

TRAFFIC ENGINEERING STUDY

Various Crosswalk Locations

Oberlin, Ohio

November 14, 2007

Prepared for:
Oberlin Municipal Light & Power
289 South Professor Street
Oberlin, Ohio 44074



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TMS Engineers, Inc.

Transportation Management Services

4547 Hudson Drive • Stow, Ohio 44224

Tel: (330) 686-6402 • Fax: (330) 686-6417

Email: Mtransportation@neo.rr.com

Web site: [http:// www.TMSEngineers.com](http://www.TMSEngineers.com)

TABLE OF CONTENTS

	Page
Executive Summary	
1. Introduction	1-2
1.1 Purpose of the Report	1
1.2 Study Objectives	1
2. Area Conditions	3-12
2.1 Transportation Network Study Area	3
2.2 Crosswalks	7
2.3 Pedestrian/Vehicular Traffic	11
3. Crosswalk Requirements & Guidelines	13-23
3.1 Purpose	13
3.2 General Needs	13
3.3 Ohio Manual of Uniform Traffic Control Devices	14
3.4 Signs	17
3.5 Pavement Markings	20
4. Existing Conditions Analysis	24-46
4.1 Current Pedestrian Traffic	24
4.2 Crosswalk Locations	25
4.3 Crosswalk Signing	26
4.4 Crosswalk Pavement Markings	32
4.5 Geometric Configurations	34
4.6 Visibility / Safety	35
4.7 Curb Ramps	39

TABLE OF CONTENTS Con't

	Page
4.8 Alternative Treatments	43
5. Conclusions	47-48

APPENDICES

- A. Traffic Counts

LIST OF FIGURES

	Page
1. Location Map	2
2. Study Area Aerial View	5
3. Study Area Lane Use & Traffic Control	7
4. Crosswalk Locations & Widths	17
5. 2007 Current Traffic Volumes	18
6. Unsignalized Intersection Crosswalk Signs	2
7. Pedestrian Crossing & Supplemental Plaque Warning Signs	5
8. Yield Line Layouts	7
9. Example Yield Lines at Mid-Block Crossing	17
10. Examples of Crosswalk Markings	18
11. Yield Ahead Triangle Symbol	18

1. INTRODUCTION

1.1 Purpose of Report

This traffic engineering study has been prepared at the request of Oberlin Municipal Light and Power for the analysis of five existing mid-block crosswalk locations in the downtown area of the City of Oberlin, Lorain County, Ohio (**see the Location Map, Figure 1, Page 2**).

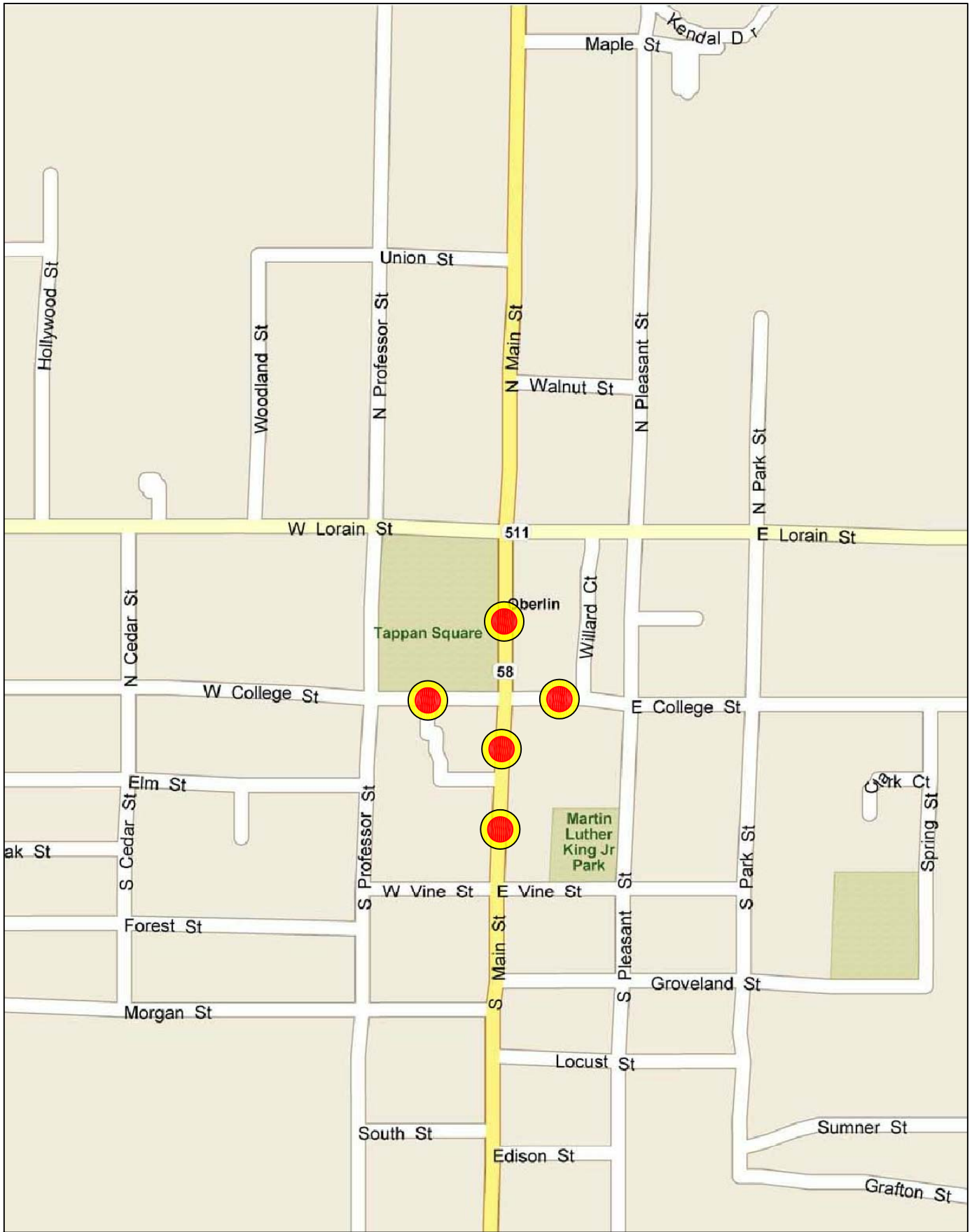
1.2 Study Objectives

This study is structured for the following purposes;

- to adequately assess the ability of the existing mid-block crosswalk locations to safely and efficiently serve the traveling public and to identify the level of traffic/pedestrian conditions,
- to provide a comprehensive study which evaluates and documents the traffic/pedestrian impacts and any needed improvements to provide safe and efficient mid-block crosswalk locations,
- to provide a technically sound basis to identify any necessary mitigation requirements that meet local, State and Federal codes.

This study documents the methodologies, findings and conclusions of the analysis, including the basis for all assumptions, traffic parameters utilized and conclusions reached.

Recommendations and conclusions will be determined by comparing the existing conditions and data collected to the criteria established by the **Ohio Manual of Uniform Traffic Control Devices** and professional engineering judgment from an on-site field review.



 - CROSSWALK LOCATION

LOCATION MAP

Various Crosswalk Locations, City of Oberlin, Lorain County, Ohio

FIG. NO.:

01

PAGE NO.:

02

2. AREA CONDITIONS

2.1 Transportation Network Study Area

Main Street (State Route 58) is a two lane roadway which has a north to south orientation in the study area. The speed limit along Main Street is 25 miles per hour. The roadway is known as North Main Street north of College Street and as South Main Street south of College Street. Main Street has an average daily traffic (ADT) of approximately 9,300 vehicles per day in the study area. It is classified as urban principal arterial roadway according to the Ohio Department of Transportation. This classification can be seen on ODOT's web site at:



View Looking North on North Main

<http://www.dot.state.oh.us/planning/Functional%20Class/2004FuncClass/District03/Lorain.pdf>

College Street (County Road 500) is a 2 lane roadway which has an east to west orientation in the study area. The roadway is known as West College Street west of Main Street and as East College Street east of Main Street. It is classified as urban collector roadway according to the Ohio Department of Transportation. This classification can be seen on ODOT's web site at the previously mentioned web address. The speed limit along College Street is 25 miles per hour. College Street has an average daily traffic (ADT) of approximately 3,650 vehicles per day in the study area.



View Looking South on South Main



View Looking West on West College

The study area is the downtown area of Oberlin, Ohio. The land use along Main Street and College Street is primarily commercial and institutional. There are numerous buildings in the study area that offer retail services and that are part of and support Oberlin College. Tappan Square is located at the northwest corner of Main Street and College Street. This is a large park area. This park area serves as a main cut through area for pedestrian traffic from the adjacent Oberlin College buildings to the downtown area.

There is on street parking allowed along Main Street and College Street. There is angled parking on both sides of South Main Street. There is angled parking along the east side and parallel parking along the west side of North Main Street. There is angled parking along the south side and parallel parking along the north side of West College Street. There is angled parking along the north side and parallel parking along the south side of East College Street.

Main Street and College Street intersect at a traffic signal controlled intersection. There are exclusive left turn lanes on the northbound and westbound approaches. There are marked crosswalks on all four intersection approaches. There are pushbuttons for the activation of the pedestrian crossing signal heads at the intersection.



View Looking East on East College

Figure 2, Page 5 shows an aerial view of the study area and the crosswalk locations. **Figure 3, Page 6** shows the existing study area lane use and traffic control conditions.

