# TRAFFIC STANDARDS

## 5.00 DESIGN STANDARDS

### 5.01 PURPOSE

These standards outline and define the current traffic design standards**,** including illumination, signals, bicycle facilities, roundabouts, medians, roadside features, parking design, transit stops, and miscellaneous items for Springfield. These design standards may be subject to revisions by the City Traffic Engineer on a project-by-project basis. All construction standards and drawings for transportation related items are defined in the Springfield Construction Standard Specifications Sections 317, 501, and 502, and Standard Drawings 5-1 to 5-25. All designs shall be performed by an engineer capable of performing such work and licensed by the State of Oregon. Any private streets shall be designed to the public facility standards. All public streets are considered Fire Department emergency apparatus access streets and shall meet the Fire Code minimum design standards. Private streets may or may not be considered Fire Department emergency apparatus access streets as determined by the Fire Marshal.

### 5.02 GENERAL DESIGN CONSIDERATIONS

#### 5.02.1 Illumination

##### 5.02.1.A General

As part of the public improvement process, a street illumination design shall be included with all project plans submitted to the City as well as a power plan from the Springfield Utility Board (SUB). The street illumination design shall clearly show where the luminaires, conduit runs, junction boxes, service cabinets, and power sources will be located. Each lighting component shall be identified using the Oregon Department of Transportation drafting symbol library and the corresponding legend. Submitted plans shall follow the City of Springfield Standard Specifications and Standard drawings related to illumination.

Lighting plans shall be submitted on a sheet devoted exclusively to street light work. All illumination plans shall be reviewed and approved by the Transportation Section.

##### 5.02.1.B Design Standards

The lighting plan design shall utilize Oregon Department of Transportation (ODOT) drafting standards. The plans shall include symbols indicating such features as: conduit, wiring, junction boxes, power sources, poles, luminaires, luminaire arms, and all the relevant sizes and locations required to accurately construct the lighting system. For street lighting drafting typical, refer to the City's latest edition of Standard Construction Specifications and the ODOT drafting symbol/legend library.

The City standard for street illumination is:

A. Street lighting designs shall be prepared by an engineer capable of performing such work. The engineer shall be licensed by the State of Oregon. Lighting plans shall be submitted on a sheet devoted exclusively to street light work. The lighting plans shall also include wire size calculations and circuit diagrams. Lighting systems shall comply with the provisions of the National Electric Service Code (NESC). A space shall be provided for

a chart listing the specific location (geographic coordinates), address, pole number, pole owner, manufacturer's name and catalog numbers for each type of fixture, lamp, ballast and photocell in the project on the plan sheet. This chart shall be completed when preparing the as-built plans. Lighting circuits shall be designed to reduce the number of utility connection points.

B. Lights shall be located in accordance with the Illumination Standards Table (Table 5-1). In cases that are not defined in Table 5-1 a photometric evaluation of the pole spacing shall be made using accepted procedures and illumination levels in Illuminating Engineering Society, American National Standard Practice for Roadway Lighting – RP-8, most current edition.

C. Intersections shall be illuminated to a level equal to the sum of the average maintained required illuminance of the two intersecting streets.

D. Mid-block crosswalks that are approved by the City Traffic Engineer shall have two times the illumination required for the intended streets.

E. Decorative poles and fixtures shall be used on all streets within any Nodal Development Area designation or Nodal Overlay district, where any refinement plans require decorative lighting, and all off street public access ways and multi-use paths. Decorative poles and fixtures may be used on local streets in any zone at the option of the land developer. All decorative fixtures shall use metal halide lamps.

F. Roadway style "cobra head" fixtures, on standard poles, shall be used in all other locations. Metal halide or high pressure sodium lamps shall be used as follows:

1. Metal halide lamps shall be used on all Bus Rapid Transit corridors; zones of Community Commercial, Major Retail Commercial, Campus Industrial, Light Medium Industrial, Booth Kelly Mixed Use, High Density Residential, and Medical Service.

2. Public Land and Open Space zones shall use the lighting type described in this Manual regarding adjacent zones so that a continuous light type is achieved.

3. Zones of Medium Density Residential, Low Density Residential, Neighborhood Commercial, Light Medium Industrial, Special Heavy Industrial, Heavy Industrial, General Office, and Quarry/Mining shall use high pressure sodium lamps.

4. As other zones or overlay districts may be established, the City Traffic Engineer will determine the lighting type based on similarity to the zones list above and record it on the "Street Light Type by Zone Map".

G. When roadway style poles are used on arterial and collector streets, they shall be steel or aluminum.

H. When roadway style poles are used on local and collector streets in residential areas, they shall be fiberglass, steel, or aluminum.

The only time wood poles will be permitted is when replacing damaged poles or when installing additional lighting in an area that has wood poles used throughout to maintain consistency. If used, wood poles shall be class 4 pressure treated poles.

I. Poles shall be placed at least 3 feet from the face of curb. Luminaire arms shall be aligned at right angles from the curb line.

J. In areas where lot frontage is 80 feet or less, poles shall be located at or near property lines when possible.

K. Conduits shall be electrical PVC with a minimum size of 1 inch. Street crossings shall have a 1.5 inch minimum diameter. All conduit runs shall be clearly indicated on the plans showing the route from the power source (typically a SUB vault) to the street light.

