to pedestrian safety and route continuity where the eastbound Beltway off-ramp meets Route 1. We suggest that the ramp be realigned to slow vehicle turns.

10 EXISTING PROPOSALS

This section provides our comments on several existing proposals that affect the corridor. Although we have not conducted a detailed technical review of these proposals, these are based on our professional knowledge of how they would or would not fit with the other recommendations in this report.

10.1 University of Maryland Connector Study

The University of Maryland Connector is a proposed roadway that would connect the UM campus directly to the Beltway. The proposed alignments for the roadway currently under study are not public at this time, but the project team did examine a previous connector plan for this general corridor. The UM Connector project is the subject of some controversy related to its effects on the economic growth of the Route 1 corridor, the potential benefits to traffic flow, and costs and benefits to the region.

In the previous study of a transit connector through this area, five potential alignments were identified, three of which would traverse the Beltsville Agricultural Research Center. One alignment was along Route 1 (i.e., a new parking garage and shuttle service would be constructed, but no new roadway). According to a feasibility study of the transit connector,[105] the project would not result in travel time savings for faculty and staff, who generally have parking within a five-minute walk of their campus offices. For students, travel time savings were less than ten minutes. The project did not project any alleviation of traffic congestion along Route 1, since the diverted traffic represented only one to three percent of the average daily volume. Finally, the report noted that campus parking overflow lots do not fill, which would seem to indicate that campus parking is adequate. Costs for the various alignments ranged from $40.8 million for the parking garage and rolling stock to $76.6 million for those elements plus the Transit Connector itself.

Although these findings may not be directly applicable to a new roadway along this corridor, controversy continues to surround the UM Connector study. Creating a new roadway in this area would likely work at cross-purposes with the community's desire to make Route 1 more attractive to pedestrian, bicycle, and transit use. A new roadway project would also detract from the funding priority given to the multimodal improvements to Route 1, which have yet to begin construction since the *Finding of No Significant Impact* study was completed in 2005. In addition, the previous study noted a number of potential environmental issues, such as forested areas requiring mitigation, stream crossings, and a historic site eligible for the National Register.

Despite the controversy, the Maryland SHA plans to continue the study of the UM Connector at this time, with a $1 million set-aside for the study. We recommend that the plans for this corridor be closely coordinated with the land use plans for the entire area in light of the limited funding that may be available to implement both the Route 1 improvements and this proposed new roadway.

10.2 Purple Line

The Purple Line is a transit project that will connect Prince George's County with Montgomery County via either bus rapid transit (BRT) or light rail. According to the current alignment shown on project plans, there will be a stop on the UM campus. The project is currently in the environmental impact review phase, with the Maryland Transit Administration the lead agency responsible for creating a draft Environmental Impact Statement (DEIS). While the DEIS was previously anticipated to be complete by

[105] Maryland State Highway Administration. *University of Maryland Transit Connector Feasibility Study, Final Report*. January 2003. This report is posted at http://rethinkcollegepark.net/blog/wp-content/uploads/2006/10/UMTC_Feasibility_Study.pdf.

spring 2007, it has been delayed approximately a year due to problems with the computer model that generated the ridership forecasts.[106]

We support continuation of this study, as our transit analysis showed that there was significant east-west transit demand, which a high-capacity service such as BRT or light rail could well serve. This service could also consolidate several other bus and shuttle lines. In addition, this would be a direct transit link to the center of campus, whereas currently students must switch from a bus or rail system to a shuttle to access the center of campus.

[106] www.purpleline.org (accessed April 19, 2007)

Appendix A: Suggested Changes to Route 1 Design

Figures 41 to 49 on the following pages provide annotations to the road design proposed in SHA's *Finding of No Significant Impact*, based on the comments made throughout this report.