● - Crosswalk Locations

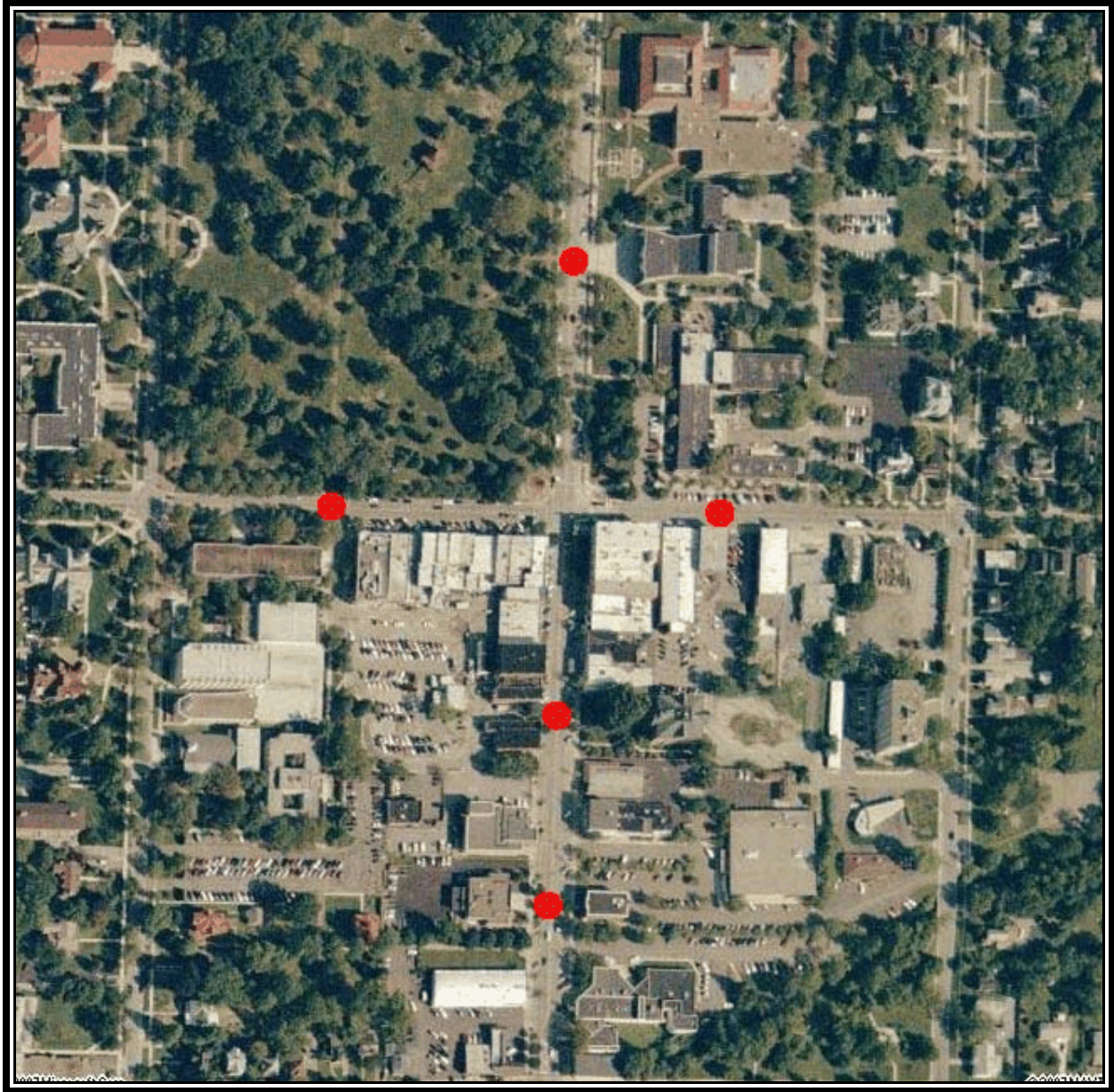
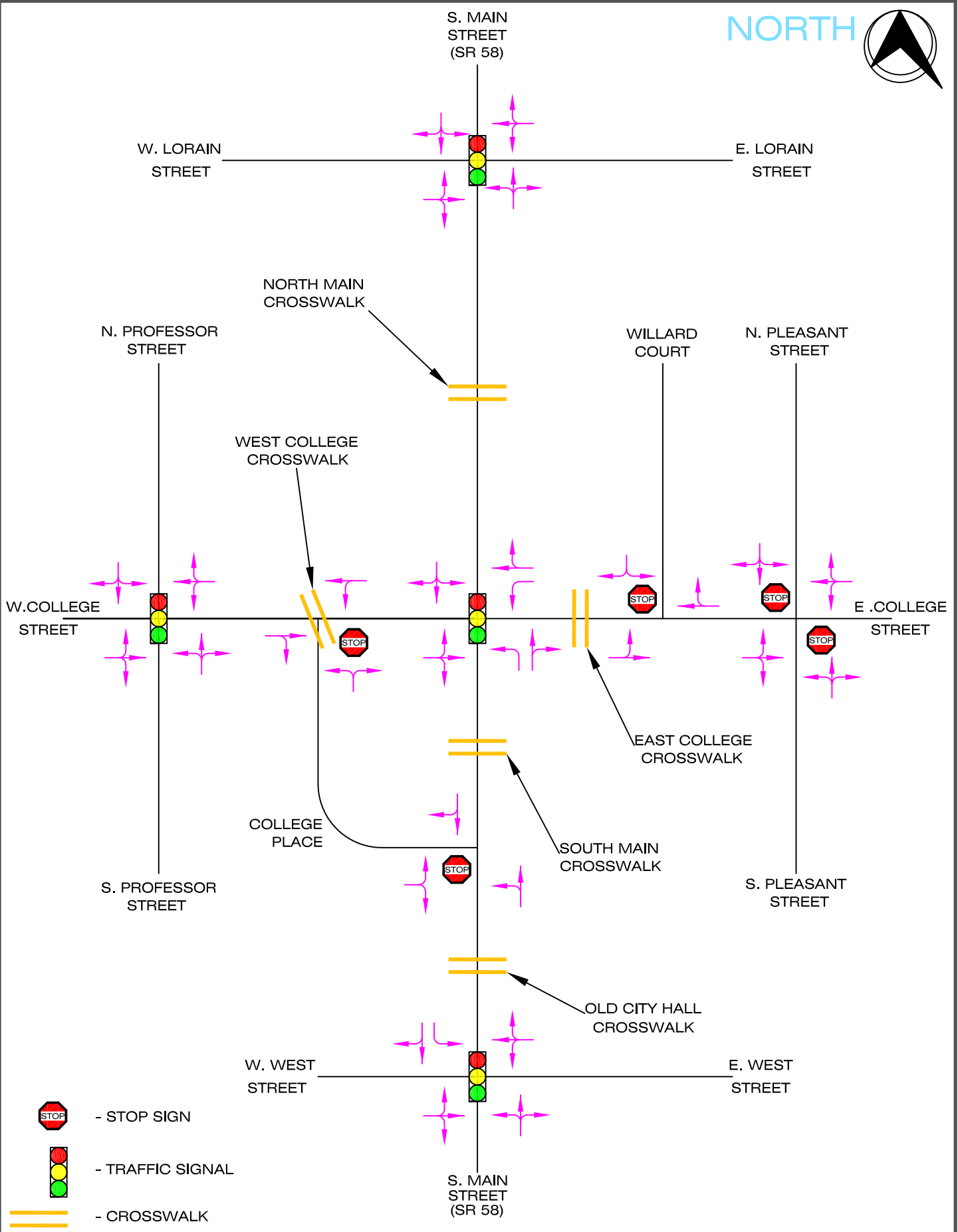


Figure 2 - Aerial View



STUDY AREA

Existing Lane Use & Traffic Control

2.2 Crosswalks

There were five crosswalk locations identified by the City of Oberlin, Ohio for review. The following are the five locations:

1. Crosswalk along North Main Street between College Street and Lorain Street
- North Main Crosswalk
2. Crosswalk along South Main Street at 29 South Main Street
- South Main Crosswalk
3. Crosswalk along South Main Street at 69 South Main Street
- Old City Hall Crosswalk
4. Crosswalk along West College Street at 37 West College Street
- West College Crosswalk
5. Crosswalk along East College Street at 27 East College Street
- East College Crosswalk

The location and existing roadway conditions at these five locations can be seen in **Figures 1 and 3 , Pages 2 and 6**, respectively.

North Main Crosswalk

This crosswalk is located along North Main Street between Lorain Street to the north and College Street to the south. The crosswalk provides a connection across North Main Street from Tappan Square to the west and several Oberlin College buildings to the east.



North Main Crosswalk Looking West

South Main Crosswalk

This crosswalk is located on South Main Street between Vine Street to the south and College Street to the north. The crosswalk provides a connection between the commercial and municipal buildings along South Main Street. There is an Army-Navy surplus store located at this crosswalk.



South Main Crosswalk Looking East

Old City Hall Crosswalk

This crosswalk is also located on South Main Street between Vine Street to the south and College Street to the north. Is located south of the crosswalk referred to as the South Main crosswalk. This crosswalk provides a connection between the commercial and municipal buildings along South Main Street. This crosswalk is referred to as the Old City Hall crosswalk since the former city hall building is located at this crosswalk along the east side of South Main Street.



Old City Hall Crosswalk Looking West

West College Crosswalk

This crosswalk is located on West College Street between Professor Street to the west and Main Street to the east. The crosswalk is at the intersection of West College Street and College Place. The crosswalk runs diagonally across West College Street from the southeast corner of the intersection to the northwest corner. This crosswalk provides a connection between Tappan Square on the north side of West College Street and several storefronts including the Oberlin College bookstore along the south side of College Street.



West College Crosswalk Looking South

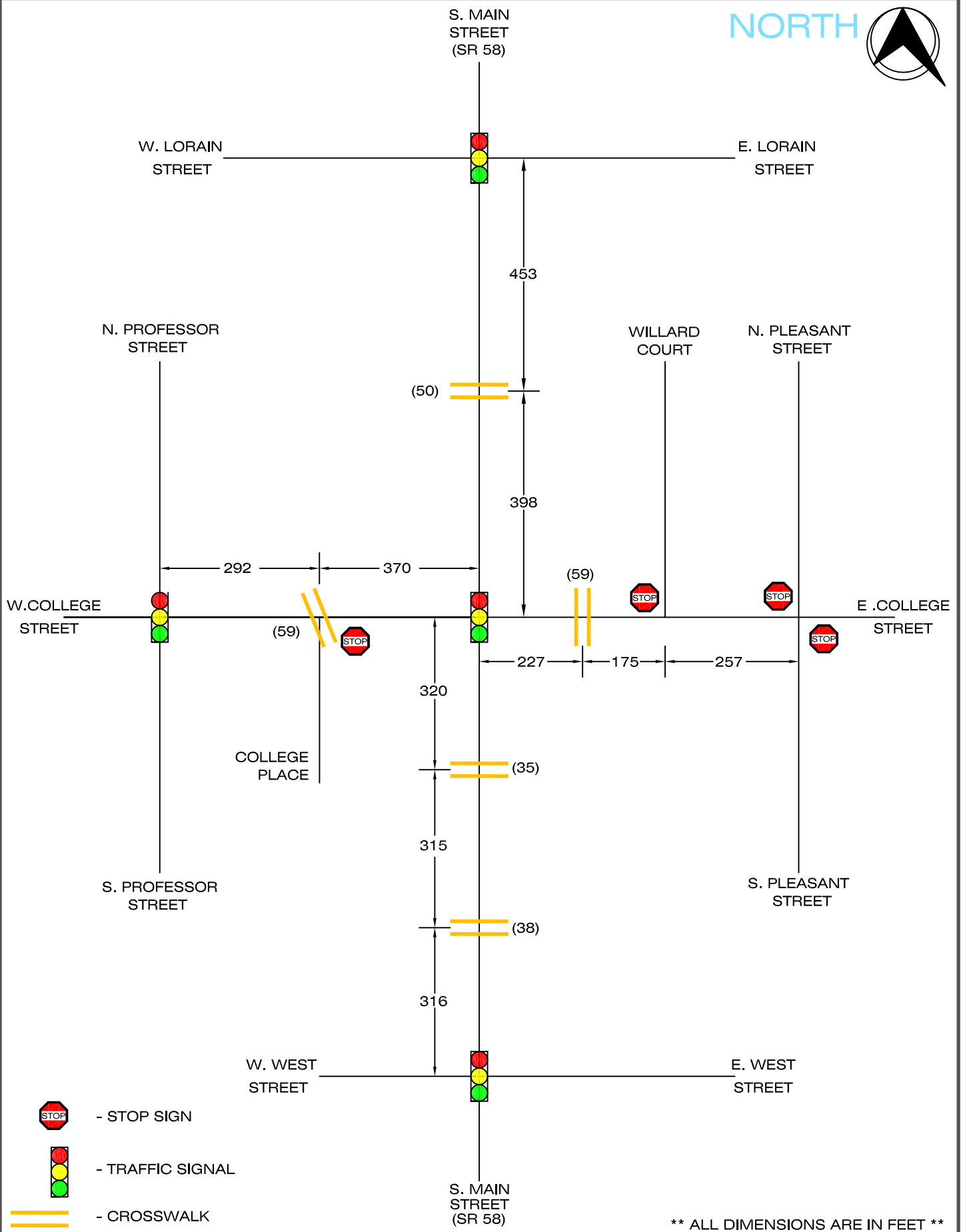
East College Crosswalk




The East College Crosswalk is located on East College Street between Main Street to the west and Willard Court to the east. This crosswalk provides a connection between the commercial and municipal buildings along East College Street.



