Town of Bel Air

Pedestrian Traffic Study
GOAL: TO IMPROVE THE PEDESTRIAN MOVEMENT IN THE TOWN OF BEL AIR

January 2000
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PEDESTRIAN SAFETY ACTION PLAN

1. Continue DPW Sidewalk Development Program, including annual prioritization review (Appendix C), and Crosswalk Maintenance Program (Appendix E)
   - Responsibility - DPW
   - Completion Date - Ongoing
   - Budget - FY00....

2. Implement Crosswalk Improvements identified in Appendix D.
   - Submit formal written request to SHA to eliminate outdated crosswalk markings
   - Conduct annual deficiency review in conjunction with sidewalk review
   - Responsibility - DPW
   - Completion Date - 7/1/01
   - Budget - FY 01

3. Develop Commercial Area Sidewalk Program as follows:
   - Complete commercial area sidewalk inspections 5/1/00
   - Identify problem areas 7/1/00
   - Send rank-based property maintenance notices for repairs/extensions where required 9/1/00
   - 11/1/00
   - 4/1/01
   - 6/1/01
   - Work with property owners to effect repairs and/or take appropriate follow up action 9/1/00
   - Develop notification procedure for commercial property maintenance 12/1/00
   - Responsibility - DPW
   - Completion date - Ongoing
   - Budget - FY 01...
4. Conduct a Pedestrian School Zone Safety Improvement Analysis to more specifically define safety improvement needs and options for the following areas:

♦ Route 1 between Maitland Street & Atwood Road 6/30/00
♦ Route 1 between Kelly Avenue & Tollgate Road 6/30/00
♦ Route 924 between MacPhail Road & Linwood Avenue 6/30/01
♦ Main Street between Route 1 and PA Avenue 6/30/01
♦ Hickory Avenue between PA Avenue and Broadway 2/15/00

→ Responsibility - Planning Department
→ Completion Date - 6/30/01
→ Budget - FY 00/FY 01

5. Implement Pedestrian Safety Improvements (See Action #4 above)

→ Responsibility - Planning, DPW & SHA
→ Completion Date - 6/30/02
→ Budget - FY 02

6. Design and Build Plumtree Run Trail System

♦ Secure Board of Education Approval 4/3/00
♦ Design Trail 6/30/00
♦ Secure Funding 9/30/00
♦ Construct Trail 6/30/02

→ Responsibility - Planning & DPW
→ Completion Date - 6/30/02
→ Budget - FY 01/FY 02

7. Design and Build Bynum Run Trail System

♦ Assemble necessary County and Private Properties 6/30/01
♦ Design Trail 12/31/01
♦ Secure Funding 9/30/02
♦ Construct Trail 6/30/03
8. Complete Acquisition and Construction of Town portion of Ma & Pa Trail System

- Secure requisite parcels to complete project 6/30/01
- Coordinate with Harford County to finalize acquisition and development 12/31/01
- Responsibility - Town Administrator, Planning & DPW
- Completion Date - 6/30/04
- Budget - n/a

9. Eliminate Free Turn Movement at the following intersections:

- Churchville Road/Main Street
- Churchville Road/Bond Street
- Route 1/Main Street/Fulford Avenue

- Submit formal written request to SHA 3/1/00
- Monitor progress at Tri-Agency Meeting Ongoing
- Install “no turn on red” and “yield to pedestrian in crosswalk” signage 10/1/00

- Responsibility - Planning & DPW
- Completion Date - 10/1/00
- Budget - n/a

10. Develop a Tree Replacement Program for Sidewalk Development Program

- Identify problem areas 3/1/00
- Identify appropriate replacement trees 4/1/00
- Develop cost estimate 5/1/00
- Obtain funding 6/30/00
- Remove and replace trees Ongoing
11. Implement **Tree Replacement Program** in conjunction with Sidewalk Development Program

- Submit DPW Sidewalk improvement schedule to Tree Committee for analysis and recommendation  2/16/00
- Develop tree replacement recommendation for areas planned for improvement in next fiscal year  3/15/00 (annually thereafter)
- Prepare cost estimate and identify potential funding sources  3/30/00
- Initiate Tree Replacement Program  7/1/00

- Responsibility - Planning & DPW
- Completion Date - Ongoing
- Budget - FY 01...

12. Conduct a **Pedestrian Education Program** directed toward Youth & Elderly

- Develop plan in conjunction with AAA and SHA  9/1/00
- Provide educational materials to schools, youth center, senior center, Hickory Hills condominiums, English Country Manor and others upon request  10/1/00

- Responsibility - Planning
- Completion Date - 10/1/00
- Budget - FY 01
INTRODUCTION

The Bel Air Board of Town Commissioners adopted a goal of improving pedestrian movement throughout the Town. To accomplish this, the staff conducted a study of pedestrian safety and access issues throughout the Town's business, residential and school districts.

This study focuses on the following objectives:

- Improving pedestrian safety by providing a pedestrian network that serves a wide variety of users
- Developing accessible and varied pedestrian links interconnecting business, residential and school districts
- Developing a cost effective plan for construction of pedestrian improvements
- Improving overall community livability

Study findings led to development of a Comprehensive Pedestrian Safety Action Plan incorporating specific activities, timeframes for implementation and budgeting implications. The Pedestrian Safety Action Plan is detailed on page 2 of this document; followed by a detailed explanation of the study’s parameters and findings. The Appendices provides background materials, maps and charts which form the basis for many of the proposed Action Plan.

ISSUES

Three major facilities service pedestrian movement throughout the Town.
These include sidewalks, crosswalks and pedestrian trails. An efficient pedestrian plan should include each of these. Therefore, to better understand the issues, all pedestrian facilities were evaluated based on availability, safety and access.

Identified issues are as follows:

- Sidewalks

1. Although the current sidewalk network is extensive, there are gaps in the existing network, as well as handicap accessibility deficiencies.

2. Citizens are often resistant to sidewalk construction in developed residential areas.

![Gap in Sidewalk at Idlewild and South Main Street](image)

3. Continuing maintenance and repair is expensive. It is also complicated by the age of the developments within the Town and the need to satisfy the American With Disabilities Act (ADA) requirements.

4. Sidewalk maintenance is complicated by tree placement, tree roots pushing up sidewalk panels and inappropriate tree selection.
Crosswalks

1. Although generally available in business areas of Route 1, downtown Bel Air, and the various school zones, lines are often faded or in poor repair.

2. State Highway Administration is often reluctant to maintain or install new crosswalks.

3. Motorists often ignore the pedestrian right-of-way laws.

4. Traffic signal timing in several locations makes street crossings quite difficult.
5. Continual vehicular turn movements at major intersections and high volume multi-lane roads limit pedestrian movement.

- Trails

1. The Town’s Comprehensive Plan specifies a series of trails. However, much of the proposed trail system has not yet been implemented.

2. Pedestrian trails could be constructed along the Ma and Pa railroad bed, the Plumtree Run and the Bynum Run. While the Ma and Pa Trail has received funding, a primary linkage is not in place because of property owner resistance. The other two trail locations require funding and negotiations with adjoining property owners.

DISCUSSION

Sidewalks

The primary element of the Town’s pedestrian network is its sidewalk system. The existing network developed over time resulting in "missing links" or gaps in the system.

The Bel Air Town Code requires that all new development include sidewalk construction at the property owner's expense. The Town has assumed responsibility for gaps in sidewalks in existing residentially developed portions of the Town. Repairs of sidewalks in the commercial areas are the responsibility of the property owner (see Appendix 1, Town Policy I.H.).
Lack of Adequate Road Right-Of-Way
North Main Street

Sidewalk improvement is often complicated by the lack of available right-of-way. As streets have continued to expand, available public right-of-way area has decreased in size, leaving little space for sidewalk construction, i.e. North Main Street.

Residents are often reluctant to dedicate land for sidewalk construction in areas with an insufficient public right-of-way. As noted earlier, many citizens, especially the elderly, are resistant to new sidewalk construction in their neighborhoods because of concerns about their maintenance responsibilities (ice, snow removal) and liability issues. Also, in certain areas the limited potential for foot traffic may not justify the cost and other alternatives may need to be evaluated, such as paths through neighborhoods away from streets (See path across from Webster Street).

Finally, in evaluating options, it is important to be cognizant of the cost factor. According to the Town's Department of Public Works sidewalk
construction plan, one linear foot of four (4) foot wide sidewalk costs $20. With curb, the cost can rise to as much as $40 per linear foot. Curb ramp costs are approximately $780 per ramp.

Crosswalks

Crosswalks are provided at most major intersections throughout the Town's business districts and in school crossing areas. Those on Town streets are painted annually to assure visibility. The State Highway Administration relies more on pedestrian crossing signals to avoid on-going maintenance. Brick paver crosswalks are provided in a few locations throughout the Town, i.e. Office Street. Pedestrian refuge islands are not generally used in Town as yet, although this may be an option in the future. A center island is located along MD Route 24 which provides some protection for pedestrians in this area. These protected areas help to minimize the time a pedestrian must be on the roadway and work well on multi-lane, high volume, high speed roadways. An annotated list of existing crosswalk areas and a map of existing crosswalks in the Town Center and in the Route 1/Route 24/Route 924 areas are included as Appendix D. As shown below, conflict situations continue to exist.
An informal random pedestrian crossing survey was conducted at South Main Street between Heighe Street and Homestead Street. Within seven minutes (after school), sixty-five pedestrians crossed South Main Street at this intersection.

**Pedestrian/Vehicular Conflicts**

Traffic signals affect the ability of a pedestrian to safely cross a street. Typically traffic signals are timed to ensure efficient movement of vehicles, often ignoring pedestrian needs. For example, the signalized Churchville/Main Street intersection is timed to allow continuous vehicular traffic flow. Pedestrian traffic is relatively heavy at this location because of the connection between the County Office Buildings and the number of high school students using this route. The free turn on red further aggravates pedestrian crossing at this busy intersection. This conflict situation is repeated in several locations throughout the Town.

Proximity of traffic to pedestrians also creates a perceived and sometimes real threat. While the Town is currently correcting this problem along Bond Street with an expanded sidewalk and streetscape improvements, Route 1 remains a significant concern with few options for sidewalk
improvements. These conflicts usually occur near shopping centers, schools and recreational facilities.

**Trails**

An alternative pedestrian system is included in the Town's Comprehensive Plan which is intended to supplement the Town's sidewalks and to provide recreation, as well as connectivity. This trail network would follow the three (3) stream valleys in/and adjacent to the Town. The Ma & Pa trail which connects the County Parks and Recreation property (Heavenly Waters Park and the Soma Property on Route 1) through the Mall area to Main Street in north Bel Air opened in August 1999. This trail will eventually extend north to the Pennsylvania line and south to Baltimore County. Options remain to develop trails along the Plumtree Run from Plumtree Park through the Bel Air High School property to the hospital site on MacPhail Road, and to develop a similar trail from Conowingo Road through Majors Choice, Oakcrest and Southampton Middle School to Bynum Run Park. Development of these trail systems is dependent on obtaining the necessary right-of-way and funding availability.
Proposed Trail System

Proposed Bynum Run Trail
Proposed Plumtree Run Trail
Town Boundary
MA & PA Trail
ANALYSIS

Based on the issues identified, the Town needs to highlight particular areas of concern, specify those areas needing additional study and schedule improvements that will enhance the Town’s pedestrian network. These needs include a maintenance and development program, an educational program and an interjurisdictional initiative to address problems along state highways in the Town, which are more fully described below.

Sidewalk Improvement Plan

Because of the extensive pedestrian network throughout the Town, it is necessary to prioritize the Town’s construction program for sidewalk enhancements. The Department of Public Works has developed a sidewalk construction plan which identified areas of the Town having an unconnected network of sidewalks. This plan prioritizes new construction based on need, with particular emphasis on providing an uninterrupted sidewalk network connecting residential and school destination areas; areas with significant safety concerns, and high pedestrian volumes. A separate category was established identifying those areas in which developers will be responsible for sidewalk improvements and areas along State highways that are a State Highway Administration and Town shared responsibility. The Department
of Public Works is also developing a sidewalk repair plan, outlining areas which have cracked or deteriorating sidewalks. The plan includes those areas in which the Town is responsible for the improvements. Commercial property owners are responsible for sidewalk maintenance for their properties. The Town may need to establish a more pro-active notice approach to assure timely sidewalk improvements in the commercial districts. In areas deemed to be critical for sidewalk extensions, the Town should evaluate the use of condemnation. This issue needs more evaluation and should be considered on a case by case basis acknowledging legal, fiscal & political constraints.

Where possible, it is best to provide at least a five (5) foot grass strip between roads and walkways. This separates pedestrian traffic from rain swollen gutters, reduces conflict between pedestrians and garbage cans/plowed snow, provides a gradient change area for driveways without impacting the pedestrian area and allows an area for landscaping. The Town should work with the State Highway Administration to ensure sidewalk connections in front of Harford Mall and possibly adjacent to shopping centers with frontage on Route 24 to determine the optimum location and type of pedestrian improvements needed to assure safe pedestrian movement in the Route 1/Route 24 business district.
The detailed Department of Public Works sidewalk improvement plan should be evaluated annually to assure that the prioritization of sidewalk construction and repair plans meet current needs. Such prioritization should be based on consideration of several factors: available right-of-way, construction impediments, cost and safety needs. In the future, the Town will need to develop a maintenance needs inventory for the commercial areas and a policy (procedure) for notifying property owners of the required maintenance in a timely fashion.

Crosswalks, Pedestrian and Vehicular Conflicts

The study should be used to determine specific safety improvement needs for each identified area of concern, such as crossing signals, increased signage, speed restrictions and infrastructure improvements. A School Zone Pedestrian Study should be developed, including South Main Street (MacPhail Road to Idlewild), Baltimore Pike (Atwood Road to Maitland Street) and Hickory Avenue (Pennsylvania Avenue to Broadway). This area provides access for many children going to local schools. In addition to a school crossing analysis, this study area should incorporate concerns noted by the Downtown Task Force, which included motorists running yellow and red lights, a lack of sidewalk continuity, the need for programs to help pedestrians
along the Main Street area and the need to improve pedestrian connections. While conditions in the downtown area are not as severe as those along Route 1, improvements would help with school access concerns and the commercial vitality of the area. Traffic signal timing should be examined to provide safe pedestrian crossing. Right turn on red traffic signals should be analyzed to assure pedestrian safety needs are adequately addressed.

