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5101 TRAFFIC DESIGN

5101.1 Traffic Signal Design Procedures

Traffic signal design shall be done according to standards set forth in ACHD's Standard Traffic Details (Section 1100), ACHD's Standard Traffic Specifications, the Manual on Uniform Traffic Control Devices (MUTCD), and good engineering practice. This policy includes existing traffic signals to be reconstructed by ACHD or under contract.

Traffic signals shall be installed only after a traffic engineering investigation or study determines that specific warrant(s) are met. Signal warrants to be considered are found in the most recently adopted edition of the MUTCD. Other intersection treatments (all-way stop control, warning sign improvements, etc.) should be considered prior to signal installation.

Roundabouts should be considered as an alternative to traffic signal installation. Guidelines for roundabout consideration in Ada County should be followed in accordance with Section 5108 of this policy.

Traffic signals may be installed as part of traffic improvement plans. Wherever feasible, signal poles, the controller cabinet and other devices installed as part of signal control should be placed at the "ultimate" location to avoid having to move them in the future. Temporary pedestrian push button poles may be necessary to address interim or ultimate conditions to accommodate pedestrian accessibility.

Signal controller cabinets and service pedestals should be placed where they will not create a sight obstruction. See ACHD's Traffic Standard Details (TS-1111) for additional information.

Traffic signals, unless otherwise directed by ACHD's Traffic Department, should have provisions for signals interconnect with adjacent traffic signals and/or ACHD's Traffic Management Center (TMC). Design for signal interconnect, when included as part of the project scope, shall include provisions for conduit and junction box installation from the controller to the project limits on all approaches with direction from ACHD's Traffic Department.

The traffic signal plan shall include appropriate signing to indicate the conditions encountered by drivers. See ACHD's Traffic Standard Details (TS-1117) for additional information. The traffic signal plan shall also be accompanied by a striping plan that extends on each intersection approach to the point where new markings match existing markings. The striping plan shall also show all driveway locations, traffic signage and on-street parking regulations within the defined section.

5101.2 Traffic Marking Design Procedures

Part 3 of the MUTCD provides standards and guidance with regard to the marking of roadways. Minor modifications and refinements are provided by ACHD policies and procedures. Particular concerns in marking design are as follows:

1. Taper Lengths

Taper rates generally apply to the development of separate left and right turn lanes. They can also refer to instances where a roadway has a change in alignment.

Guidelines for calculating taper lengths can be found in ACHD's Traffic Standard Details (TS-1112). Other appropriate reference sources include the most recently published versions of AASHTO's "A Policy on Geometric Design of Highways and Streets" and the Institute of Transportation Engineers (ITE) "Traffic Engineering Handbook".

The recommended departure taper from the through traffic lane to a right turn lane is a straight line 10:1 taper. This distance may need to be adjusted in situations where intersection geometry and turning demand dictate a longer taper is necessary to accommodate turning traffic. Significant deviation from this taper length shall only occur with the approval of the ACHD Traffic Engineer.

2. The Use of Double/Double Yellow Markings vs. Two-Way Left Turn Lane (TWLTL) Markings

The distinction between TWLTL turn lane markings and barrier markings (double/double yellow) is often misunderstood by the public; the latter treatment should not be extensively employed. Where crossing the roadway centerline is discouraged or at locations where left turns do not occur, barrier markings provide the proper message. However, in most cases, they should be supplemented with movement prohibition signs, channelizing devices, and/or a raised concrete median.

3. Continuity of Through Travel Lanes

Markings shall be arranged to maintain maximum continuity for through travel lanes. In situations where an intersection widening project precedes a roadway widening project, there may be temporary add/drop lanes while allowing provisions for adding and dropping lanes. Right or left turn drop lanes at major intersections should be avoided, if feasible. Drop lanes also require sufficient advance warning signage, per MUTCD criteria, for the approaching condition.

The applicable roadways should be marked under a plan prepared or approved by ACHD's Traffic Department. Guidelines for auxiliary through lanes can be found in ACHD's Traffic Standard Details (TS-1112).

4. New Roadway Improvements from Private Development That Allow for Improved Striping

Striping modifications should be considered when additional pavement width is installed with commercial development or residential subdivisions. Traffic Engineering should be notified before routine restriping is performed.

5101.3 Bicycle Facility Design

Bicycle facility design shall consider ACHD's Livable Street Design Guide, the Ada County Roadways to Bikeways Master Plan, and other adopted plans. Where ACHD design details do not address the specific situation, the most recent version of

AASHTO's "Guide for the Development of Bicycle Facilities" shall be consulted. Another resource for bicycle facility design may include the National Association of City Transportation Officials' (NACTO) "Urban Bikeway Design Guide".

Bicycle facilities are to be signed and marked according to ACHD's Traffic Standard Details (TS-1112) and the MUTCD. Bike lane widths less than those recommended may be approved by ACHD's Traffic Department on a case by case basis to provide facility continuity under constrained conditions.

5101.4 Roadside Barriers

Roadside barriers include devices specifically designed to reduce the severity of crashes or roadway departures within reasonable financial constraints. They lessen the impact of a vehicle with a roadside object (e.g.: utility pole, bridge abutments) or redirect errant vehicles away from an unusual roadside situation (e.g.: steep, non-recoverable slope). Barriers should only be placed at locations where the result of striking the barrier is likely to be less severe than striking the hazard that the barrier is designed to protect.

Frequently, the need for a traffic barrier is based on the probable risk to the driver and occupants of an errant vehicle. The factors considered include:

- height and slope of fill;
- shoulder/clear zone width;
- horizontal roadway curvature;
- vehicular speeds,
- traffic volumes,
- roadside conditions, including obstacles.

The primary resource for determining whether to place a barrier and how to design it is the most recent version of AASHTO's "Roadside Design Guide".

5101.5 Transit Operations

The following factors should be considered regarding transit operations in the design of ACHD projects and approval of private development projects:

1. The pavement structural design, with current and anticipated bus traffic. This may apply to roadways where Valley Regional Transit (VRT) maintains existing routes in addition to roadways where buses may operate in the future.
2. The turning radii of buses with current and anticipated bus traffic.
3. Bus turnouts at key locations where bus layovers and transfers are likely to occur. These locations should be identified in coordination with VRT.
4. Specific locations for signed bus stops should be selected in coordination with VRT. ACHD generally prefers stops on the far side of a signalized intersection, as this allows right turning vehicles to proceed without being blocked by a stopped bus. Consideration for near side stops should be based on site specific conditions (sidewalks, sight distance limitations, bus routing, etc.).

5. Installation of transit amenities associated with ACHD or private improvement projects, such as bus benches and shelters, shall be coordinated with VRT. Refer to VRT's most recently adopted version of their "Bus Stop Location and Transit Amenities Development Guidelines" for further details regarding bus stop placement and design throughout the VRT service area.
6. Active or passive Transit Signal Priority (TSP) techniques to assist bus traffic along transit routes should be identified in coordination with VRT. Refer to Section 5201.3 (Emergency Vehicle Preemption/Bus Preemption) for additional details regarding TSP requirements.

5101.6 Pedestrian Accessibility

Consideration shall be given to the needs of persons with disabilities when designing ACHD projects and approving private improvement projects. Particular attention should be given to meeting the applicable provisions of the most recently adopted versions of the Americans with Disabilities Act (ADA), Standards for Accessible Design, and ACHD's ADA Transition Plan. Examples of items in ACHD projects that shall conform to the ADA are pedestrian ramps, pedestrian push button detection at signalized intersections and sidewalk barriers that result in inadequate lateral clearance.

Areas that have a high concentration of elderly or disabled individuals should be provided additional consideration in traffic design for items such as audible pedestrian signals, signing, accessibility, etc.

The applicable standards for identification of deficiencies are the ADA Standards for Accessible Design and AASHTO's "A Policy on Geometric Design of Highways and Streets".

5101.7 Railroad Preemption and Crossing Improvements

ACHD shall encourage railroad preemption where an active railroad crosses one of the approach legs to a signalized intersection. ACHD shall work cooperatively with the railroad operator to work out the best compromise for traffic safety and efficiency. Motion sensing devices shall be required in advance of railroad preemption if there is the potential for a train to stop near the street crossing and keep the flashing red lights operating or hold gates in a closed position.

All railroad preemption devices and proposed crossing improvements shall conform to the most recently adopted version of the MUTCD.

5101.8 Construction Traffic Control Plan Review

ACHD Traffic Engineering staff reviews traffic control plan(s) associated with capital and private development projects to assure compliance with established standards in the most recently adopted version of the MUTCD and good engineering practice. Traffic Engineering also reviews the project specific traffic control during construction, at the request of ACHD's Construction Services Section, and makes recommendations regarding traffic control changes. Traffic Engineering may also recommend special provisions or changes to the design and/or implementation of traffic control plans.

The following items shall be considered in the review of traffic control plans:

1. Congestion that is likely to occur on the route, adjacent to the route, or on parallel facilities. Time of day restrictions, including night work or weekend work only, may need to be implemented as part of the contract documents or approved traffic control.
2. Other construction activities (permit work, other capital and private projects, e.g.) in the general vicinity that are likely to occur simultaneously. In areas where multiple activities are taking place, care should be taken to avoid overlapping or conflicting traffic control.
3. Evaluate the inconvenience and amount of delay incurred to drivers, pedestrians, and bicycles due to the proposed traffic restrictions. ACHD may compare users' costs with the costs of a different construction method and traffic control plan to decide the best alternative. Several options may need to be considered.
4. Consider the affected community and the hardship on any group of people or businesses due to the proposed traffic restrictions. Recent construction activity in the area is a relevant consideration.
5. All traffic control phases shall address pedestrian accessibility requirements, as outlined in Standards for Accessible Design and ACHD's ADA Transition Plan. Multiple phases may be necessary to accommodate pedestrian needs throughout a project.
6. Attempt to schedule construction so as not to conflict with major traffic generating events, such as Boise State University home football games or other significant campus events, special events like the Twilight Criterion and the Western Idaho Fair, seasonal peaks (summer traffic near Barber Park, e.g.) and holiday shopping traffic around the Boise Towne Square Mall (see Sec. 5101.8.1 for further details on holiday permitting).