East College Crosswalk Looking North

Figure 4, Page 10 shows the location of the crosswalks and the distance between them and the adjacent intersections where marked crosswalks exist as well as signalized pedestrian crossing facilities at the signalized intersections. The curb to curb widths of the crosswalks are also shown in the drawing in parentheses next to the crosswalk indication.



-  - STOP SIGN
-  - TRAFFIC SIGNAL
-  - CROSSWALK

** ALL DIMENSIONS ARE IN FEET **

CROSSWALK LOCATIONS & WIDTHS

2.3 Pedestrian/Vehicular Traffic

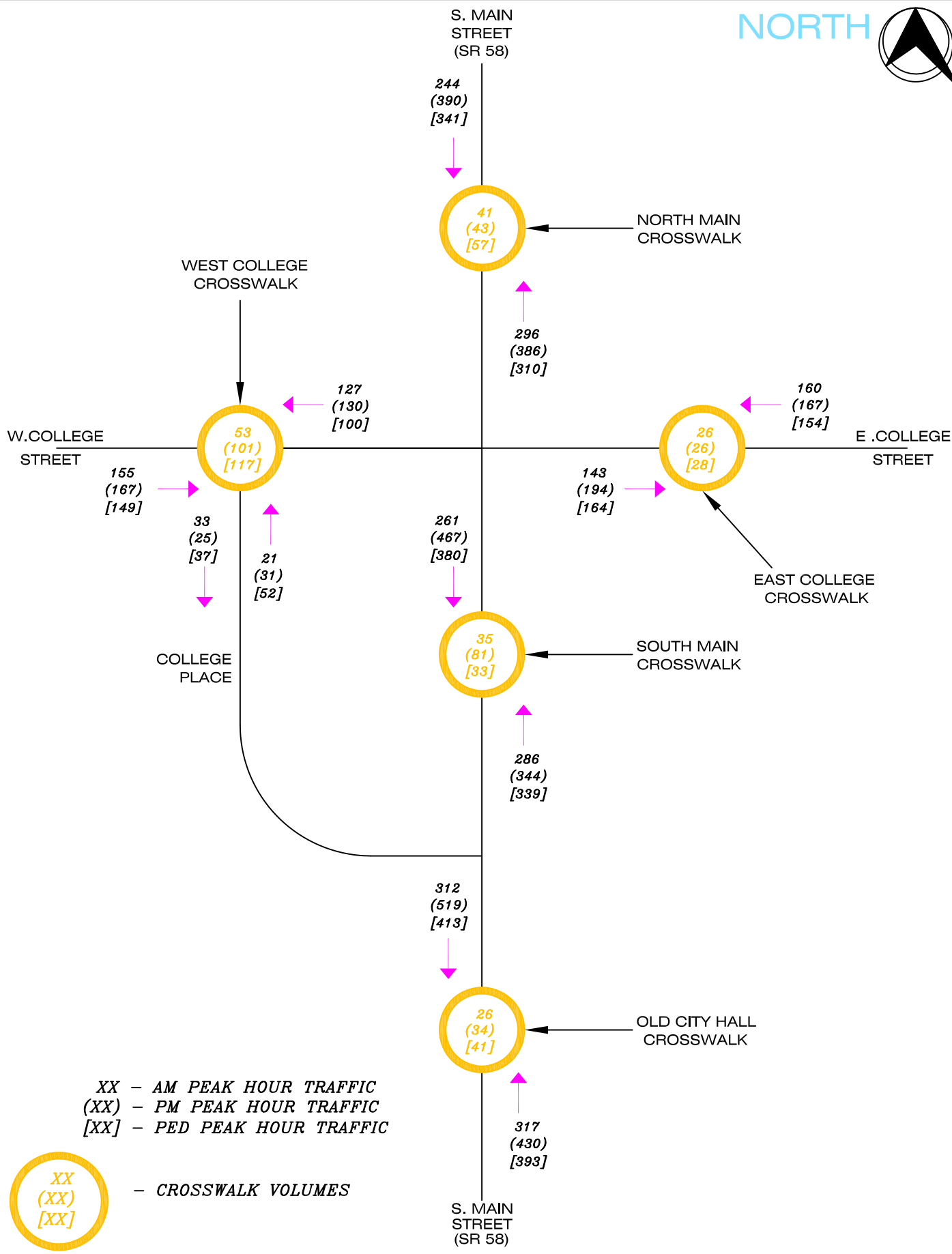
Nine hour, weekday traffic and pedestrian counts were performed at the locations of the five mid-block crosswalks. The following are the approximate locations of the these crosswalks and how the various locations will be referred to in this study:

1. Crosswalk along North Main Street between College Street and Lorain Street
- North Main Crosswalk
2. Crosswalk along South Main Street at 29 South Main Street
- South Main Crosswalk
3. Crosswalk along South Main Street at 69 South Main Street
- Old City Hall Crosswalk
4. Crosswalk along West College Street at 37 West College Street
- West College Crosswalk
5. Crosswalk along East College Street at 27 East College Street
- East College Crosswalk

The surveys were taken between Friday, September 14, 2007 and Thursday, September 20, 2007. The traffic surveys were conducted in fifteen (15) minute intervals between the hours of 7 AM - 10 AM, 11 AM - 2 PM, and 3 PM - 6 PM, then hourly totals were calculated. Vehicle classification to determine the extent of trucks, buses and pedestrians was also performed. Copies of the intersection turn movement counts with pedestrian volumes are included in **Appendix A**.

Average daily traffic was calculated for each of the study roads using expansion factors to account for daily and seasonal variations according to the recommendations and latest data from the Ohio Department of Transportation.

From the data, the weekday AM peak hour of vehicular traffic was determined to be 9:00 AM to 10:00 AM and the PM peak hour of vehicular traffic was determined to be 4:00 PM to 5:00 PM. The weekday peak hour of pedestrian traffic was determined to be from 12:00 PM to 1:100 PM. These three periods will be analyzed since they reflect the periods of the highest volume of traffic flow for the roadway in terms of both vehicles and pedestrians. It will provide a worst case scenario for traffic. Current peak hour vehicular and pedestrian traffic volumes are shown in **Figure 5, Page 12**.



CURRENT WEEKDAY TRAFFIC VOLUMES

Vehicular & Pedestrian Volumes - Peak Hours

3. CROSSWALK REQUIREMENTS & GUIDANCE

3.1 Purpose

Safe, convenient and well designed facilities are essential to encourage mid-block crosswalk use, as well as to provide safe and efficient operating conditions to the pedestrians and motorists involved at a mid-block crosswalk.

This report will discuss recommended design criteria needed for attaining good design while being sensitive to the needs of both the pedestrian and the motorist. It will provide recommendations for the designation of mid-block crosswalks through the use of striping, signing and pavement markings in advance of and at the crosswalk locations. Where necessary additional construction and the use of flashing beacons will be discussed.

3.2 General Needs

Mid-block crosswalks are normally established with the appropriate pavement markings and signing along streets in corridors where there is significant pedestrian activity and where there are distinct needs that can be served by them. The purpose should be to provide a safe and efficient place to cross the street for pedestrians while interacting with the motorists traveling the roadway. Crosswalks are intended to provide guidance for pedestrians who are crossing roadways by defining and delineating paths on approaches to and within signalized intersections, and at approaches to other intersections where traffic stops. Crosswalks also serve to alert road users of a pedestrian crossing point across roadways not controlled by a traffic signals or stop signs. At mid-block locations, crosswalk markings legally establish the crosswalk. A mid-block crosswalk can concentrate or channelize multiple pedestrian crossings to a single location.

3.3 Ohio Manual of Uniform Traffic Control Devices

The **Ohio Manual of Uniform Traffic Control Devices (OMUTCD)** has been established to provide a safe, uniform, and efficient system of traffic control devices on all public streets and highways within the State of Ohio. The **Manual** provides requirements and guidelines for the use of these traffic control devices.

Design, placement, operation, maintenance, and uniformity are aspects that should be carefully considered in order to maximize the ability of a traffic control device to meet the following the five basic requirements:

1. Fulfill a need;
2. Command attention;
3. Convey a clear, simple meaning;
4. Command respect from road users; and
5. Give adequate time for proper response.

Design of Traffic Control Devices

Traffic control devices should be designed so that features such as size, shape, color, composition, lighting or retro-reflection, and contrast are combined to draw attention to the devices; that size, shape, color, and simplicity of message combine to produce a clear meaning; that legibility and size combine with placement to permit adequate time for response; and that uniformity, size, legibility, and reasonableness of the message combine to command respect.

Placement and Operation of Traffic Control Devices

Placement of a traffic control device should be within the road user's view so that adequate visibility is provided. To aid in conveying the proper meaning, the traffic control devices should be appropriately positioned with respect to the location, object, or situation to which it applies. The location and legibility of the traffic control device should be such that a road user has adequate time to make the proper response in both day and night conditions.

Traffic control devices should be placed and operated in a uniform and consistent manner. Unnecessary traffic control devices should be removed. The fact that a device is in good physical condition should not be a basis for deferring needed removal or change.

Maintenance of Traffic Control Devices

Functional maintenance of traffic control devices should be used to determine if certain devices need to be changed to meet current traffic conditions. Physical maintenance of traffic control devices should be performed to retain the legibility and visibility of the device, and to retain the proper functioning of the device. Clean, legible, properly mounted devices in good working condition command the respect of road users.

Uniformity of Traffic Control Devices

Uniformity of devices simplifies the task of the road user because it aids in recognition and understanding, thereby reducing perception/reaction time. Uniformity assists road users, law enforcement officers, and traffic courts by giving everyone the same interpretation. Uniformity assists public highway officials through efficiency in manufacture, installation, maintenance, and administration. Uniformity means treating similar situations in a similar way. The use of uniform traffic control devices does not, in itself, constitute uniformity. A standard device used where it is not appropriate is as objectionable as a nonstandard device; in fact, this might be worse, because such misuse might result in disrespect at those locations where the device is needed and appropriate.

These traffic control devices as they relate to crosswalks include but are not limited to signs and pavement markings. The signs used at crosswalks typically fall into one of two sign categories. The first category is regulatory signs. Regulatory signs are used to inform road users of selected traffic laws or regulations and indicate the applicability of the legal requirements. These signs are to be installed at or near where the regulations apply. The signs are to clearly indicate the requirements imposed by the regulations and shall be designed to and installed to provide adequate visibility and legibility in order to obtain compliance.

The other type of sign is a warning sign. These signs call attention to unexpected conditions on or adjacent to a street and to situations that might not be readily apparent to road users. Warning signs alert road users to conditions that might call for a reduction of speed or an action in the interest of safety and efficient traffic operations. Regulatory and warning signs should be used conservatively because these signs, if used to excess, tend to lose their effectiveness.

Pavement markings on roadways have important functions in providing guidance and information for the road user. Major marking types include pavement and curb markings, object markers, delineators, colored pavements, barricades, channelizing devices and islands. In some cases, markings are used to supplement other traffic control devices such as signs, signals and other markings. In other instances, markings are used alone to effectively convey regulations, guidance, or warnings in ways not obtainable by the use of other devices. Markings have limitations. Visibility of the markings can be limited by snow, debris, and water on or adjacent to the markings. Marking durability is affected by material characteristics, traffic volumes, weather, and location. However, under most highway conditions, markings provide important information while allowing minimal diversion of attention from the roadway. Pavement markings can enhance roadway delineation with the addition of audible and tactile features such as bars, differential surface profiles, raised pavement markers, or other devices intended to alert the road user that a delineation on the roadway is being traversed.