All school pedestrian routes should be reviewed to ensure that adequate crosswalks are in place. All Town and State roads should be evaluated annually to assure that the crosswalk areas are working efficiently and are identified properly.

Example of Deficient Crosswalk Location

Pedestrian Network Coordination

It is extremely important for the Town to develop a coordinated approach to the pedestrian program through coordination with the State Highway Administration, the Board of Education, Harford County, the Town's Tree Committee and local property owners.
These groups and individuals are essential players in developing a successful action plan and assuring funding and implementation of the various elements necessary to enhance the Town’s pedestrian network. State Highway Administration controls improvement possibilities on all state roads. The Board of Education is integral to identifying school related pedestrian issues. The County’s support is required for sidewalk enhancement projects on state roads and for trail improvement projects, the Tree Committee’s input will help avoid future sidewalk development problems by assuring new and replacement trees are chosen to enhance pedestrian experience, but not cause damage to sidewalk areas as roots expand. Finally, property owners need to be included to assure that concerns are satisfied and the final pedestrian plan truly meets citizen needs.

RECOMMENDATIONS

- Continue the Department of Public Works Sidewalk Development Program, including annual prioritization review.
- Complete and implement the Town’s sidewalk program, incorporating a more pro-active approach to repair and extension of sidewalks in the Town’s commercial area.
- Complete the School Zone Pedestrian Study, noting all illegal pedestrian crossing areas; conflicts between pedestrian and vehicular
movement at intersections; potential physical and infrastructure improvements, i.e. signage, crosswalk relocation and impediments to pedestrian movement, sidewalk width or ADA compliance issues and evaluate use of crossing bays to minimize pedestrian/vehicular conflicts.

- Work with area citizens to assure that all pertinent issues are identified and citizen input is incorporated into the Pedestrian Action Plan.
- Work with the County and State (TEA21) to develop an expanded trail network and sidewalks along State Roads. Priority should be given to extending the sidewalks on Route 1, adjacent to the Harford Mall, extending a trail system along Plumtree Run, from Howard Park to the Upper Chesapeake Medical Center, and evaluating pedestrian improvement options between the shopping centers at Route 1 and Route 24.
- Work with the State Highway Administration to improve pedestrian movement by eliminating right turn on red at identified intersections, to provide pedestrian islands and to explore other possible pedestrian improvements near school crossings, particularly in the Route 1 area.
- Develop, with the Bel Air Tree Committee's assistance, an inventory
of sidewalks with tree root damage and a list of acceptable trees for planting adjacent to sidewalks, to eliminate future problems. Identify and implement enforcement procedures based on identified needs.

- Develop and implement a Pedestrian Safety Education Program directed particularly to the most accident prone members of the public: the old and the young.
APPENDICES
APPENDIX A

BEL AIR TOWN CODE, ARTICLE 2
SIDEWALK CONSTRUCTION
Appendix A
Bel Air Town Code

Article 2. Sidewalk Construction

Section 13-201. "Owner" Defined: Methods of Giving Notice to Owner

The word "owner" as used in this Article shall denote the person appearing as owner in the tax assessment records of the County, and any notice required herein shall be deemed sufficient notice if mailed to the owner at the address given therein. If the owner's name or the owner's address as shown by the records is believed by the Board of Town Commissioners to be in error, the Commissioners, may, in addition to the notice above provided, publish a letter in one of the newspapers printed and published in the Town "to the owner of (the property concerned, describing it)." which letter shall contain the information required by this Article.

Section 13-202. New Sidewalk Construction

Owners of residential and commercial use property shall be responsible for the initial construction of new sidewalk abutting their property.

Wherever curbs and gutters have been constructed along any street within the Town, or wherever such curbs and gutters shall be constructed along any such street, or wherever there is an existing sidewalk along any such street, the Board of Town Commissioners may order and direct the property owner of the abutting property on such street to construct new sidewalk. Such sidewalk shall be constructed in accordance with Town standards and specifications and existing Town policy.

Should an owner fail to comply with such an order, the Board of Town Commissioners is empowered to cause the work to be completed and assess the cost thereof to the owner, placing a lien upon the land which abuts the sidewalk so constructed and may be recovered either as a debt or in such manner as the taxes of the Town are recoverable.

Section 13-203. Procedure for Ordering the Construction of New Sidewalk

Where the Board of Town Commissioners desires a new sidewalk to be constructed, a written notice shall be given by the Town to the owner of the property along which the sidewalk is to be constructed of the intention of the Commissioners to compel the construction of the new sidewalk. This notice shall set forth in simple terms the specifications therefor.

Section 13-204. Maintenance and Replacement of Existing Sidewalks

The maintenance and replacement of existing sidewalks abutting commercial use property shall be the responsibility of the property owner. The maintenance and replacement of existing sidewalk abutting residential use property shall be the responsibility of the Town of Bel Air.

Wherever such maintenance and replacement is the responsibility of the property owner abutting such sidewalk, a notice shall be sent by the Town to such property owner setting forth in simple terms the reasons why the maintenance or replacement is considered necessary and shall set forth in simple
terms the specifications or the nature of the improvements.

Section 13-205. Hearings on Notices

Where the Commissioners seek to compel the repaving or improvement of an existing sidewalk, opportunity for hearing as to the reasonableness of the specifications or as to the reasonableness of the repaving or improvement shall be given to the owner at a regular meeting of the Board of Town Commissioners next following the fifth day after the receipt of such notice by the owner. The Commissioners, after such hearing, may require the Superintendent of Public Works to make any changes in the specifications which they shall deem reasonable and proper. The Commissioners shall enter their findings and the changes required, if any, upon their minute book within five days from the date of such hearing and shall make the same known to the owner upon his request at the Town office.

Section 13-206. Standard Sidewalk Specifications

Sidewalks in the Town of Bel Air shall be constructed in accordance with Town of Bel Air Standards and Specifications.

Section 13-207. Notification by Owner that Work to be Performed Under Private Contract

It shall become the duty of the owner within fifteen days from the receipt of the original notice to the owner, or within twenty days from the hearing provided under Section 13-205, to notify the Commissioners in writing if the owner undertakes and agrees to pave, repave or improve the sidewalk by private contract according to the Town’s standard specifications.

Section 13-208. Failure of Owner to Begin Work Within Thirty Days

If the owner, after giving to the Commissioners the notice as provided in Section 13-207, shall not begin the paving, repaving or improvement of the sidewalk within thirty days from the date of such notice, he shall be presumed to have waived his right to do so, unless, within the thirty-day period, he shall have made written request to the Commissioners to extend the time for beginning work.

Section 13-209. Failure to Complete Work Within Fifteen Days After Starting

If the owner shall begin the paving, repaving or improvement of the sidewalk and shall not complete the same within fifteen days from the date of such beginning, he shall be presumed to have waived his right to do so, unless, within the fifteen-day period, he shall have made written request to the Commissioners to extend the time for completing the work.

Section 13-210. Granting of Time Extension

Upon receipt of a request for an extension of time for either beginning or completing the work, the Commissioners shall give to the owner opportunity
for hearing upon such request not later than their regular meeting next following the receipt of such request. Their decision upon such request, and the extension of time allowed, if any, shall be entered upon their minute book and shall be made known to the owner upon his request at the Town office. Further extensions of time may be granted by the Commissioners upon like request and in like manner.

Section 13-211. Completion of Work by Town; Billing Property Owner When Authorized

Upon any failure of the owner to comply with the provisions of this Article, it shall be lawful for the Superintendent of Public Works to pave, repave, or improve the sidewalk according to the specifications established. Upon completion of the work, the Town shall mail to the owner an itemized bill for the cost of the work so completed.

Section 13-212. Completion of Work by Town; Hearing on Reasonableness of Bill

Opportunity for a hearing as to the reasonableness and propriety of the bill mentioned in Section 13-211, or as to any item thereof, shall be given to the owner at the regular meeting of the Commissioners next following the tenth day after the mailing of such bill. The Commissioners may require the Superintendent of Public Works to make any changes in the bill which they shall deem reasonable and proper. They shall enter their findings as to the final cost of the work upon their minute book within five days from the date of such hearing and shall make the same known to the owner upon his request at the Town office.
APPENDIX B

BEL AIR SIDEWALK CONSTRUCTION
AND MAINTENANCE POLICY
GENERAL POLICY STATEMENTS

Sidewalk Construction and Maintenance

1. New Sidewalk Construction - Residential

Owners of residential use property are responsible for initial construction of a sidewalk in accordance with Town standards and specifications within a right-of-way along their lot frontage, if any. The Town is responsible for initial construction of a sidewalk in accordance with Town standards and specifications within the right-of-way along one-half of the side and back street frontage unless said construction is part of a subdivision plan or site plan in which case the responsibility will be that of the developer/owner.

2. New Sidewalk Construction - Non-residential

Owners of non-residential use property are responsible for initial construction of a sidewalk in accordance with the Town standards and specifications within the right-of-way along all abutting street frontage.

3. Sidewalk Maintenance - Residential

The Town of Bel Air will be responsible for replacement and maintenance of sidewalks abutting residential use property which is within the rights-of-way accepted for maintenance by the Town and which has been damaged or deteriorated through no fault of the property owner.

4. Sidewalk Maintenance - Non-residential

Maintenance and replacement of sidewalks which are abutting non-residential use property is the responsibility of the abutting property owner except that such sidewalks may be replaced or repaired at no cost to the abutting property owner as part of a major governmental project such as street widening where the Town's specifications provides for sidewalk replacement or as part of a project funded by a Federal or State grant or when damaged as a result of public utility installation, replacement or repair.

5. New Sidewalk Construction and Maintenance - Private

The construction, replacement and maintenance of sidewalks located on private property is the sole responsibility of the property owner unless the Town has been granted an easement pertaining thereto and accepted maintenance of said sidewalk easement.
6. New Driveway Construction and Maintenance

The construction, replacement and maintenance of that portion of all driveways between a property line and the abutting roadway is the sole responsibility of the property owner.
APPENDIX C

DEPARTMENT OF PUBLIC WORKS
FILL-IN SIDEWALK CONSTRUCTION PLAN
TOWN OF BEL AIR
DEPARTMENT OF PUBLIC WORKS

FILL-IN SIDEWALK CONSTRUCTION PLAN

ISSUE. If the Town of Bel Air is to continue to construct sidewalks, a plan with priorities and based on sound reasoning is necessary to insure Town construction funds are applied to the most critical needs first. The appendices to this paper provide such a plan.

BACKGROUND. In the past two years (1997/1998) there has been much discussion among the Town Board and staff regarding the interdependence of pedestrian safety and timely, well planned sidewalk construction. According to the Town Code, Sections 13-202 and 13-203, the abutting property owner, commercial or residential, is responsible to install sidewalks, not the Town. Over the years this requirement has been generally adhered to, however, numerous gaps have developed, in most cases for good reason and in some instances through oversight. Regardless, gaps do exist and to construct "fill-in" sidewalks is a costly undertaking. Repair of residential sidewalks is the responsibility of the Town while commercial property owners must repair their own.

DISCUSSION/EXPLANATION. In practice the Town Code regarding construction of sidewalks works reasonably well. Requiring new development, either commercial or residential, to install sidewalks is normally done without much resistance from the owner/developer(s). In determining how to handle the construction of "fill-in" sidewalks, in most all cases in the recent past, the Town has funded this work rather than demand it be funded by the abutting property owner. For example, over the past 5 years we have spent an average of $18,743 per year on "fill-in" sidewalks and curb ramps. In 1998 dollars, one linear foot of 4 foot wide sidewalk costs $16 and a curb ramp costs $780.

The individual plans attached as Appendices I through V essentially provide a comprehensive 20-year fill-in sidewalk (including curb ramps) construction plan. Developer sidewalks as well as State shared sidewalks are included. Each budget cycle this plan will be reviewed, new sidewalks added from the out-years plan based on demand, priorities examined and an affordable amount of construction will be included in the upcoming FY budget.

CONCLUSION. The Town is spending money building sidewalks in residential areas and in some commercial areas which property owners have the responsibility under law to fund. However, we are not talking about a lot of money and it would appear that what we are doing is affordable and is consistent with what some other towns are doing.

Appendices:

I. SIDEWALKS ALONG TOWN STREETS - DEVELOPER RESPONSIBILITY

II. SIDEWALKS ALONG STATE HIGHWAYS - SHA/TOWN SHARED RESPONSIBILITY

III. SIDEWALKS ALONG TOWN STREETS - TOWN OR ADJACENT PROPERTY OWNER RESPONSIBILITY (20 Year Plan)

IV. SIDEWALKS ALONG TOWN STREETS - TOWN OR ADJACENT PROPERTY OWNER RESPONSIBILITY (Out-Years Plan)

V. CURB RAMP CONTRUCTION PLAN
TOWN OF BEL AIR
DEPARTMENT OF PUBLIC WORKS

FILL-IN SIDEWALK CONSTRUCTION PLAN

I. SIDEWALKS ALONG TOWN STREETS - DEVELOPER RESPONSIBILITY

A. GENERAL. These are sidewalks planned to be installed along Town streets and where a known developer or future developer will be responsible for construction. Priorities are assigned mainly for tracking purposes and reflect the relative order in which the sidewalks are expected to be constructed. These sidewalks are funded by developers and consequently will not appear in the Town budget.