5101.8.1 Holiday Permit Guidelines

Roadwork in the public right-of-way that occurs between the Monday before Thanksgiving and the first working day after New Year's Day presents specific concerns to ACHD and local businesses. Non-emergency permit requests for work during this time on roadways near major shopping areas should be considered as follows:

1. Daytime lane closures (9am to 4pm) may be allowed at the discretion of ACHD's Traffic Department, provided the affected street has more than one travel lane in a given direction. Daytime closures or flagging operation on two lane roadways may be considered provided the traffic can be reasonably detoured or operational problems are not created at nearby intersections. Where school walk routes or school access is affected, work times may be modified at the discretion of ACHD.
2. Overnight lane or roadway closures (10pm to 6am) may be considered in situations where daytime work cannot be allowed.

3. Lane or roadway closures that exceed 24 hours shall, under most circumstances, not be approved in primarily commercial areas during the holiday season as stated above.
4. Roadwork that affects on-street parking only should generally be allowed during the holiday season. Proposed roadwork may require approval from the appropriate City department responsible for metered or time restricted parking.
5. If a lane closure causes operating problems at nearby intersections, the ACHD Inspector may, at their discretion or in consulting with the Traffic Engineer, direct the permit holder to suspend work and open all travel lanes.

5101.9 Project Completion

At the end of a project, Traffic Engineering shall make a final field review to assure compliance of traffic control devices with the construction plans, specifications and appropriate engineering standards. The field review may be performed in conjunction with a final project walk through organized by Construction Services.

If a project significantly changes the character of a roadway, such as a project that increases the number of through lanes, Traffic Engineering may perform a traffic and engineering study to either confirm or revise the posted speed limit. This study should be performed within six months of project completion unless extenuating circumstances (other road work or significant development along the project, e.g.) dictate waiting for traffic conditions to normalize.

5101.10 Weight Limit Restrictions on Roads and Bridges

Weight restrictions should be posted on roadways and/or bridges according to the determination of ACHD's or the State of Idaho's bridge inspection program. Advance posting may be appropriate for routes with large numbers of trucks, poor turn around conditions, or long distances to the nearest alternate route.

5102 TRAFFIC STUDIES

5102.1 Requirements and General Information

Traffic impact studies shall be required in conjunction with private development. They shall be consistent with requirements set forth in Section 7100 of ACHD's Development Policy Manual.

5102.2 Traffic Studies

Traffic studies may be required for a variety of reasons on both capital and private development projects. Traffic Engineering should be an active participant in the review of those projects that involve ACHD maintained roads.

Traffic studies may vary in size and scope. A one page study evaluating existing traffic volumes, accidents, and physical conditions may be sufficient in addressing traffic related issues associated with a project. A traffic study may be a more complex analysis

of existing and future levels of service at several locations as well as possible capital and development project scenarios. They may consider various roadway concept alternatives, alignments, modes of travel, and project enhancements such as location of enhanced pedestrian crossings (PHBs, RRFBs, etc.) and roundabouts.

5103 TRAFFIC DATA AND ANALYSIS

5103.1 Crashes

An annual review by Traffic Engineering shall be made of high crash locations (HCLs) to determine any collision patterns that might be correctable by changes to traffic control devices, roadway improvements, or other measures under ACHD control. A field visit of key intersections should take place in mid to late spring of each year once crash data has been entered and finalized for the previous calendar year. The five most recent years of crash data should be considered in the analysis.

Periodic follow up for key locations should be made if significant changes are incorporated at a particular intersection (all-way stop control installation, protected left turn phasing, etc.).

5103.2 Traffic Counts

Machine traffic counts (volume) should be performed at regular intervals (preferably every two to three years on arterials and collectors) to obtain a sample of traffic volumes on ACHD roadways. This data helps determine growth trends and provides information for ACHD's Planning and Programming Section as well as development and calibration of the long range model. Machine counts can also be employed for various traffic safety investigations and studies, design projects, traffic calming requests and other special needs. Traffic counts should be bidirectional, where feasible.

Turning movement counts may be made where specific information is needed regarding intersection turning movements, traffic conflicts, and pedestrian and bicycle traffic. This information helps assess the need for crosswalks or other enhanced pedestrian crossings, perform signal warrant analyses and conduct other studies that help prioritize improvements. Morning turning movement counts are generally performed from 7am to 9am, midday counts are generally performed from 11am to 1pm and evening turning movement counts are generally performed from 4pm to 6pm. Other count times may be considered if the majority of anticipated pedestrian or vehicular traffic occurs outside of these timeframes (school drop off and release times, e.g.).

Care should be used in placing traffic counters for basic data collection in areas where roadway construction may have a significant impact on traffic volumes for that segment. However, traffic counters may be a useful tool in determining impacts related to roadway construction (road closures, lane reductions, detours, etc.).

Traffic count records shall be retained in accordance with Idaho Code and ACHD public records policy.

5103.3 Speed Studies

Speed studies shall be performed as part of a traffic and engineering study to set or reevaluate speed limits. A manual observation with a radar speed measuring device is the accepted method for measuring speed for such a study.

Machine speed measurements can be useful for lower volume locations, such as local streets, in an assessment of residential traffic management issues. They are, however, generally not a preferred method for measuring vehicular speeds for establishing speed limits. Machine data may be used as supplemental information on lower volume roadways where a manual radar study would take an excessive amount of time.

5103.4 Vehicle Classification Counts

Vehicle classification counts can be useful for pavement design, the design of some roadway geometric features (intersection curb radii, roundabout truck aprons, etc.) and the placement of traffic control devices. The use of a mechanical device for classifying vehicles may be cross-checked with manual observation of the traffic stream.

5103.5 Other Data Collection

Other types of traffic data may be collected for special studies. Examples include traffic control device compliance studies, gap studies and license plate surveys to determine cut through traffic.

5103.6 Traffic Signal Warrants

Traffic signal warrants from the most recently adopted version of the MUTCD shall be used as guidelines in considering the need for a traffic signal at an intersection. Other features that should be considered include the following:

- traffic circulation patterns;
- spacing with respect to other controls;
- physical characteristics of the intersection (such as horizontal and vertical curvature).

Special consideration should be given to intersections that satisfy the school crossing warrant or the crash history warrant.

5103.7 Pedestrian Signal Warrants

Pedestrian signal warrants from the most recently adopted version of the MUTCD shall be used in considering the need for a pedestrian signal or other enhanced crossing device (pedestrian hybrid beacon, rectangular rapid flashing beacon, etc.). Care should be made in avoiding placement of devices where there is a significant geometric feature that inhibits appropriate sight distance without supplemental provisions (advance signage, flashing beacons, etc.). Other features that should be considered include the following:

- established school walk routes;
- spacing with respect to other traffic control devices;
- proximity to schools or other major pedestrian generators.

5104 TRAFFIC INVESTIGATIONS

5104.1 Traffic Safety Investigations

Traffic safety investigations are performed by Traffic Engineering staff in response to requests from the public, other agencies, staff observations, or other manners in which a potential safety concern is identified. Documentation is made of the concern and the findings by Traffic Engineering staff. The traffic safety investigation conclusions should be based upon an engineering evaluation accounting for the following:

- traffic volumes;
- crash history;
- vehicular speeds;
- physical conditions;
- other relevant factors appropriate to the investigation.

Where ACHD investigates the need for traffic control devices, the MUTCD shall serve as the primary set of guidelines for traffic control device use. Various Institute of Transportation Engineer (ITE) publications, the American Association of State Highway and Transportation Officials (AASHTO) policies, and other relevant professional and technical publications may also supplement the MUTCD.

The District shall investigate school safety concerns based on requests from the school district or other parties. The most recently adopted version of the MUTCD shall serve as the primary guideline for placement of traffic control devices.

5104.2 Residential Traffic Management (Traffic Calming)

ACHD shall cooperate with residents, municipalities, and neighborhood associations to manage residential traffic and mitigate the negative effects of excessive traffic speed and/or volume on residential streets.

5104.2.1 Eligibility

The following criteria shall be met for a street to be considered eligible for traffic calming:

- Residential streets greater than 750' in length with a posted speed limit of 30 mph or less and classified as a local or collector street (as identified in the ACHD Master Street Map)
- Minimum average daily traffic (ADT), as measured by a weekday count of at least three days duration, shall be at least 400 vehicles.
- Maximum average daily traffic (ADT), as measured by a weekday count of at least three days duration, shall be no more than 4000 vehicles.

Streets that do not meet the eligibility criteria may be considered for traffic calming through a more detailed planning study, or capital project, as determined by ACHD Traffic Engineering staff.

5104.2.2 Traffic Safety Investigation

Prior to implementing traffic calming, a traffic safety investigation consistent with procedures outlined in Sec. 5104.1 shall be completed. At least three (3) years are required between investigations. Traffic safety investigations may recur less than three (3) years after completion of a prior investigation if street conditions have substantially changed (e.g., new development, land use changes, new street connection) or if approved by the ACHD Traffic Engineering Supervisor.

5104.2.3 Peak Hour Traffic and Speed Thresholds for Local Residential Roads

Based on the results of the Traffic Safety Investigation one of the following thresholds shall be met for a street to be considered for traffic calming:

1. Peak hour traffic greater than 100 vehicles.
2. 15% of vehicles are traveling at or exceeding 28 mph.
3. 5% of vehicles are traveling at or exceeding 32 mph.

5104.2.4 Peak Hour Traffic and Speed Thresholds for Collector Roads

Based on the results of the Traffic Safety Investigation one of the following thresholds shall be met for a street to be considered for traffic calming:

1. Peak hour traffic greater than 300 vehicles where no direct lot access is permitted and 150 vehicles where direct lot access exists.
2. 15% of vehicles are traveling at or exceeding 33 mph.
3. 5% of vehicles are traveling at or exceeding 36 mph.

As determined by the Traffic Engineering Supervisor the speed thresholds for Local Residential Roads may be used for Collector Roads where direct lot access exists or as supported by the land use context.