3.4 Signs

Regulatory signs for use at mid-block crossings can be seen in **Figure 6**. The sign code as assigned in the **OMUTCD** is shown below the signs. This code is used to identify the sign and its type.



Figure 6 - Unsignalized Intersection Crosswalk Signs

If yield lines are used in advance of a marked mid-block crosswalk, Yield Here To Pedestrians (R1-5 or R1-5a) signs shall be placed 20 to 50 ft in advance of the nearest crosswalk line. The In-Street Pedestrian Crossing (R1-6) sign may be used to remind road users of laws regarding right-of-way at an unsignalized pedestrian crossing. The legend STATE LAW may be shown at the top of the sign. The legend YIELD TO may be used in conjunction with the appropriate symbol. If used, the In-Street Pedestrian Crossing sign shall have a black legend (except for the red YIELD sign symbol) and border on either a white and/or fluorescent yellow-green background. If the In-Street Pedestrian Crossing sign is placed in the roadway, the sign support shall comply with the breakaway requirements of the latest edition of AASHTO's "Specification for Structural Supports for Highway Signs, Luminaires, and Traffic Signals". The In-Street Pedestrian Crossing sign may be used seasonably to prevent damage in winter because of plowing operations, and may be removed at night if the pedestrian activity at night is minimal.

Figure 7 shows the warning sign for use at and in advance of a marked pedestrian crossing (W11-2). Also included are variations of the supplemental plaques that can be used in conjunction with the warning sign. The sign code as assigned in the OMUTCD is shown below the signs. This code is used to identify the sign and its type.

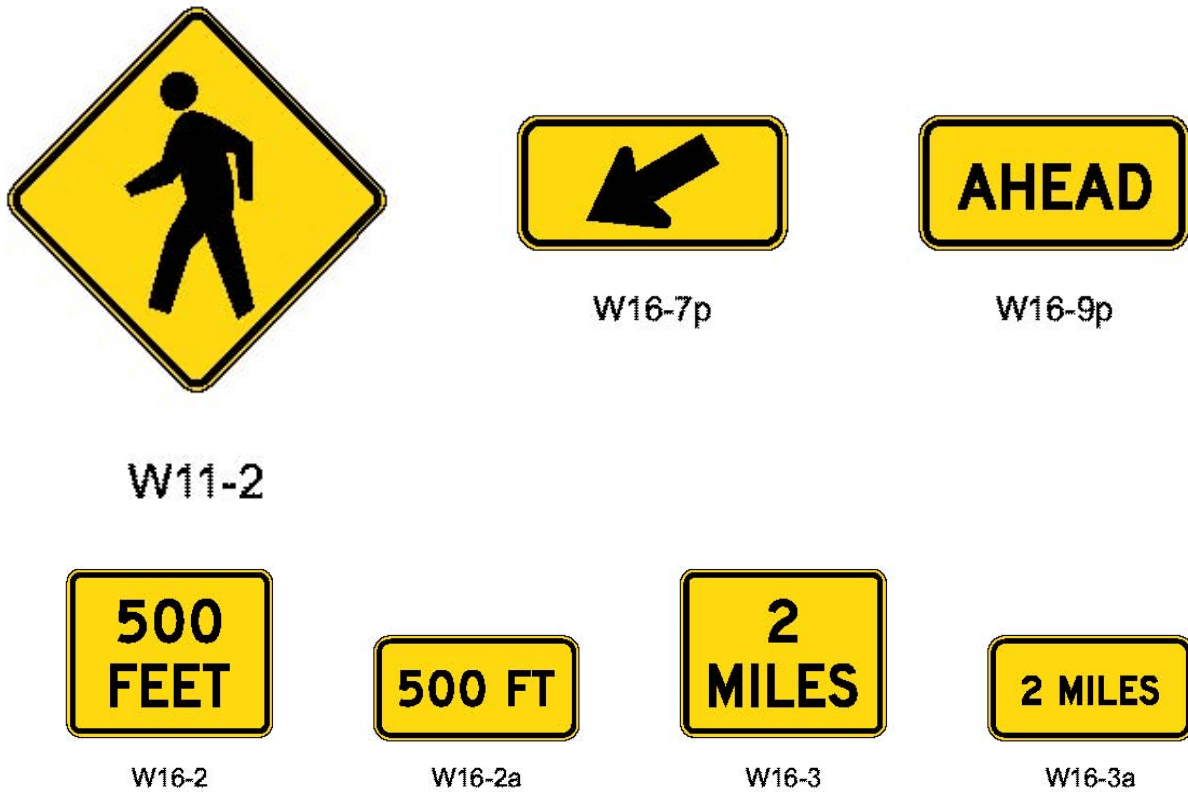


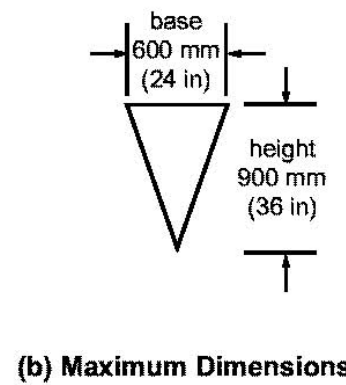
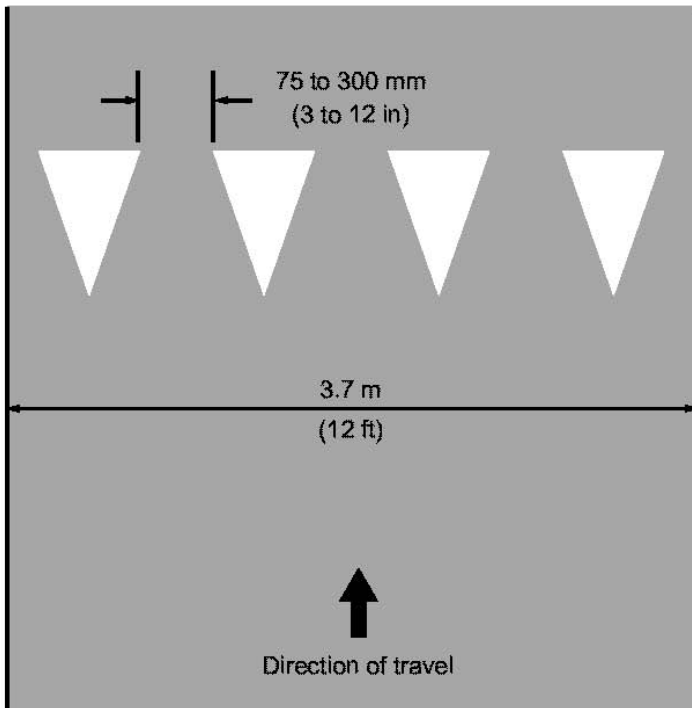
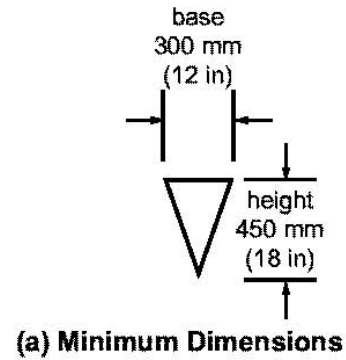
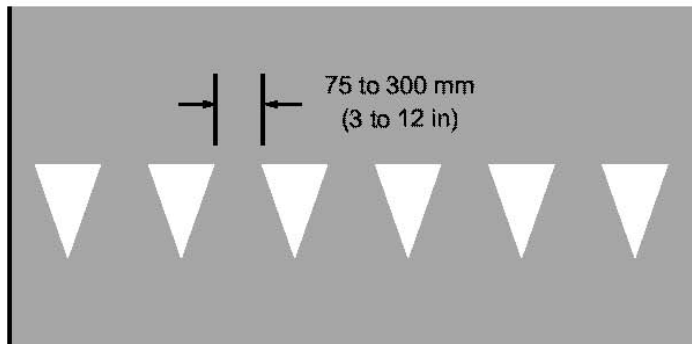
Figure 7 - Pedestrian Crossing & Supplemental Plaque Warning Signs

The pedestrian warning sign (W11-2) may be used to alert road users in advance of locations where unexpected entries into the roadway by pedestrians and other crossing activities might occur. When used in advance of a crossing, the warning sign may be supplemented with supplemental plaques such as those shown above to provide advance notice to road users of crossing activity. When used at the crossing, the sign shall be supplemented with a diagonal downward pointing arrow (W16-7p) plaque to indicate the location of the crossing.

Pedestrian signs and their related supplemental plaques may have a fluorescent yellow-green background with a black legend and border. When a fluorescent yellow-green background is used, a systematic approach featuring one background color within a zone or area should be used. The mixing of standard yellow and fluorescent yellow-green backgrounds within a selected site area should be avoided.

3.5 Pavement Markings

Figure 8 details the layout and use of yield lines for use at mid-block crossings. These are also referred to as “sharks teeth”.



Notes:
 Triangle height is equal to 1.5 times the base dimension.
 Yield lines may be smaller than suggested when installed on much narrower, slow-speed facilities such as shared-use paths.

Figure 8 - Yield Line Layouts

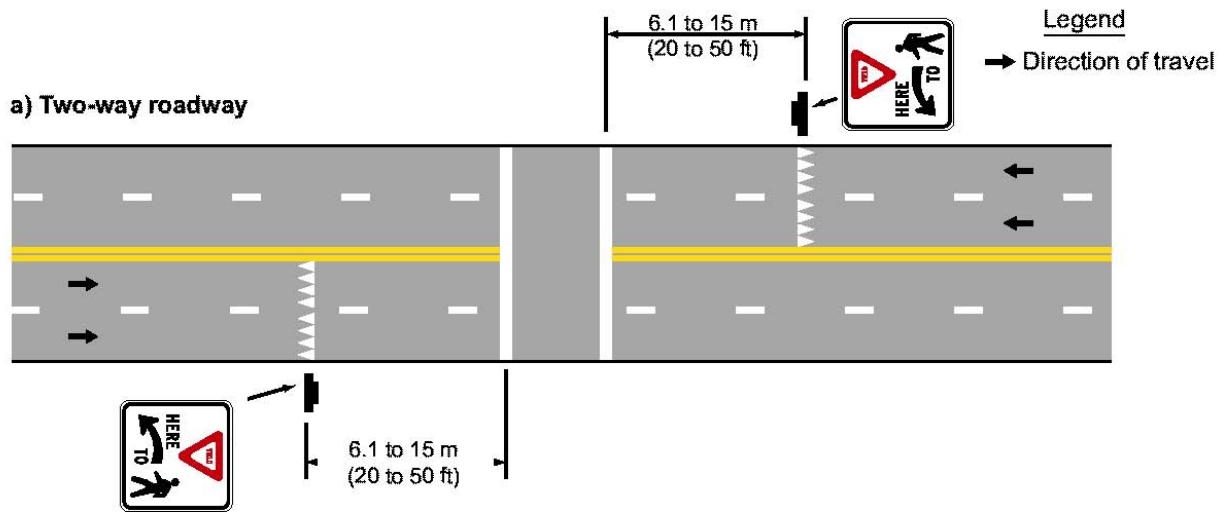


Figure 9 - Example of Yield Lines at Mid-Block Crosswalk

Yield lines shall consist of a row of solid white isosceles triangles pointing toward approaching vehicles extending across approach lanes to indicate the point at which the yield is intended or required to be made. Yield lines may be used to indicate the point behind which vehicles are required to yield in compliance with a YIELD (R1-2) sign or a Yield Here to Pedestrians (R1-5) sign. Yield signs when used at an unsignalized mid-block crosswalk, should be placed adjacent to the Yield Here to Pedestrians sign located 20 to 50 feet in advance of the nearest crosswalk line, and parking should be prohibited in the area between the yield line and the crosswalk (see **Figure 9**). Drivers who yield too close to crosswalks on multi-lane approaches place pedestrians at risk by blocking other drivers' views of pedestrians.