Completed

B. SCHEDULE.

<table>
<thead>
<tr>
<th>Priority</th>
<th>Location</th>
<th>LF</th>
<th>FY</th>
<th>Project/Developer</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-1</td>
<td>Fulford Avenue - corner of Fulford &amp; Barnes, s-side</td>
<td>200</td>
<td>99/00</td>
<td>Maloney Office Building</td>
<td>along ped. thoroughfare</td>
</tr>
<tr>
<td>D-2</td>
<td>Howard Street - Rockspring Avenue to 300' east, s-side</td>
<td>300</td>
<td>99/00</td>
<td>JA/JR Bob Martin</td>
<td>along ped. thoroughfare</td>
</tr>
<tr>
<td>D-3</td>
<td>Rockspring Avenue - Howard Street to south 250', e-side</td>
<td>250</td>
<td>99/00</td>
<td>JA/JR Bob Martin</td>
<td>alongside residential area</td>
</tr>
<tr>
<td>D-4</td>
<td>Williams Street - Opp. Alice Anne to Thomas, e-side; Hays Street - Pennsylvania Avenue to hair salon, w-side; Thomas - Williams to Hays, n-side</td>
<td>600</td>
<td>99/00</td>
<td>Aegis Expansion</td>
<td>commercial district</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3901</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D-5</td>
<td>Giles - Fulford Ave. south, w-side to existing sidewalk</td>
<td>100</td>
<td>99/00</td>
<td>Medical Office</td>
<td>commercial district</td>
</tr>
<tr>
<td>D-6</td>
<td>Marketplace Drive - Rte. 24 to 700' east, s-side</td>
<td>700</td>
<td>99/00</td>
<td>Amoco/HNB/Diner</td>
<td>commercial district</td>
</tr>
<tr>
<td>D-7</td>
<td>S. Atwood Road - Baltimore Pike to Marketplace Drive, w-side</td>
<td>1100</td>
<td>00+</td>
<td>Bel Air Plaza Addition</td>
<td>future commercial</td>
</tr>
<tr>
<td>D-8</td>
<td>S. Atwood Road - Red Oak Drive to 550' north, w-side</td>
<td>550</td>
<td>00+</td>
<td>Bel Air Land Development</td>
<td>future commercial</td>
</tr>
<tr>
<td>D-9</td>
<td>MacPhail Road - 924 to Edgehill Drive, n-side</td>
<td>600</td>
<td>00+</td>
<td>County</td>
<td></td>
</tr>
<tr>
<td>D-10</td>
<td>Thomas Street - Williams Street to Brooks, n-side; Williams - Alice Anne to Thomas, w-side</td>
<td>1000</td>
<td>00+</td>
<td>Julio</td>
<td>future</td>
</tr>
<tr>
<td>D-11</td>
<td>Hays Street - back from George Street</td>
<td>230</td>
<td>00+</td>
<td></td>
<td>future</td>
</tr>
</tbody>
</table>
TOWN OF BEL AIR
DEPARTMENT OF PUBLIC WORKS

FILL-IN SIDEWALK CONSTRUCTION PLAN

II. SIDEWALKS ALONG STATE HIGHWAYS - SHA/TOWN SHARED RESPONSIBILITY

A. GENERAL. These are sidewalks located along state roads which pass through Town where the Town shares responsibility with the State Highway Administration (SHA) for construction. In the late 1990's SHA instituted a 50-50 cost share program to encourage municipalities/counties to construct sidewalks along its (SHA's) roads. Beyond FY 1998/99 this cost share program is doubtful, so the Town has attempted to take full advantage of it while the funding is available. Priorities were established based on need and safety. Completion of pedestrian thoroughfares was also considered.

B. SCHEDULE.

<table>
<thead>
<tr>
<th>Priority</th>
<th>Location</th>
<th>LF</th>
<th>FY</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-01</td>
<td>Fulford Avenue - Barnes Street to Maltland Avenue, s-side</td>
<td>300</td>
<td>99</td>
<td>pedestrian thoroughfare</td>
</tr>
<tr>
<td>S-02</td>
<td>Baltimore Pike @ Harford Mall, n-side</td>
<td>1000</td>
<td>99</td>
<td>pedestrian thoroughfare</td>
</tr>
<tr>
<td>S-03</td>
<td>Rockspring Avenue - from Howard north to Moores Mill Road, e-side</td>
<td>1050</td>
<td>99</td>
<td>pedestrian thoroughfare</td>
</tr>
<tr>
<td>S-04</td>
<td>S. Main - Kenmore to south of Homestead, w-side</td>
<td>300</td>
<td>99</td>
<td>pedestrian thoroughfare</td>
</tr>
<tr>
<td>S-05</td>
<td>Rockspring Avenue - from exist. sidewalk to Ash Alley, n-side</td>
<td>150</td>
<td>00/01</td>
<td>insufficient R-O-W</td>
</tr>
<tr>
<td>S-06</td>
<td>Churchville Rd. - from Giles Street to Fulford Place, s-side</td>
<td>500</td>
<td>00/01</td>
<td>pedestrian thoroughfare</td>
</tr>
<tr>
<td>S-07</td>
<td>Rockspring Avenue - from opp. Dallam Avenue to exist. sidewalk, e-side</td>
<td>300</td>
<td>01/02</td>
<td>pedestrian thoroughfare</td>
</tr>
<tr>
<td>S-08</td>
<td>S. Main Street - from Idlewild south to MacPhail Road, e-side</td>
<td>1200</td>
<td>01/02</td>
<td>wide shoulder, sidewalk on west side</td>
</tr>
<tr>
<td>S-09</td>
<td>Fulford Avenue - from Main east to existing sidewalk, n-side</td>
<td>200</td>
<td>02/03</td>
<td>sidewalk to be installed on south side</td>
</tr>
<tr>
<td>S-10</td>
<td>Rockspring Avenue - from Ellendale north to existing sidewalk, e-side</td>
<td>300</td>
<td>03/04</td>
<td>safe for pedestrians in its present condition</td>
</tr>
<tr>
<td>S-00</td>
<td>Churchville Road - from Giles Street to Shamrock Road, n-side</td>
<td>750</td>
<td>04+</td>
<td>not critical, shoulder is wide</td>
</tr>
<tr>
<td>S-00</td>
<td>Rockspring Avenue - from Maulsby to Moores Mill Road, w-side</td>
<td>1850</td>
<td>04+</td>
<td>insufficient R-O-W, not critical with east side sidewalk</td>
</tr>
</tbody>
</table>
TOWN OF BEL AIR  
DEPARTMENT OF PUBLIC WORKS  

FILL-IN SIDEWALK CONSTRUCTION PLAN  

III. SIDEWALKS ALONG TOWN STREETS - TOWN OR ADJACENT PROPERTY OWNER RESPONSIBILITY (20 Year Plan)  

A. GENERAL. These are sidewalks deemed necessary by the Town and located mainly in residential areas where either the Town or the abutting property owner is responsible for installation. Priorities were established based on the need to connect existing sidewalk segments which, once completed, will provide safer passage for, (1) school children to walk to school, and (2) residents to walk from residential areas to shopping/commercial districts and recreation areas. Completion and connection to pedestrian thoroughfares was also considered.  

B. SCHEDULE.  

<table>
<thead>
<tr>
<th>Priority</th>
<th>Location</th>
<th>LF</th>
<th>FY</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Archer - Thomas to George, e-side</td>
<td>505</td>
<td>1999</td>
<td>to Bel Air High School/ downtown</td>
</tr>
<tr>
<td>2</td>
<td>Broadway - McCormick to 470 east, s-side</td>
<td>470</td>
<td>1999</td>
<td>to St. Margaret's School/ downtown</td>
</tr>
<tr>
<td>3</td>
<td>Hickory - Broadway to Wright Street, e-side</td>
<td>135</td>
<td>2000</td>
<td>to St. Margaret's School/ downtown</td>
</tr>
<tr>
<td>4</td>
<td>Broadway - Hickory to McCormick</td>
<td>450</td>
<td>2000</td>
<td>to St. Margaret's School/ downtown</td>
</tr>
<tr>
<td>5</td>
<td>Hays - Aegis Addition to Thomas St/ hair salon, w-side</td>
<td>150</td>
<td>2000</td>
<td>to Bel Air High School</td>
</tr>
<tr>
<td>6</td>
<td>Lee Way - McCormick Street to 400' east, n-side</td>
<td>400</td>
<td>2000</td>
<td>to St. Margaret's School/ downtown</td>
</tr>
<tr>
<td>7</td>
<td>Franklin - Broadway south to existing, e-side</td>
<td>200</td>
<td>2000</td>
<td>to Bel Air Elementary School</td>
</tr>
<tr>
<td>8</td>
<td>Shamrock - Route 22 to Courtland &amp; down Courtland, n-east corner</td>
<td>300</td>
<td>2001</td>
<td>to downtown/recreation area</td>
</tr>
<tr>
<td>9</td>
<td>Barnes - Powell to Eastern, w-side</td>
<td>605</td>
<td>2005</td>
<td>to downtown/recreation area</td>
</tr>
<tr>
<td>10</td>
<td>Idlewild Street - S. Main Street west to Board of Ed., n-side</td>
<td>550</td>
<td>2002</td>
<td>to public school</td>
</tr>
<tr>
<td>11</td>
<td>Maitland - Fulford to Powell, e-side</td>
<td>568</td>
<td>2003</td>
<td>to downtown</td>
</tr>
<tr>
<td>12</td>
<td>Giles - Courtland to Fulford, w-side</td>
<td>650</td>
<td>2003</td>
<td>to downtown/recreation area</td>
</tr>
<tr>
<td>13</td>
<td>Giles - Medical Office, w-side to existing sidewalk</td>
<td>200</td>
<td>2004</td>
<td>to downtown/recreation area</td>
</tr>
<tr>
<td>Priority</td>
<td>Location</td>
<td>LF</td>
<td>FY</td>
<td>Justification</td>
</tr>
<tr>
<td>---------</td>
<td>---------------------------------------------------------------------------</td>
<td>----</td>
<td>-----</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>14</td>
<td>Lee Street - Armory alley east 180', s-side</td>
<td>180</td>
<td>2006</td>
<td>to St. Margaret’s School/downtown</td>
</tr>
<tr>
<td>15</td>
<td>Williams Street - Catheirne to Alice Anne Street, w-side</td>
<td>350</td>
<td>2006</td>
<td>to downtown/recreation area</td>
</tr>
<tr>
<td>16</td>
<td>George Street - Kelly to Reed, n-side</td>
<td>250</td>
<td>2007</td>
<td>to downtown/recreation area</td>
</tr>
<tr>
<td>17</td>
<td>George Street - Reed to Atwood Road, n-side</td>
<td>200</td>
<td>2007</td>
<td>to malls/downtown</td>
</tr>
<tr>
<td>18</td>
<td>George Street - Atwood east to existing, n-side</td>
<td>300</td>
<td>2007</td>
<td>to malls/downtown</td>
</tr>
<tr>
<td>19</td>
<td>George Street - Williams west to existing, n-side</td>
<td>350</td>
<td>2008</td>
<td>to malls/downtown</td>
</tr>
<tr>
<td>20</td>
<td>Williams Street - Broadway to opp. Cedar Alley, w-side</td>
<td>250</td>
<td>2008</td>
<td>to Bel Air High School/recreation area</td>
</tr>
<tr>
<td>21</td>
<td>Williams Street - Nichols to Broadway, w-side</td>
<td>250</td>
<td>2008</td>
<td>to Bel Air High School/recreation area</td>
</tr>
<tr>
<td>22</td>
<td>Williams Street - Maulsby to Nichols, w-side</td>
<td>400</td>
<td>2009</td>
<td>to Bel Air High School/recreation area</td>
</tr>
<tr>
<td>23</td>
<td>Mast - Maulsby north to existing, w-side</td>
<td>100</td>
<td>2009</td>
<td>to Bel Air High School/downtown</td>
</tr>
<tr>
<td>24</td>
<td>Mast - Dallam to alley (opp.), w-side</td>
<td>120</td>
<td>2009</td>
<td>to Bel Air High School/downtown</td>
</tr>
<tr>
<td>25</td>
<td>Catherine - Williams west to existing, n-side</td>
<td>600</td>
<td>2010</td>
<td>to malls/recreation area</td>
</tr>
<tr>
<td>26</td>
<td>Hickory Avenue - opp. St. Margaret Church, w-side</td>
<td>550</td>
<td>2010</td>
<td>to downtown</td>
</tr>
<tr>
<td>27</td>
<td>Maitland - opp. Powell to Eastern Avenue, e-side</td>
<td>600</td>
<td>2011</td>
<td>to Bel Air High School/recreation area</td>
</tr>
<tr>
<td>28</td>
<td>Maitland - Eastern Avenue to Linwood, e-side</td>
<td>350</td>
<td>2011</td>
<td>to Bel Air High School/recreation area</td>
</tr>
<tr>
<td>29</td>
<td>Giles - Eastern Avenue to Linwood, w-side</td>
<td>400</td>
<td>2012</td>
<td>to Bel Air High School/recreation area</td>
</tr>
<tr>
<td>30</td>
<td>Kelly Avenue - Boulton Street to 240' south, w-side</td>
<td>240</td>
<td>2012</td>
<td>to malls/Bel Air High School</td>
</tr>
<tr>
<td>31</td>
<td>N. Reed Street - Catherine to Thomas, w-side</td>
<td>1000</td>
<td>2013</td>
<td>to malls/Bel Air High School</td>
</tr>
<tr>
<td>32</td>
<td>N. Atwood Road - Gordong to Catherine, s-side</td>
<td>400</td>
<td>2014</td>
<td>to malls/Bel Air High School</td>
</tr>
<tr>
<td>33</td>
<td>Gordon Street - Williams to Atwood, s-side</td>
<td>810</td>
<td>2014</td>
<td>to malls/downtown</td>
</tr>
<tr>
<td>34</td>
<td>Gordon Street - Williams to Wallace, n-side</td>
<td>430</td>
<td>2015</td>
<td>to malls/downtown</td>
</tr>
<tr>
<td>35</td>
<td>Maulsby - &quot;The Mill&quot; to Mast, s-side</td>
<td>600</td>
<td>2015</td>
<td>to downtown</td>
</tr>
<tr>
<td>Priority</td>
<td>Location</td>
<td>LF</td>
<td>FY</td>
<td>Justification</td>
</tr>
<tr>
<td>---------</td>
<td>--------------------------------------------------------------------------</td>
<td>-----</td>
<td>------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>36</td>
<td>Lee Way - opp. Ardmore, s-side</td>
<td>600</td>
<td>2015</td>
<td>to downtown/recreation area</td>
</tr>
<tr>
<td>37</td>
<td>Shamrock Road - Linwood Avenue to Hunter Drive, w-side</td>
<td>30</td>
<td>2016</td>
<td>to Bel Air High School</td>
</tr>
<tr>
<td>38</td>
<td>Shamrock Road - MacPhail Road to 550' north, e-side</td>
<td>550</td>
<td>2016</td>
<td>to Bel Air High School</td>
</tr>
<tr>
<td>39</td>
<td>Howard - Ridgewood to Old Orchard, south side to existing, s-side</td>
<td>350</td>
<td>2016</td>
<td>to downtown</td>
</tr>
<tr>
<td>40</td>
<td>Webster - McCormick Street to Hickory Avenue, s-side</td>
<td>500</td>
<td>2017</td>
<td>to St. Margaret's School/ downtown</td>
</tr>
<tr>
<td>41</td>
<td>Harlan Street - Francis Avenue to Hickory Avenue, n-side</td>
<td>700</td>
<td>2017</td>
<td>to St. Margaret's School/ downtown</td>
</tr>
<tr>
<td>42</td>
<td>Crocker Street - Francis Avenue to Hickory Avenue, s-side</td>
<td>700</td>
<td>2018</td>
<td>to St. Margaret's School/ downtown</td>
</tr>
<tr>
<td>43</td>
<td>N. Shamrock Road - Lee Way to Broadway, w-side</td>
<td>400</td>
<td>2018</td>
<td>to St. Margaret's School/ recreation area</td>
</tr>
<tr>
<td>44</td>
<td>Broadway - between Rockspring &amp; Williams, n-side</td>
<td>300</td>
<td>2019</td>
<td>to St. Margaret's School/ downtown</td>
</tr>
<tr>
<td>45</td>
<td>Catherine Court</td>
<td>700</td>
<td>2019</td>
<td>to downtown</td>
</tr>
<tr>
<td>46</td>
<td>Kenmore Avenue - between Heighe Street &amp; Homestead, e-side</td>
<td>400</td>
<td>2020</td>
<td>to Bel Air High School/ downtown</td>
</tr>
<tr>
<td>47</td>
<td>Kenmore Avenue - between Heighe Street &amp; Homestead, w-side</td>
<td>400</td>
<td>2020</td>
<td>to Bel Air High School/ downtown</td>
</tr>
</tbody>
</table>
TOWN OF BEL AIR  
DEPARTMENT OF PUBLIC WORKS  
FILL-IN SIDEWALK CONSTRUCTION PLAN  