5104.2.5 Neighborhood Survey

If the eligibility criteria and thresholds for traffic calming are satisfied, ACHD shall facilitate a neighborhood survey.

- As part of the survey process support from 60% of affected households (property residents) shall be verified by ACHD Traffic Engineering.
- For local streets the survey area will include households directly abutting the street under consideration for traffic calming.
- For collector streets the survey area will include households directly abutting the street under consideration for traffic calming and households abutting adjacent local streets that depend upon the collector for major street access.

During the neighborhood survey process input from emergency services (police, fire, EMT, etc.) should be obtained by ACHD. If the roadway is a primary response route, ACHD may determine the street is not eligible for calming.

5104.26 Procedure for Traffic Calming Installation

If the eligibility criteria and thresholds for traffic calming are satisfied, and the survey process is completed with support as outlined in section 5104.2.5, ACHD shall perform the design and determine the timing of traffic calming installation.

ACHD may consider installation of the following traffic calming features, including but not limited to:

- Vertical Deflection (Speed Humps and Tables);
- Horizontal Shifts (Medians, Chokers, Lane Narrowing, Chicanes);
- Intersection Treatments (Roundabouts, Mini Roundabouts, Traffic Circles, Diverters, Bulbouts, Raised Intersections, and Raised Crossings);
- Vertical Elements (Street Trees or landscaping only for the purpose of traffic calming may be considered where there is an agreement for others to irrigate and maintain);
- Temporary Materials may be used as approved by ACHD Traffic Engineering to evaluate potential treatments prior to permanent installation.

5104.2.7 Development Funded Traffic Calming Measures

Traffic calming measures may be required as a site related impact for any development which is likely to create or add to residential traffic exceeding thresholds outlined in Sec. 5104.2.4 or 5104.2.5. The volume or cut-through criteria specified in Sec. 5104.2.4 or 5104.2.5 shall be satisfied by projected traffic volumes as identified in a traffic impact study or, where no study is required, by ACHD determination.

Traffic calming measures required with development may be approved by the ACHD Commission based on the following:

1. Evidence of neighborhood support via petition;
2. The relationship of the proposed development's impact to existing and future traffic volumes;
3. Route importance for emergency response;
4. Response from affected emergency services personnel to the proposal.

The selection of traffic calming measures shall be limited to the most appropriate devices to mitigate speeding concerns. Where the measures are for an established neighborhood area, that neighborhood may request more costly traffic control measures, but shall be responsible for the additional cost.

5104.2.8 Policy for Radar Trailer (Visual Traffic Speed Indicator)

Requests for trailer use may be accepted by ACHD Traffic Engineering from municipalities, neighborhood associations or groups, law enforcement personnel, school districts or individual residents on a residential street. Requests may be made

in writing, by phone, or via email. Location consideration shall respond to safety and sight obstruction factors.

Radar trailer availability is normally on a first come, first served basis, Monday through Friday. Display operation is all day (24 hours). Priorities for radar trailer placement may change due to special studies, weather, construction or other considerations.

5104.3 Encroachments and Sight Obstructions

5104.3.1 Encroachments and Sight Obstructions – Definitions

- A. Encroachments include, but are not limited to, any gate, building, private sign, mailbox, facility, structure, object, hedge, tree, shrubbery, fence, or wall that is placed on, over, beneath, or within or otherwise encroaches into any portion of any highway or any public right-of-way.
- B. Sight Obstructions include, but are not limited to any gate, building, private sign, mailbox, facility, structure, object, hedge, tree, shrubbery, fence, or wall that interferes with driver vision.

5104.3.2 Encroachment and Sight Obstructions – Notice and Investigation

Upon actual notice of an encroachment or sight obstruction, either by direct and documented observation by District staff, or by receiving a clear and concise written or verbal communication from the public or other written or verbal notification from another governmental entity, the District Engineer or its designees, in accordance with duly adopted policies and procedures, shall conduct an engineering and traffic safety investigation to determine whether an encroachment or sight obstruction exists and whether it effectively obstructs and prevents the use of an open highway for vehicles or is unsafe for pedestrian, bicyclist or motorist use of an open highway. In accordance with duly adopted policies and procedures, appropriately trained Maintenance personnel may also conduct an investigation of an encroachment or sight obstruction and make a determination relative to its severity.

5104.3.3 Encroachments and Sight Obstructions – Removal Specifications

Encroachments and sight obstructions will be considered for removal or mitigation based upon applicable Idaho law, District specifications, and duly adopted policies and procedures. Pursuant to Idaho Code 40-2319(2), if an encroachment effectively obstructs and prevents the use of an open highway for vehicles or is unsafe for pedestrian or motorist use of an open highway, it is subject to immediate removal by the District without notice to the occupant or owner of the land, or person causing or owning the encroachment or sight obstruction. District specifications for sight obstructions include, but are not limited to, the 40-foot vision triangle, the 3-foot and 10-foot height requirements, and intersection sight distance; see Figure 1 and Figure 2. These specifications are in accordance with Idaho Code 49-221 and 40-2319 and applicable AASHTO guidelines and the location related to the highway or public right-of-way. Section 5104.3.4 provides additional guidelines for removal and mitigation of sight obstructions, encroachments, and other hazards.