Figure 10 details the use of various types of crosswalk markings. It should be noted that while the illustration shows the markings in use at an intersection, these markings can be used at a mid-block location.

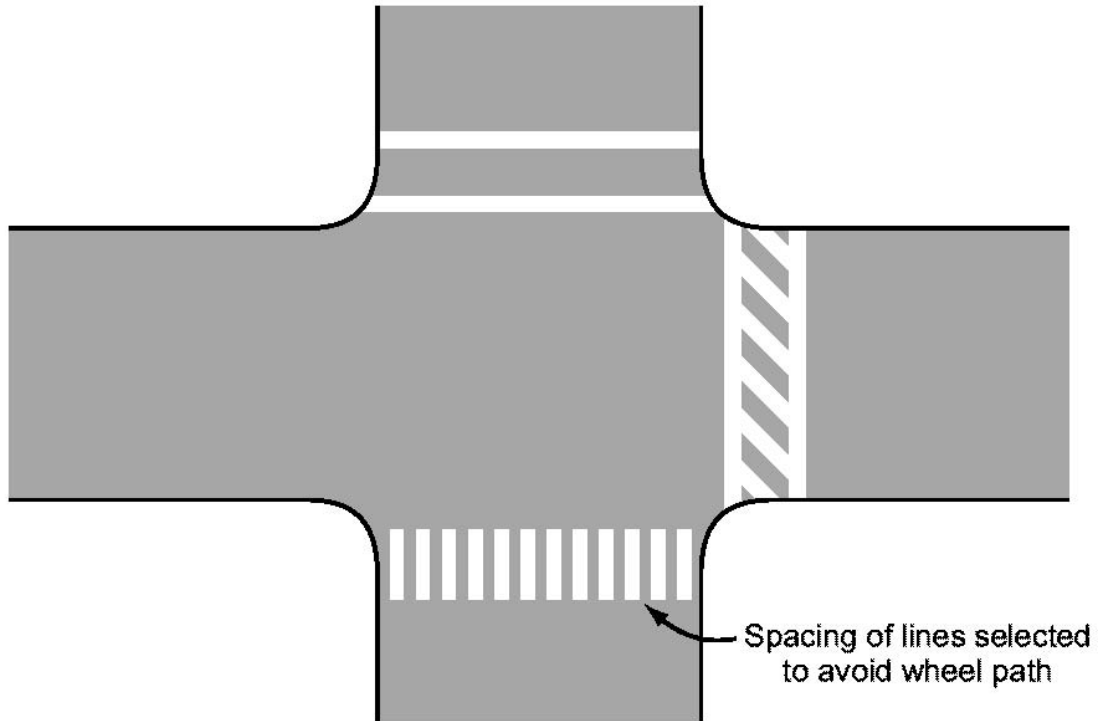


Figure 10 - Examples of Crosswalk Markings

When crosswalk lines are used, they typically consist of solid white lines that mark the crosswalk boundaries. If transverse lines are used to mark a crosswalk, the gap between the lines should not be less than 6 feet. If diagonal or longitudinal lines are used without transverse lines to mark a crosswalk, the crosswalk should be not less than 6 feet wide. Crosswalk lines, if used on both sides of the crosswalk, should extend across the full width of pavement. Because non-intersection pedestrian crossings are generally unexpected by the road user, warning signs should be installed and adequate visibility should be provided by parking prohibitions. For added visibility, the area of the crosswalk may be marked with white diagonal lines at a 45-degree angle to the line of the crosswalk or with white longitudinal lines parallel to traffic flow as shown in **Figure 10**. When diagonal or longitudinal lines are used to mark a crosswalk, the transverse crosswalk lines may be omitted. This type of marking may be used 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. If used, the diagonal or longitudinal lines should be 12 to 24 inches wide and spaced 12 to 60 inches apart. The marking design should avoid the wheel paths, and the spacing should not exceed 2.5 times the line width.

Word and symbol markings on the pavement are used for the purpose of guiding, warning, or regulating traffic. Symbol messages are preferable to word messages. Letters and numerals should be 6 feet or more in height and should not exceed three lines of information. Pavement word and symbol markings should be no more than one lane in width. If a pavement marking word message consists of more than one line of information, it should read in the direction of travel. The first word of the message should be nearest to the road user. The longitudinal space between word or symbol message markings should be at least four times the height of the characters for low-speed roads, but not more than ten times the height of the characters under any conditions. The number of different word and symbol markings used should be minimized to provide effective guidance and avoid misunderstanding.

A yield-ahead triangle symbol or YIELD AHEAD word pavement marking may be used on approaches to intersections where the approaching traffic will encounter a YIELD sign at the intersection. Word and symbol markings for crosswalks may include, but are not limited to, YIELD AHEAD, the YIELD AHEAD Triangle Symbol, and PED XING. An example of a yield ahead triangle symbol can be seen below in **Figure 11**.

· Posted or Statutory Speed Limit less than 70 km/h (45 mph)

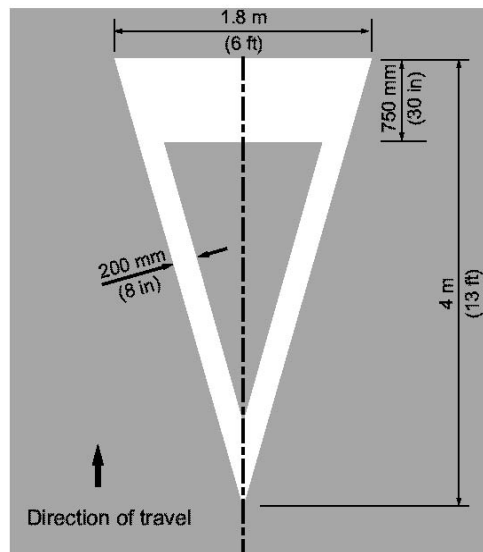


Figure 11 - Yield Ahead Triangle Symbol

4. EXISTING CONDITIONS ANALYSIS

4.1 Current Pedestrian Traffic

Pedestrian traffic was observed on a typical weekday to determine current usage of the mid-block crossings. The following chart shows the hourly pedestrian volumes during nine hours of the day at the five crossing locations under review.

HOUR	VOLUME OF PEDESTRIANS AT CROSSWALK LOCATIONS				
	NORTH MAIN	SOUTH MAIN	OLD CITY HALL	WEST COLLEGE	EAST COLLEGE
7:00 AM	9	2	12	10	1
8:00 AM	30	10	9	26	9
9:00 AM	41	35	26	53	26
11:00 AM	26	42	29	102	28
12:00 N	57	81	41	117	28
1:00 PM	56	45	30	103	29
3:00 PM	30	47	28	103	28
4:00 PM	43	33	34	101	26
5:00 PM	15	48	12	94	5
Total	307	343	221	709	180

The above volumes indicate a significant amount of existing pedestrian traffic currently using the five crossing locations on a typical weekday. It should be noted that the crosswalks are located in the downtown area of Oberlin. There is a significant retail and commercial presence along the Main Street and College Street corridors. Oberlin College is also located in this section of the City. These adjacent land uses near the crosswalks and the significant amount of on street parking and the lack of direct parking for each land use contributes to a significant amount of pedestrian activity in the study area. The mid-block crossings are justified based upon the observed pedestrian volumes, the adjacent land uses, and the layout and availability of parking spaces in the downtown area of Oberlin.

4.2 Crosswalk Locations

The locations of the crosswalks were shown in **Figures 1 and 2** . The distance between these mid-block crossings and the adjacent signalized crossing facilities were shown in **Figure 4**. The shortest distance between a mid-block crossing and a signalized intersection with pedestrian facilities was 292 feet between the West College crosswalk and the traffic signal at Professor Street. It is our opinion that the existing locations and spacing of these mid-block crosswalks is justified due to the spacing between the signalized intersections and the density of the development along the Main Street and College Street corridors.

4.3 Crosswalk Signing

The crosswalk locations were reviewed to determine if the signing at each location meets the requirement and guidelines found in the **OMUTCD**.

North Main Crosswalk

There are pedestrian warning signs (W11-2) with the Ahead supplemental plaque (W16-9p) located just north and south of the North Main crosswalk. Both signs and plaques have the fluorescent yellow-green background. These sign configurations are consistent with an advance warning situation. Photos showing the signs and their placement can be seen in the following pictures.



North Main Looking North



North Main Looking South

The sign combination for the southbound traffic should be moved further north to provide adequate advance notice to drivers. It is recommended to remove the advance warning sign for northbound direction of travel. These existing sign installations should be replaced with the pedestrian warning sign (W11-2) and arrow plaque (W16-9p) facing each direction at the crosswalk. The new sign locations should be placed as close as possible to the actual crosswalk location. The existing northbound warning sign and supplemental plaque is obscured from the motorists view due to the growth of a tree. This tree would most likely obscure the view of a sign placed at the crosswalk as well. This tree should be regularly trimmed to ensure the warning signs can be seen by the oncoming northbound traffic from an adequate distance so the driver has time to initiate a response if necessary.

South Main Crosswalk

There are pedestrian warning signs (W11-2) with the Ahead supplemental plaque (W16-9p) located north and south of the South Main crosswalk. Both signs and plaques have the fluorescent yellow-green background. These sign configurations are consistent with an advance warning situation. Photos showing the signs and their placement can be seen in the following pictures.



South Main Looking South



South Main Looking North

It is recommended to remove the advance warning signs for both the northbound and southbound directions. There is already a southbound advance warning installation recommended north of the North Main Crosswalk. Pedestrian warning signs (W11-2) and the arrow plaque (W16-9p) should be erected at the crosswalk for the northbound and southbound directions. The signs should be placed on the sidewalk bump out area so as to not be blocked by a parked vehicle. The bump out is the area where the sidewalk area has been extend out into the street to shorten the amount of roadway that a pedestrian has to cross. All new signs should be of the same background color as others used throughout the study area.

Old City Hall Crosswalk

There is a pedestrian warning sign (W11-2) and arrow plaque (W16-7p) located at the crosswalk facing the southbound traffic. The sign is located behind the bump out and the on-street parking spaces. There is an advance pedestrian warning sign combination just south of the crosswalk facing the oncoming northbound traffic. Both signs and plaques have the fluorescent yellow-green background. Photos showing the signs and their placement can be seen in the following pictures.



Old City Hall Looking South



Old City Hall Looking North

It is recommended to move the northbound advance warning sign combination further south to provide adequate notice to motorists that they are entering an area where pedestrians will be entering and crossing the roadway. A warning sign (W11-2) and arrow plaque (W16-7p) should be erected at the crosswalk for the northbound traffic. This sign combination should be located at the crosswalk and out on the bump out so that the visibility of the sign is increased. The existing southbound sign combination should be re-located to the crosswalk and out on the bump out so that the visibility of the sign is increased. By locating these warning sign combinations out on the bump outs it removes them from being behind the on-street parking and increases their visibility. All new signs should continue to maintain the same background color as those in use throughout the study are to provide uniformity.

West College Crosswalk

The West College crosswalk is properly signed with Pedestrian Warning signs (W11-2) facing each direction of travel and the supplemental arrow plaque (W16-7p) pointing to the crosswalk location. Both signs and plaques have the fluorescent yellow-green background. The eastbound warning sign and supplemental plaque is obscured from the motorists view due to the placement of a free parking sign. Photos showing the signs and their placement can be seen in the following pictures.