L. Junction boxes shall be placed near the base of each light as shown in Standard Drawing 5-22 (SD 5-22). All junction boxes used for the street lighting system shall have the words STREET LIGHTING displayed on the lid. (See Section 502 of the Springfield Standard Specifications for additional details.) Junction boxes shall not be placed in sidewalks or ramps. If there are more than four (4) conduit stubs in the junction box, a junction box number 2 shall be used. Junction boxes located in the travel way shall be traffic load bearing junction boxes.

M. All electrical conductors shall be copper, THWN with a minimum size of Number 12 AGW.

N. When a service cabinet with a master photoelectric cell is provided, the service cabinet shall provide a photoelectric cell bypass/test switch, and contactor(s).

O. Luminaire poles shall not be placed along the outside of curves.

P. A manufacturer's specification 'catalog cut sheet' shall be submitted for all materials for city review and approval prior to installation.

Q. All new City street light poles shall have City pole tags installed on the pole 6 feet from ground level and facing the street or multi-use path that the light is on. The pole tags are provided by the City by contacting the Springfield Transportation Section. Use approved methods and materials for attachment.

R. Conduit Plug – Wire Theft Deterrent
All new street lights shall be constructed with wire theft deterrents. Wire shall be glued inside the conduit to a depth of 8 inches at every conduit stub up at underground junction boxes. The conduit leading to the pole base shall not be glued. Conduit larger than 1 inch shall have approved polyester or fiberglass filler material installed 8 inches below the stub up end to prevent the adhesive from slumping. The proposed street lighting design shall include a note directing the contractor to install wire theft deterrents.

Construction adhesive meeting the following requirements shall be used._Approved

manufacturer: PL Sealants – PL Premium Polyurethane Construction Adhesive

S. Electrical Circuit Identification

A tag shall be attached to each conduit entering underground junction boxes. The following information shall be written on the tag with permanent marker: Voltage – 120 or 208 or 240; Circuit – Alpha or Numeric as shown on the plan set; Power Source – Utility name and pole or transformer number, distance from power source, and compass direction to source. The proposed street lighting design shall include a note directing the contractor to include lighting circuit identification tags.

Approved manufacturer: Brady – Yellow Color-Code Plasti-Tags Catalog # 56926, 3-1/2" H x 2-1/2" W, 10 Mil Plastic, with nylon tie.

## 5.02.1.C Street Light Spacing

Street lighting shall be engineered and designed to reflect the level of illuminance listed in Table 5-1. Weak point light = 0.1 foot candles minimum.

**Table 5-1: Average Maintained Horizontal Illuminance[1]**
**For Street and Pedestrian Facilities**

| **High Pressure Sodium Lamps** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | **Concrete R1** | | | **Asphalt R3** | | |
| **Street Classification** | **Pole Height** | **Area Class** | **Foot-Candles Required** | **Ave/Min** | **Lamp/Spacing** | **Foot-Candles Required** | **Ave/Min** | **Lamp/Spacing** |
| Arterial 72' Street (2 Poles Opposite) | 35' | Commercial | 1.2 | 3:1 | **250w @ 210'** | 1.7 | 3:1 | **250w @ 170'** |
| | 35' | Intermediate | 0.9 | 3:1 | **200w @ 210'** | 1.3 | 3:1 | **250w @ 210'** |
| | 35' | Residential | 0.6 | 3:1 | **150w @ 210'** | 0.9 | 3:1 | **200w @ 210'** |
| Collector 48' Street (poles on same side) | 35' | Commercial | 0.8 | 4:1 | **250w @ 210'** | 1.2 | 4:1 | **250w @ 170'** |
| | 35' | Intermediate | 0.6 | 4:1 | **200w @ 210'** | 0.9 | 4:1 | **250w @ 210'** |
| | 30' | Residential | 0.4 | 4:1 | **150w @ 200'** | 0.6 | 4:1 | **150w @ 190'** |
| Local 36' Street (poles on same side) | 30' | Commercial | 0.6 | 6:1 | **150w @ 210'** | 0.9 | 6:1 | **200w @ 210'** |
| | 30' | Intermediate | 0.5 | 6:1 | **150w @ 210'** | 0.7 | 6:1 | **150w @ 210'** |
| | 30' | Residential | 0.3 | 6:1 | **100w @ 210'** | 0.4 | 6:1 | **100w @ 200'** |
| Local 28' Street (poles on same side) | 30' | Commercial | 0.6 | 6:1 | **150w @ 210'** | 0.8 | 6:1 | **200w @ 210'** |
| | 30' | Intermediate | 0.5 | 6:1 | **150w @ 210'** | 0.7 | 6:1 | **150w @ 210'** |
| | 30' | Residential | 0.3 | 6:1 | **100w @ 210'** | 0.4 | 6:1 | **100w @ 210'** |