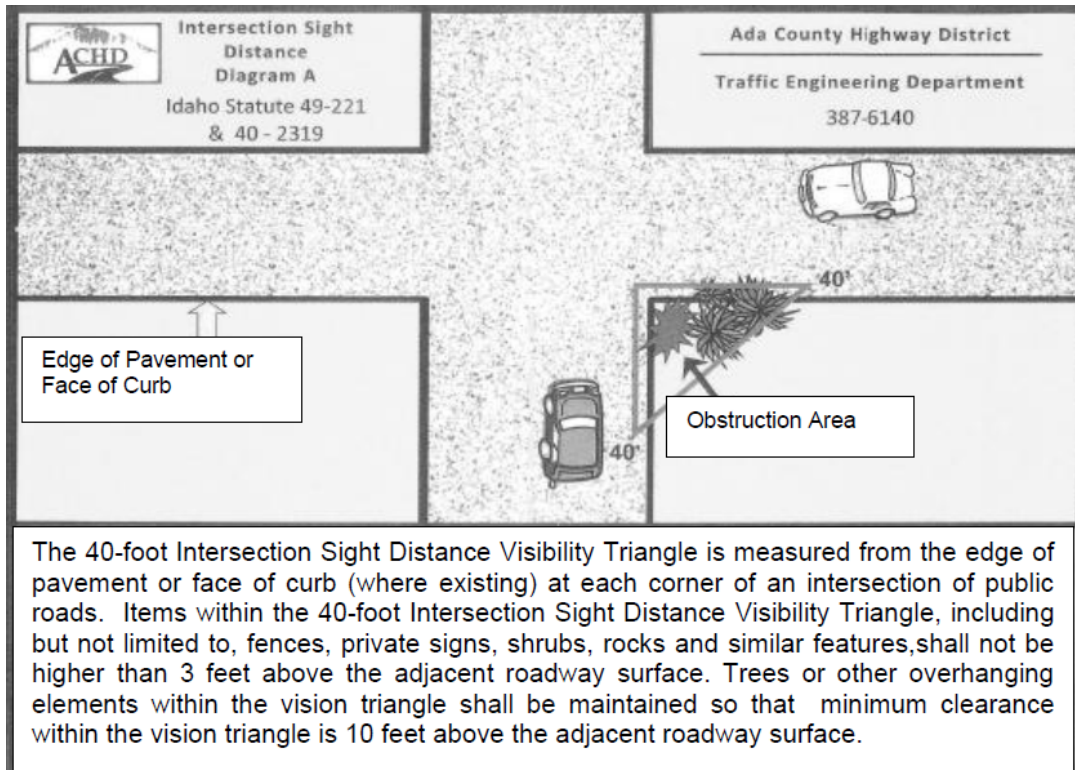


Figure 1 – Uncontrolled Intersection

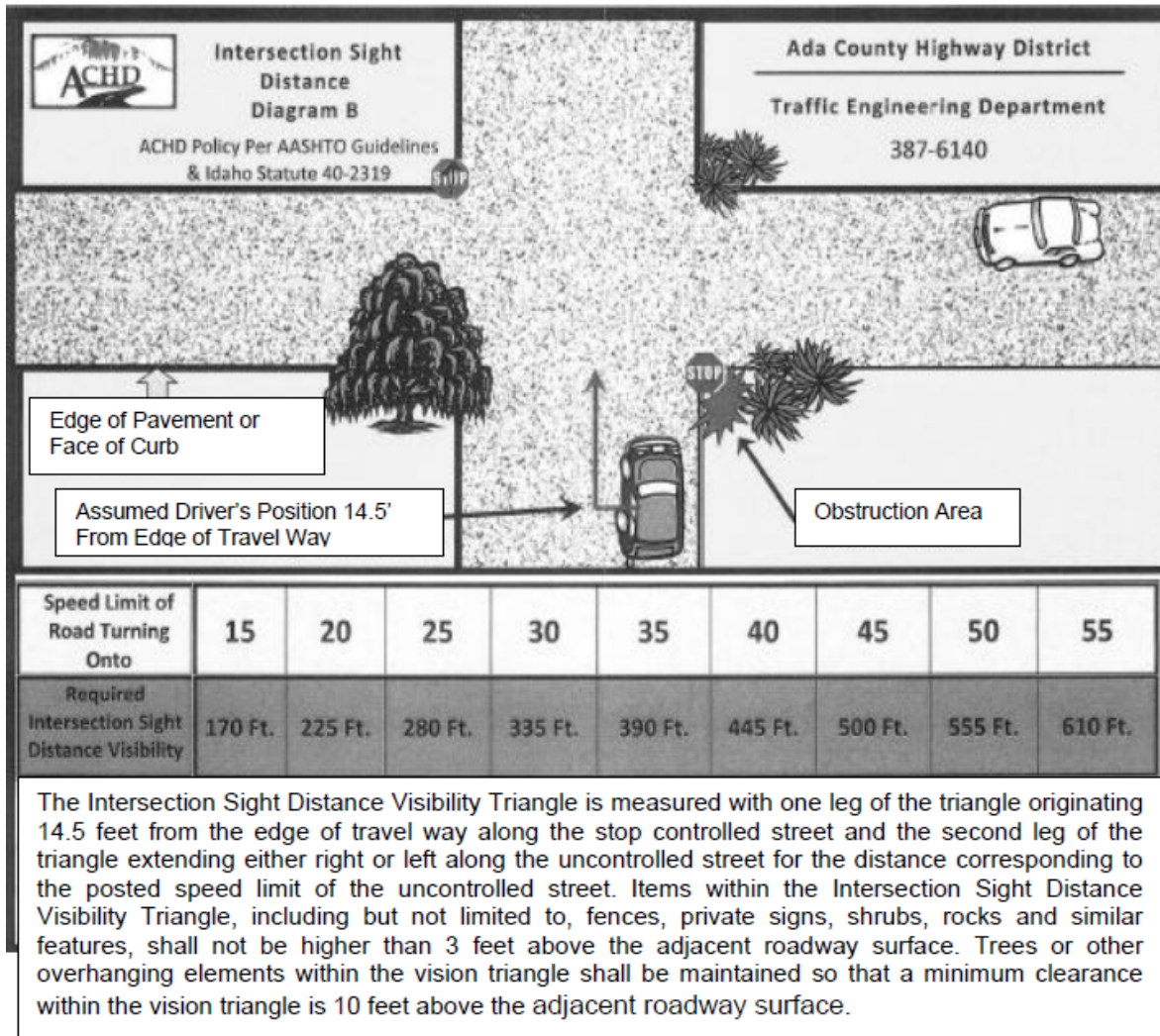


Figure 2 – Stop Controlled Intersection

5104.3.4 Guidelines for Removal and Mitigation of Traffic Hazards Caused by Encroachments and Sight Obstructions

A. Degree or Severity of Hazard

Hazards are prioritized as follows:

1. Hazard effectively obstructs and prevents the use of an open highway for vehicles or is unsafe for pedestrian or motorist use of an open highway.
2. Deficiency based upon operational safety, such as accident record, or emergency stopping sight distance, or threatens structural integrity of the road surface or raises other concerns relative to maintenance or operation of the highway or public right-of-way.
3. Safety deficiency based upon current design standards, such as intersection sight distance, or stopping sight distance.
4. Beneficial to remove or mitigate, but minimum standards are met, such as vegetation cut to back of curb on minor residential streets; 2-feet behind curb for collectors; 4-feet behind curb for arterials; mitigating traffic control at intersections with visibility obstruction; and partial obstructions to visibility in sight triangles.
5. No significant benefit to removing sight triangle obstruction or encroachment

B. Location of Hazard

1. Right-of-way
2. Private property in sight triangle
3. Private property not in sight triangle

C. Potential Removal and Mitigation Actions

1. Notice of Encroachment (Requiring Removal Within 10 Days)
2. Follow-up Certified Letter, Door Hanger, Telephone Call, or Personal Visit
3. Attorney Letter
4. District Zone Inspection Services Remove
5. District Maintenance Remove
6. District Traffic Operations Place Temporary Mitigation
7. City/County Forestry Trim or Remove
8. City/County Code Enforcement
9. Court Injunction
10. Criminal Citation
11. Placement of Traffic Control Device

12. Minor District Project (Current Budget Year)
13. Major District Project (Consider for Future Year)
14. License Agreement

D. Degree of Removal and Mitigation Effort

The following chart identifies, but does not limit, the suggested removal and mitigation actions based on the degree and location of the hazard.

DEGREE OF HAZARD	LOCATION OF HAZARD	POTENTIAL REMOVAL AND MITIGATION ACTION
1	Right-of-Way	4, 5, 6 (Immediately)
1	Private Property (In Sight Triangle (ST))	4, 5, 6 (Immediately)
1	Private Property (Not in ST)	4, 5, 6 (Immediately)
2	Right-of-Way	All except 8, (depending on circumstances: 14)
2	Private Property (In ST)	All except 7, 14
2	Private Property (Not in ST)	1, 2, 11, 12, 13
3	Right-of-Way	1, 2, 4 (depending on circumstances: 5, 9, 12, 13, 14)
3	Private Property (In ST)	1, 2, 4
3	Private Property (Not in ST)	1
4	Right-of-Way	1, (depending on circumstances: 2, 4, 9, 14)
4	Private Property (In ST)	1, 4
4	Private Property (Not in ST)	1 (not certified mail)
5	Right-of-Way	1, (depending on circumstances: 2, 4, 9, 14)
5	Private Property (In ST)	None
5	Private Property (Not in ST)	None

E. Non-Immediate Encroachment Removal – Civil Penalty

1. If the encroachment is not removed, or commenced to be removed, prior to the expiration of ten (10) days from the service or posting the Notice of Encroachment, the person who caused, owns or controls the encroachment shall forfeit up to one hundred fifty dollars (\$150) for each day the encroachment continues unremoved.
2. If the owner, occupant, or person controlling the encroachment, refuses either to remove it or to permit its removal, the District shall commence in the proper court an action to abate the encroachment. If the District recovers judgment, it may, in addition to having the encroachment abated, recover up to one hundred fifty dollars (\$150) for every day the nuisance encroachment remained after notice, as well as costs of the legal action and removal.

3. If the owner, occupant or person controlling the encroachment fails to respond to the Notice of Encroachment within ten (10) days after the service or posting of the Notice of Encroachment is complete, the District may remove the encroachment at the expense of the owner, occupant, or person controlling the encroachment, and the District may recover costs and expenses, as well as the sum of up to one hundred fifty dollars (\$150) for each day the encroachment remained after notice was complete.

5104.3.5 Non-regulatory Signs, Temporary Signs, and Nuisance Signs or Lighting

All Non-regulatory signs, such as "Neighborhood Watch" signs, Temporary signs such as but not limited to "Real Estate", "Open House", "Garage Sale", and "Political Campaign" signs, and Nuisance Signs such as but not limited to miscellaneous services and lost animals (collectively hereafter referred to as "Signs") shall be placed according to current District standards and are granted permission for placement within the public right-of-way under District jurisdiction subject to the following restrictions:

1. Signs shall not be placed or located in a manner that interferes with the movement of motor vehicles or bicyclists or pedestrians or creates a sight obstruction for drivers or pedestrians or otherwise impedes driver or cyclist or pedestrian vision.
2. Signs, regardless of height or width, shall not be placed or located within the 40' x 40' Intersection Sight Distance Visibility Triangle located on the corner of every roadway intersection as defined by the intersection of the curb lines of both streets or where curbs do not exist, the edge of the pavement lines of both streets; see Figure 1, in Section 5104.3.3 and Figure 3.
3. Signs shall not be placed or located in a manner that interferes with the required intersection sight distance visibility; see Figure 2 in Section 5104.3.3 and Figure 3.
4. Signs shall not be located within twelve (12) feet of the edge of pavement where there are no curbs and/or sidewalks; see Figure 3.
5. Where curb exists without sidewalks, signs shall not be located closer than six (6) feet from the curb to allow for a pedestrian walkway; see Figure 3.
6. Where sidewalk exists, signs may be located on the property (non-roadway) side of the sidewalk if sufficient public right-of-way exists for such placement, see Figure 3; provided that the sign shall not hang over the sidewalk. This will ensure the pedestrian access route on the sidewalk to be no narrower than the minimum width required under the Americans with Disabilities Act.
7. Signs shall not be located on any sidewalk, traffic median, island, boulevard strip, or landscape area between the curb and the separated sidewalk; see Figure 3.

8. Signs shall not be displayed using digital, flashing, battery operated, wireless, electronic or solar technology.
9. Signs shall not be placed on or attached to any post, pole, traffic sign, traffic marker, or traffic control facility located within the public right-of-way.
10. All political campaign signs are to be removed from the public right-of-way within 48 hours after the election.
11. Any signs that are an encroachment or sight obstruction as provided in Section 5104.3.3 or are otherwise a hazard to vehicles, bicyclists, or pedestrians, or which hang over the sidewalk in such a manner that it causes the pedestrian access route on the sidewalk to be narrower than the minimum width required under the Americans with Disabilities Act, must be removed. Any illumination that creates a traffic hazard must be shielded, removed, or otherwise properly mitigated.