West College Looking West



West College Looking East

The parking sign that currently obscures the westbound warning sign should be relocated so the sign can be clearly seen by oncoming motorist.

There are no advance warning signs in either direction along West College Street that let motorists know that this is an area where pedestrians may be entering the roadway at a designated mid-block crossings. It is recommended that a pedestrian warning sign (W11-2) with an Ahead plaque (W16-9p) be erected just to the east of Professor Street to alert motorists that they are entering an area where pedestrians are crossing the roadway. These signs should be of the same color as those currently posted throughout the area.

East College Crosswalk

There are currently no pedestrian warning signs or advance warning signs located at the East College crosswalk. Photos showing the view of the crosswalk from the east and west can be seen in the following pictures.



East College Looking East



East College Looking West

Pedestrian warning signs (W11-2) with the arrow plaque (W16-7p) should be erected at the crosswalk for both the eastbound and westbound traffic. An advance pedestrian warning sign should be erected east of the crosswalk consisting of the pedestrian warning sign (W11-2) and the ahead plaque (W16-9p). All new signs should have the same background color as those used throughout the study area to provide uniformity with all the crosswalk related signs.

As mentioned earlier the removal and replacement of the advance pedestrian warning signs was recommended. To prevent sign clutter and overuse of the advance warning sign combination, the advance warning combinations are only being recommended before the first crosswalk a motorist would encounter while traveling through the College Street and Main Street corridors. For example a northbound motorist traveling along South Main Street would encounter an advance warning sign combination shortly after Vine Street and then would see the pedestrian warning signs at the crosswalk locations for the Old City Hall, South Main, and North Main crosswalk locations. Under this scenario the same situations would occur for eastbound and westbound traffic along College Street and for the southbound traffic along Main Street. The advance warning signs are recommended to be located just south of Lorain Street for southbound Main Street, north of Vine Street for northbound Main Street, east of Professor Street for eastbound College Street, and west of Pleasant Street for westbound College Street.

All pedestrian warning signs and plaques in the study area are currently using the fluorescent yellow-green background. To provide uniformity throughout the study area all new signs should continue to use the same color scheme.

The yield to pedestrian within crosswalk sign (R1-6) shown previously in **Figure 6** can be substituted for the pedestrian warning sign (W11-2) and arrow plaque (W16-7p) combination at the crosswalk locations. This would put a regulatory sign in place at the crosswalk location as opposed to a warning sign. This sign would provide a specific instruction to the driver upon encountering a pedestrian in the crosswalk.

4.4 Crosswalk Pavement Markings

All five crosswalk locations are currently employing the standard crosswalk pavement markings. Each location is marked with two parallel white lines perpendicular to the roadway. The crosswalk lines at all five locations extend across the full width of the roadway from curb to curb. The photos on this page show the existing crosswalk pavement markings for the five crosswalk locations under study.



North Main Crosswalk



South Main Crosswalk



Old City Hall Crosswalk



West College Crosswalk



East College Crosswalk

To provide a higher degree of visibility to motorists that there is a marked mid-block crosswalk two alternative methods of striping the crosswalks are recommended. The first method would be to continue to use the parallel lines that are perpendicular to the roadway with the area between the lines filled in with diagonal white lines. The transverse lines could be omitted in this scenario. The second method to increase the visibility of the crosswalk would be to use longitudinal lines parallel to the traffic flow to mark the crosswalk. The marking design should avoid the wheel paths of the vehicles traveling on the roadway. Examples of these pavement markings can be seen **Figure 10**.

4.5 Geometric Configuration

Four of the five crosswalks run perpendicular to the roadway. There is no need to change the geometric layout of these crosswalks at North Main, South Main, Old City Hall, and East College.

The West College crosswalk runs diagonally across the roadway from the southeast corner to the northwest corner of the West College Street and College Place intersection. This is a heavily used crosswalk as Tappan Square is located on the north side of West College Street and the Oberlin College bookstore is located along the south side of West College Street. There are no other marked crosswalks at this intersection.



To improve the safety and efficiency of the intersection operation two improvements are recommended. The first recommendation is to re-align the existing crosswalk so it runs from the northwest corner to the southwest corner. This will shorten the length of the crosswalk which will shorten the time it will take a pedestrian to cross West College Street. It is also recommended to stripe a crosswalk across the College Place. This will provide marked and designated crosswalks on two approaches of the intersection. At a three-way intersection two crosswalks will allow a pedestrian to traverse the intersection to any quadrant.

4.6 Visibility/Safety

Traffic crash reports were requested from the City of Oberlin for any crashes that occurred at or in the vicinity of the crosswalk locations. Six reports for the years 2005-2007 were received. Two crashes were reported in each year. Five of the crashes involved a vehicle rear-ending another vehicle at or near a crosswalk location. In each crash report the first vehicle stopped or slowed at the crosswalk and the trailing vehicle then rear-ended the lead vehicle. This concern was also voiced in discussions with officials from the City of Oberlin as they have received many notices of the issue where a crash did not occur but was very close to happening. These type of crashes usually occur because the second vehicle was following too closely and did not leave themselves an adequate clear stopping distance or because the first vehicle is forced to make a sudden stop because they did not realize the crosswalk was in use.

In order to improve the safety and visibility for both pedestrians and motorists we are making several recommendations. The first recommendation is to stripe yield lines on the roadways, on each side of the crosswalk. These lines (shark teeth) would indicate the point in the roadway where motorists are supposed to yield in compliance with a Yield to Pedestrian sign (R1-5). The yield to pedestrian sign (R1-5) would need to be installed at each yield line. This configuration is recommended for each crosswalk location. The yield line with signs configuration can be seen in **Figure 9**.

At the North Main, West College, and East College crosswalks the on-street parking is adjacent to the crosswalks. This makes it difficult for oncoming traffic and pedestrians waiting to cross the street to see each other if the spaces adjacent to the crosswalk are occupied, especially with an SUV or van. These configurations can be seen in the following photos.



North Main Crosswalk



West College Crosswalk



East College Crosswalk

In order to improve the visibility at these locations the adjacent parking spaces should be eliminated. The North Main crosswalk currently restricts parking near the crosswalk along the west side of North Main Street. The first parking space on each side of the crosswalk along the east side of North Main Street should be eliminated. The first parking space along the north side of West College Street on each side of the crosswalk should be eliminated. The first parking space along the north side of East College Street on each side of the crosswalk should be eliminated. To ensure vehicles do not park in these areas the curbs could be painted yellow like the west side of North Main Street at the crosswalk. This setup can be seen in the following picture.



Restricted Parking Area @ North Main Crosswalk

Another option to improve the visibility for both the pedestrian and motorists would be to construct bump outs (curb extensions) at the West College, North Main, and East College crosswalks. Bump outs are already present at the South Main and Old City Hall crosswalks. These bump outs improve the visibility of pedestrians waiting to cross by bringing them closer to the center of the driver's cone of vision and by minimizing the impact of parked vehicles on pedestrian visibility. Bump outs are an extension of the sidewalk area across the parking lanes to the edge of the travel lanes. This feature would narrow the distance of the road that a pedestrian has to cross. A shorter distance to cross would lessen the amount of time a pedestrian is in the roadway. The following photos show an example of a bump out at the South Main crosswalk. It should be noted that the curbs of the bump outs are painted yellow to emphasize there is no parking allowed along the bump out.



Bump Out @ South Main Crosswalk



Bump Out @ South Main Crosswalk

Word on pavement markings can also be used to bring the presence of pedestrian crossings to a drivers attention. The use of word on pavement markings is recommended at the locations of the advance warning signs. This will supplement and reinforce the message of the of the advance warning signs. This would consist of PED XING being marked on the roadways at four locations. These locations are just south of Lorain Street for southbound Main Street, north of Vine Street for northbound Main Street, east of Professor Street for eastbound College Street, and west of Pleasant Street for westbound College Street.

4.7 Curb Ramps

The crosswalks under review should comply with the Americans with Disabilities Act (ADA) to maximize mobility for all users. It should also be noted that curb ramps are required for all new or reconstructed curbs per **Section 729.12** of the **Ohio Revised Code**. These curb ramps should include a detectable warning surface.

Curb ramps should be designed to the least slope consistent with the curb height, available corner area and underlying topography. A level landing is necessary for turning, maneuvering or bypassing the sloped surface. Proper curb ramp design is important to users either continuing along a sidewalk path or attempting to cross the street.

Detectable warnings are standardized surface features on walking surfaces to warn visually impaired people of the transition between the sidewalk and the street. Truncated domes are specified as the detectable warnings to be used in the ODOT **Location and Design Manual, Volume 1**. Truncated domes must have a visual contrast with adjoining surfaces. Many existing curb ramps can remain in place if they were originally constructed to current ADA standards. However, these curb ramp may need to have truncated domes installed. ODOT has approved several cast-in-place type of products for installation in new concrete and some surface applied products specifically manufactured to be placed on existing sound concrete as a retro-fit.

The crosswalks under review currently have perpendicular curb ramps. Perpendicular ramps are generally perpendicular to the curb and line up directly with the crosswalk. Users will generally be traveling perpendicular to vehicular traffic when they enter the street at the bottom of the ramp. A review of each curb ramp at the crosswalks was conducted to determine if any improvements are necessary.

North Main Crosswalk



East Curb Ramp



West Curb Ramp

The curb ramps at the North Main crosswalk should be retro-fitted with a detectable warning surfaces consisting of truncated domes.

South Main Crosswalk



East Curb Ramp



West Curb Ramp

The curb ramps at the South Main crosswalk should be retro-fitted with a detectable warning surfaces consisting of truncated domes.

Old City Hall Crosswalk



East Curb Ramp



West Curb Ramp

The curb ramps at the Old City Hall crosswalk should be retro-fitted with a detectable warning surfaces consisting of truncated domes. It should also be noted that the east curb ramp does not line up directly with the crosswalk. The curb ramp is on an angle that would discharge pedestrians into the roadway outside of the marked crossing. A pedestrian using such a ramp may enter the intersection outside of the marked crosswalk, or a visually impaired person is aimed away from the crosswalk and into traffic. This proves especially difficult for wheelchairs as the person would have to redirect themselves after exiting the curb ramp to remain within the confines of the crosswalk. Future consideration should be give to re-aligning the curb ramp so that it lines up with the crosswalk.

West College Crosswalk



North Curb Ramp



South Curb Ramps

The curb ramps at the West College crosswalk should be retro-fitted with a detectable warning surfaces consisting of truncated domes. With the relocation of the existing crosswalk to the southwest corner and the addition of a marked crosswalk across the College Place approach the southwest corner should have an adequate curb ramp design with detectable surfaces for the use of both crosswalks.

East College Crosswalk



North Curb Ramp



South Curb Ramp

The curb ramps at the East College crosswalk appear to have had the truncated domes stamped into the concrete when the curb ramp was constructed. These domes have since become worn down and have lost their functionality. The curb ramps at the East College crosswalk should be retro-fitted with a detectable warning surfaces consisting of truncated domes.

4.8 Alternative Treatments

Several other treatments are currently in use around the country that aim to increase the safety and efficiency of mid-block crossings. These items vary in terms of the necessary construction and cost to install these improvements as well as future maintenance considerations. These items are provided as recommendations for future consideration.

Pavement Legends

Similar to word pavement markings on the roadway pavement legends for pedestrians are placed on the roadway at each end of the crosswalk to be legible to pedestrians as they are waiting to cross. These markings are there to encourage the pedestrian to be observant and look in each direction for oncoming traffic before crossing. The cost for this improvement would be low as it could be done as part of striping the crosswalk. It should be noted that this type of marking and its use on roadways is not discussed in the **OMUTCD**.