Areas with pole set behind sidewalks - 8' arm length
Areas with poles set between curb and sidewalk or in sidewalk - 6' arm length

| Metal Halide Lamps | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | Concrete R1 | | | Asphalt R3 | | |
| **Street Classification** | **Pole Height** | **Area Class** | **Foot-candles Required** | **Ave/Min** | **Lamp/Spacing** | **Foot-candles Required** | **Ave/Min** | **Lamp/Spacing** |
| Arterial 72' Street (2 Poles Opposite) | 35' | Commercial | 1.2 | 3:1 | **400w @ 180'** | 1.7 | 3:1 | **400w @ 180'** |
| | 35' | Intermediate | 0.9 | 3:1 | **250w @ 180'** | 1.3 | 3:1 | **400w @ 180'** |
| | 35' | Residential | 0.6 | 3:1 | **150w @ 180'** | 0.9 | 3:1 | **250w @ 180'** |
| Collector 48' Street (poles on same side) | 35' | Commercial | 0.8 | 4:1 | **400w @ 210'** | 1.2 | 4:1 | **400w @ 180'** |
| | 35' | Intermediate | 0.6 | 4:1 | **400w @ 210'** | 0.9 | 4:1 | **400w @ 210'** |
| | 30' | Residential | 0.4 | 4:1 | **150w @ 160'** | 0.6 | 4:1 | **150w @ 160'** |
| Local 36' Street (poles on same side) | 30' | Commercial | 0.6 | 6:1 | **150w @ 170'** | 0.9 | 6:1 | **250w @ 170'** |
| | 30' | Intermediate | 0.5 | 6:1 | **150w @ 170'** | 0.7 | 6:1 | **150w @ 170'** |
| | 30' | Residential | 0.3 | 6:1 | **150w @ 170'** | 0.4 | 6:1 | **150w @ 170'** |
| Local 28' Street (poles on same side) | 30' | Commercial | 0.6 | 6:1 | **150w @ 170'** | 0.9 | 6:1 | **150w @ 150'** |
| | 30' | Intermediate | 0.5 | 6:1 | **150w @ 170'** | 0.7 | 6:1 | **150w @ 170'** |
| | 30' | Residential | 0.3 | 6:1 | **150w @ 170'** | 0.4 | 6:1 | **150w @ 170'** |

Areas with sidewalks - 8' arm length
Areas with no sidewalks - 6' arm length

| Decorative Metal Halide Lamps | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Local 36' Street (poles on same side) | 12’ | Residential | 0.3 | 6:1 | **150w @ 100'** | 0.4 | 6:1 | **150w @ 100'** |
| Local 28' Street (poles on same side) | 12’ | Residential | 0.3 | 6:1 | **150w @ 100'** | 0.4 | 6:1 | **150w @ 100'** |

| Public Access Way - Decorative Metal Halide Lamps | | | | | |
|---|---|---|---|---|---|
| Bike Paths 12' wide, (Pole 3' from edge, poles on same side) | 12’ | Access Way | .5 | 10:1 | **70w @ 120'** |

[1.] Source: *American National Standard Practice for Roadway Lighting.* ANSI/IES RP-8-00. Illuminating Engineering Society of North America.

Residential Area Class
- Low Density Residential
- Medium Density Residential
- High Density Residential
- Residential Mixed Use

Commercial Area Class
- Neighborhood Commercial
- Community Commercial
- Major Retail Commercial
- Commercial Mixed Use

Intermediate Area Class
- Booth Kelly/Mixed Use
- General Office
- Light Medium Industrial
- Light Medium Industrial/Community Commercial
- Campus Industrial
- Heavy Industrial
- Special Heavy Industrial
- Quarry/Mining
- Office Mixed Use
- Employment Mixed Use
- Residential Mixed Use

**5.02.1.D Conduit Size**

A. Conduits shall be sized according to the requirements of the National Electrical Service Code (NESC) current edition.

B. All conduit runs shall be as direct from point to point as possible, shall remain within the right-of-ways, and maintain as straight an alignment as possible.

C. The minimum conduit size shall be 1 inch. All conduits under the street shall be a minimum of 1.5 inches in diameter. Conduits placed on SUB utility poles shall require 'stand-off' mountings and need to be specified in whole inch diameters.

D. A junction box shall be included at each end of street conduit crossings.

**5.02.1.E Conductor Size**

A. A catalog cut sheet with maximum starting and operating amperages information shall be included in the plans submittal to verify the wire sizing calculations.

B. A circuit diagram and load calculations shall be included on the plan sheets at the end of the lighting construction drawings.

C. The maximum voltage drop shall be two percent from the utility to the service equipment and three percent from the service to the farthest load.

D. Any suitable method for calculating voltage drop and conductor sizes may be used. Provide reference to any source of information.

## 5.02.2 Signals

### 5.02.2.A General

Signals shall be designed as specified in this Section. Consultants shall perform traffic signal designs using current National Electric Code (NEC), AASHTO, the Manual on Uniform Traffic Control Devices (MUTCD) and the Oregon Supplement to the MUTCD. This work shall consist of furnishing and installing a complete and functional traffic control system of controllers, signals and appurtenances as required by Springfield (See Division 500 of the Springfield Standard Construction Specifications based on ODOT Standards). The locations of signals shown on the plans can be approximate; the exact locations shall be established by the Engineer of Record in the field, unless relocated by the City Traffic Engineer. Please see section 5.04 regarding intersection analyses.

### 5.02.2.B Signal Design Standards

The traffic signal design shall be submitted on a separate sheet of the project plans. The design shall clearly show the following:

A. Existing and proposed topography including edge of pavement or curb line, center lines with stationing, lane use, striping, signing, sidewalks, sidewalk ramps, right-of-way lines, street names, driveways, adjacent lots, existing and proposed trees, and other topographical features as needed.