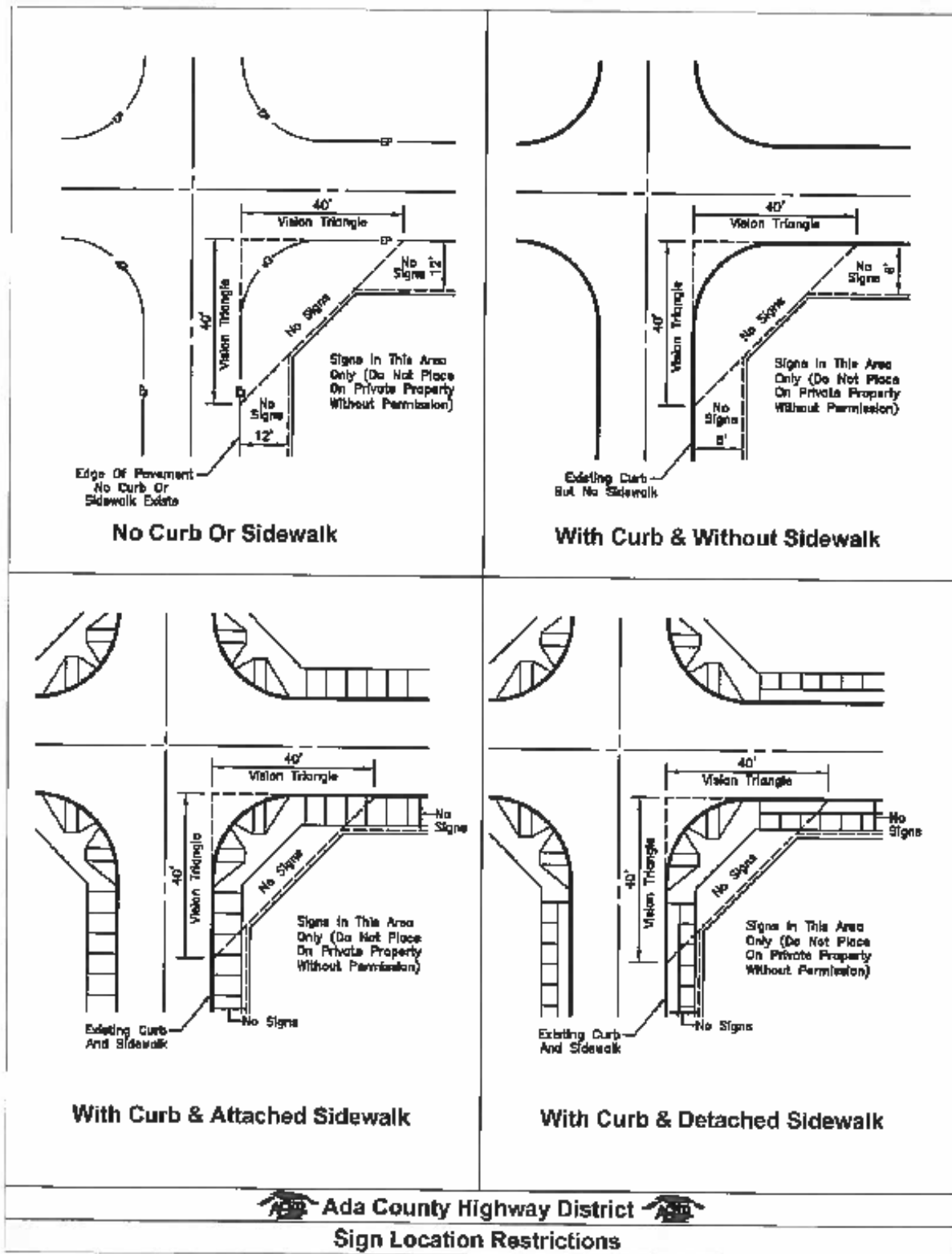


Figure 3 – Sign Location Restrictions

Signs placed in violation of these restrictions will be removed by the District and may be subject to civil penalties in an amount equal to the cost to remove the sign. For the purpose of imposing and collecting any civil penalty, there is a rebuttable presumption that the owner of the sign is responsible for the placement of the sign and who may be obligated to pay the civil penalty. The Commission may cause the District to institute a civil action in the District Court of Ada County to enforce compliance with this policy and to collect the civil penalty. Signs that have been removed by the District may be retrieved at the District offices.

Nothing in this Section 5104.3.5 is intended to, nor shall it be considered, a granting of permission to place signs on private property or on state or federal highways or public rights-of-way. Ada County and the cities within Ada County may have sign ordinances that are more restrictive than this Section 5104.3.5. If so, the more restrictive standard shall apply. It is the responsibility of those placing signs in the public right-of-way to be aware of those regulations.

5104.3.6 Mailboxes

Mailboxes causing a hazardous obstruction in the right-of-way or which hang over the sidewalk in such a manner that it causes the pedestrian access route on the sidewalk to be narrower than the minimum width required under the Americans with Disabilities Act must be removed, at the discretion of the District Director.

5104.4 Parking Investigations

The District shall investigate concerns related to parking in the public right of way as well as place and maintain parking controls for traffic safety and operations. As a general rule, the District installs signs to delineate parking restrictions. The District does not paint curbs to identify locations where on-street parking is not permitted. Mitigation measures may include the following:

- Installation of “no parking” signs or “no parking, here to corner signs” along street frontage to improve intersection sight distance;
- Installation of time of day, limited time or full time parking restriction signs;
- Installation of “tow-away” signs, considered for issues related to traffic safety with input from local law enforcement;
- Coordinating with City Parking Services (if applicable) on appropriate measures related to parking restrictions within their area of influence.

On publicly maintained roadways under the jurisdiction of the District, the District shall have sole authority to install parking restrictions, except as otherwise provided by Idaho Code (e.g.: metered parking, accessible parking spaces). Signs installed by others in the public right of way without the authority of the District shall be removed.

On residential streets, adjacent property owners may petition for parking restrictions. If a subsequent investigation by the District finds this to be feasible, 75% of the adjacent property owners shall sign a petition agreeing to the restriction. In these cases, the property owner(s) may be obligated to pay the cost of installation and maintenance of the signs.

5104.4.1 Loading Zones

Loading zones are designated areas in a parking lane for the loading and unloading of deliveries to adjacent buildings. Loading zones may be installed where, in District staff's estimation, there is a need by an area business for a specific location on the roadway to allow freight operation.

Any request for loading zone shall require, from the applicant, an understanding of the delivery volume, both in terms of quantity of cargo as well as delivery frequency. This helps ensure loading zones are set aside only for those businesses that require them.

Loading zones may also be considered near schools, where the school has established an area on the roadway for bus pick-ups and drop-offs.

5104.4.2 Special Parking Districts

Special Parking Districts (SPDs) are created when residential neighborhoods are impacted by volumes of vehicles that arrive in an area and adversely impact the neighborhood and its residents. SPDs are established by the appropriate City agency, which includes sign installation and maintenance in addition to enforcement of the posted condition. While the District is not responsible for SPD sign installation or maintenance, the District shall work collaboratively with the City to avoid parking conflicts or in areas of high sign density to maintain visibility of other regulatory sign postings.

5104.4.3 Accessible Parking

In residential areas, the District is not legally obligated to provide accessible parking. The District shall consider such requests according to the following criteria:

- Existing parking restrictions (posted restrictions near an applicant's residence shall not be removed to accommodate accessible parking spaces);
- Parking demand (existing on-street parking demand should not exceed 75% of the available parking within 500' of the proposed accessible parking space);
- Passenger-side vehicle entry (where passenger side entry is required, the sidewalk or park strip shall be unobstructed or mitigated at the cost of the applicant);
- Roadway safety (no roadway characteristics, such as curvature or sight distance challenges, should be present near the proposed accessible space).

All applicants shall provide the following documentation to the District in order to be eligible for disabled parking on public streets:

- Proof of residency at the proposed location;
- Proof of disability (disabled plate or placard);
- Proof of driveway or garage impact.

If the District finds accessible parking to be appropriate at a given location, the District shall pay for and maintain the necessary signage. Should the District determine the posted area is being misused, (long term vehicle storage, applicant has moved, etc.) the District shall remove the signs.

Installation of accessible parking spaces in the public right of way are available for all appropriately licensed or permitted vehicles and shall not give preference to specific individuals.

5104.4.4 Diagonal Parking on Public Streets

Diagonal parking consideration for District roadways shall include the following:

1. Diagonal or perpendicular on-street parking is common in the vicinity of the request;
2. Existing activities in the vicinity are not able to accommodate parking by off-street and/or parallel curb parking;

Design guidelines for on-street diagonal parking can be found in ACHD's Traffic Standard Details (TS-1122).

5105 SPECIAL EVENTS - PERMITS AND FEES

5105.1 Permit Required

No person shall hold a special event which occurs within, obstructs, closes, or causes to be obstructed or closed, any public right-of-way or impedes the general movement of vehicular or pedestrian traffic upon any public right-of-way, without first obtaining a Special Event Permit. The following types of use permits are established for special events in the public right-of-way.

5105.2 Type A – Special Events – Nonprofit

- a. Type A permits may be issued for the use of public right-of-way for 24 or less continuous hours for nonprofit purposes which do not involve the physical disturbance of the right-of-way and are not otherwise covered by Section 6007 of the ACHD Code.
- b. Type A permit uses may involve disruption of pedestrian and vehicular traffic or access to private property but they may not restrict or prevent the public from accessing the right-of-way, except as necessary for public safety. (e.g. Applicants may not barricade the event in such a manner that only invitees are allowed to access the closed right-of-way, except as necessary for public safety.)
- c. Type A permits include, but are not limited to,
 - Bike races;
 - Parades
 - Residential Block parties;
 - Parking;
 - Walks or Runs;
 - Street dances;
 - Theatrical plays or events, etc.;
 - Marketing booths.

- d. Type A permits do not include religious, social or political rallies, or similar events which have received a permit from the applicable city or which are spontaneous in nature.
- e. A non-refundable application fee in accordance with the approved Fee Schedule in effect at the time of the permit application shall be collected from the Applicant along with the application for a Type A permit and there shall be no other charge or fee associated with a Type A permit.
- f. Applicants requesting Type A permit for a residential block party shall provide, in addition to the permit application and application fee, verification that 51% or more of the owners and/or heads of household of residences within 300 feet of either side of the location of the block party or the nearest intersection, whichever is closer, are in favor of the residential block party. Provided however, dead-end or no outlet street sections shall not be blocked or their ingress/egress adversely impacted by a residential block party.
- g. Applications for a Type A permit shall be submitted to the District a minimum of thirty (30) days prior to the event to allow for sufficient review time by District staff and shall include a diagram, map, or similar site sketch depicting the site location and identifying the rights-of-way involved (i.e. street name) and adjacent or nearby rights-of-way, as well as a narrative describing the special event and setting forth the site address, names of rights-of-way involved, the planned date of the special event including the starting and ending times of the special event, and a Temporary Traffic Control Plan in conformance with Section 6007.11 of the ACHD Code. In its sole discretion, ACHD staff may waive all or a portion of the thirty (30) day advanced application submittal requirement for extenuating circumstances.
- h. In making an application for a Type A permit, Applicants shall agree to indemnify, defend, and hold harmless, ACHD, its officers, agents, and employees from and against any and all claims for damages to property and or bodily injury which may result from or in connection with any of the operations carried on by the Applicant under the permit.
- i. Applicants for any Type A permit, other than a Block party, shall also submit with the application, a copy of a certificate of liability insurance, and a specific endorsement, each in an amount not less than \$500,000 per claim and \$1,000,000 aggregate per occurrence and each naming Ada County Highway District as a certificate holder and an additional insured.
- j. Type A permits shall expire automatically upon the conclusion of the special event.