IV. SIDEWALKS ALONG TOWN STREETS - TOWN OR ADJACENT PROPERTY OWNER  
RESPONSIBILITY (Out-Years Plan)  

A. GENERAL. These are sidewalks along streets mainly in residential areas where none currently exist  
or where there is an existing sidewalk on one side of the street. In most all cases, there has been no  
demand or request for these sidewalks by residents. Each year as priority fill-in sidewalks are constructed  
and where demand dictates that any of these sidewalks be constructed, the 20-Year Plan would be amended  
to include same. The added sidewalks would then compete for priority with those remaining in the 20-year  
Plan and would be scheduled for construction accordingly.  

B. SCHEDULE.  

<table>
<thead>
<tr>
<th>Priority</th>
<th>Location</th>
<th>LF</th>
<th>Justification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idlewild Street - S. Main street west to Board of Ed., s-side</td>
<td>550</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Homestead Street - S. Main west to Board of Ed., s-side</td>
<td>550</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Kenmore Avenue - Heighe Street to Homestead Street, w-side</td>
<td>380</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>George Street - Archer Street to Atwood Road, s-side</td>
<td>560</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>George Street - Atwood Road to Reed Street, s-side</td>
<td>210</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>George Street - Reed Street to Kelly Avenue, s-side</td>
<td>250</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Boulton Street - Kelly Avenue to Park Manor Circle, s-side</td>
<td>250</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Ewing Street - betw. Churchville Road &amp; Fulford Ave., w-side</td>
<td>350</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Ewing Street - betw. Fulford Avenue &amp; south end, w-side</td>
<td>450</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Ewing Street - betw. Churchville &amp; Fulford, e-side</td>
<td>350</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Ewing Street - betw. Fulford Avenue &amp; south end, e-side</td>
<td>450</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Giles Street - betw. Courtland Street &amp; Churchville Road, e-side</td>
<td>350</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Giles Street - betw. Churchville Rd. &amp; Fulford Avenue, e-side</td>
<td>350</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Maitland St - betw. Fulford Avenue &amp; Linwood Ave., w-side</td>
<td>1125</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Barnes Street - betw. Fulford Avenue &amp; Linwood Avenue, e-side</td>
<td>1200</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Barnes St - betw. Fulford Avenue &amp; Linwood Avenue, w-side</td>
<td>950</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Eastern Avenue - betw. Main Street &amp; Giles Street, n-side</td>
<td>800</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Eastern Avenue - betw. Main Street &amp; Giles Street, s-side</td>
<td>700</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Linwood Avenue - betw. Maitland Street &amp; Giles Street, n-side</td>
<td>250</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Street Description</td>
<td>Size</td>
<td>Demand</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------------</td>
<td>------</td>
<td>--------</td>
<td></td>
</tr>
<tr>
<td>Powell Avenue - betw. Barnes Street &amp; Maitland Street, n-side</td>
<td>225</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Powell Avenue - betw. Main Street &amp; Maitland Street, s-side</td>
<td>550</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Wilson Street - full length, e-side</td>
<td>850</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Wilson Street - full length, w-side</td>
<td>850</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>John Street - full length, n-side</td>
<td>350</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>John Street - full length, s-side</td>
<td>450</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Archer Street - Thomas Street to Baltimore Pike, w-side</td>
<td>750</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Brooks Road - Catherine Street to Thomas Street, e-side</td>
<td>750</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>George Street - betw. Williams Street &amp; Atwood Road, s-side</td>
<td>600</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>George Street - betw. Atwood Road &amp; Reed Street, s-side</td>
<td>225</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>George Street - betw. Reed Street &amp; Kelly Avenue, s-side</td>
<td>250</td>
<td></td>
<td></td>
</tr>
<tr>
<td>George Street - betw. Kelly Avenue &amp; Park Manor, s-side</td>
<td>250</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Atwood Rd - betw. Gordon Street &amp; Catherine Street, w-side</td>
<td>400</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Gordon Street - betw. Richardson &amp; Richardson Alley, n-side</td>
<td>300</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Gordon Street - betw. Richardson &amp; Town Boundary, n-side</td>
<td>750</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Gordon Street - betw. Atwood Road &amp; Town boundary, s-side</td>
<td>250</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Homestead Street - betw. S. Main &amp; Board of Ed., s-side</td>
<td>600</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Idlewild Street - betw. S. Main &amp; Board of Ed., s-side</td>
<td>600</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Broadway - betw. Richardson &amp; Williams Street, n-side</td>
<td>425</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Broadway - betw. Richardson &amp; Williams Street, s-side</td>
<td>350</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Richardson Street - betw. Broadway &amp; Gordon Street, w-side</td>
<td>500</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Richardson street - betw. Broadway &amp; Gordon Street, e-side</td>
<td>450</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Broadway - betw. Rockspring &amp; Williams Street, s-side</td>
<td>650</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Ellendale - betw. Rockspring Avenue &amp; Franklin Street, s-side</td>
<td>800</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Ellendale - betw. Rockspring Avenue &amp; Franklin Street, n-side</td>
<td>1050</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Ellendale Street - betw. Rockspring &amp; Williams street, n-side</td>
<td>500</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Ellendale Street - betw. Rockspring &amp; Williams Street, s-side</td>
<td>500</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Williams Street - betw. Dallam &amp; Maulsby, e-side</td>
<td>200</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Williams Street - betw. Maulsby &amp; Ellendale, e-side</td>
<td>350</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Williams Street - betw. Ellendale &amp; Ash Alley, e-side</td>
<td>200</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Williams Street - betw. Broadway &amp; Cedar Alley, e-side</td>
<td>150</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Williams Street - betw. Cedar Alley &amp; Gordon Street, e-side</td>
<td>250</td>
<td>no demand</td>
<td></td>
</tr>
<tr>
<td>Maulsby - betw. Rockspring &amp; Williams Street, n-side</td>
<td>400</td>
<td>no demand</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX D

EXISTING CROSSWALK ANALYSIS
Legend

1. No signal; good striping.
2. School crossing signs; no signal and faded school crossing on Main Street.
3. No signal; good striping. No crossing for Main Street to Lee Street.
4. No signal; good striping. No crossing for Main Street to Lee Street.
5. No signal; no crossing on Lee Street.
7. Signals for all directions.
8. Crosswalks and signals, all directions. Faded striping on Main Street.
9. No signals; pedestrian crossing signs.
10. Crosswalks and signals in all directions. Faded striping on Main Street.
11. No signal; good striping.
12. Crosswalks on Churchville Road and South Main Street are satisfactory. Signals for all directions (except west side Churchville Road). Poor curb cut location, east side Churchville Road.
13. Signals for all directions. Churchville Road crosswalks satisfactory. Main Street crosswalks are faded.
15. Signals for all directions. No crosswalk on east side of Fulford Avenue. All intersection crosswalks faded.
Crosswalks
Route 1, Route 24, and Route 924

LEGEND
1. signals
2. signals
3. signals
4. signal at Rt. 24
5. signals
6. signals
   faded striping
no crosswalk at Atwood Rd.
7. signals in all directions
no crosswalk-Bond or S. Balt. Pk.
faded striping
8. no signal
   good striping
9. no signal
   good striping
   school crossing signs
10. signal
    faded striping

Bel Air
High School
Bel Air
Middle School
Homestead/Wakefield
Elementary Schools

0.3 0 0.3 0.6 Miles

Buildings
APPENDIX E

CROSSWALK MAINTENANCE PROGRAM
CROSSWALK MAINTENANCE PROGRAM

The Town's Department of Public Works has a Crosswalk Maintenance Program, which identifies all of the crosswalks located on Town streets, by quadrant. These crosswalks are scheduled for routine maintenance on an annual basis.

Quadrant I, northwest Bel Air, includes the area north of Broadway, west of Hickory.

Quadrant II, northeast Bel Air, includes the area north of Route 22, east of Hickory.

Quadrant III, southwest Bel Air, includes the area south of Broadway, west of Route 924.

Quadrant IV, southeast Bel Air, includes the area south of Fulford and east of Route 924.

The maintenance program requires painting and maintenance of both stop bars and crosswalks on an annual basis. The following list outlines the crosswalks located in each individual quadrant:

**Quadrant I**
- Gordon Street at Rockspring Avenue, east side
- Franklin Street at Broadway, north and south sides
- Franklin Street at Gordon Street, north side
- Gordon Street at Franklin Street, west side

**Quadrant II**
- Lee Street at Main Street, east and west sides
- Lee Street at Hickory Avenue, east, west and north sides
- Pennsylvania Avenue at Main Street, east and west sides
- Pennsylvania Avenue at Hickory, east and west sides
- Hickory at Pennsylvania, north and south sides
- Courtland Street at Main Street, east and west sides
- Courtland Street at Burns Alley, west side
- Courtland Street at Hickory Avenue, east and west sides
- Lee Street at Shamrock, east and west sides
- Shamrock at Lee Street, north and south sides

**Quadrant III**
- Pennsylvania Avenue at Bond Street, east side
- Thomas Street at Bond Street, west side

**Quadrant IV**
- None
APPENDIX F

MARYLAND UNIFORM TRAFFIC CONTROL DEVICES
CROSSWALKS (EXCERPT)
Appendix F
MD Uniform Traffic Control Devices - Crosswalk (exerpt)

2B-37 Traffic Signal Signs (R10-1 to 12)

To supplement traffic signal control, auxiliary signs of the type illustrated are often desirable or necessary for the instruction of pedestrians and drivers. Signal instruction signs should be located adjacent to the signal face to which they apply.

Among the traffic signal instruction signs applicable to pedestrians are signs R10-1, 2, 3, and 4. These signs need not be reflectorized.

Permissible as an alternate message for the Pedestrian Actuated Signal sign (R10-3, R10-4) is the legend TO CROSS STREET (arrow) PUSH BUTTON WAIT FOR GREEN (WALK) SIGNAL (R10-3a, R10-4a).

The symbol sign R10-4b may also be used as an alternate to sign R10-4.

The symbol sign R10-2a may be used as an alternate to sign R10-2.

The Pedestrian Actuated Signal sign should be 9 x 12 inches in size and shall be mounted immediately above or incorporated in the pedestrian push-button unit (sec. 4D-6).

Signal instruction signs may be needed at certain locations to clarify signal control. Among the legends for this purpose are LEFT ON GREEN ARROW ONLY (R10-5), LEFT TURN YIELD ON GREEN (symbolic green ball) (R10-12), or LEFT (RIGHT) TURN SIGNAL (R10-10) for compliance with certain turn signals, STOP HERE ON RED (R10-6) for observance of signal limit lines, DO NOT BLOCK INTERSECTION (R10-7) for avoidance of traffic obstructions, and USE LANE(S) WITH GREEN ARROW (R10-8) for obedience to lane-direction control signals.

The NO TURN ON RED sign (R10-11a, 11b) shall be used to indicate that a right turn on red (or left turn on red for one-way streets) is not permitted. For part time prohibitions see section 2B-15. The NO TURN ON RED sign should have standard dimensions of 24 x 30 inches and 24 x 24 inches for R10-11a and R10-11b, respectively. The sign should be erected near the appropriate signal head.