B. Existing lighting, poles, wiring, vehicle signals, pedestrian signals, overhead signs, traffic signal controller, service equipment, and all other equipment that needs to be removed. General notes shall state what is to be removed.

C. The location and specification of traffic signal poles, underground conduit, traffic signal loops or detection zones, traffic signal wiring, junction boxes, vehicle signals, pedestrian signals, pushbuttons, pushbutton instruction signs, overhead signs, traffic signal controller, service equipment, pre-emption devices, existing power sources, and all other equipment needed to install the signal.

D. A loop detector wiring diagram showing loop number, phase, function, slot number, and notes for symbols and details used and/or video camera detection details.

E. A normal phase rotation diagram and fire preemption operation diagram for the intersection.

F. Interconnect cable.

G. Bus rapid transit priority equipment.

H. Radio communication equipment.

Each signal component shall be identified using the ODOT drafting symbol library and the

corresponding legend. Submitted plans shall follow the Springfield Standard Specifications, Drafting Standards Section 9, and Standard drawings related to traffic signals.

All public signal designs shall be prepared by an engineering firm capable of performing such work. The engineer shall be licensed by the State of Oregon.

### 5.02.2.C Induction Loops

Induction loops shall be constructed as specified in Standard Drawing 5-12.

A. Loops shall not be cut into the final lift of new asphalt.

### 5.02.2.D Conduit

A separate conduit shall be used for low voltage and high voltage circuits, such as: signal circuits, detector circuits, service wires, and 240 volt or greater illumination circuits. Metal conduit shall be coated in corrosive soil areas. Schedule 40 PVC conduit shall be used for all signal, interconnect, and lighting designs. Conduit sweeps shall conform to current ODOT standards.

### 5.02.2.E Junction Boxes

A. Junction boxes shall not be placed in sidewalks or ramps.

B. Junction boxes shall be sized to meet current ODOT standards.

C. Junction boxes located in the travel way shall be traffic load bearing junction boxes.

### 5.02.2.F Power Source

A. A separate post or pedestal shall be provided for service. Refer to current ODOT standards.

B. Power source shall be underground from power source to meter.

C. Meter and service cabinet shall be mounted as close to the controller as practical.

D. Service equipment shall not be mounted on the controller cabinet.

E. Power shall be run underground from service cabinet to controller.

## 5.03 BICYCLE FACILITIES

### 5.03.1 General

All bicycle facilities shall conform to the latest addition of the Oregon Bicycle and Pedestrian Plan, the Springfield Bicycle Plan, TransPlan, the Regional Transportation System Plan, AASHTO guidelines, and applicable Sections of the Springfield Development Code (SDC).

### 5.03.2 Design Standards

A quick reference table on bikeway standards is shown below.

**Table 5-2: Bikeway Standards**

| | |
|---|---|
| Bike Lane | 6 feet |
| Shoulder Bikeway | 6 feet |
| Multi-Use Path | 10 feet with 2 foot wide gravel shoulders on each side |
| Multi-Use Path (High Use) | 12 feet with 2 foot wide gravel shoulders on each side |
| Bike Lane Stripe | 8 inches |
| Shoulder Stripe | 4 inches |
| Vertical Clearance | 10 feet |
| Pavement Thickness | Shall be designed to withstand an 80,000lb load and withstand frost heave |

### 5.03.3 Bike Lanes

Bike lanes are implemented on urban arterial, major collector streets, and rural streets near urban areas where high potential bicycle use could be present. Bike lanes shall have an 8 inch lane stripe and thermoplastic bike stencils. Motorists are not permitted in the bike lanes for driving or parking, but may use the bike lanes for emergency maneuvers or breakdowns.

The standard width of a bike lane is 6 feet, measured from the center of the stripe to the edge of pavement. The minimum bike lane width is 4 feet on open shoulders and 5 feet from the face of a curb, guardrail or parked cars. Bike lanes wider than 6 feet may be required in areas of very high use, on high-speed facilities where wider shoulders are warranted, or where they are shared with pedestrians. Adequate markings shall be used to discourage motorists from using the bike lane as a travel-way or parking lane.

Where a bike lane is to be designed adjacent to a parking lane, its location will be reviewed and evaluated by staff on a case by case basis as there may be a variety of elements that may need to be taken into consideration.

Bike lanes on one-way streets shall be on the right side of the street, except in the case where a left bike lane would cause fewer conflicts, and the bicycle can return to the right safely.

### 5.03.4 Bicycle Parking

Refer to the SDC Sections 3.4-270G.13 and 14, and 4.140.155 for the minimum required bicycle parking spaces and additional bicycle parking standards.

### 5.03.5 Multi-Use Paths

A. A two-way multi-use path shall be a minimum width of 10 feet.

B. The path design shall include a 2 foot or greater clear distance on both sides of the multi-use path. This area shall be at the same slope as the path.

C. The overhead clearance shall be 10 feet.

D. Where a path is parallel and adjacent to a street, there shall be a 5 foot or greater width separating the path from the edge of the street, or a physical barrier of sufficient height shall be installed.