Figure 41: Hollywood Road to Edgewood Road

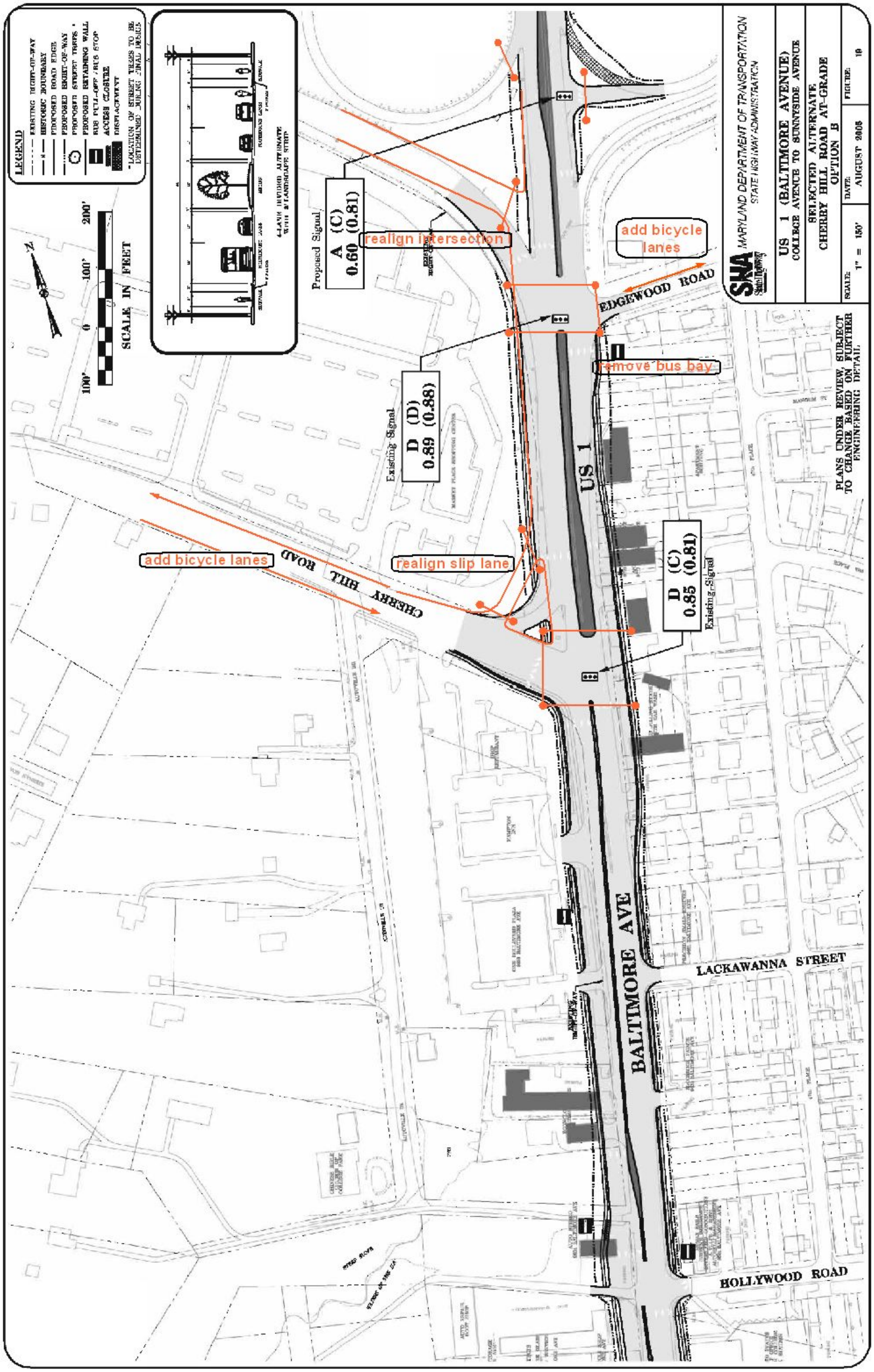


Figure 42: Hollywood Road and Lackawanna Road