2B-30
A NO TURN ON RED sign may be considered whenever an engineering study finds that one or more of the following conditions exist:

1. Sight distance to vehicles approaching from the left (or right, if applicable) is inadequate.
2. The intersection area has geometrics or operational characteristics which may result in unexpected conflicts.
3. There is an exclusive pedestrian phase.
4. Significant pedestrian conflicts are resulting from RTOR maneuvers.
5. More than three RTOR accidents per year have been identified for the particular approach.
6. There is significant crossing activity by children, elderly, or handicapped people.

Where improved utilization of progressive signal systems is desired, the Traffic Signal Speed sign (sec. 2D-47) should be used.

2B-31
3B–18 Crosswalks and Crosswalk Lines

Crosswalk markings at signalized intersections and across intersectional approaches on which traffic stops, serve primarily to guide pedestrians in the proper paths. Crosswalk markings across roadways on which traffic is not controlled by traffic signals or STOP signs, must also serve to warn the motorist of a pedestrian crossing point. At non-intersectional locations, these markings legally establish the crosswalk.

Crosswalk lines shall be solid white lines, marking both edges of the crosswalk. They shall be not less than 6 inches in width and should not be spaced less than 6 feet apart. Under special circumstances where a stop line is not provided or where vehicular speeds exceed 35 MPH or where crosswalks are unexpected, it may be desirable to increase the width of the crosswalk line up to 24" in width. Crosswalk lines on both sides of the crosswalk should extend across the full width of pavement to discourage diagonal walking between crosswalks (fig. 3-14a).

Crosswalks should be marked at all intersections where there is substantial conflict between vehicle and pedestrian movements. Marked crosswalks should also be provided at other appropriate points of pedestrian concentration, such as at loading islands, midblock pedestrian crossing, or where pedestrians could not otherwise recognize the proper place to cross.

Crosswalk markings should not be used indiscriminately. An engineering study should be required before they are installed at locations away from traffic signals or STOP signs.

Since non-intersectional pedestrian crossings are generally unexpected by the motorist, warning signs (sec. 2C-31) should be installed and adequate visibility provided by parking prohibitions.

For added visibility, the area of the crosswalk may be marked with white diagonal lines at a 45° angle or with white longitudinal lines at a 90° angle to the line of the crosswalk (figs. 3-14b, 14c). These lines should be approximately 12" to 24" wide and spaced 12" to 24" apart. When diagonal or longitudinal lines are used to mark a crosswalk, the transverse crosswalk lines may be omitted. This type of marking is intended for use at locations where substantial numbers of pedestrians cross without any other traffic control device, at locations where physical conditions are such that added visibility of the crosswalk is desired or at places where a pedestrian crosswalk might not be expected. Care should be taken to insure that crosswalks with diagonal or longitudinal lines used at some locations do not weaken or detract from other crosswalks (where special emphasis markings are not used) (fig. 3-14a). When an exclusive pedestrian phase signal, which permits diagonal crossing, is installed at an intersection, a unique marking may be used for the crosswalk (fig. 3-15).

3B–19 Parking Space Markings

Parking space markings shall be white.
Where the total entering traffic on one street is more than twice that on the cross street, detectors on the cross street should be placed closer to the stop line than on the main street.

Additional "ceiling" detectors may be required on lower volume streets to handle traffic entering the street from driveways between the basic detector and the stop line.

The transverse placement of detectors should be such that vehicles traveling away from the intersection do not register "false-calls." On narrow two-way roadways this may require use of directional detectors.

4B-26 Auxiliary Signs

Signal instruction signs (sec. 2B-37) used with traffic signals should be located adjacent to the signal face to which they apply. Minimum clearance of the total assembly shall conform to the provisions of sections 2A-23 and 4B-13.

Stop signs shall not be used in conjunction with any signal operation, except:

1. When the indication flashes red at all times, or
2. When a minor street or driveway is located within or adjacent to the controlled area, but does not warrant separate signal control due to extremely low potential for conflict.

When used in conjunction with traffic signals, illuminated signs shall be designed and mounted in such a manner as to avoid glare and reflections that seriously detract from the signal indications. The traffic control signal faces shall be given dominant position and brightness to assure their target priority in the overall display.

Traffic Signal Speed signs (sec. 2D-48) may be used to inform drivers of the speed of progression in effect on streets in the signal system.

4B-27 Removal of Confusing Advertising Lights

There should be legal authority to prohibit the display of any unauthorized sign, signal, marking, or device which interferes with the effectiveness of any official traffic control device. Specific reference is made to Section 11-205, Uniform Vehicle Code (1968, Supp. II 1976).

4B-28 Provisions of Pedestrians

The design and operation of traffic control signals must take into consideration the needs of pedestrian as well as vehicular traffic. Where minimum numbers of pedestrian movements regularly occur:

1. Signal indications must be visible to pedestrians. This can be accomplished for a given pedestrian movement by:
   a. provision of pedestrian signal indications, or
b. a R.Y.G. signal face for an adjacent vehicular movement visible to pedestrians, or
c. vehicular indications for conflicting movements that can be conveniently viewed by pedestrians, and from which pedestrians can readily and accurately deduce when they have the right-of-way.

2. There must be an opportunity to cross without excessive delay. Pedestrian actuation shall be installed at traffic control signals where the signal operation does not otherwise provide this opportunity.

3. Pedestrians should be provided with sufficient time to cross the roadway. This may be accomplished by adjusting the signal operation and timing to automatically provide this assurance or via pedestrian actuation.

Where it is desired to prohibit certain pedestrian movements at a traffic control signal, a sign NO PEDESTRIAN CROSSING (2B-36) may be used.

4B-29 Pedestrian Detectors

Pedestrian detectors (usually push buttons) should be conveniently located near each end of crosswalks where pedestrian actuation is required. A mounting height of 3 1/2 to 4 feet above the sidewalk has been found best adapted to general usage. Permanent-type signs (sec. 2B-37) shall be mounted above or in unit with the detectors, explaining their purpose and use. At certain locations, it may be desirable to supplement this sign with a larger sign suspended over the sidewalk to call attention to the push button. Where two crosswalks, oriented in different directions, end at or near the same location, the positioning of pedestrian push buttons should clearly indicate which crosswalk signal is actuated by each push button. Additional push-button detectors may be required on islands or medians where a pedestrian might become stranded.

Special purpose push-bottons (to be operated only by authorized persons) should include a housing capable of being locked to prevent access by the general public. Instruction signs are not necessary in this case.

A pilot light or other means of indication may be installed with a pedestrian push button and normally shall not be illuminated. Upon actuation, it shall be illuminated until the pedestrian’s green or WALK indication is displayed.
When the 85-percentile speed of major-street traffic exceeds 40 mph in either an urban or a rural area, or when the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the Minimum Vehicular Volume warrant is 70 percent of the requirements above.

4C-4 Warrant 2, Interruption of Continuous Traffic

The Interruption of Continuous Traffic warrant applies to operating conditions where the traffic volume on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay or hazard in entering or crossing the major street. The warrant is satisfied when, for each of any 8 hours of an average day, the traffic volumes given in the table below exist on the major street and on the higher-volume minor-street approach to the intersection, and the signal installation will not seriously disrupt progressive traffic flow.

**Minimum Vehicular Volumes for Warrant 2**

<table>
<thead>
<tr>
<th>Number of lanes for moving traffic on each approach</th>
<th>Vehicles per hour on major street (total of both approaches)</th>
<th>Vehicles per hour on higher-volume minor-street approach (one direction only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Street</td>
<td>Minor Street</td>
<td></td>
</tr>
<tr>
<td>1.........1.</td>
<td>1.</td>
<td>750</td>
</tr>
<tr>
<td>2 or more........1.</td>
<td>1.........1.</td>
<td>900</td>
</tr>
<tr>
<td>2 or more................2 or more........2.</td>
<td>2 or more........2.</td>
<td>900</td>
</tr>
<tr>
<td>1.</td>
<td>2 or more........2.</td>
<td>750</td>
</tr>
</tbody>
</table>

These major-street and minor-street volumes are for the same 8 hours. During those 8 hours, the direction of higher volume on the minor street may be on one approach during some hours and on the opposite approach during other hours.

When the 85-percentile speed of major-street traffic exceeds 40 mph in either an urban or a rural area, or when the intersection lies within the built-up area of an isolated community having a population of less than 10,000, the Interruption of Continuous Traffic warrant is 70 percent of the requirements above.

4C-5 Warrant 3, Minimum Pedestrian Volume

A traffic signal may be warranted where the pedestrian volume crossing the major street at an intersection or mid-block location during an average day is:

100 or more for each of any four hours; or
190 or more during any one hour.

4C-4
The pedestrian volume crossing the major street may be reduced as much as 50 percent of the values given above when the predominant pedestrian crossing speed is below 3.5 feet per second.

In addition to a minimum pedestrian volume of that stated above, there shall be less than 60 gaps per hour in the traffic stream of adequate length for pedestrians to cross during the same period when the pedestrian volume criterion is satisfied. Where there is a divided street having a median of sufficient width for the pedestrian(s) to wait, the requirement applies separately to each direction of vehicular traffic.

Where coordinated traffic signals on each side of the study location provide for platooned traffic which result in fewer than 60 gaps per hour of adequate length for the pedestrians to cross the street, a traffic signal may not be warranted.

This warrant applies only to those locations where the nearest traffic signal along the major street is greater than 300 feet and where a new traffic signal at the study location would not unduly restrict platooned flow of traffic. Curbside parking at non-intersection locations should be prohibited for 100 feet in advance of and 20 feet beyond the crosswalk.

A signal installed under this warrant should be of the traffic-actuated type with push buttons for pedestrians crossing the main street. If such a signal is installed within a signal system, it should be coordinated if the signal system is coordinated.

Signals installed according to this warrant shall be equipped with pedestrian indications conforming to requirements set forth in other sections of this Manual.

4C-6 Warrant 4, School Crossing

A traffic control signal may be warranted at an established school crossing when a traffic engineering study of the frequency and adequacy of gaps in the vehicular traffic stream as related to the number and size of groups of school children at the school crossing shows that the number of adequate gaps in the traffic stream during the period when the children are using the crossing is less than the number of minutes in the same period (sec. 7A-3).

When traffic control signals are installed entirely under this warrant:

1. Pedestrian indications shall be provided at least for each crosswalk established as a school crossing.

2. At an intersection, the signal normally should be traffic-actuated. As a minimum, it should be semi-traffic-actuated, but full actuation with detectors on all approaches may be desirable. Intersection installations that can be fitted into progressive signal systems may have pretimed control.

3. At non-intersection crossings, the signal should be pedestrian-actuated, parking and other obstructions to view should be prohibited for
at least 100 feet in advance of and 20 feet beyond the crosswalk, and the installation should include suitable standard signs and pavement markings. Special police supervision and/or enforcement should be provided for a new non-intersection installation.

4C-7 Warrant 5, Progressive Movement

Progressive movement control sometimes necessitates traffic signal installations at intersections where they would not otherwise be warranted, in order to maintain proper grouping of vehicles and effectively regulate group speed. The Progressive Movement warrant is satisfied when:

1. On a one-way street or a street which has predominantly unidirectional traffic, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning and speed control, or

2. On a two-way street, adjacent signals do not provide the necessary degree of platooning and speed control and the proposed and adjacent signals could constitute a progressive signal system.

The installation of a signal according to this warrant should be based on the 85-percentile speed unless an engineering study indicates that another speed is more desirable.

The installation of a signal according to this warrant should not be considered where the resultant signal spacing would be less than 1000 feet.

4C-8 Warrant 6, Accident Experience

The Accident Experience warrant is satisfied when:

1. Adequate trial of less restrictive remedies with satisfactory observance and enforcement has failed to reduce the accident frequency; and

2. Five or more reported accidents, of types susceptible to correction by traffic signal control, have occurred within a 12-month period, each accident involving personal injury or property damage apparently exceeding the applicable requirements for a reportable accident; and

3. There exists a volume of vehicular and pedestrian traffic not less than 80 percent of the requirements specified either in the Minimum Vehicular Volume warrant, the Interruption of Continuous Traffic warrant, or the Minimum Pedestrian Volume warrant; and

4. The signal installation will not seriously disrupt progressive traffic flow.

Any traffic signal installed solely on the Accident Experience warrant should be semi-traffic-actuated (with control devices which provide proper coordination if installed at an intersection within a coordinated system) and normally should be fully traffic-actuated if installed at an isolated intersection.
D. PEDESTRIAN SIGNALS

4D-1 Pedestrian Signal Indications

Pedestrian signal indications are special types of traffic signal indications intended for the exclusive purpose of controlling pedestrian traffic. These indications consist of the illuminated words WALK and DONT WALK or the illuminated symbols of a walking person (symbolizing WALK) and an upraised hand (symbolizing DONT WALK).

4D-2 Meaning of Pedestrian Indications

The meanings of pedestrian signal indications are as follows:

1. The DONT WALK indication, steadily illuminated, means that a pedestrian shall not enter the roadway in the direction of the indication.

2. The DONT WALK indication, while flashing, means that a pedestrian shall not start to cross the roadway in the direction of the indication, but that any pedestrian who has partly completed his crossing during the steady WALK indication shall proceed to a sidewalk, or to a safety island.

3. The WALK indication means that a pedestrian facing the signal indication may proceed across the roadway in the direction of the indication. The WALK indication means that there may or may not be possible conflict of pedestrians with turning vehicles.

4. A WALK indication shall not be flashed.

4D-3 Applications of Pedestrian Signal Indications

Pedestrian signal indications shall be installed in conjunction with vehicular traffic signals (which meet one or more of the traffic signal warrants previously set forth) under any of the following conditions:

1. When a traffic signal is installed under the Pedestrian Volume or School Crossing warrant.

2. When an exclusive interval or phase is provided or made available for pedestrian movements in one or more directions, with all conflicting vehicular movements being stopped.