E. Multi-use paths shall be strong enough to support maintenance vehicles and emergency vehicles.

F. The maximum grade shall be 5 percent for bicycle use.

G. If a fence or railing is used along a path, the height, openings in the railing, and rub-rail requirements shall comply with AASHTO standards. Lighting shall be installed on multi-use paths. See the lighting standards for recommended illumination in Section 5.02.

### 5.03.6 Striping and Signing

A. Plastic bike stencils shall be placed after most intersections.

B. Additional stencils may be placed on long sections of street with no intersections. The correct spacing in feet is equal to the designated travel speed (mph) multiplied by 40.

C. All bicycle striping going through an intersection or crossed by high volume traffic shall be thermoplastic striping.

D. Signs shall have a 3 foot lateral clearance from the edge of the path. The bottom of signs shall be 5 feet above the path. Signs placed over a path shall have a minimum vertical clearance of 8 feet.

### 5.03.7 Protected Bikeways

If protected bikeways or "cycle tracks" are proposed, they be reviewed and approved by the City Traffic Engineer.

### 5.03.8 Other Bicycle Facilities

Other bicycle facilities may be designed such as but not limited to bicycle boulevards, lanes, routes, parking, and paths but shall be evaluated on a case by case basis to ensure the proper safety for all users.

## 5.04 INTERSECTION CONTROL

When a project includes reconstructing or constructing new intersections, all intersection control types will be evaluated using Springfield's "Intersection Control Checklist" provided in Appendix 5.A.

### 5.04.1 Roundabouts

All roundabouts on City streets shall be designed by the City of Springfield Transportation Section staff. Private developers shall arrange for these services from Springfield staff as part of their planning for developments which include a proposed roundabout.

Roundabouts shall be constructed in concrete unless otherwise approved by the City Engineer.

## 5.05 MEDIANS

### 5.05.1 General

Medians are provided to prevent accidents caused by crossover traffic, head light glare

distraction, traffic turning left from through lanes, refuge for pedestrians crossing the street, and to remove turning traffic from through lanes thereby maintaining efficient and safe traffic flow.

A median is defined as an area between traffic lanes for control of vehicle movements or for pedestrian refuge. Within the intersection area, a median or an outer separation is considered to be an island.

### 5.05.2 Median Location Criteria

A. Medians may be required on arterial and collector streets if any of the following conditions are met:

1. There are two or more through traffic lanes in each direction on the street being accessed;

2. The street being accessed has a crash rate of over one crash per million vehicle miles traveled, and currently has a two-way left turn lane or exclusive left turn lane.

3. Topography and horizontal or vertical street alignment result in inadequate left-turn intersection sight distance along a street segment and it is impractical to relocate or reconstruct the connecting approach street or it is impractical to reconstruct the street in order to provide adequate sight distance.

B. If the forecast Peak Hour Flow exceeds 600 vehicles per lane, or if the forecasted Peak Hour Flow is less than 600 vehicles per lane but the posted speed limit is 45 miles per hour or higher, a vehicular restrictive median at least 6 feet wide shall be considered.

C. A raised median pedestrian refuge island shall be considered on streets that have a posted speed limit of 30 miles per hour or higher where large pedestrian volumes and high traffic volumes make pedestrian crossings difficult. Enhanced signing, marking and beacons may be required in cases where the pedestrian is exposed to high threat traffic.

### 5.05.3 Design Standards

Landscaping and irrigation shall be installed when directed by the City Traffic Engineer. A detailed median design plan shall be included in the public improvement plan set on a separate sheet and approved by the City Traffic Engineer.

### 5.05.3.A Length of Median

The length of a median is determined based on the storage length requirements as determined in the Traffic Impact Study (T.I.S.), based on safety and/or operational efficiency needs of the street first and the access second, and as approved by the City Traffic Engineer.

The usable length of a pedestrian refuge area along a street shall not be less than 8 feet or the width of the crosswalk, whichever is greater. The median length shall not be less than 30 feet.

### 5.05.3.B Median Width

Elongated medians shall not be less than 4 feet wide. In special cases, where right-of-way is limited, elongated islands may be as narrow as 2 feet, except when used as pedestrian refuge areas.

Pedestrian refuge medians shall be at least 8 feet wide unless special circumstance limits the width possible. In no case shall a pedestrian median be less than 6 feet wide.

The minimum desirable width of a median that will accommodate a turning lane is 16 feet. Where right-of-way is limited, a median width of 12 feet can be used with a 10 foot turning lane.

Triangular medians shall be at least 75 square feet and preferably 100 square feet.

### 5.05.3.C Median Openings

Median openings that allow left turns in both directions shall be not less than 50 feet nose to nose. All median turn lanes and openings shall be designed for at least a WB50 truck, and a WB67 truck on designated truck routes.

### 5.05.3.D Median Types

The type of median shall be determined by the City Traffic Engineer.

### 5.05.3.E Visibility

Fixed objects shall not normally be permitted on medians. Planting shall be located so as not to violate sight distance standards or the turning radius of emergency apparatus.

### 5.05.3.F Access to Required Fire Features

Where access to an existing fire protection feature (i.e. fire hydrant, fire lane or other required fire protection feature) is limited by a median installation, the Fire Marshal shall be consulted in order to evaluate an equivalent fire protection feature.