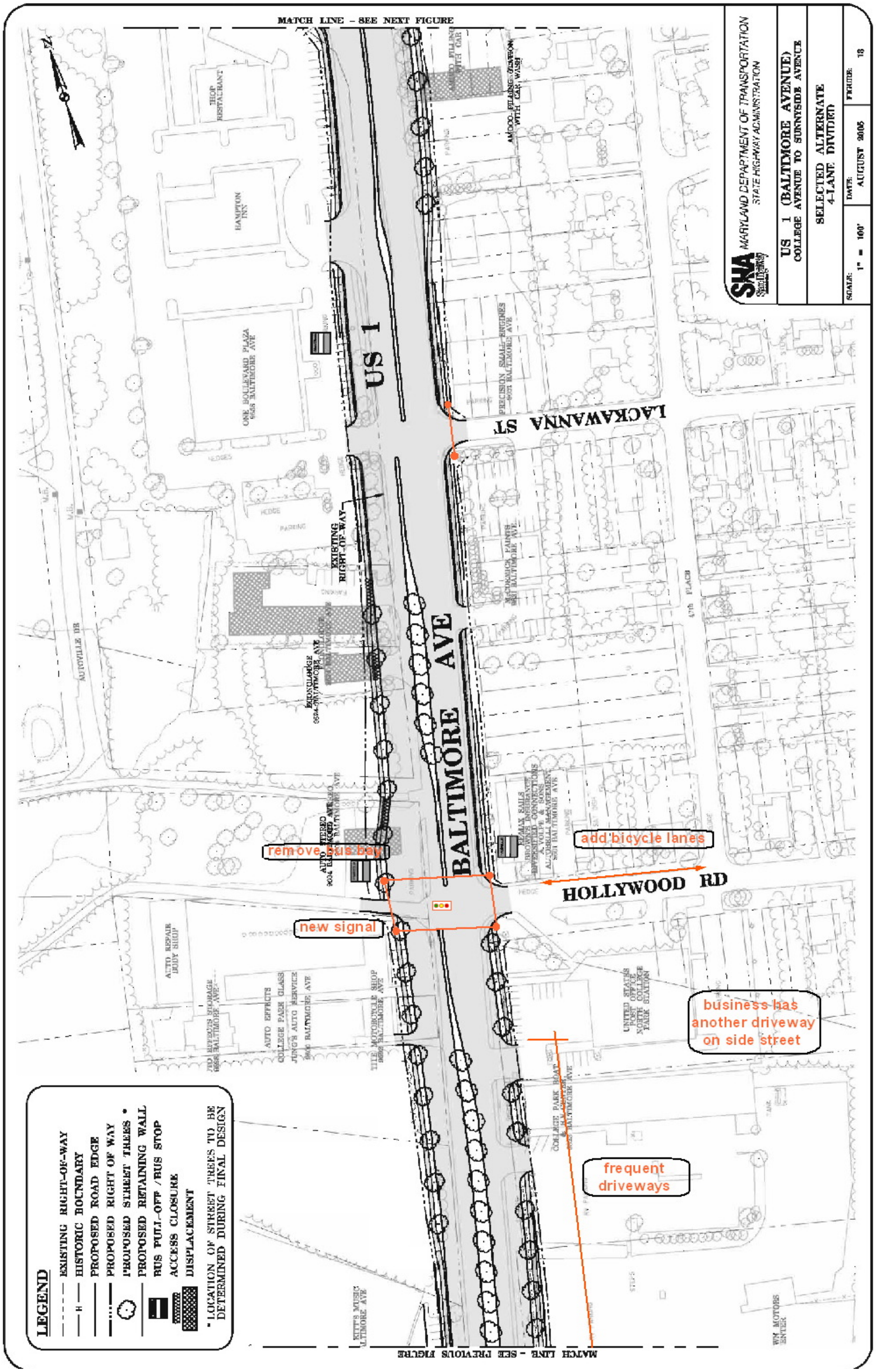


Figure 43: Erie Street to Indian Lane

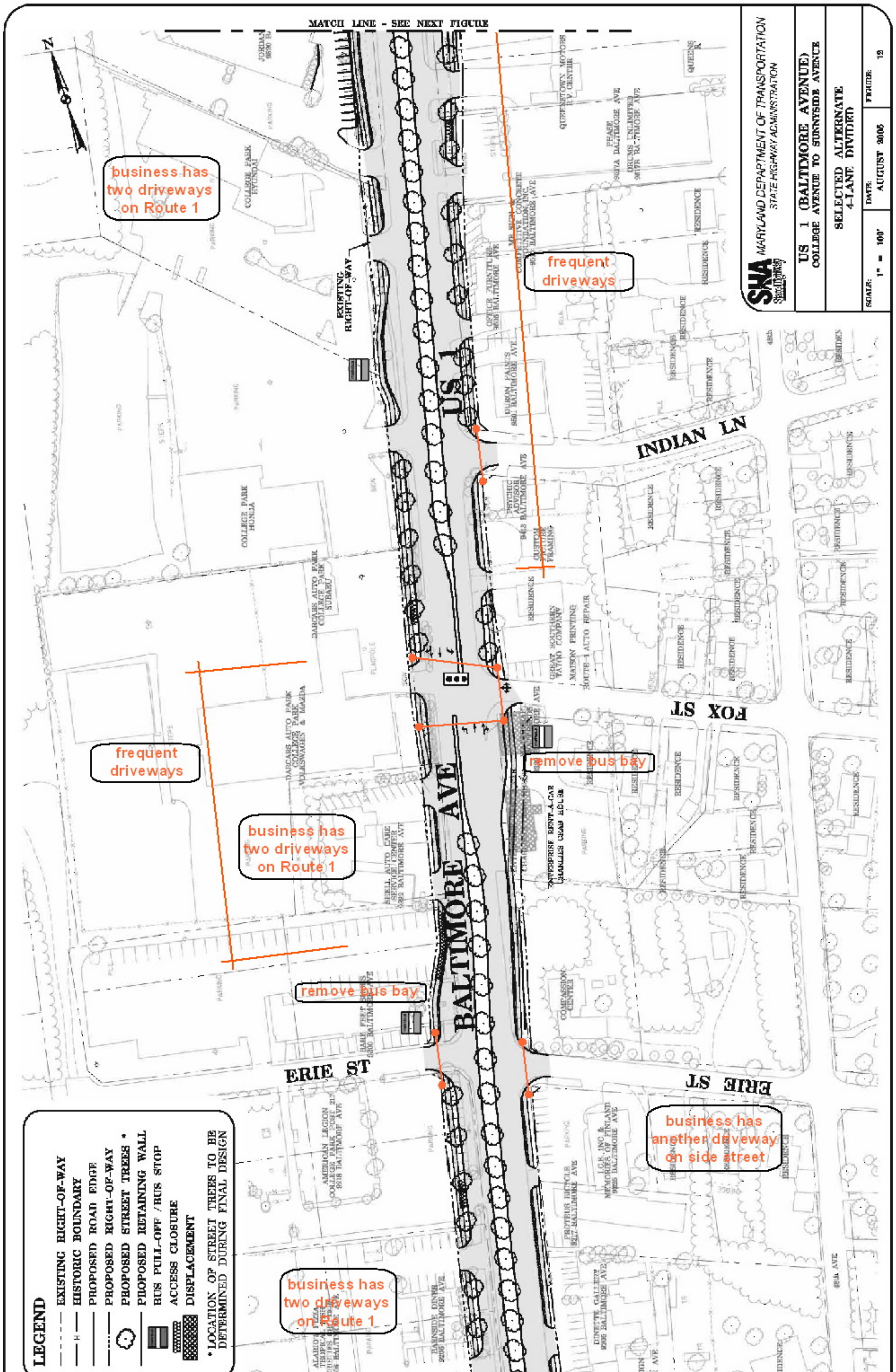