3. When vehicular indications are not visible to pedestrians such as on one-way streets, at "T" intersections; or when the vehicular indications are in a position which would not adequately serve pedestrians. (see Section 4B-28)

4. At established school crossings at intersections signalized under any warrant.
Pedestrian signal indications also may be installed under any of the following conditions:

1. When any volume of pedestrian activity requires use of a pedestrian clearance interval to minimize vehicle-pedestrian conflicts or when it is necessary to assist pedestrians in making a safe crossing.

2. When multi-phase indications (as with split-phase timing) would tend to confuse pedestrians guided only by vehicle signal indications.

3. When pedestrians cross part of the street, to or from an island, during a particular interval (where they should not be permitted to cross another part of that street during any part of the same interval).

4D-4 Design Requirements

Design requirements for pedestrian signals include the following:

1. Pedestrian indications should attract the attention of, and be readable to, the pedestrian (both day and night) at all distances from 10 feet to the full width of the area to be crossed.

2. All pedestrian indications shall be rectangular in shape and shall consist of the lettered or symbolized messages WALK and DONT WALK. Only internal illumination shall be used (fig. 4-3). Symbol designs are set forth in the Standard Highway Signs booklet.

3. When illuminated, the WALK indication shall be white conforming to the document entitled, Pedestrian Traffic Control Signal Indications, with all except the letters or symbols obscured by an opaque material.

4. When illuminated, the DONT WALK indication shall be Portland orange conforming to the Pedestrian Traffic Control Signal Indications, with all except the letters or symbols obscured by an opaque material.

5. When not illuminated, the WALK and DONT WALK messages shall not be readily distinguishable by pedestrians at the far end of the crosswalk they control.

6. For crossings where the distance from the near curb to the pedestrian signal indication is 60 feet or less, the letters, if used, shall be at least 3 inches high or the symbols, if used, shall be at least 6 inches high. For distances over 60 feet, the letters, if used, should be at least 4 1/2 inches high and the symbols, if used, should be at least 9 inches high.

7. The light source shall be designed and constructed so that in case of an electrical or mechanical failure of the word DONT, the word WALK of the DONT WALK message will also remain dark.

4D-5 Location

Pedestrian signal faces shall be mounted with the bottom of the housing not less than 7 feet nor more than 10 feet above the sidewalk level, and so

* Available from the Institute of Transportation Engineers, see page iv.
Figure 4-3. Typical pedestrian signal indications.
there is a pedestrian indication in the line of pedestrians' vision which pertains to the crosswalk being used.

The DONT WALK indication shall be mounted directly above or integral with the WALK indication.

Pedestrian signal heads may be mounted separately or on the same support with other signal heads. When mounted with other signal heads there shall be a physical separation between the two heads.

The pedestrian signal head shall be so positioned and adjusted as to provide maximum visibility at the beginning of the controlled crossing.

4D-6 Detectors

(See Section 4B-29, Pedestrian Detectors)

4D-7 Pedestrian Intervals and Phases

Under normal conditions, the WALK interval should be at least 4 to 7 seconds in length so that pedestrians will have adequate opportunity to leave the curb before the clearance interval is shown. The lower values may be appropriate where it is desired to favor the length of an opposing phase and if pedestrian volumes and characteristics do not require the longer interval, the WALK interval itself need not equal or exceed the total crossing time calculated for the street width, as many pedestrians will complete their crossing during the flashing DONT WALK clearance interval.

A pedestrian clearance interval shall always be provided where pedestrian signal indications are used. It shall consist of a flashing DONT WALK indication. The duration should be sufficient to allow a pedestrian crossing in the crosswalk to leave the curb and travel to the center of the farthest traveled lane before opposing vehicles receive a green indication (normal walking speed is assumed to be 4 feet per second). On a street with a median width sufficient for pedestrians to wait, it may be desirable to allow only enough pedestrian clearance time on a given phase to clear the crossing from the curb to the median. In the latter case, if the signals are pedestrian actuated, an additional detector shall be provided on the island (sec. 4B-29). In some cases of railroad preemption and emergency vehicle priority control, the pedestrian clearance may be abbreviated as described in 4B-22 and 8C-6.

At intersections equipped with pedestrian signals, the pedestrian signals shall be displayed except when the traffic signal is being operated as a flashing device. At those times, the pedestrian indications shall not be illuminated.
Part V. ISLANDS

A. GENERAL

5A-1 Scope of Island Standards

A traffic-control island is a defined area between traffic lanes for control of vehicle movements or for pedestrian refuge. Within an intersection area, a median or an outer separation is considered to be an island. An island may be designated by paint, raised bars, mushroom buttons, curbs, guideposts, pavement edge, or other devices.

For the purposes of this Manual, an island includes not only the designated area but also all end protection and approach end treatments.

It should be realized that islands constitute an integral part of the geometric design of streets and highways and should be included in overall projects for construction. At times, however, an island may need to be installed at an existing intersection to improve or correct an outdated design. This Manual treats primarily the traffic-control characteristics of islands rather than their design features; however, certain minimum standards are given. Other features of island design are presented to be used as guidelines.

5A-2 Placement Authority (Reference Section 1A-3.1)

5A-3 Classification and Function

Islands frequently serve more than one purpose but may be generally classified accordingly to their main function as follows:

1. Pedestrian refuge islands.
2. Traffic divisional islands.
3. Traffic channelizing islands.

5A-4 Pedestrian Refuge Islands

The specific function of a refuge island is to provide a place of safety for pedestrians who cannot cross the entire roadway width at one time in safety because of changing traffic signals or on coming traffic.

Refuge islands are particularly useful at intersections in urban areas where there is a considerable amount of pedestrian traffic and where heavy volumes of vehicular traffic make it difficult and dangerous for pedestrians to cross, such as:

1. On multi-lane roadways.
2. In large or irregularly shaped intersections.
3. At signalized intersections to provide a place of safety between different traffic streams.

When refuge islands are required at each intersection along a street, consideration should be given to providing a continuous median divider strip between intersections.

Passenger loading islands are considered to be a special class of refuge islands inasmuch as they serve as a pedestrian refuge while loading and unloading passengers from transit vehicles.

5A-5 Traffic Divisional Islands

The function of divisional islands is to separate opposing traffic; also, they may be used to separate traffic in the same direction, e.g., to divide left-turn traffic in a median lane from the through traffic. Divisional islands are used to guide traffic around an obstruction within the roadway (such as a bridge pier), in advance of an intersection to separate opposing traffic and may be located to prevent overtaking and passing at hazardous points, such as sharp curves or narrow underpasses.

Where divisional islands are continuous, they are called medians; the more important functions are as follows:

1. Medians provide an insulating area between opposing streams of moving traffic.

2. Medians provide protection and control of cross and turning traffic.

3. Medians provide a refuge for pedestrians.

5A-6 Traffic Channelizing Islands

The primary function of a channelizing island is to control and direct a vehicle operator into the proper channel for his intended route. Channelizing islands may be installed in areas that otherwise would be broad expanses of pavement, to bring about an orderly flow of traffic.

Channelization is particularly helpful at streets intersecting at oblique angles, at 3-leg junctions, and at multileg intersections.

Traffic channelizing islands may be provided for separation (and special control) of turning movements.
C. MARKINGS

7C-1 Functions and Limitations of Markings

Markings have definite and important functions to perform in a proper scheme of school area traffic control. In some cases they are used to supplement the regulations or warnings of other devices such as traffic signs. In other instances they obtain results, solely on their own merits, that cannot be obtained by the use of any other device. In such cases they serve as a very effective means of conveying certain regulations and warnings that could not otherwise be made clearly understandable.

Pavement markings have definite limitations. They are obliterated by snow, may not be clearly visible when wet, and may not be very durable when subjected to heavy traffic. In spite of these limitations, they have the advantage, under favorable conditions, of conveying warnings or information to the driver without diverting his attention from the roadway.

7C-2 Standardization

Each standard marking shall be used only to convey the meaning prescribed for it in this Manual.

7C-3 Crosswalk Lines

Crosswalk lines shall be solid white lines marking both edges of the crosswalk. They shall be not less than 6 inches in width and should not be spaced less than 6 feet apart. Under special circumstances (where no advance stop line is provided or where vehicular speeds exceed 35 MPH or where crosswalks are unexpected) it may be desirable to increase the width of the crosswalk line up to 24" in width. Crosswalk lines on both sides of the crosswalk should extend across the full width of pavement to discourage diagonal walking between crosswalks.

Crosswalks should be marked at all intersections on established routes to school where there is material conflict between vehicles and kindergarten or elementary students (while crossing), where students are permitted to cross between intersections, or where students could not otherwise recognize the proper place to cross.

For added visibility, the area of the crosswalk may be marked with white diagonal lines at a 45° angle or with white longitudinal lines at a 90° angle to the line of the crosswalk. These lines should be approximately 12” to 24” wide and spaced 12” to 24” apart. When diagonal or longitudinal lines are used to mark a crosswalk, the transverse crosswalk lines may be omitted. Care should be taken to insure that crosswalks with diagonal or longitudinal lines used at some locations do not weaken or detract from other crosswalks where special emphasis markings are not used.
7D-8 Pedestrian Detectors

Detectors (usually push "buttons") for pedestrian-actuated signals should be conveniently located near each end of crosswalks where pedestrian actuation is required. A mounting height of 3½ to 4 feet above the sidewalk has been found best adapted to general usage. Permanent-type signs shall be mounted above or in unit with the detectors, explaining their purpose and use. At certain locations it may be desirable to supplement this sign with a larger sign suspended over the sidewalk to call attention to the push button. Where two crosswalks oriented in different directions, end at or near the same location, the positioning of pedestrian push buttons should clearly indicate which crosswalk signal is actuated by each push button. Additional push button detectors may be required on islands or medians where a pedestrian might become stranded.

Special purpose push buttons to be operated only by authorized persons should include a housing capable of being locked to prevent access by the general public. Instruction signs are not necessary in this case.

A pilot light or other means of indication may be installed with a pedestrian push button and normally shall not be illuminated. Upon actuation, it shall be illuminated until the pedestrian's green or WALK indication is displayed.

7D-9 Operation of Pedestrian Signals

At non-intersection school signal installations, as there is no parallel vehicular movement, the pedestrian crossing is an exclusive interval.

Pedestrians should be assured of sufficient time to cross the roadway at a signalized intersection:

1. Where traffic signals are of the actuated type, control equipment should provide sufficient pedestrian crossing time when there has been a pedestrian actuation, whenever the minimum vehicular time is less than that needed by the pedestrians.

2. Where traffic signals are not of the vehicle-actuated type, pedestrian actuation may be used to provide sufficient pedestrian crossing time, or the vehicular time should be adjusted to provide the crossing time needed by pedestrians.

3. Under normal conditions, the WALK interval should be at least 4 to 7 seconds in length so that pedestrians will have adequate opportunity to leave the curb, before the clearance interval is shown. The lower values may be appropriate where it is desired to favor the length of an opposing phase and if pedestrian volumes and characteristics do not require the longer interval. The WALK interval itself need not equal or exceed the total crossing time calculated for the street width, as many pedestrians will complete their crossing during the flashing DONT WALK clearance interval.

4. A pedestrian clearance interval shall always be provided where pedestrian signal indications are used. It shall consist of a flashing DONT WALK indication. The duration should be sufficient to allow a pedestrian
crossing in the crosswalk to leave the curb and travel to the center of the farthest traveled lane before opposing vehicles receive a green indication. (Normal walking speed is assumed to be 4 feet per second.) On a street with a median width sufficient for pedestrians to wait, it may be desirable to allow only enough pedestrian clearance time on a given phase to clear the crossing from the curb to the median. In the latter case if the signals are pedestrian-actuated, an additional detector shall be provided on the island.

7D–10 Coordination with Adjacent Signals

A school signal at an established school crossing within half a mile of a signal controlling the same traffic should be coordinated with the adjacent signal.

Coordinated operation normally should include both pretimed signals and traffic-actuated signals within the appropriate distances.

7D–11 Vehicle Change Interval

A yellow vehicle change interval shall be used following each CIRCULAR GREEN interval and, where applicable, after each GREEN ARROW interval. In no case shall a CIRCULAR YELLOW indication be displayed in conjunction with the change from CIRCULAR RED to CIRCULAR GREEN.

The exclusive function of the yellow interval shall be to warn traffic of an impending change in the right-of-way assignment.

Yellow vehicle change intervals should have a range of approximately 3 to 6 seconds. Generally the longer intervals are appropriate to higher approach speeds.

7D–12 Location and Placement

The detailed standards and requirements governing the location and placement of all signals, including school signals, are given in Part IV of this Manual. The aspects of these standards and requirements most significant to school signals are given in the following sections.

7D–13 Visibility, Number, and Location of Signal Faces

Each signal face shall be so adjusted that its indications will be of maximum effectiveness to the approaching traffic for which they are intended.

Visors should be used on all signal faces to aid in directing the signal indication specifically to approaching traffic, as well as to reduce "sun phantom" resulting from external light entering the lens.

The visibility of signals shall be insured by providing, on each approach to an intersection, a minimum of two signal faces for through traffic. They should be continuously visible from the appropriate distances listed in Table VII–1, up to the stop line, unless a physical obstruction exists.
Where two lens sections are used with school speed limit signs, they may be vertically or horizontally aligned, and may flash either alternately or simultaneously.

Speed Limit Sign Beacons shall be flashed at a rate of not less than 50 nor more than 60 times per minute. The illuminated period of each flash shall not be less than one-half and not more than two-thirds of the total cycle.

All flashing contacts should be equipped with a filter for suppression of radio interference.

When illuminated, the Speed Limit Sign Beacon shall be clearly visible to all drivers it faces for a distance of at least a quarter of a mile, under normal atmospheric conditions, unless otherwise physically obstructed.

A Speed Limit Sign Beacon is intended for use with a fixed or variable Speed Limit sign, to indicate that the speed limit shown is in effect. The lenses of a Speed Limit Beacon when used with a School Speed Limit Sign may be positioned within the face of the sign.