## 5.06 ROADSIDE FEATURES

### 5.06.1 General

Miscellaneous features included herein shall be developed and constructed to encourage the uniform development and use of roadside features wherever possible. Any roadside facility installed in the public right-of-way shall first be permitted and reviewed by the City Traffic Engineer for safety evaluation.

### 5.06.2 Design Standards

The design and placement of roadside features included in this Section shall comply with the specific requirements listed for each feature.

### 5.06.3 Mailboxes

A. Mailbox supports shall be 4 inches by 4 inches or 4½-inch diameter wood posts, or a metal post with no greater than a 2 inch-diameter standard strength steel pipe, with a height of 42 inches to the bottom part of box, embedded no more than 24 inches into the ground with a lateral distance of 6 to 12 inches from the edge of curb, or 8 to 12 inches from edge of pavement if there is no curb. For example, a single two-pound-per-foot U-channel support would be acceptable under this structural limitation. Mailbox supports shall not be set in concrete unless the support design has been shown to be safe by crash tests.

B. Mailbox-to-post attachments shall prevent mailboxes from separating from their supports under vehicle impacts.

C. Multiple mailbox installations shall meet the same criteria as single mailbox installations. Multiple support installations shall have their supports separated a minimum distance of 4 feet above ground. This distance shall be 12 inches for a single support.

D. Neighborhood delivery and collection box units are owned by the U. S. Postal Service and are a specialized type of multiple mailbox installation that shall be located outside the clear zone.

See ODOT Standard Drawing RD 100 for Mailbox Installation drawings.

### 5.06.4 Roadside Traffic Barriers

See *AASHTO, Roadside Design Guide* for Roadside Traffic Barrier design requirements.

### 5.06.5 Signing

A. See City Standard Drawing 5-18 for sign installation details.

B. See the latest edition of the *Manual on Uniform Traffic Control* (MUTCD) and Oregon Supplements to the MUTCD for specific signs.

C. Street name signs:

1. Street name signs shall be erected to identify street intersections in both urban and rural areas. In residential districts at least one sign is required at each intersection. In business districts or on major arteries, street name signs shall be placed on diagonal corners so that they will be on the near left-hand and far right-hand side of the intersection for traffic on the major street.

2. The sign shall be white letters on a green background.

3. Street name signs shall be mounted a minimum of 9 feet above the pavement.

D. Signs shall be placed on street light poles when practicable.

## 5.07 MISCELLANEOUS

### 5.07.1 Turn Bay Lengths

The elements of a turn bay are comprised of four components which include:

$d_1$ = distance traveled during the perception-reaction time
$d_2$ = distance traveled while driver decelerates and maneuvers laterally
$d_3$ = distance traveled during full deceleration and coming to a stop
$d_4$ = storage length

The physical length of the turn bay excludes the distance traveled during perception-reaction time.

- It shall be designed so that a turning vehicle will develop a speed differential of 10 mph or less at the point it clears the through traffic.
- The length of the bay shall allow the vehicle to come to a comfortable stop prior to reaching the end of the expected queue in the turn bay.
- The deceleration/maneuver distance ($d_2 + d_3$) is found in table 5-5.
- The turn bay shall be longer than the queue in the adjacent through lane so that entry is not blocked.

Limiting conditions may only be used if approved by the City Traffic Engineer.

**TABLE 5-3: Upstream Functional Intersection Area, Excluding Storage, in Feet[(1)]**

| | Desirable Conditions | | Limiting Conditions | |
|---|---|---|---|---|
| Operating Speed (mph) | Maneuver Distance [(2) (6)] ($d_2 + d_3$) | PIEV[(3)] Plus Maneuver Dist. ($d_1 + d_2 + d_3$) | Maneuver Distance [(4) (6)] ($d_2 + d_3$) | PIEV[(5)] Plus Maneuver Dist. ($d_1 + d_2 + d_3$) |
| 20 | 70 | 130 | 70 | 100 |
| 25 | 110 | 185 | 105 | 140 |
| 30 | 160 | 250 | 145 | 190 |
| 35 | 215 | 320 | 190 | 240 |
| 40 | 275 | 395 | 245 | 305 |
| 45 | 345 | 475 | 300 | 365 |
| 50 | 425 | 570 | 365 | 440 |
| 55 | 510 | 670 | 435 | 515 |
| 60 | 605 | 780 | 510 | 600 |
| 65 | 710 | 900 | 590 | 685 |
| 70 | 820 | 1025 | 680 | 785 |

[(1)] Rounded to 5 feet
[(2)] 10 mph speed differentials, 5.8 $fps^2$ deceleration while moving from the through lane into the turn lane; 6.8 $fps^2$ average deceleration after completing lateral shift into the turn lane
[(3)] 2.0 second perception-reaction time
[(4)] 10 mph speed differential; 5.8 $fps^2$ deceleration while moving from through lane into the turn lane; 9.2 $fps^2$ average deceleration after completing lateral shift into the turn lane.
[(5)] 1.0 second perception-reaction time
[(6)] Assumes turning vehicle has "cleared the through lane" (a following through vehicle can pass without physically encroaching on the adjacent through lane) when the turning vehicle has moved laterally 10 ft. Also assumes a 12 ft. lateral movement will be completed in 3.0 seconds.