Figure 44: Cherokee Street to Delaware Street

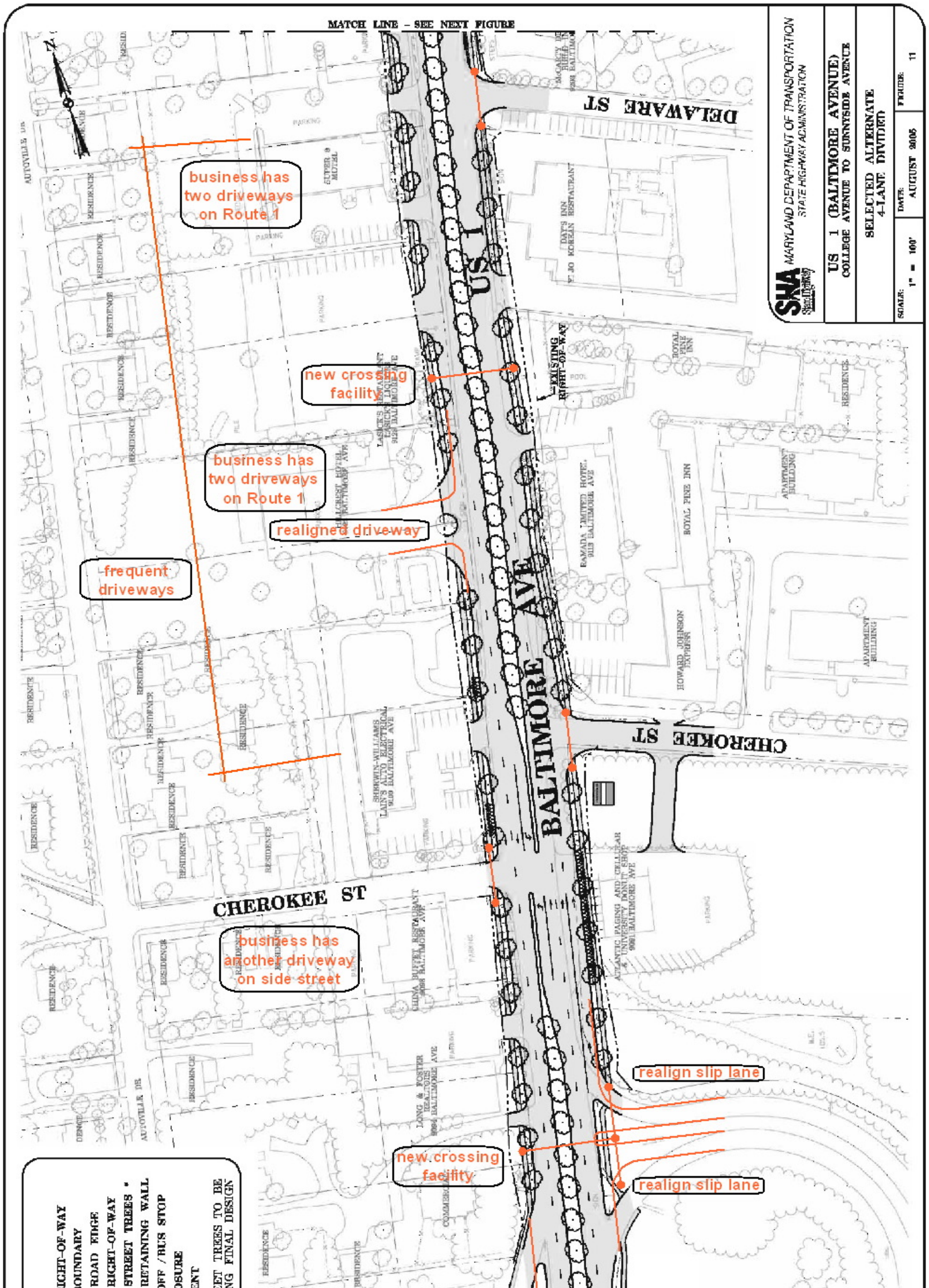


Figure 45: Metzerott Road