Overhead Mounted Signs

An option to improve the visibility of signs in areas where it is difficult to see side mounted signs along the roadway would be to install the warning signs overhead. This is accomplished through mounting the sign on either span wire or mast arms. This would improvement would have considerable costs due to the necessary materials involved and the construction of the installation.

Textured Surfaces

Constructing crosswalks with stamped concrete or asphalt as well as brick pavers laid in a pattern can increase driver awareness of pedestrian activity by improving visibility and creating a different audible tone. The textured surface helps make the crossing stand out better. Textured surfaces can provide a tactile cue to people with sight impairment, but care should be taken to assure that there is also a tactile cue that a person is leaving the sidewalk to cross the street. This would also be a high cost improvement as reconstruction of the roadway would be necessary to install a textured crosswalk.

Street Lighting

Providing adequate levels of lighting that are oriented toward pedestrian activity improves conditions for drivers to see pedestrians. Pedestrians feel safer in such environments. This is a high cost application with regular maintenance concerns.

In-Pavement Markers with Automated Detection

In-pavement raised markers are an option that is designed to increase the motorist's attentiveness when approaching a marked crosswalk occupied by pedestrians. With this treatment the crosswalk is lined with durable encased raised pavement markers. Most treatments now use amber LED strobe lighting in the raised pavement markers to alert drivers that they are approaching an occupied crosswalk. The LED's can be activated either by pushbuttons or by an automatic detection system. The most common automatic detection method is the use of bollards with infrared sensors that cover the entrance to the crosswalk. Microwave and video based technology has also been employed to serve this purpose. Automatic detection is recommended with this treatment as the pedestrian still needs to be alert for oncoming traffic as they enter the roadway. The pushbutton application can give a false sense of security to the pedestrian as they activate the crosswalk and then enter the street assuming that oncoming traffic has recognized the activity in the crosswalk and has stopped. This treatment can not be used in conjunction with any yield sign controlled crosswalks as per the standards found in the **OMUTCD**. This is a high cost treatment due to the roadway construction for installation as well as for maintenance.

Anti-Skid Pavement Surfacing

Anti-skid pavement surfacing is a treatment of the roadway surface that improves skid resistance especially when the roadway is experiencing wet conditions. This treatment is aimed at reducing the braking distances of vehicles. This would be done in advance of a crosswalk typically where vehicles are expected to be braking for pedestrian activity in the crosswalk.

Warning Beacons

Warning beacons can be used as a supplemental emphasis to pedestrian warning signs and as an emphasis for the presence of mid-block crosswalks. A Warning Beacon shall consist of one or more signal sections of a standard traffic signal face with a flashing circular yellow signal indication in each signal section. A Warning Beacon is to be used only to supplement an appropriate warning or regulatory sign. The beacon shall not be included within the border of the any sign except for school speed limit signs. Warning beacons can be used as part of a side of the road mounted assembly or as part of an overhead assembly.

HAWK Signals

To increase pedestrian safety at school crossing locations, the City of Tucson developed a traffic signal called the HAWK (High-intensity Activated crossWalk). The HAWK uses traditional traffic and pedestrian signal heads but in a different configuration. It includes a sign instructing motorists to “stop on red” and a “pedestrians” overhead sign. There is also a sign informing pedestrians on how to cross the street safely.

When not activated, the signal is blanked out. The HAWK signal is activated by a pedestrian push button. The overhead signal begins flashing yellow and then solid yellow, advising drivers to prepare to stop. The signal then displays a solid red and shows the pedestrian a “Walk” indication. Finally, an alternating flashing red signal indicates that motorists may proceed when safe, after coming to a full stop. The pedestrian is shown a flashing “Don’t Walk” with a countdown indicating the time left to cross. The following photo shows a HAWK signal installation.



HAWK Signal

This is a new treatment that is up for approval at the Federal level that will be allowed in the next revision of the **MUTCD**. Ohio is also considering them for use in the **OMUTCD**. The HAWK signal could be considered as possible future improvement.

5. CONCLUSIONS

Based on the results of the field review and analyses, we offer the following conclusions and recommendations:

- 5.1 There are five mid-block crosswalks located in the downtown area of Oberlin, Ohio. The five locations are the North Main, South Main, Old City Hall, West College, and East College crosswalks.
- 5.2 The weekday AM peak hour of vehicular traffic was determined to be 9:00 AM to 10:00 AM and the PM peak hour of vehicular traffic was determined to be 4:00 PM to 5:00 PM. The weekday peak hour of pedestrian traffic was determined to be from 12:00 PM to 1:100 PM. These three periods were analyzed since they reflect the periods of the highest volume of traffic flow for the roadway in terms of both vehicles and pedestrians.
- 5.3 The mid-block crossings are justified based upon the observed pedestrian volumes, the adjacent land uses, the layout and availability of parking spaces. The existing locations and spacing of these mid-block crosswalks is justified due to the spacing between the signalized intersections and the density of the development along the Main Street and College Street corridors.
- 5.4 The sign combination of the pedestrian warning sign (W11-2) and the arrow plaque (W16-7p) is recommended to be located at all crosswalks facing each direction of travel. The yield to pedestrian within crosswalk sign (R1-5) is an adequate alternative option to use at these crosswalks.
- 5.5 To prevent sign clutter and overuse of the advance warning combination (W11-2 & W16-9p), advance warning sign combinations are only being recommended before the first crosswalk a motorist would encounter while traveling through the College Street and Main Street corridors. The advance warning signs are recommended to be located just south of Lorain Street for southbound Main Street, north of Vine Street for northbound Main Street, east of Professor Street for eastbound College Street, and west of Pleasant Street for westbound College Street. The use of word on pavement markings is recommended at the locations of these advance warning signs. This would consist of PED XING being marked on the roadways at the four locations.

- 5.6 To provide a higher degree of visibility to motorists that there are marked mid-block crosswalks two alternative methods of striping the crosswalks are recommended. The first method would be to continue to use the parallel lines that are perpendicular to the roadway with the area between the lines filled in with diagonal white lines. The second method would be to use longitudinal lines parallel to the traffic flow to mark the crosswalk.
- 5.7 The West College crosswalk should be relocated so that it runs between the southwest and northwest quadrants of the West College Street and College Place intersection. A crosswalk should also be striped across the College Place approach.
- 5.8 The implementation of yield lines on the roadways, on each side of the crosswalks is recommended. These lines (shark teeth) would indicate the point in the roadway where motorists are supposed to yield in compliance with a Yield to Pedestrian sign (R1-5). The yield to pedestrian sign (R1-5) would need to be installed at each yield line.
- 5.9 The first parking space on each of side of the crosswalk along the east side of North Main Street should be eliminated. The first parking space along the north side of West College Street on each side of the crosswalk should be eliminated. The first parking space along the north side of East College Street on each side of the crosswalk should be eliminated. To ensure vehicles do not park in these areas the curbs should be painted yellow like the west side of North Main Street at the crosswalk.
- 5.10 To improve the visibility for both the pedestrian and motorists bump outs (curb extensions) could be constructed at the West College, North Main, and East College crosswalks. Bump outs are an extension of the sidewalk area across the parking lanes to the edge of the travel lanes. These bump outs improve the visibility of pedestrians waiting to cross by bringing them closer to the center of the driver's cone of vision and by minimizing the impact of parked vehicles on pedestrian visibility. This feature would narrow the distance of the road that a pedestrian has to cross. A shorter distance to cross would lessen the amount of time a pedestrian is in the roadway.
- 5.11 The curb ramp on the east side of the Old City Hall crosswalk should be reconfigured so that it lines up directly with the crosswalk.
- 5.12 The curb ramps at all five crosswalk locations should be retro-fitted with detectable warning surfaces consisting of truncated domes.

APPENDIX A TRAFFIC COUNTS

VEHICULAR TRAFFIC COUNT SUMMARY

Municipality: Oberlin At Intersection of: Crosswalk at North Main Street and between Lorain Street & College Street
 Date: 9/20/2007 Day: Thu. Comments: _____ Project: 07-060
 Weather: Clear Recorder(s): JAD Date entered: Sep-26-2007
 Data entry by: JJO J Main St between Lorain Street & Collee

TIME BEGINS	N. Main St. FROM NORTH				N. Main St. FROM SOUTH				TOTAL NORTH SOUTH		Pods FROM EAST				FROM WEST				TOTAL EAST WEST		TOTAL ALL DIREC.				PEAK HOUR FACTOR						
	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	North	South	East	West	North	South	East	West	
06:00																															
07:00	0	194	0	194	17	4	0	261	0	261	14	9	0	9	0	0	0	0	0	0	0	0	0	0.915	0.777	0.281		0.915	0.777	0.281	
08:00	0	277	0	277	13	6	0	256	0	256	27	5	0	30	0	0	0	0	0	0	0	0	0.824	0.853	0.500		0.824	0.853	0.500		
09:00	0	244	0	244	15	1	0	296	0	296	21	4	0	41	0	0	0	0	0	0	0	0	0.953	0.881	0.603		0.953	0.881	0.603		
10:00																															
11:00	0	321	0	321	28	3	0	316	0	316	22	3	0	26	0	0	0	0	0	0	0	0	0.922	0.814	0.542		0.922	0.814	0.542		
12:00	0	341	0	341	15	2	0	310	0	310	17	1	0	57	0	0	0	0	0	0	0	0	0.897	0.842	0.838		0.897	0.842	0.838		
1:00	0	278	0	278	18	4	0	350	0	350	24	2	0	56	0	0	0	0	0	0	0	0	0.790	0.911	0.667		0.790	0.911	0.667		
2:00																															
3:00	0	352	0	352	16	5	0	353	0	353	11	3	0	30	0	0	0	0	0	0	0	0	0.907	0.849	0.750		0.907	0.849	0.750		
4:00	0	390	0	390	18	2	0	386	0	386	15	5	0	43	0	0	0	0	0	0	0	0	0.841	0.854	0.632		0.841	0.854	0.632		
5:00	0	334	0	334	11	0	0	296	0	296	9	1	0	15	0	0	0	0	0	0	0	0	0.888	0.871	0.625		0.888	0.871	0.625		
6:00																															
7:00																															
8:00																															
9:00																															
TOTALS	0	2731	0	2731	151	27	0	2824	0	2824	160	33	0	307	0	0	0	0	0	0	0	0	307	0	0	0	307	5862			
ADT	0	4228	0	4228	6.5%		0	4372	0	4372	6.8%		0	475	0	0	0	0	0	0	0	0	475	0	0	0	475	9074			

HOURLY FACTOR: 1.72 MONTHLY FACTOR: 0.90 COMBINED FACTOR: 1.55

TMS ENGINEERS, INC.
 45-47 Hudson Drive
 Show, Ohio 44224
 (330) 686-6402 FAX: (330) 686-6417

VEHICULAR TRAFFIC COUNT SUMMARY

Municipality: Oberlin At Intersection of: 29 South Main Street and Crosswalk-Army/Navy Store
 Date: 9/18/2007 Day: Tue. Comments: _____ Project: 07-060
 Weather: Clear Recorder(s): EBS Date entry by: JJO Date entered: Sep. 20, 2007
 29 S. Main St Crosswalk 091807