7D–25 School Crossings at Existing Signal Installations

Intersections where pre-timed or traffic-actuated signals have been installed on the basis of vehicle warrants (Part IV) may be convenient locations for established school crosswalks. If so, their use should be encouraged and proper allowance should be made in the signal equipment and operation for this use (secs. 7D–27 and 28).

7D–26 Signal Indications

When an existing traffic signal installation is to be used as an established school crossing, pedestrian signals shall be located and mounted in the manner specified in sections 7D–14 and 7D–15.

7D–27 Signal Control

When an existing traffic signal installation is to be used as an established school crossing, the control of the pedestrian signal indications may be accomplished with the timing mechanism normally employed for the traffic signal. For this type of operation, the pedestrian phase or indication is given at a predetermined point during each cycle, or a push button is used to introduce the pedestrian phase or indication (in accordance with the needs of pedestrian traffic).

7D–28 Signal Operation

When an intersection with an existing traffic signal installation is to be used as an established school crossing, the pedestrian crossing interval can be combined with the vehicular movements in one of the four basic ways set forth in section 7D–9.

The timing of the pedestrian crossing phase shall be in conformance with the provisions of section 7D–9.
APPENDIX G

PRELIMINARY PEDESTRIAN STUDY AREAS
Preliminary Pedestrian Study Area
Route 1
Preliminary Pedestrian Study Area
School Zone

Note: See Town Center Study Area for Bel Air Elementary School Zone Study.
Preliminary Pedestrian Study Area
Town Center

Buildings (single color)
Infrastructure

Print Date: 08/10/1999  RSS
APPENDIX H

PEDESTRIAN STUDIES - EXCERPT FROM DOWNTOWN IMPROVEMENT MANUAL
CHAPTER 20
PEDESTRIANS

INTRODUCTION

It has been estimated that in the central business districts of larger cities 90 percent or more of all daily trips are walking trips. The CBD's of smaller communities, though dependent to a lesser degree, still rely largely on walking for their internal transportation needs.

The typical central business district is tied together, however, by a physical network based not on the needs of pedestrians, but rather on those of automobiles and other motor vehicles. As a result, the pedestrian in our downtown areas often faces the danger of being run down by a car or truck. He is also subjected to the discomforts caused by the pollution and noise of vehicular traffic. Distances become longer as he must follow countless auto-oriented streets to get to where he is going. Being an area so dependent on pedestrians, these problems are some of the CBD's major functional and competitive liabilities, particularly when confronted with competition from new suburban, auto-free shopping malls.

Many downtown planning efforts, while giving major consideration to car and truck movement, pay relatively little attention to the CBD's needs for pedestrian circulation, safety, and amenities. The following sections will provide some guidance in helping to alleviate this deficiency. The discussion is divided into two phases, pedestrian studies and physical improvements.

PEDESTRIAN STUDIES

There are three types of pedestrian studies that can be undertaken as part of a downtown improvement program: safety studies, street and sidewalk inventories, and analyses of the impact of new facilities.

Safety Studies — The objective of a safety study is to identify actual and potential pedestrian-vehicle conflicts. This is done by analyzing information relating to law observance and accidents. The following steps are involved:

(a) All physical and legal restrictions to free pedestrian movement are noted on the CBD map, including the location of pedestrian crosswalks, curbside parking, traffic signs which order cars to yield to pedestrians, parking entrances and exits, alleys, etc.

(b) Observers are stationed throughout the central business district during peak hours to map illegal crossings by pedestrians;
conflicts between pedestrians and turning vehicles at intersections; conflicts between pedestrians and vehicles at parking entrances, exits, and alleys; and other potentially dangerous situations.

(c) Accident statistics are analyzed to indicate locations where safety has been particularly impaired in the past and to determine the causes of accidents.

(d) Physical improvements, legal sanctions, and enforcement measures are proposed to eliminate the dangers identified.

**Street and Sidewalk Inventories** -- Chapter 7 recommended a sidewalk inventory which would form a basis for making visual improvements and which would provide locational information on features which might interfere with physical improvements. Such an inventory can also be adapted for use in analyzing pedestrian movement. Among the information which would be gathered and graphically depicted is the following:

- dimensions of each street and sidewalk;

- all traffic regulations, signs, signal locations and their cycle lengths, and traffic volumes;

- locations and dimensions of building entrances (and transit system entrances, if any);

- bus stops, sidewalk furniture, and other impediments that restrict sidewalk efficiency (e.g., parking meters, sign poles, and trash containers).

This information can be used in identifying sidewalk obstructions; in measuring the adequacy of sidewalk widths; and in determining the adequacy of traffic signs, signals, and crosswalks for current and expected pedestrian flows. Such an analysis can be done either formally or informally. Where a formal, precise analysis is desired (such as in areas of heavy pedestrian traffic), the following method can be used:

1. **Measure Pedestrian Flows** -- Actual pedestrian counts can be taken at intersections, crosswalks, and at mid-block, with the unit of measurement being the number of pedestrians going past a designated point every 10 minutes (or at some other time interval).

2. **Relate Peak Pedestrian Flows to Sidewalk Capacity** -- To determine the adequacy of the sidewalk for the current (or projected) pedestrian flow, you will want to know the number of pedestrians going by per foot width of walkway per minute. A measure commonly referred to as "PFM." This measure is computed by dividing the number of pedestrians per minute (which pass a given point) by the effective sidewalk width (measured in feet). The effective sidewalk width is that portion of the sidewalk which is available for actual pedestrian travel. Where there is a tendency for window shopping, you should subtract 18 inches from the gross sidewalk.
width to obtain effective sidewalk width. Where there are sidewalk impediments such as parking meters and trees, an appropriate additional amount should be subtracted (usually a minimum of two feet).

The following is an example of how to compute PFM:

Assume that pedestrians have been counted as passing a certain point at an average of 64 per minute. The overall sidewalk width is 12 feet. However, there are parking meters and plant containers which reduce the effective width by 4 feet—yielding 8 feet. Dividing 64 by 8, we obtain a PFM of 8.

(3) **Decide on Sidewalk Adequacy** -- Under most circumstances, it is desirable to keep pedestrian volumes to 7 PFM or less, although a range of from 7 to 10 PFM is sometimes acceptable—especially where primary pedestrian flows are in one direction. Where pedestrian volumes are determined to exceed these levels, consideration should be given to increasing the effective sidewalk width, by either widening the walk or removing obstacles.

**Analyzing the Impact of New Facilities** -- Whenever any new large facility is to locate in the CBD, its impact on pedestrian volumes should be evaluated. A method for projecting such an impact is illustrated by the example shown in Figure 20-1. Assume that a new office building will be built which is expected to add 120 pedestrians every 10 minutes (a) to an existing sidewalk and (b) to a crosswalk holding area. The existing pedestrian flow is 200 pedestrians every 10 minutes, and the effective sidewalk width is 5 feet. The traffic light cycle at the crosswalk is 60 seconds, with a 25/35 split favoring the avenue.

(a) The impact on the sidewalk section is as follows:

\[
\text{Existing flow + Added pedestrians} = \frac{\text{Pedestrians per minute}}{\text{Number of minutes}}
\]

\[
\frac{200 + 120}{10} = \frac{320}{10} = 32 \text{ PFM}
\]

(b) The impact on the crosswalk holding area is as follows:

With the 25/35 traffic signal split, the crosswalk holding area would be required to hold on the average --

---

1. John J. Fruin, *Pedestrian Planning and Design*, pp. 74-78. These pages describe different levels of service (i.e., measures of congestion).
FIGURE 20-1

SIDEWALK EVALUATION PROBLEM:
IMPACT OF A NEW FACILITY
Number of pedestrians crossing street during measurement period \(\times\) Waiting time \(\times\) Traffic light cycle length = Number of pedestrians waiting at one time

<table>
<thead>
<tr>
<th>Measurement period</th>
<th>160 peds.</th>
<th>25 sec.</th>
<th>4000</th>
<th>6.7 pedestrians</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 min. (\times) 60 sec.</td>
<td>600</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The required holding area for pedestrians should be based on a standard of 5 square feet per pedestrian. This standard multiplied by the number of waiting pedestrians gives us 33.559 square feet. As can be seen from figure 20-1, almost the entire 35 square foot corner is needed to hold them. They will block sidewalk access to the side street unless the holding area is made larger, a new crosswalk is provided at mid-block, or some other solution is devised.

(c) The impact on the crosswalk is as follows:

The 160 pedestrians crossing the street will be concentrated because of the interruptions of traffic signals. The available green signal for crossing the street is 35 seconds per minute. The average flow is 16 pedestrians per minute. The level of service is determined as follows --

\[
\text{Pedestrian flow per minute} \times \text{Traffic light cycle length} = \text{Pedestrian volume in crosswalk}
\]

<table>
<thead>
<tr>
<th>Crossing period</th>
<th>16 peds. (\times) 60 sec. = 960 = 3.9 PFM</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 sec. (\times) 7 ft. = 245</td>
<td></td>
</tr>
</tbody>
</table>

This falls well within our standard of 7 PFM. However, this does not include pedestrians coming from the side street or coming from the opposite direction who will also take up space in the crosswalk.

PEDESTRIAN IMPROVEMENTS

Downtown pedestrian improvements range from simple projects entailing modest capital expenditures to complex and costly systems of pedestrian malls and grade separations. The more expensive kinds of pedestrian improvements—the pedestrian precinct, mall, and above and below ground pedestrian walkways—are discussed in Chapter 21. Basic pedestrian improvements, on the other hand, are categorized and described in the following pages according to the objectives which they seek: (1) increased pedestrian safety, (2) improved circulation, and (3) improved aesthetics and amenities.
Widening and beautifying sidewalks presents one alternative for enhancing the pedestrian's experience downtown. Two Illinois communities where this approach is being taken are Evanston and Glencoe. In their central business districts, sidewalks are being widened, refurnished, and resurfaced with new materials.

Glencoe

The Village of Glencoe is constructing a number of "leisure islands" in its central business district. Brick paving is being simulated by pouring reddish-colored concrete which is then stamped in the shape of bricks. After the concrete has dried, grouting is placed between the "bricks" to complete the process.

In addition to being repaved, sidewalks are also being widened to create the leisure islands. New trees are being planted, with new iron grilles, and plans are being made to add benches, waste receptacles, and, possibly, kiosks at a later date. Of the three leisure islands which are currently being constructed in downtown Glencoe, two are being financed out of general municipal revenues with the other being paid for by a downtown bank.

Evanston

The City of Evanston has undertaken a program to resurface and furnish downtown sidewalks, with the cost to be borne jointly by the city and property owners.

The basic cost of resurfacing the street, replacing curbing, and providing the sidewalk underlay is being paid for with Evanston's motor fuel tax funds. Through the vehicle of "special service areas", property owners bear the cost of a special sidewalk surface, consisting of exposed-aggregate concrete with a brick border along the curb. Street furnishings are also being renewed and reorganized. Trees, double-headed parking meters, and light poles are alternated at 22-foot intervals (adapting to the length of on-street parking spaces).

Typical modulation of light fixtures, parking meters and tree wells in brick accented curb liners.

![Diagram of sidewalk layout](image)

At many corners the sidewalk is being extended into the street to form "crossing bays" or "knuckles". A primary effect of these extensions is to shorten the street-crossing distance for pedestrians. They also physically prevent parking in these areas, eliminating the need for "no parking" signs.

In a 1974 trial project, the additional cost of this treatment over standard concrete repaving was $40,000 for two blocks of sidewalk, to be paid for by property owners over a ten-year period. Bonds were issued by the city to pay the initial costs. The ordinances which created the special service area and which authorized the issuance of the bonds can be found in Appendix I.
The signs below have been adopted by the U.S. Department of Transportation and the American Revolution Bicentennial Administration as a sign system to guide visitors in unfamiliar cities. These signs are an outgrowth of an extensive study of symbol signs by the American Institute of Graphic Studies. Additional symbol signs may yet be adopted.

<table>
<thead>
<tr>
<th>Public Services</th>
<th>Telephone</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mail</td>
</tr>
<tr>
<td></td>
<td>Currency Exchange</td>
</tr>
<tr>
<td></td>
<td>First Aid</td>
</tr>
<tr>
<td>Lost and Found</td>
<td>Elevator</td>
</tr>
<tr>
<td>Baggage Lockers</td>
<td>Toilets, Men</td>
</tr>
<tr>
<td>Toilets, Women</td>
<td>Information</td>
</tr>
<tr>
<td>Toilets</td>
<td>Hotel Information</td>
</tr>
<tr>
<td>Taxi</td>
<td>Bus</td>
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<tr>
<td></td>
<td>Ground Transportation</td>
</tr>
<tr>
<td></td>
<td>Rail Transportation</td>
</tr>
<tr>
<td>Air Transportation</td>
<td>Airport</td>
</tr>
<tr>
<td></td>
<td>Water Transportation</td>
</tr>
<tr>
<td>Concessions</td>
<td>Car Rental</td>
</tr>
<tr>
<td></td>
<td>Restaurant</td>
</tr>
<tr>
<td></td>
<td>Coffee Shop</td>
</tr>
<tr>
<td></td>
<td>Bar</td>
</tr>
<tr>
<td>Shops</td>
<td></td>
</tr>
<tr>
<td>Processing Activities</td>
<td>Ticket Purchase</td>
</tr>
<tr>
<td></td>
<td>Baggage Check-in</td>
</tr>
<tr>
<td></td>
<td>Baggage Claim</td>
</tr>
<tr>
<td></td>
<td>Customs</td>
</tr>
<tr>
<td></td>
<td>Immigration</td>
</tr>
<tr>
<td>Regulations</td>
<td>No Smoking</td>
</tr>
<tr>
<td></td>
<td>Smoking</td>
</tr>
<tr>
<td></td>
<td>No Parking</td>
</tr>
<tr>
<td></td>
<td>Parking</td>
</tr>
<tr>
<td></td>
<td>No Entry</td>
</tr>
</tbody>
</table>
Pedestrian Safety Improvements

There are three areas in which safety measures may be implemented: education, physical improvements, and enforcement.