to University Boulevard

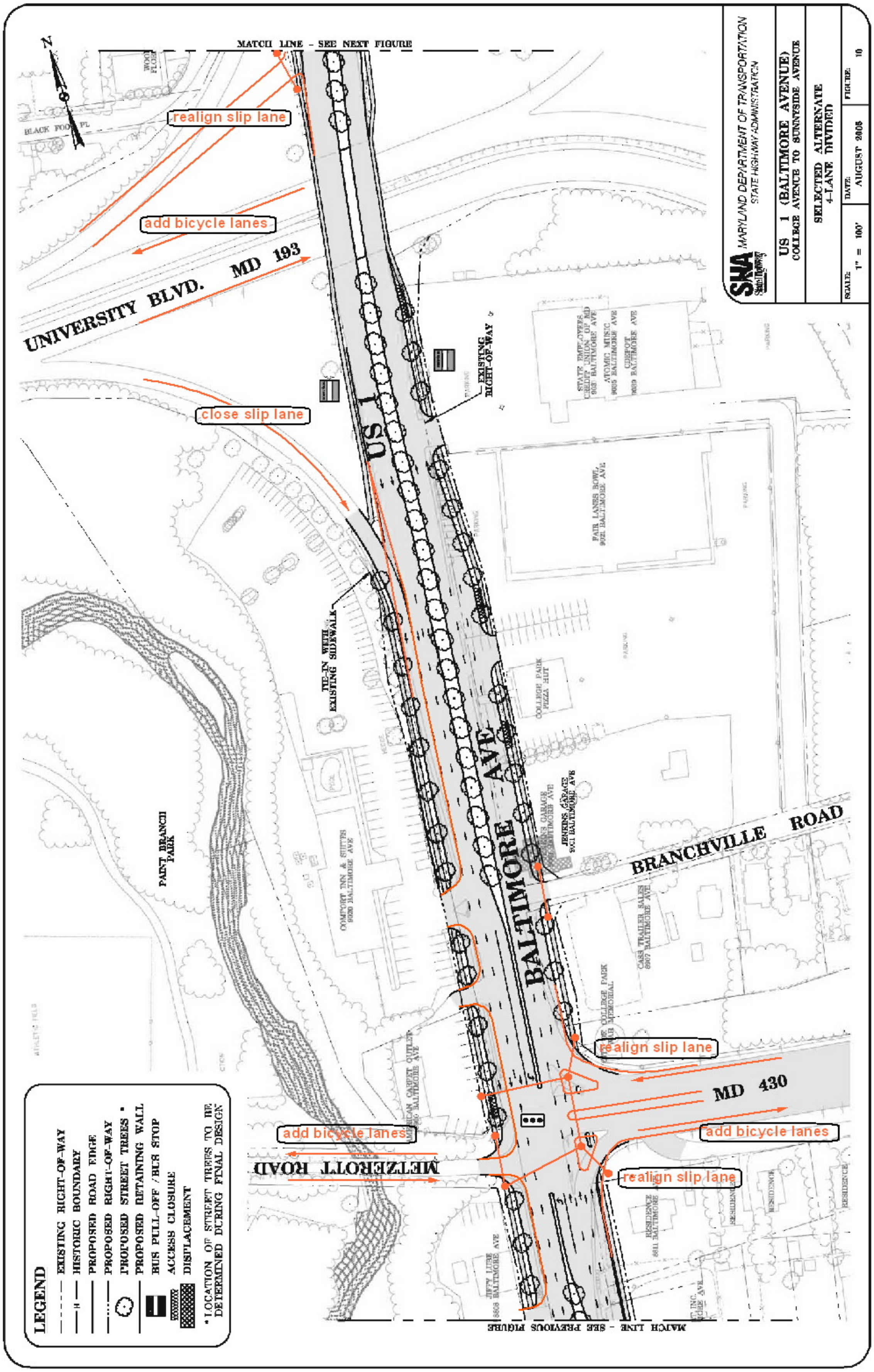


Figure 46: Quebec Street to Tecumseh Street