Source: *Vergil G. Stover and Frank J. Koepke, Transportation and Land Development, Institute of Transportation Engineers, Prentice-Hall, Inc., 1988, 2nd edition in preparation.*

### 5.07.2 Sight Distance

The minimum sight distance available on a street shall be sufficiently long to enable a vehicle traveling at or near the design speed to stop before reaching a stationary object in its path. Sight distance at every point along the street shall be at least that required for a below-average operator or vehicle to stop in this distance.

**Table 5-4: Clear Distance to See Sign**[1]

| Speed Limit (MPH) | Non-Critical Signs[1] (FT.) | Critical Signs[2] (FT.) |
|---|---|---|
| 30 | 150 | 250 |
| 40 | 200 | 350 |
| 50 | 250 | 450 |
| 60 | 300 | 600 |

[1] Source: *Vegetation Control for Safety*, USDOT, FHWA

[2] Critical signs are STOP, YIELD, DO NOT ENTER, ONE WAY, WRONG WAY, and other regulatory signs or warning signs. Non-critical signs are destination guide signs, parking regulations, or information signs.

Stopping sight distance shall be designed in accordance with the current standards specified in *A Policy on Geometric Design of Highways and Streets* published by AASHTO.

At intersections, a vision clearance triangle shall be maintained. In addition to AASHTO sight distance requirements, refer to SDC 4.2-130 for requirements.

### 5.07.3 Bus Turnout

A turnout is a specialized bus stop where passengers who board and de-board a bus can load in an area that is separated from the traffic lanes. Turnouts are appropriate in certain conditions. A properly marked turnout also serves as a reminder of the availability of transit service.

It is important that turnouts be properly designed with sufficient length to allow for easy and safe flow by the bus in and out of traffic. If there is a high traffic volume on the street, efficient bus operation may require that the timing of nearby traffic signals be designed to ensure that there will be sufficient gaps in the traffic to allow the bus to pull back into the traffic flow.

Safety and traffic flow are important considerations in deciding whether to install a turnout. Turnouts may be helpful on streets that function with higher speeds (over 35 miles per hour) because there is less risk of a rear-end collision while the bus is stopped to board or deboard passengers. A bus stopped at a turn out, will also not impede traffic flow, which could be a significant advantage for traffic operation on the street, particularly if the stop time is long due to high passenger activity or boardings by people who use wheelchairs and other mobility devices.

Installing turnouts on streets that function with speeds of 35 mile per hour or less shall be approached with caution. If there is high volume traffic (exceeding 600 vehicles per hour) for all or part of the day, with few gaps in traffic flow, it may take an extended amount of time for the bus to safely enter the travel lane after a stop, resulting in longer travel time for transit riders and higher operational costs. This could be mitigated by the use of traffic control signals, or queue jumpers at a nearby intersection.

Bus turnouts shall be designed as specified in the current standards in "A Policy on Geometric Design of Highways and Streets", "Guide for Design of High-Occupancy Vehicle and Public Transportation Facilities", and "Guidelines for the Location and Design of Bus Stops" published by AASHTO. The following standards are from "A Policy on Geometric Design of Highways and Streets".

The interference between buses and other traffic can be considerably reduced by providing turnouts on arterials. The bus turnout shall include a deceleration lane or taper, a standing space long enough to accommodate the maximum number of vehicles expected to occupy the space at one time, and a merging lane to reenter the travel way.

The deceleration lane shall be tapered at an angle flat enough to encourage the bus operator to pull completely clear of the through lane before stopping. A taper of 8:1, longitudinal to transverse is a desirable minimum.

The boarding area shall provide 50 feet of length for a standard bus and 60 feet of length for an articulated bus. When two or more buses that use the stop at the same time use the equation; [50'+65'(x-1)], x = number of buses. The width shall be at least 10 feet, preferably 12 feet. The merging or reentry taper shall not be sharper than 8:1.

### 5.07.4 Bus Stop Locations

A. A transit or bus stop is a designated place along a transit route where a public transit vehicle stops to allow passengers to board and deboard. General decisions about where to locate a stop are based on the following criteria:

1. Distance between Stops: The standard distance between bus stops on a standard local route is 750-1300 feet. Bus stops shall be installed when service is needed in each direction at the same intersection where practicable. Lane Transit District (LTD) can operate service most effectively by balancing customer convenience and accessibility to the service with the need to retain operational speed and efficiency.

2. Safety for Passengers: Stops are placed in areas where passengers can have a safe and direct access to sidewalks, walkways, and waiting areas. Stops shall be placed so that there is adequate sight distance between bus operators and waiting customers. A safe environment shall also be provided for all necessary operational movements. It is important for passengers with disabilities, or other needs, especially those who use wheelchairs, mobility devices or have children in strollers to have an accessible route to and from the bus door.

3. Convenient Access: In order for public transit to be effective, passengers must be able to access service that is close to major passenger destinations. It should also be easy for passengers to transfer from one bus to another, either at the same bus stop or to one on a nearby cross street.

4. Operational Characteristics: A properly developed bus stop allows for safe movement by the bus into and out of the traffic flow with a minimum of delay. If the stop is on a heavily used transit corridor, there may be a need to accommodate two or possibly more buses using the stop at the same time. Turnouts may be desirable in some cases.