TIME BEGIN	South Main St. FROM NORTH					South Main St. FROM SOUTH					TOTAL NORTH SOUTH			FROM EAST					FROM WEST					TOTAL EAST WEST			TOTAL ALL DIREC.			PEAK HOUR FACTOR						
	Left	Thru	Right	Total	Bus	Left	Thru	Right	Total	Bus	Left	Thru	Right	Total	Bus	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus	North	South	East	West	North	South	East	West	
06:00																																				
07:00	0	213	0	213	5	0	268	0	268	13	481	0	2	0	2	0	0	2	0	2	0	0	0	2	0	2	0	0	0.873	0.770			483	0.854	0.902	0.500
08:00	0	263	0	263	4	0	285	0	285	4	548	0	10	0	10	0	0	10	0	10	0	0	0	10	0	10	0	0	0.870	0.897			558	0.870	0.897	0.500
09:00	0	261	0	261	3	0	286	1	287	3	548																						583			0.583
10:00																																				
11:00	0	320	0	320	2	0	291	0	291	4	611	0	42	0	42	0	0	42	0	42	0	0	0	42	0	42	0	0	0.899	0.866			653	0.899	0.866	0.700
12:00	1	380	0	381	2	0	339	0	339	5	720	0	81	0	81	0	0	81	0	81	0	0	0	81	0	81	0	0	0.794	0.848			801	0.794	0.848	0.610
1:00	0	372	0	372	4	0	313	0	313	3	685	0	45	0	45	0	0	45	0	45	0	0	0	45	0	45	0	0	0.894	0.889			730	0.894	0.889	0.750
2:00																																				
3:00	0	427	0	427	2	0	300	0	300	3	727	0	47	0	47	0	0	47	0	47	0	0	0	47	0	47	0	0	0.882	0.915			774	0.882	0.915	0.618
4:00	0	467	0	467	8	0	344	0	344	8	811	0	33	0	33	0	0	33	0	33	0	0	0	33	0	33	0	0	0.927	0.851			844	0.927	0.851	0.688
5:00	0	420	1	421	18	0	319	0	319	1	740	0	48	0	48	0	0	48	0	48	0	0	0	48	0	48	0	0	0.957	0.961			788	0.957	0.961	0.706
6:00																																				
7:00																																				
8:00																																				
9:00																																				
TOTALS	1	3123	1	3125	31	0	2745	1	2746	44	5871	0	343	0	343	0	0	343	0	343	0	0	0	343	0	343	0	0					6214			
ADT	2	4942	2	4945	7.8%	0	4344	2	4345	8.8%	9290	0	543	0	543	0.0%	0	543	0	543	0.0%	0.0%	0	543	0	543	0.0%	0.0%					9833			

HOURLY FACTOR: 1.72 MONTHLY FACTOR: 0.92 COMBINED FACTOR: 1.58

TMS ENGINEERS, INC.
 45-47 Hudson Drive
 Show, Ohio 44224
 (330) 686-6402 FAX: (330) 686-6417

Figure #:
 Page #:

VEHICULAR TRAFFIC COUNT SUMMARY

Municipality: Oberlin At Intersection of: 69 South Main Street and Crosswalk-Old City Hall
 Date: 9/14/2007 Day: Fri. Comments: _____ Project: 07-060
 Weather: Clear Recorder(s): EBS & JAD Date entry by: JJO Date entered: Sep. 20, 2007
 69 S. Main St Crosswalk 091407

TIME BEGINS	South Main St. FROM NORTH				South Main St. FROM SOUTH				TOTAL NORTH SOUTH		Peds. FROM EAST				Peds. FROM WEST				TOTAL EAST WEST			TOTAL ALL DIREC.			PEAK HOUR FACTOR							
	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	North	South	East	West							
06:00																																
07:00	0	231	0	231	15	3	0	319	0	319	13	13	550	0	12	0	12	0	0	0	0	6	0	0	0	0	18	568	0.731	0.886	0.333	0.500
08:00	0	251	0	251	14	3	0	296	0	296	23	1	547	0	9	0	9	0	0	0	0	3	0	0	0	0	12	559	0.826	0.804	0.750	0.375
09:00	0	312	0	312	23	1	0	317	0	317	36	6	629	0	26	0	26	0	0	0	0	1	0	1	0	0	27	656	0.813	0.943	0.650	0.250
10:00																																
11:00	0	381	0	381	25	3	0	344	0	344	27	3	725	0	29	0	29	0	0	0	0					29	754	0.925	0.804	0.558		
12:00	0	413	0	413	21	0	0	393	0	393	22	2	806	0	41	0	41	0	0	0	0	2	0	2	0	0	43	849	0.846	0.877	0.513	0.500
1:00	0	401	0	401	20	6	0	359	0	359	21	1	760	0	30	0	30	0	0	0	0					30	790	0.928	0.863	0.750		
2:00																																
3:00	0	476	0	476	18	6	0	382	0	382	20	4	858	0	28	0	28	0	0	0	0					28	886	0.875	0.901	0.700		
4:00	0	519	0	519	10	2	0	430	0	430	10	7	949	0	34	0	34	0	0	0	0	1	0	1	0	0	35	984	0.877	0.881	0.773	0.250
5:00	0	488	0	488	13	1	0	389	0	389	5	5	877	0	12	0	12	0	0	0	0					12	889	0.953	0.935	0.500		
6:00																																
7:00																																
8:00																																
9:00																																
TOTALS	0	3472	0	3472	159	25	0	3229	0	3229	177	42	6701	0	221	0	221	0	0	0	0	13	0	13	0	0	234	6935				
ADT	0	5196	0	5196	5.3%		0	4832	0	4832	6.8%		10027	0	331	0	331	0	0.0%	0.0%	0	19	0	19	0	0.0%	350	10378				

HOURLY FACTOR: 1.72 MONTHLY FACTOR: 0.87 COMBINED FACTOR: 1.50

TMS ENGINEERS, INC.
 45-47 Hudson Drive
 Show, Ohio 44224
 (330) 686-6402 FAX: (330) 686-6417

VEHICULAR TRAFFIC COUNT SUMMARY

Municipality: Oberlin At Intersection of: 37 West College Street and Crosswalk-Oberlin Bookstore

Date: 9/18/2007 Day: Tue. Comments: Project: 07-060

Weather: Clear Recorder(s): JAD Date entry by: JJO Date entered: Sep. 20, 2007

37 W. College St Crosswalk

TIME BEGINS	Peds. FROM NORTH						Side Street FROM SOUTH			TOTAL NORTH SOUTH			West College St. FROM EAST						West College St. FROM WEST						TOTAL EAST WEST			TOTAL ALL DIREC.			PEAK HOUR FACTOR													
	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus	North	South	East	West										
06:00																																												
07:00	0	10	0	10	0	0	5	0	3	8	0	0	7	48	0	55	5	0	0	93	9	102	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
08:00	0	26	0	26	0	0	3	0	4	7	0	0	14	100	0	114	3	3	0	112	6	118	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
09:00	0	53	0	53	0	0	11	0	10	21	0	0	18	109	0	127	2	7	0	140	15	155	3	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
10:00																																												
11:00	0	102	0	102	0	0	13	0	12	25	0	0	9	65	0	74	2	0	0	112	12	124	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
12:00	0	117	0	117	0	0	23	0	29	52	0	0	16	84	0	100	2	0	0	128	21	149	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1:00	0	103	0	103	0	0	14	0	18	32	0	0	17	96	0	113	4	0	0	127	16	143	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2:00																																												
3:00	0	103	0	103	0	0	16	0	15	31	0	0	15	103	0	118	3	2	0	153	19	172	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4:00	0	101	0	101	0	0	16	0	15	31	0	0	17	113	0	130	1	2	0	159	8	167	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
5:00	0	94	0	94	0	0	10	0	11	21	0	0	11	98	0	109	0	0	0	122	13	135	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6:00																																												
7:00																																												
8:00																																												
9:00																																												
TOTALS	0	709	0	709	0	0	111	0	117	228	0	0	124	816	0	940	22	14	0	1146	119	1265	23	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
ADT	0	1122	0	1122	0.0%	0.0%	176	0	185	361	0.0%	0.0%	196	1291	0	1457	3.8%	3.1%	0	1813	188	2002	3.1%	3.1%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		

HOURLY FACTOR: 1.72 MONTHLY FACTOR: 0.92 COMBINED FACTOR: 1.55

TMS ENGINEERS, INC.
 45-47 Hudson Drive
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Figure #:
Page #:

VEHICULAR TRAFFIC COUNT SUMMARY

Municipality: Oberlin At Intersection of: 27 East College Street and Crosswalk
 Date: 9/20/2007 Day: Thu. Comments: _____ Project: 07-060
 Weather: Clear Recorder(s): EBS Date entry by: JJO Date entered: Sep. 26, 2007 27 E. College St & Crosswalk, 092007

TIME BEGINS	Peds.												27 E. College St. FROM EAST				27 E. College St. FROM WEST				TOTAL EAST WEST				TOTAL ALL DIREC.				PEAK HOUR FACTOR																																								
	FROM NORTH						FROM SOUTH						TOTAL	Thru	Right	Trk	Bus	TOTAL	Thru	Right	Trk	Bus	TOTAL	Thru	Right	Trk	Bus	TOTAL	Thru	Right	Trk	Bus	North	South	East	West																																	
	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus																									Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus	Left	Thru	Right	Total	Trk	Bus															
06:00																																																																					
07:00	0	1	0	1	0	0																	0	39	0	39	2	1	0	69	0	69	2	5	108	109	0.250	0.609	0.719																														
08:00	0	9	0	9	0	0							0	105	0	105	2	2	0	129	0	129	6	6	234	243	0.450	0.905	0.849																																								
09:00	0	26	0	26	0	0							0	160	0	160	5	6	0	143	0	143	2	7	303	329	0.542	0.952	0.872																																								
10:00																																																																					
11:00	0	28	0	28	0	0							0	114	0	114	2	3	0	140	0	140	3	3	254	282	0.700	0.663	0.833																																								
12:00	0	28	0	28	0	0							0	154	0	154	2	0	0	164	0	164	2	5	318	346	0.700	0.802	0.820																																								
1:00	0	29	0	29	0	0							0	127	0	127	4	1	0	157	0	157	3	2	284	313	0.806	0.738	0.835																																								
2:00																																																																					
3:00	0	28	0	28	0	0							0	176	0	176	5	6	0	170	0	170	8	3	346	374	0.778	0.698	0.850																																								
4:00	0	26	0	26	0	0							0	167	0	167	0	1	0	194	0	194	4	3	361	387	0.650	0.928	0.898																																								
5:00	0	5	0	5	0	0							0	107	0	107	1	0	0	147	0	147	2	1	254	259	0.625	0.892	0.835																																								
6:00																																																																					
7:00																																																																					
8:00																																																																					
9:00																																																																					
TOTALS	0	180	0	180	0	0							180	1149	0	1149	23	20	0	1313	0	1313	32	35	2462	2642																																											
ADT	0	279	0	279	0.0%								279	1779	0	1779	3.7%		0	2033	0	2033	5.1%		3811	4090																																											

HOURLY FACTOR: 1.72 MONTHLY FACTOR: 0.90 COMBINED FACTOR: 1.55

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TRAFFIC ENGINEERING STUDY

VARIOUS CROSSWALK LOCATIONS OBERLIN, OHIO

NOVEMBER 14, 2007

Prepared For:

OBERLIN MUNICIPAL LIGHT & POWER
289 SOUTH PROFESSOR STREET
OBERLIN, OHIO 44074

Prepared By:

TMS ENGINEERS, INC.
4547 HUDSON DRIVE
STOW, OHIO 44224

"This document was prepared consistent with local agency requirements and/or applicable guidelines contained in this report."