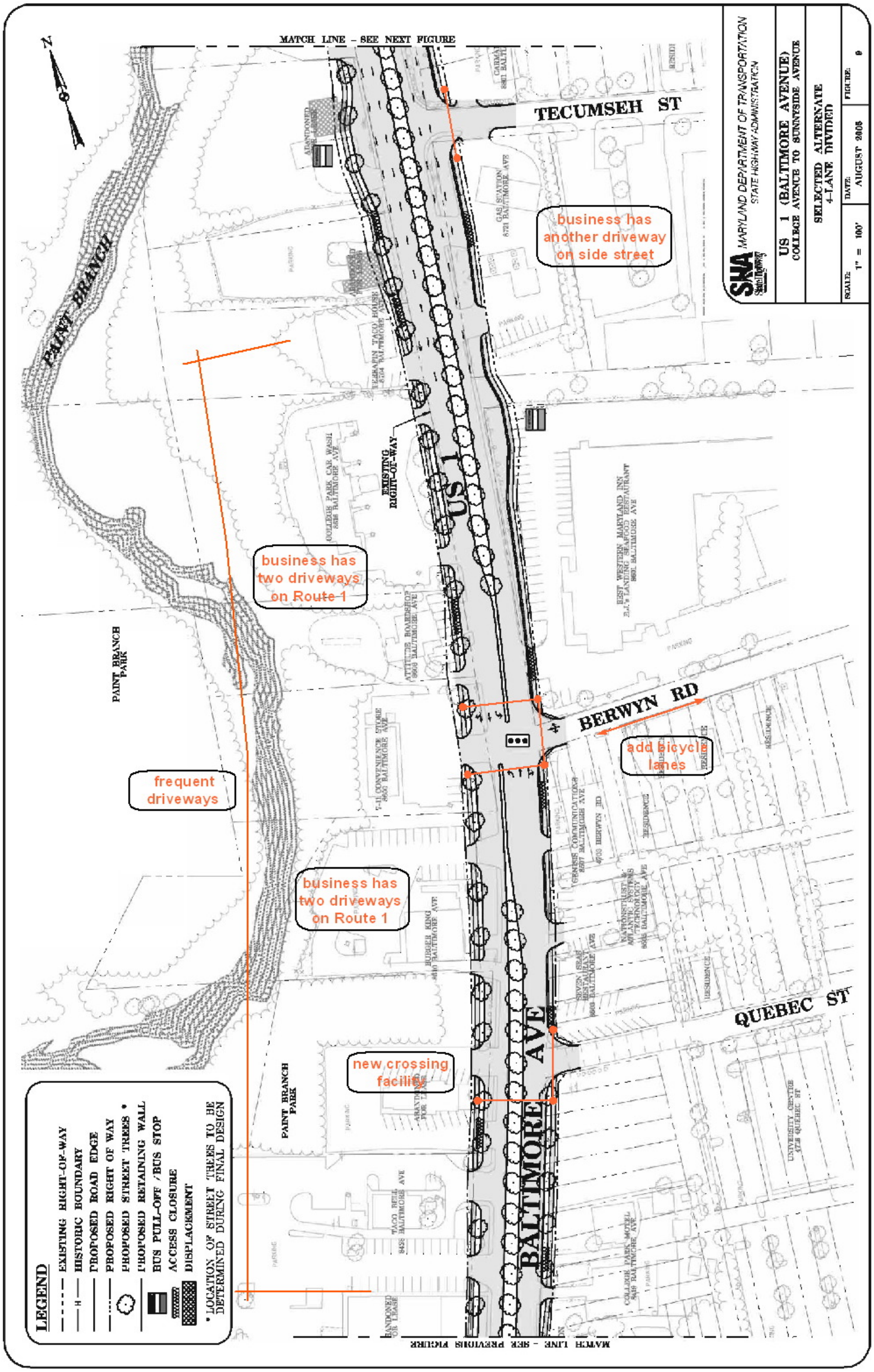


Figure 47: Melbourne Place to Pontiac Street

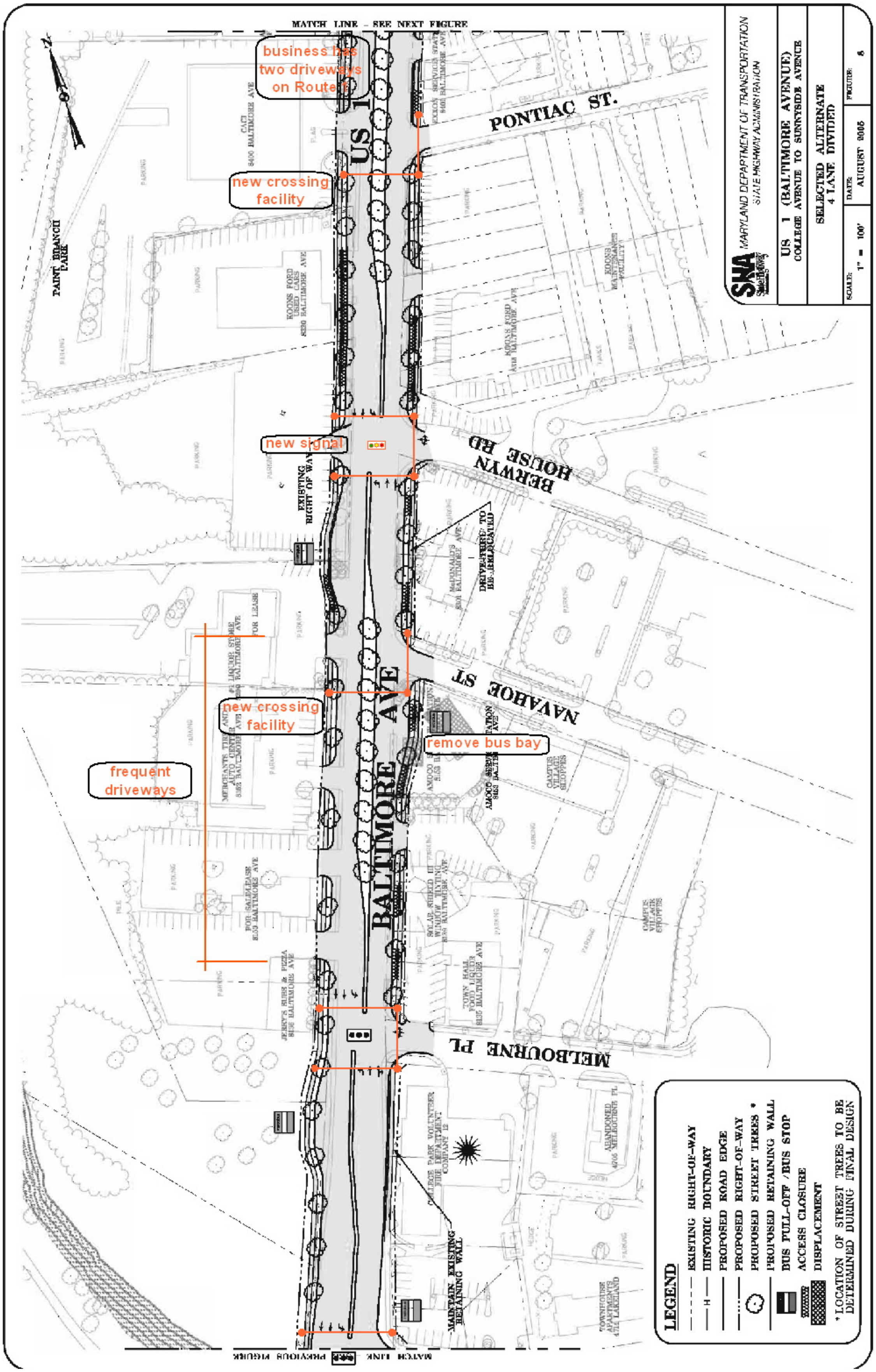