B. The actual position of a bus stop from a street intersection can depend on transit operations, safety, bus riders' needs, traffic flow, parking, physical roadside constraints (trees, poles, driveways, etc.) and property concerns. There are three basic types of bus stop locations along a street: far-side, near-side, and mid-block bus stops.

Far-Side Bus Stop: A bus stop that is located immediately following an intersection and is recommended for use when:

1. Traffic in the direction the bus is traveling is heavier approaching the intersection than leaving the intersection.

2. There is a high demand for right turns in the direction the bus is traveling.

3. The crossing street is a one-way street where traffic flows from left to right.

4. A preferred bus stop length is 90 feet measured from the crosswalk to the bus stop sign.

Near-Side Bus Stop: A bus stop that is located immediately before an intersection and is recommended for use when:

1. Traffic in the direction the bus is traveling is heavier leaving the intersection than approaching the intersection.

2. The cross street is one-way where traffic flows from the right to left.

3. The location is one that offers a clear advantage for transit riders by providing improved access to a major destination or to other intersecting bus routes.

4. The preferred length is 90 feet measured from the crosswalk to the bus stop sign.

Mid-Block Bus Stop: A bus stop that is generally located 100 feet or more before or beyond an intersection and is recommended for use when:

1. Traffic or physical street characteristics prevent siting a stop close to an intersection.

2. The distance between intersections will far exceed the standard for bus stop spacing.

3. The bus stop serves large businesses, housing developments or other significant trip generators. Generally, activity is limited to the bus stop side of the street. If there is a mid-block crosswalk, the stop shall be placed on the far side of the crosswalk so motorists and pedestrians can have clear sight lines.

4. The preferred length is 100 feet measured from the crosswalk to the bus stop sign.

C. Even if a chosen bus stop location fits a recommended description for one of the types than others, both LTD and Springfield need to consider the advantages and disadvantages in their location decision. Common advantages and disadvantages of each type are listed below.

**Table 5-5: Bus Stop Locations**

**Near-Side**

| Advantages | Disadvantages |
|---|---|
| Minimizes interferences when traffic is heavy on the far side of the intersection. | Conflicts with right turning vehicles are increased. |
| Passengers access buses closest to crosswalk. | Stopped buses may obscure curbside traffic control devices and crossing pedestrians. |
| Intersection available to assist in pulling away from curb. | Sight distance is obscured for crossing vehicles stopped to the right of the bus. |
| No double stopping. | The through lane may be blocked during peak periods by queuing buses. |
| Buses can serve passengers while stopped at a red light. | Increases sight distance problems for crossing pedestrians. |
| Gives bus operator the opportunity to look for oncoming traffic including other buses with potential passengers | |

**Far-Side**

| Advantages | Disadvantages |
|---|---|
| Minimizes conflicts between right turning vehicles and buses. | Intersections may be blocked during peak periods by queuing buses. |
| Provides additional right turn capacity by making curb lane available for traffic. | Sight distance may be obscured for crossing vehicles. |
| Minimizes sight distance problems on approaches to intersection. | Increases sight distance problems for crossing pedestrians. |
| Encourages pedestrians to cross behind the bus. | Stopping far side after stopping for a red light interferes with bus operations and all traffic in general. |
| Requires shorter deceleration distances for buses. | May increase number of rear-end accidents since drivers do not expect buses to stop again after stopping at a red light. |
| Gaps in traffic flow are created for buses re-entering the flow of traffic at signalized intersections. | |

**Mid-Block**

| Advantages | Disadvantages |
|---|---|
| Minimizes sight distance problems for vehicles and pedestrians. | Requires additional distance for no-parking restrictions. |
| Passenger waiting areas experience less pedestrian congestion. | Encourages patrons to cross street at midblock (jaywalking). |
| | Increases walking distance for patrons crossing at intersections. |

D. Operating convenient, safe, and efficient transit service means that there shall be sufficient service and sufficient amounts of curb space for bus stops. Aligning a bus

parallel to a curb or street edge is important for boarding and deboarding riders, especially those who use wheelchairs, mobility devices such as walkers, child strollers or carts.

E. If a stop is located at a mid-block location on a collector or arterial street, a pedestrian actuated control device and street lighting may be required to be installed at the discretion of the City Traffic Engineer.

### 5.07.5 Bus Stop and Shelter Layout

Bus stop sign poles shall be located a minimum of 1 foot 6 inches, with 2 feet preferred, from the curb face to assure both visibility and clearance from passing vehicles.

Passenger shelters are generally placed in bus stop locations where there are 30 or more boardings per day.

## 5.08 PARKING LOT DESIGN

Parking lot design shall comply with the latest edition of the Institute of Transportation Engineers (ITE) Transportation and Land Development reference book and applicable Sections of the SDC.

## 5.09 ON STREET PARKING

On street parking shall be designed to aid in the safe and efficient mobility of pedestrians, bicyclists, and vehicles. When designing on street parking, please refer to the AASHTO 'A Policy On Geometric Design of Highways and Streets', ITE guidance, the Springfield Downtown Parking Study, the Institute of Traffic Engineers design guidance, and any relevant refinement plans.

When parking is only allowed on one side of the street, parking shall be located on the side of the street that has pedestrian amenities.