5105.3 Type B – Special Events - Commercial

- a. Type B permits may be issued for the use of public right-of-way for 72 hours or less continuous hours for commercial purposes which do not involve the physical disturbance of the right-of-way and are not otherwise covered by Section 6007 of the ACHD Code.
- b. Type B permit uses may involve disruption of pedestrian and vehicular traffic or access to private property but they may not restrict or prevent the public from accessing the right-of-way, except as necessary for public safety. (e.g. Applicants

may not barricade the event in such a manner that only invitees are allowed to access the closed right-of-way, except as necessary for public safety.)

- c. Type B permits include, but are not limited to,
- Any Type A permit use when for a commercial purpose;
 - Fairs;
 - Temporary sale of goods;
 - Farmer's Markets;
 - Grand opening;
 - Open house or similar event.
- d. A non-refundable application fee in accordance with the approved Fee Schedule in effect at the time of the permit application shall be collected from the Applicant along with the application for a Type B permit along with a use fee set forth in the approved Fee Schedule for each 24 hour period that a right-of-way is planned to be used under a Type B permit. For special events which reoccur on a regular basis throughout a 12 month or less period of time, an applicant may apply for an annual Type B permit. A non-refundable application fee in accordance with the approved Fee Schedule in effect at the time of the permit application shall be collected from the Applicant along with the application for an annual Type B permit along with a use fee set forth in the approved Fee Schedule for each 24 hour period that a right-of-way is planned to be used under an annual Type B permit for the first month of uses; the use fee shall be paid thereafter on a monthly basis, and shall be due on or before the 5th day of each month.
- e. Applicants for any Type B permits for a grand opening, open house or similar special event shall provide, in addition to the permit application and payment of the application fee and applicable use fees, verification that a majority of owners or occupiers (or their legal representative) of property within 300 feet of either side of the location of the special event or the nearest intersection, whichever is closer, are in favor of the special event. Provided however, dead-end or no outlet street sections shall not be blocked or their ingress/egress adversely impacted by the special event.
- f. Applications for a Type B permit shall be submitted to the District a minimum of forty-five (45) days prior to the event to allow for sufficient review time by District staff and shall include a diagram, map, or similar site sketch depicting the site location and identifying the rights-of-way involved (i.e. street name) and adjacent or nearby rights-of-way, as well as a narrative describing the event and setting forth the site address, the names of rights-of-way involved, the planned date that the special event will begin, the planned duration of the special event including the planned starting and ending times of the special event, and a Temporary Traffic Control Plan in conformance with Section 6007.11 of the ACHD Code. Applicant's failing to meet the mandatory minimum time to submit an application for a Type B permit shall automatically be denied the requested permit. For annual Type B permits, the narrative shall also provide the planned schedule for the reoccurring special event.
- g. If the special event requires a detour, a condition of granting the permit shall be ACHD's verification that all detour roadways and/or the constricted roadway are still at or under capacity with the proposed closure.

- h. Applicants for a Type B permit shall also submit with the application, a copy of a certificate of liability insurance, and a specific endorsement, each in an amount not less than \$500,000 per claim and \$1,000,000 aggregate per occurrence and each naming Ada County Highway District as a certificate holder and as an additional insured.
- i. In making an application for a Type B permit, Applicants shall agree to indemnify, defend, and hold harmless, ACHD, its officers, agents, and employees from and against any and all claims for damages to property and or bodily injury which may result from or in connection with any of the operations carried on by the Applicant under the permit.
- j. Type B permits shall expire automatically upon the conclusion of the special event; however, annual Type B permits shall expire automatically 12 months following the date of issuance by ACHD, or upon the last regularly scheduled special event, or upon failure to timely pay the applicable monthly use fee, whichever is earlier.

5105.4 Maintenance & Operations and Construction Services shall be given copies of all Special Event Permits issued.

5105.5 Use of Certified Flaggers and Course Marshals

Certified flaggers and course marshals are necessary for organizing safe events. Certified flaggers are responsible for stopping and holding motor vehicle traffic during an event at major intersections (e.g., signalized intersections and significant stop controlled intersections). Marshals are volunteers engaged by event applicants and are responsible for minor intersection traffic control (e.g., stop controlled intersections, major driveways). Marshals may hold traffic at a stop-controlled intersection or minor uncontrolled intersection or driveway and should be briefed on their duties prior to the event. Such a briefing shall be performed prior to the start of the event by a certified flagger or police officer knowledgeable about traffic control principles and familiar with the event.

5105.5.1 General Conditions

Certified flaggers and marshals need specific information to be maximally effective. All personnel actively controlling traffic shall wear a fluorescent vest with reflective stripes. At a minimum, they should know the following:

- Time and direction participants will be moving past their location;
- The entire course, including start times and approximate end times, in order to answer motorist questions;
- How do direct traffic, including use of a STOP paddle, the manner in which to stop motorists, and the need to act professionally.

5105.5.2 Special Conditions

Based on the proposed route and impacts to traffic, the District may require the following items to be included in the special event's approved traffic control:

- Police control shall be used at intersections where the District or law enforcement determine there is a need to do so for participant and public safety. Officer locations shall be provided on the traffic control plan.
- If a signal is placed into flashing red operation, a police officer shall be required to direct traffic at the intersection. Only police or ACHD personnel will be allowed to place a signal into flashing red operation.
- Certified flaggers are not required at minor intersections where marshals are holding traffic at a stop controlled street or driveway approach.

5106 ROADWAY LIGHTING

5106.1 Purpose and Applicability

The purpose of this policy is to assure that roadway lighting is designed to attain a level of visibility which, under low or no natural light conditions, enables motorists to distinctly see the roadway alignment and any obstacles, pedestrians, or cyclists on or about to enter the roadway.

This policy applies to all roadways under the jurisdiction of the Ada County Highway District in order to enhance the safety and mobility of the travelling public. By State Statute, the Ada County Highway District is only responsible for lighting which is primarily for the benefit of the motorist.

5106.2 Roadway Lighting Installations

5106.2.1 Installations by the District

The District shall design and install roadway lighting for all public roadway intersections and marked (non-intersection) crosswalks that are included in a capital improvement project. Continuous roadway lighting may be designed and installed by the District with a capital improvement project or safety project if deemed beneficial by an engineering study from the Traffic Engineering Division or other qualified source.

5106.2.2 Installations by Development

All developments shall install lighting at intersections of roadways built by the development. This includes intersections of a new road with a new road, intersections of a new road with an existing road, and marked mid-block crosswalks. No development plans shall be approved without inclusion of roadway lighting as required by this standard.

5106.2.3 Installations by a City or the County

A city or Ada County may elect to install roadway lighting at the sole cost of that agency. An agency may also elect to cost share with the District to upgrade lighting that the District is proposing to install. All city or county roadway lighting installations and all upgraded roadway lighting installations shall comply with these standards. Lighting that is solely for illuminating pedestrian walkways or for aesthetics (such as historical lighting) does not need to comply with these standards so long as the glare created for motorists is not in excess of recommended thresholds per AASHTO guidelines.

5106.3 Roadway Lighting Design Standards

The most current edition of the ACHD Roadway Lighting Design Standards supplements this policy. These standards contain guidance to assist the designer in providing roadway lighting plans and specifications to meet the requirements of this policy. The Design Standards are revised and updated as needed to include advances in roadway lighting best practices.

5107 ROADWAY LIGHTING DESIGN STANDARDS

5107.1 Roadway Lighting Design Criteria

The basis of these design guidelines is the Illuminating Engineering Society (IES) publication RP-8-14 and the American Association of State Highway and Transportation Officials (AASHTO) Roadway Lighting Design Guide (2005). Pedestrian activity levels will generally be low (<10 peds/hour) to medium (10-100 peds/hour), with the exception of central business districts with high nighttime pedestrian activity (>100 peds/hour), such as near civic centers.

The illuminance method shall be used for designing lighting systems for signalized intersections and mid-block pedestrian crossings. The following lighting levels shall be achieved after a light loss factor (LLF) is applied (0.90 for LED lighting).

Intersection lighting for continuously lighted approaches shall meet the following illuminance levels:

Street Classification	Avg. Illumination at Pavement in Lux/ft ²			E _{avg} /E _{min}
	High	Medium	Low	
Arterial/Arterial	34.0/3.4	26.0/2.6	18.0/1.8	3.0
Arterial/Collector	29.0/2.9	22.0/2.2	15.0/1.5	3.0
Arterial/Local	26.0/2.6	20.0/2.0	13.0/1.3	3.0
Collector/Collector	24.0/2.4	18.0/1.8	12.0/1.2	4.0
Collector/Local	21.0/2.1	16.0/1.6	10.0/1.0	4.0
Local/Local	18.0/1.8	14.0/1.4	8.0/0.8	6.0

Intersection lighting for isolated intersections (without continuously lighted approaches) shall meet the following illuminance levels:

Road Classification	Pavement Classification		Uniformity Ratio E _{avg} /E _{min}
	R1 (concrete) Lux/ft ²	R3 (asphalt) Lux/ft ²	
Arterial & Expwy	6.0/0.6	9.0/0.9	3.0
Collector	4.0/0.4	6.0/0.6	4.0
Local	3.0/0.3	4.0/0.4	6.0

Marked crosswalks not at signalized intersections shall be illuminated to the same levels as signalized intersections.

If continuous lighting is deemed beneficial by the Traffic Engineering Division, it must meet the following luminance criteria:

Street Classification	Ped Activity Level	Avg. Luminance $L_{avg}(cd/m^2)$	Avg. Uniformity Ratio L_{avg}/L_{min}	Max. Uniformity Ratio L_{max}/L_{min}	Max. Veiling Luminance Ratio L_{max}/L_{avg}
Arterial	High	1.2	3.0	5.0	0.3
	Medium	0.9	3.0	5.0	0.3
	Low	0.6	3.5	6.0	0.3
Collector	High	0.8	3.0	5.0	0.4
	Medium	0.6	3.5	6.0	0.4
	Low	0.4	4.0	8.0	0.4
Local	High	0.6	6.0	10.0	0.4
	Medium	0.5	6.0	10.0	0.4
	Low	0.3	6.0	10.0	0.4

Railroad crossings shall be illuminated to a minimum of 6.0 Lux with a uniformity ratio of 3.0 or better. A luminaire shall be installed as close as possible to each side of a railroad crossing so that the vertical faces of passing railroad cars will be lighted.