Figure 48: Paint Branch Parkway/Campus Drive

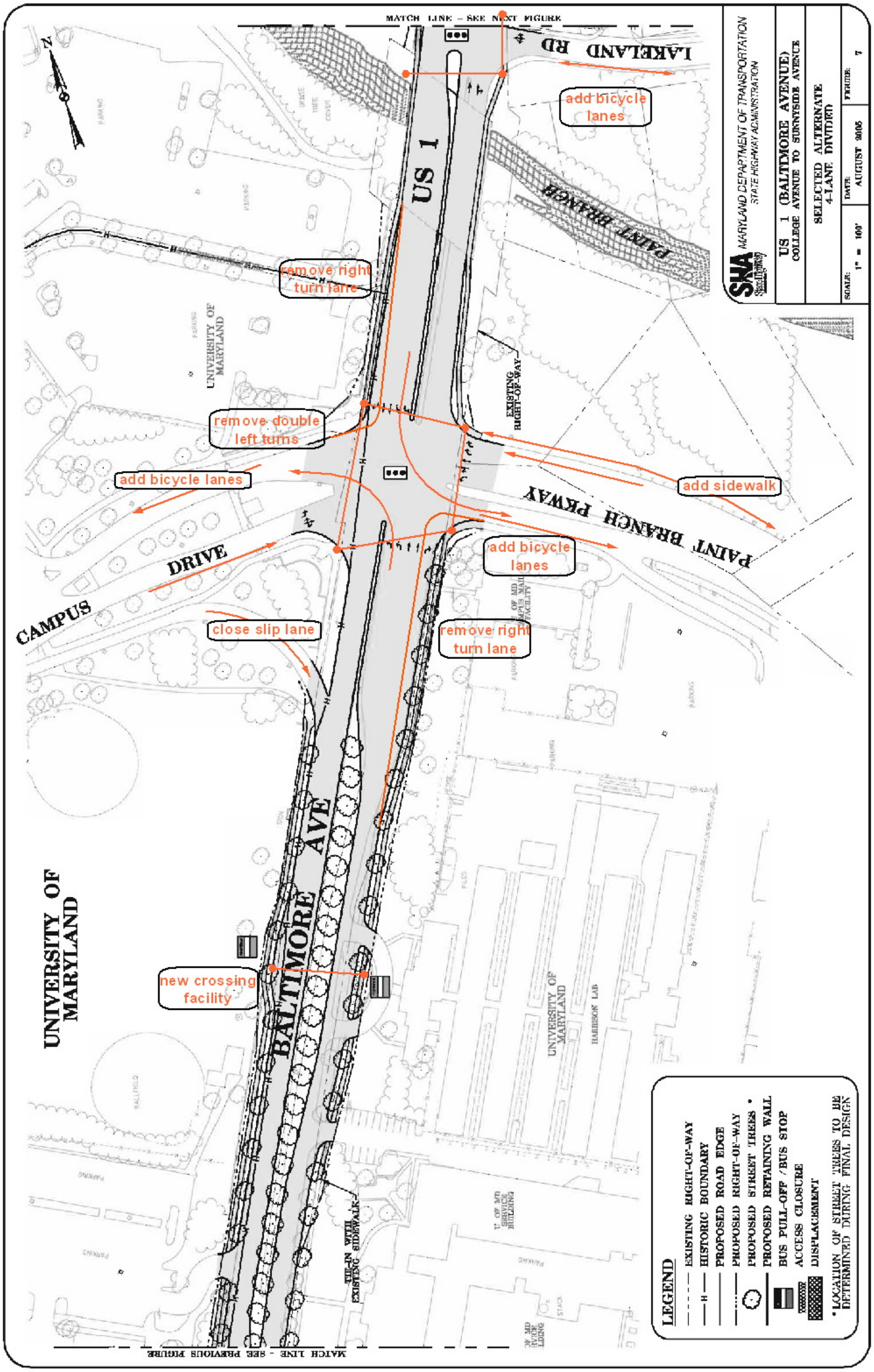
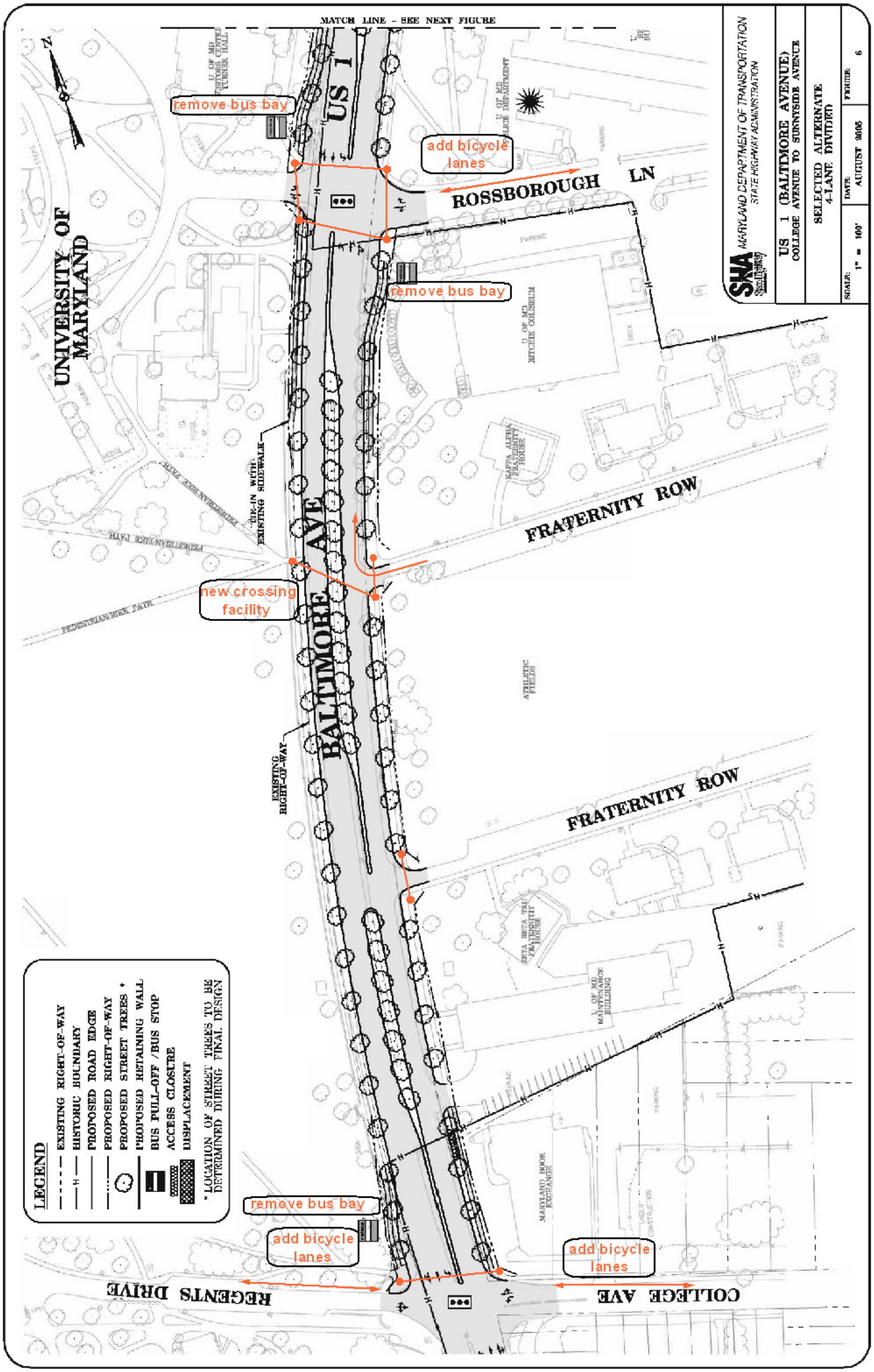