Safety Education -- Safety education is directed particularly towards the most accident-prone members of the public: the old and the young. It is usually best to coordinate safety education programs with schools, church groups, and senior citizens' organizations. Sometimes the media will cooperate by providing advertising space, special feature stories, or television and radio spots. The American Automobile Association provides advice and special educational materials for such programs.

Physical Improvements -- Physical measures to improve safety can include standardization of signs and signals, distinctive crosswalk delineation (particularly aimed at driver recognition of crosswalk zones), removal of obstacles to motorists' lines of sight, upgrading of street lighting, and any other physical improvement which contributes to pedestrian safety.

To eliminate or reduce pedestrian-traffic conflicts, an advance or delayed green indication for turning vehicles can be used. This allows vehicles to turn outside of the pedestrian walk cycle. An exclusive pedestrian signal phase, called the "all-walk" or "scramble" system, may be used at busy downtown intersections. During this signal phase, pedestrians are given exclusive crossing rights and may even cross diagonally within the intersection. However, time separation by use of traffic signals has the disadvantage of inducing greater concentrations of pedestrians at corners and on sidewalks.¹

Another way of reducing conflicts between pedestrians and turning vehicles is to locate crosswalks away from the intersection to a distance of, say, five feet. This setback gives pedestrians additional lead time from turning vehicles. However, it is often not successful since pedestrians are reluctant to detour for even 5 feet.

A particular problem is making the downtown area usable (safe) for the handicapped pedestrian.² The following guidelines for improvements are recommended:

1. Effective walkway widths should be at least 5 feet with a maximum grade of 5%.
2. Walks should be of a continuing, common surface, not interrupted by steps or abrupt changes in level.
3. Whenever walks and roadways cross, the curb should be cut and the walk ramped to road level. If safety islands are provided, a roadway level walk-through should be provided.

¹Ibid., pp. 115-116.
²Ibid., pp. 178-181.
(4) Where walkways cross streets, changes in pavement texture should be used to provide the blind with tactile signals of crossing location.

(5) Walks should have non-slip surfaces.

A 1973 Illinois law requires that many sidewalk improvements made by municipalities in commercial areas include provision for "curb cuts" or ramps at crosswalks. The following projects are covered by this law:

All new curbs which are provided for by a municipality and all existing curbs which are a part of any reconstruction, within any block which is contiguous to any highway and in which more than 50% of the territory is devoted to or zoned for business, commercial or industrial use... (Illinois Revised Statutes, Chapter 24, Section 11-80-11).

The following physical standards are provided by the Act:

In order to enable persons using wheelchairs to travel freely and without assistance, at each crosswalk a ramp with non-slip surface shall be built into the curb so that the sidewalk and street blend to a common level. Such ramp shall be not less than 32 inches wide and shall not have a slope greater than 1 inch rise per 12 inches length. Where because of surrounding buildings or other restrictions it is impossible to conform the slope with this requirement, the ramp shall contain a slope with as shallow a rise as possible under the circumstances. In all ramps there shall be a gradual rounding at the bottom of the slope (Illinois Revised Statutes, Chapter 24, Section 11-80-11).

The diagrams in figure 20-2 were prepared by the State of North Carolina and are among the best current thinking on the design of curb ramps. All suggested designs comply with the Illinois law.

Enforcement -- Laws for the protection of pedestrians can be developed and implemented which are uniformly recognized by both pedestrians and motorists. These measures can be in the form of regulations specifying that vehicles always yield to pedestrians; restrictions on heavy traffic, either partial or absolute, during certain hours of the day; and heavy fines for law breaking. The municipality may also establish in the building code certain building standards that will benefit the handicapped. For example, the code could require that at least one primary entrance to each new building be usable by persons in wheelchairs, and it could provide minimum standards for ramps.

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1Ronald I. Mace, An Illustrated Handbook of the Handicapped Section of the North Carolina State Building Code (Raleigh: North Carolina Department of Insurance, 1974).

CURB RAMP

CURB CUT SHOULD HAVE A TEXTURED NON-SLIP SURFACE SUCH AS BROOM FINISH CONCRETE.

TYPE III - PARALLEL WHEN INSUFFICIENT DEPTH IS AVAILABLE FOR 8.33% SLOPE, RAMP MAY RUN PARALLEL TO STREET.

Pedestrian Circulation Improvements

Pedestrian circulation can be improved by providing widened sidewalks; building setbacks; pedestrian arcades which bisect long blocks; proper location, elimination and/or consolidation of street furniture; restrictions on cross-sidewalk freight operations; and traffic signalization timed for pedestrians rather than for auto traffic. The preceding section on pedestrian studies described how to evaluate the capacity of sidewalks and pedestrian crossings. Such an analysis carried out in a given CBD may suggest that movable items like newsstands, telephone booths, mail boxes, and planters be relocated immediately if they are found to be constricting pedestrian flow. Permanent fixtures such as traffic signals and hydrants may also need to be moved as part of a long-term replacement program.

Improvements in Aesthetics and Amenities

Pleasant pedestrian routes can attract even those people who must go out of their way to use them. Careful planning should therefore go into the creation of primary pedestrian routes which are attractive not only because of their location in relation to major generators of pedestrian traffic (such as parking lots and department stores), but also because they are enjoyable to use. If these routes are made to coincide with primary retail blocks, substantial benefits to the downtown economy can be realized.

A number of measures discussed elsewhere in the manual can be effective in beautifying pedestrian routes. Among these are the following:

(1) The streetscape survey described in Chapter 7 will allow an assessment of current pedestrian paths and any amenities that lay along them.

(2) Many of the basic improvements in Chapters 10 through 13—building renovation, landscaping, new pavement and other surfaces, pedestrian-oriented lighting, and street furniture—will enliven sidewalks and create interest for pedestrians.

The degree to which a pedestrian route can be enjoyed is determined in large part by its convenience, its length, and the scale and character of the buildings and spaces which lay along the way. One possible detrimental aspect is the deadening effect which parking lots and vacant lots have on the enjoyment of pedestrian trips. To combat this, the creation of sidewalk activities, landscaping, and other diversions may compensate for blank or unsightly frontages.

In large central business districts, the spacing of squares and rest areas can also be important. Good locations for these havens are often midway between two large department stores that are neither too close nor too far apart for a rest area to be of maximum benefit. Other good locations are adjacent or close to large employment concentrations, so that workers can use them during their lunch breaks. Of course, there is little reason
PLAZAS

Figure 20-7

Figure 20-8

Figure 20-9

Figure 20-10

Figure 20-11
not to create a small park or square out of practically any vacant parcel of land, provided that it can be outfitted economically and has no immediate, more productive use.

There are a number of other ways of making the pedestrian's journey downtown shorter or more pleasant. Among these are the creation of sidewalk bays extending into the street for quick and easy crossovers (being implemented in Evanston and Glencoe, among other communities); linking of two parallel streets in the middle of the block by means of an arcade, thereby heightening enjoyment and shortening walking distances; and the elimination of on-street parking.
APPENDIX I

TOWN OF BEL AIR - DATA COLLECTION NEEDS
Appendix I

Town of Bel Air
Data Collection Needs

Sidewalks

Pedestrian counts at key intersections on weekdays (morning, noon and mid-afternoon) and weekends (Friday evening and Saturday morning and evening)
   To determine areas needing improvements or action

Sidewalk condition survey (upgrade/repair needs) currently underway by Department of Public Works
   Evaluate areas of poor coverage, "dead ends", unsafe conditions, and physical blockages

Evaluate existing construction responsibilities (State, County, Town, developer and private owner)

Pedestrian pattern survey to determine direct impacts on pedestrian safety

Crosswalks

Crosswalk location, condition and usage survey

Evaluation of current crosswalk maintenance programs

Evaluation of crosswalk signage needs

Evaluation of traffic signal timing in relation to pedestrian crossing

Evaluation of possible traffic island sites (Route 1)

Trail Systems

Evaluation of land availability/cost to develop Plumtree Run Trail and Bynum Run Trail

Evaluation of TEA funding program for trail system development

General Information

Analysis of Police accident records

Observed pedestrian and vehicular conflicts

Reported pedestrian related accidents
APPENDIX J

SAMPLE PEDESTRIAN OVERPASSES (BRIDGES)
"OVERPASSES"

The saturation of our highways and the requirement for safety has steadily increased the demand for this product. The “Gateway” box girder design has been the usual style for overpasses due to the ability to attach a security fence to the steel framework. Federal guidelines require this protective fence which we normally install at our plant before shipment. This is a safety requirement for schools, hospitals and shopping centers.

Overpasses can be provided with stairs and ramps. These ramps meet the requirements of the Americans with Disabilities Act.

✓ All Steadfast Bridges carry a 15 year warranty.

Speer Blvd, I-25, Denver, CO
Falls Church, VA
Peachtree City, GA
<table>
<thead>
<tr>
<th>Street Description</th>
<th>Length</th>
<th>Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maulsby - betw. Williams Street &amp; La Rosa Street, n-side</td>
<td>250</td>
<td>no demand</td>
</tr>
<tr>
<td>Dallam Avenue - betw. Rockspring &amp; Williams Street, n-side</td>
<td>4505</td>
<td>no demand</td>
</tr>
<tr>
<td>Cressy Parkway - full length, e-side</td>
<td>5000</td>
<td>no demand</td>
</tr>
<tr>
<td>Old Orchard Rd - betw. Howard &amp; Moores Mill Road, e-side</td>
<td>850</td>
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</tr>
<tr>
<td>Old Orchard Rd - betw. Hall &amp; Moores Mill Road, w-side</td>
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</tr>
<tr>
<td>Robinson Street - betw. Howard &amp; Moores Mill Road, e-side</td>
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<td>Robinson Street - betw. Howard &amp; Moores Mill Road, w-side</td>
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<tr>
<td>Wendellwood Drive - betw. Hall Street &amp; Roland Place, e-side</td>
<td>750</td>
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<td>Wendellwood Drive - betw. Hall Street &amp; Roland Place, w-side</td>
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<tr>
<td>Mapleview Drive - betw. Hall Street &amp; Loch Doon Trail, e-side</td>
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<td>Stoneleigh Road - full length, n-side</td>
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<td>Stoneleigh Road - full length, s-side</td>
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<td>Howard Street - full length, n-side</td>
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<tr>
<td>Franklin Street - from Broadway north to end, e-side</td>
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<td>Franklin Street - from Ellendale north to end, w-side</td>
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<td>Choice Street - from Broadway north to end, e-side</td>
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<td>Choice Street - from Broadway north to end, w-side</td>
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<td>Wright Street - from McCormick to existing sidewalk, s-side</td>
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<td>Wright Street - from McCormick to existing sidewalk, n-side</td>
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<td>McCormick Street - from Wright Street to Broadway, w-side</td>
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<td>McCormick St - from Webster street to Harlan Street, w-side</td>
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<td>McCormick St - from Webster Street to Harlan Street, e-side</td>
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<td>Broadway - from Hickory Avenue to McCormick Street, n-side</td>
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<tr>
<td>Broadway - from McCormick St. east to existing sidewalk, n-side</td>
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<td>Webster Street -from Hickory Ave. to McCormick Street, n-side</td>
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<tr>
<td>Harlan Street - from Hickory avenue to Francis Avenue, s-side</td>
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<tr>
<td>Crocker Street - from Hickory Avenue to Francis Street, n-side</td>
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<td>Francis Avenue - from Harlan Street to Crocker Street, w-side</td>
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</tr>
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<td>Description</td>
<td>Length</td>
<td>Demand</td>
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<td>Daniel Court - full length, w-side</td>
<td>250</td>
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<tr>
<td>Majors Choice Drive - from Trout Dale Place west to end</td>
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<td>Moores Mill Rd - from Route 1 east to Town boundary, s-side</td>
<td>1200</td>
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<td>Moores Mill Rd - near intersection w/Majors Choice Dr., s-side</td>
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<td>Jackson Blvd. - at Peabody Court</td>
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<td>MacPhail Road - betw. Jackson east to Town boundary, s-side</td>
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<tr>
<td>Ma cPhail Road - betw. Javckson east to Town boundary, n-side</td>
<td>150</td>
<td>no demand</td>
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TOWN OF BEL AIR
DEPARTMENT OF PUBLIC WORKS

FILL-IN SIDEWALK CONSTRUCTION PLAN

V. CURB RAMP CONSTRUCTION PLAN

A. GENERAL. These are curb ramps (handicapped ramps) to be installed where sidewalks already exist. Whenever new sidewalks are installed, curb ramps will be included and will not appear in this plan.

B. SCHEDULE.

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<th>PRIORITY</th>
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<td>1</td>
<td>Courtland @ alley leading to Library Parking Lot</td>
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<td>2</td>
<td>Courtland @ alley leading to Library Parking Lot</td>
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</tr>
<tr>
<td>3</td>
<td>Connecting street Main &amp; Bond old post office</td>
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<td>4</td>
<td>Connecting street Main &amp; Bond old post office</td>
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</tr>
<tr>
<td>5</td>
<td>Burns &amp; Pennsylvania</td>
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<tr>
<td>6</td>
<td>Burns &amp; Pennsylvania</td>
<td>1999</td>
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<tr>
<td>7</td>
<td>Courtland &amp; Hickory</td>
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<td>8</td>
<td>Pennsylvania &amp; Hickory</td>
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<td>9</td>
<td>Lee Way &amp; Hickory</td>
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<td>10</td>
<td>Burns &amp; Courtland @ entrance to Sheriff's office</td>
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<td>11</td>
<td>Fulford &amp; Maltland</td>
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<td>Giles @ Churchville Road</td>
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<td>Thomas &amp; Brooks</td>
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<td>Williams &amp; Alice Anne</td>
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<td>22</td>
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<td>23</td>
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<td>MacPhail - Shamrock &amp; Woodbury driveway</td>
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