Public school frontages shall be continuously lighted and meet the minimum criteria set forth in the luminance criteria table, for the appropriate street classification.

5107.2 Luminaire Pole Placement and Orientation

Signalized intersections of dimensions smaller than 4 lanes x 5 lanes shall have 15 foot long mast arms with 250W HPS or equivalent luminaires on opposite corners. If the mounting height is less than the standard 38 feet, additional luminaires may be needed.

For a signalized intersection of dimensions 4 lanes x 5 lanes or larger, a 20 foot long mast arm with 250W HPS or equivalent luminaire shall be placed on each corner.

Intersections larger than 7 lanes x 7 lanes shall use 20 foot long mast arms with 400W HPS or equivalent fixtures on each corner or additional luminaires as needed, to achieve required lighting levels.

In a standard signalized intersection configuration, luminaire mast arms shall be set at a 45 degree angle and not perpendicular to the roadway. For all other cases luminaire mast arms should be perpendicular to the roadway.

In order to front light pedestrians, luminaires for midblock crosswalks and marked crosswalks at isolated intersections shall have luminaire poles placed 0.7x from the crosswalk, where "x" is the mounting height of the luminaire.

Roundabout lighting shall locate luminaire poles to take into account front lighting of pedestrians, as opposed to backlighting. Lighting should also be included at approaches where vehicular deflection occurs, and along the central circulation area. Poles shall not be located within the central island of a roundabout. For typical pole locations, refer to the ACHD Roundabout Design Guide and the AASHTO Roadway Lighting Guide.

Luminaire poles should be located within buffers (between sidewalk and curb) when

possible to minimize mast arm lengths.

5107.3 Overhead Power Conflicts

The Engineer designing a lighting system, whether it is intersection or a continuous lighting system, shall verify the system does not conflict with overhead power and communications lines and that all required clearances are met. Identified conflicts can be addressed by relocating or raising overhead lines, relocating luminaire poles, or by use of a davit pole or davit extension for a signal pole.

5107.4 Provisions for Future Lighting

On capital roadway and intersection projects, the District will install empty lighting conduit and junction boxes along the back of the sidewalks to facilitate any future lighting projects. Developer cooperative projects shall include the same provisions.

5107.5 Roadway Lighting Plan Submittal and Review

5107.5.1 Roadway Lighting Designers

Roadway lighting for ACHD projects shall be designed and submitted by ACHD staff or prequalified firms approved by ACHD to design roadway lighting.

The ACHD prequalified firms approved to design roadway lighting are recommended for developer projects. If a roundabout is not designed by a firm prequalified by ACHD to design roadway lighting, the developer shall have the roadway lighting design peer review performed by a firm acceptable to ACHD. The cost of peer review shall be borne by the developer.

5107.5.2 Deliverables

All roadway lighting plans shall include photometric layouts of intersections and pedestrian mid-block crossings, showing lighting levels in foot-candles along with the calculated average maintained illuminance and uniformity ratio. Photometric layouts are not required for continuous lighting projects, however, design calculations verifying compliance with the required design values shall be provided.

5107.6 Applicability of Material Specifications

ACHD Specifications shall govern for pole types, luminaires, and other appurtenances, unless an exception is approved by the Traffic Services Manager.

5108 ROUNDABOUTS

5108.1 Roundabout Policy Purpose and Definitions

This policy defines the requirements of proposed, new, and modified circular intersections under the jurisdiction of the ACHD. A roundabout is an intersection traffic control device with the following characteristics:

- Traffic flows counter-clockwise around a center island;
- Entering traffic yields to circulating traffic;
- Channelized approaches deflect traffic into a proper entry path;

- Appropriate geometric curvature and curbs control the speed of vehicles.

5108.2 ACHD Roundabout Design Guide

The most current edition of the ACHD Roundabout Design Guide supplements this policy. The Design Guide contains guidance to help the designer analyze and design roundabouts to meet the requirements of this Policy. The Design Guide will be updated administratively as needed to include advances in the field of roundabout evaluation and design.

5108.3 Modifications and Addenda

ACHD may revise and update this Policy as necessary through approval by the ACHD Commission.

5108.4 Intersection Control Selection

Roundabout traffic control shall be considered and evaluated as an option if the intersection is being considered for improvement for any of the following reasons:

- A capacity deficiency exists, and all-way stop control and/or traffic signal volume warrants are met as defined in the MUTCD; or
- A safety deficiency exists; or
- Unconventional geometry exists (e.g., five approaches).

An alternatives analysis (potentially including other intersection control types, such as signals and stop signs) shall be conducted at all intersections where a roundabout is being considered. The alternatives analysis shall include a detailed traffic operations analysis and shall consider ACHD costs (e.g., right-of-way, construction, and maintenance) and public costs (e.g., delay, safety, and the environment.) The alternatives analysis should be the decision-making tool used to determine whether or not a roundabout will be constructed. Final discretion for all intersection control decisions rests with ACHD.

5108.5 Traffic Operations Analysis

5108.5.1 Analysis Scenarios

Traffic conditions shall be analyzed for all peak periods of the intersection's construction year and design year(s). The construction year is the year the roundabout will be constructed and opened. For federally funded projects the design year is typically 20 years after the construction year. There may be multiple design years if considering interim designs.

5108.5.2 Analysis Procedure

Traffic analysis procedures shall be consistent with the most recent version of the Highway Capacity Manual (HCM). Additional analytical or simulation tools may be required to supplement the traffic analysis. Additional analysis tools may be calibrated to match the HCM or local conditions. Site selection, data collection, and calibration methods shall be pre-approved by ACHD Traffic Engineering.

Roundabouts shall be analyzed with the following default parameters:

Variable	Existing Analysis	Future Analysis
Traffic Volume ¹	Existing	Forecast
Peak Hour Factor (PHF)	Existing	0.90 ²
Percent Heavy Vehicles (HV)	Existing % ³	
Passenger Car Equivalents (PCE) for HV	2	

1 – Analyze all critical hours as defined by ACHD. Procedure and key assumptions used to develop analysis volumes shall be provided to and approved by ACHD.

2 – Use existing PHF if existing PHF > 0.90 and no capacity improvements are planned

3 – If intersection does not currently exist or traffic composition is anticipated to change, engineering judgment should be used and documented.

4 – As traffic analysis tools require, other parameters shall reflect the recommendations of the HCM, proposed roundabout design, and traffic conditions as closely as possible.

5108.5.3 Results Reporting

Roundabout traffic operations shall be reported on a lane-by-lane basis. Reported values include the volume-to-capacity ratio (V/C), traffic delay, level of service, and 95th percentile queues.

5108.5.4 Acceptable Thresholds

The acceptable threshold for all roundabouts shall be based upon the critical/worst lane and a maximum volume-to-capacity (V/C) ratio of 0.85.

5108.6 Intersection Capacity Enhancement Phasing

In locations where a multilane roundabout will ultimately be needed but is not needed for ten years or more, three possible options to constructing the ultimate design should be considered:

- Construct the ultimate design;
- Construct an interim roundabout that will be replaced by an ultimate roundabout in the future;
- Construct an interim roundabout that is expandable (inward or outward) to the ultimate roundabout in the future.

The final discretion for which option is selected rests with ACHD. If the expandable option is chosen, the ultimate roundabout design shall be approved before the interim roundabout is designed. Interim roundabout designs shall use curbs to define the travel way (i.e., striping alone is not acceptable).

5108.7 Roundabout Review and Submittal

The process of designing a safe roundabout typically requires a considerable amount of iteration. Minor adjustments in roundabout design can significantly impact roundabout safety and operation because elements are inter-related and have a collective effect on vehicle paths and speeds. Due to the iterative nature and complexities associated with roundabout design the following detailed roundabout submittal and review process shall be followed.

5108.7.1 Roundabout Designers

ACHD roundabout projects shall be designed and submitted by ACHD staff or prequalified firms approved to design roundabouts by ACHD. A peer review shall be performed by an ACHD prequalified roundabout peer review firm for all roundabouts designed by ACHD staff. The list of firms approved to design and review roundabouts by level of roundabout complexity is available to the public via the ACHD On-Call Consultant Services list.

The ACHD prequalified firms approved to design roundabouts are recommended for developer projects. If a roundabout is not designed by a firm prequalified by ACHD to design roundabouts, the developer shall have a roundabout peer review performed by a firm acceptable to ACHD.

5108.7.2 Preliminary Deliverables

Before plat approval, right-of-way dedication or purchase, grading, or other details are designed, the designer shall demonstrate to ACHD's satisfaction that the preliminary roundabout design meets the standards set forth in ACHD Roundabout Policy. All roundabout designs will be required to meet the same standards outlined in the roundabout policy. Preliminary submittal deliverables shall include the following items:

5108.7.2.1 Traffic Operation Analysis Summary

Include input parameter summary sheets and output tables as necessary so analysis can be independently replicated.

5108.7.2.2 Scaled Plan View

Include curbs and pavement markings. Plan view shall be supplemented with an AutoCAD compatible file.

5108.7.2.3 Wheel Path Plots

Illustrate the wheel paths of the design vehicle(s) making the critical movement from each approach. Additionally, a side-by-side swept path plot shall be provided with the appropriate design vehicle(s) for multilane roundabout sections.

5108.7.2.4 Fastest Path Plots

Illustrate the fastest path for every movement from each approach. Include a complete speed comparison table.

5108.7.2.5 Natural Path Plots

Illustrate the natural path for the critical movement(s) from each applicable approach for multilane roundabouts (this is not a requirement for single lane roundabouts).

5108.7.3 Final Deliverables

Final submittals shall include the following items:

5108.7.3.1 Grading Plans

Include a plan view showing cross slopes of the circulating roadway, the entries, and the exits. Include a profile showing longitudinal slopes of the circulating roadway and a profile of each entry from the splitter island nose to the downstream exit splitter island termination (at the minimum).

5108.7.3.2 Signing and Striping Plans

Include removals, relocations, and new installations.