Figure 49: College Avenue/Regents Drive to Rossborough Lane



APPENDIX: B STUDY EMPHASES

The original work plan included the goal of:

> The Team will compile the different proposed improvements for transit, pedestrians, bicyclists, and overall transportation demand management, and identify how each policy would—both individually and as part of a comprehensive package—address the goals, objectives, and deficiencies identified in Report #1.

While the Final Report addresses all of these, feedback from stakeholders also shaped which of the many challenges and opportunities in the corridor needed the most attention. The emphasis in this final report on how to adapt physical plans for Route 1 is the result of two factors:

1. The physical plans for Route 1 are public documents and as such are both natural and obvious places to focus discussion of what needs to change in the Corridor to accomplish the goals of the City and the County.

2. Because good land uses come to good transportation facilities, the focus on Route 1's physical design is also appropriate from the perspective of how to accomplish the long-run goals of the City and County.

At the same time, both the ICF Team's recommendations, and the City and County, see large potential in short-term actions, many of which would be both quickly implementable, and also low-cost. Several stakeholders expressed interest in having this report deliver more funding detail on those options. We have delivered cost estimates for these actions as accurately as possible give the scope of this study. Where we have not delivered more detail, it is largely because providing useful guidance would require extensive work with stakeholders on those options.

For example, there is considerable interest in changing bus services along Route 1. In Chapter 5 we provide fairly detailed recommendations about how to change transit service. The recent spike in fuel prices has made improving transit even more important. It has also stretched transit providers' budgets even further. In this environment, it is all the more important that transit providers work together. Adding more detail, particularly on how to fund those changes and share those costs among providers, would require a level of consultation with the current and potential transit providers that is beyond the scope of this project.