5108.7.3.3 Illumination Plans

Include pole locations, lamp wattage and type, mounting height and location of luminaires, conduit and electrical connections, and horizontal and vertical calculation grid and illuminance values.

5108.7.3.4 Landscaping Plans

Include a plan view showing landscaping areas and any height restrictions to achieve adequate sight distance. Illustrate the sight triangles and provide the calculations used to develop the landscaping height restrictions.

5108.7.3.5 Drainage Plans

Include plans consistent with ACHD drainage and storm water standards.

5108.7.3.6 Traffic Control Plan

Include construction phasing and interim traffic control devices.

5108.8 Roundabout Design Parameters

5108.8.1 Number and Assignment of Lanes

The number of lanes and their assignment shall be based upon a roundabout traffic operations analysis.

5108.8.2 Lane Continuity

Roundabout design shall be such that vehicles do not have to change lanes within the circulatory roadway in order to exit the roundabout in a given direction. Intersecting (crossing) path conflicts shall be limited to those between entering vehicles and circulating or exiting vehicles. Exiting vehicle paths shall not conflict with circulating vehicle paths.

5108.8.3 Islands

5108.8.3.1 Right of Way

All islands shall be dedicated to ACHD as part of the intersection right-of-way. All fixed objects and landscape features are subject to ACHD approval.

5108.8.3.2 Splitter Islands

Splitter islands shall be at least 50 feet long, be able to accommodate an acceptable pedestrian refuge area, assist in sufficiently controlling vehicle speeds through path deflection, prevent exiting traffic from accidentally crossing into the path of approaching traffic, and reinforce one-way circulation.

Splitter island landscaping is permissible as long as acceptable stopping and intersection sight distances are provided.

The surfaces of splitter islands shall not drop below the top face of curb and should be a different color and/or texture than pedestrian facilities, the roadway and the truck apron.

Fixed object placement within splitter islands shall conform to AASHTO Roadside Design Guide principles.

5108.8.3.3 Central Island

The center island shall not contain anything that attracts pedestrians into the center island or that can be a distraction to drivers. The islands shall be visible to approaching traffic and provide a cue for traffic to slow down and carefully navigate the intersection.

Central island landscaping shall achieve the following landscaping requirements as long as acceptable stopping and intersection sight distances are provided:

1. 1:6 maximum surface slope (from top of curb)
2. 1:20 surface slope or greater for minimum of 20 feet inside of curb.
 - a. 1:20 positive slope or greater shall be extended for a maximum distance possible if center island is constrained by size (diameter less than 40 feet) or by sight distance requirements
3. At minimum, gain three (3) feet in vertical height from top of curb as long as the minimum sight distance requirements are met.
 - a. Vertical height can be achieved by means of surface slope and/or inclusion of height gained by foliage or art as approved by ACHD
4. The surface shall not drop below the top face of the curb.
5. Fixed object placement shall conform to AASHTO Roadside Design Guide principles.

The central island shall provide a maintenance vehicle pullout if it is anticipated such a vehicle will be required to access the island. The pullout shall be located to minimize impact to sight distance when occupied, and if there is no adjacent truck apron, the curb shall be designed as a mountable truck apron curb. The maintenance vehicle pullout area shall not utilize any area impacted by a swept path.

5108.8.4 Fastest Paths

The fastest path is the path of least travel time made by a passenger vehicle traversing through the roundabout in the absence of other traffic and irrespective of all lane markings.

5108.8.4.1 Fastest Path Procedure

The procedure used to determine fastest paths and their respective speeds shall be approved by ACHD (e.g., the ACHD fastest path procedure). Approved procedures must be objective, repeatable, consistent with the most recent version of the FHWA Roundabout Guide recommendations, and shall reflect anticipated driver behavior and vehicle performance.

5108.8.4.2 Fastest Path Threshold Requirements

Entry fastest path speeds shall be 22 mph or slower for single-lane entries and 25 mph or slower for multilane entries.

Intersecting fastest path speed differences (e.g., entering versus circulating paths) and consecutive fastest path speed differences (e.g., path that circulates then exits) should be minimized and not exceed 10 mph for single-lane configurations and 15 mph for multilane configurations.

Fastest path speeds exiting the roundabout should be minimized to reduce pedestrian crosswalk conflicts.

5108.8.5 Natural Paths

The natural path of a passenger vehicle is a path that can be comfortably followed at roundabout operating speeds. It does not contain any abrupt changes in direction. There is one natural path for each legal movement in each lane.

5108.8.5.1 Natural Path Procedure

The procedure used to determine natural paths shall be approved by ACHD. Approved procedures must be objective, repeatable, and shall reflect anticipated driver behavior and vehicle performance. The method shall depict the ability of a vehicle to stay in its lane.

5108.8.5.2 Natural Path Requirements

Passenger vehicle natural paths shall maintain a minimum 2 foot offset from each other and from curbs.

5107.8.6 Wheel and Swept Paths

A wheel path is the space required to accommodate all of a vehicle's wheels through a maneuver. A swept path is the space required to accommodate all parts of a vehicle (the vehicle body) through a maneuver.

5108.8.6.1 Wheel and Swept Path Procedure

One design vehicle shall be selected for each movement to determine the minimum lane width(s) and one design vehicle shall be selected for each movement to determine the truck apron and/or roadway width(s). The selected design vehicles shall be approved by ACHD.

Wheel and swept paths shall be analyzed for all permitted movements from each lane using the selected design vehicle with an appropriate software package (e.g., AutoTURN or AutoTRACK). Wheel and swept paths shall

reflect anticipated driver behavior and vehicle performance as approved by ACHD (e.g., no stopping or backing).

5108.8.6.2 Wheel and Swept Path Requirements

The combination of roadway width and truck apron width shall accommodate all design vehicles. Vehicles smaller than trucks with trailers shall be accommodated within the roadway without requiring the use of a truck apron. Trucks with trailers shall not be required to maneuver through a roundabout in one lane.

The clearance between curbs and design vehicle wheel paths shall be at least 1 foot. The clearance between side-by-side swept paths shall be at least 2 feet.

5108.8.7 Truck Aprons

Truck aprons are traversable areas used to accommodate semi-trailer off-tracking while achieving adequate deflection for all other vehicles.

As necessary, truck aprons shall be provided to accommodate the design vehicle(s). Truck aprons shall be a different color and texture than the roadway surface and all pedestrian and bicycle facilities. Truck aprons shall be raised three (3) inches above the adjoining roadway with mountable roundabout curb.

5108.8.8 Pedestrian Facilities

Sidewalks shall be provided on all roundabout approaches that connect to existing or planned pedestrian facilities, or where there is anticipated pedestrian demand based on a city's urban impact area, a proposed development, and/or adjacent land use. Sidewalk construction may be deferred, at ACHD's discretion, at roundabouts where no sidewalk is present on the entering roadways, provided that the roundabout design includes consideration of the future sidewalk and right-of-way is provided for construction. Crosswalks and refuge areas shall be provided to connect all roundabout approaches that have sidewalks or mixed-use paths. A buffer shall be provided between roadway curb and the sidewalk or mixed-use path.

5108.8.8.1 Sidewalk

Sidewalk shall comply with ADA standards and ACHD requirements.

5108.8.8.2 Crosswalks

Pedestrian crosswalks shall be located 20 to 25 feet back (roughly one car length) from the entrance line. However, if additional control is being considered at the crosswalk and/or a staggered crosswalk is desired it may be desirable to locate the crosswalk further back.

Provide ADA-compliant pedestrian ramps, including truncated domes, at all crosswalks (this includes the crosswalk entrances from the splitter island refuge areas). At roundabouts with bicycle facilities, the ramps shall be a minimum of eight (8) feet wide (10 feet preferred). Wings shall only be used on ramp curbs if the roadway curb is in direct contact with the sidewalk.

5108.8.8.3 Refuge Areas

Splitter islands and bypass lane islands shall provide pedestrian refuge areas where pedestrian crossings are provided or planned to be provided in compliance with ADA standards. Refuge areas shall be a minimum of eight (8) feet long in the direction of pedestrian travel and eight (8) feet wide (10 feet preferred).

5108.8.8.4 Buffer

Provide a 2.5 feet minimum buffer between the sidewalks and curbs around the exterior of the roundabout. The buffer surface material shall not consist of brick, concrete, or asphalt unless a physical barrier (e.g., fence) is also provided. All vertical elements shall comply with sight distance requirements.

Fixed object placement within the buffer shall not restrict required sight distances and shall conform to AASHTO Roadside Design Guide principles.

5108.8.9 Bicycle Facilities

Bicycle lanes and shoulders shall be terminated with a bicycle ramp or curb opening on all approaches to a roundabout. A mixed-use path shall be provided between bicycle ramps and/or curb openings.

5108.8.9.1 Bike Lane/Shoulder Termination

All bike lanes and shoulders shall be clearly terminated prior to the crosswalk but close enough to the intersection so experienced cyclists can merge with vehicles traveling at similar speeds. A sidewalk ramp (or curb opening to a shared-use path if a sidewalk is not present) must be included at the termination point for less experienced cyclists. Bicycle ramps shall be provided at safe and maneuverable angles for bicyclists.

5107.8.9.2 Mixed-Use Path

The mixed-use path shall be at minimum 10 feet wide between bicycle ramps and/or curb openings if a bicycle lane is provided and a continuous sidewalk exists or is planned. If a shoulder is provided without a bicycle lane or a continuous sidewalk does not exist nor is planned, the mixed-use path shall be at minimum five (5) feet wide between bicycle ramps and/or curb openings. The mixed-use path shall comply with ADA requirements.

5108.8.10 Vertical Alignment

The circulatory roadway, truck apron, and approaches shall have between a 1.5% and 2.5% outward cross slope. Grades in the direction of vehicle travel shall not exceed $\pm 4\%$ within the circulatory roadway and to a point at least 50 feet beyond crosswalk locations. If no crosswalk is provided, grades in the direction of vehicle travel shall not exceed $\pm 4\%$ to a point at least 50 feet beyond the circulatory roadway.

5108.8.11 Sight Distance

Sufficient stopping sight distance shall be provided for each approach, the circulatory roadway, and pedestrian ramps, landing areas, and crosswalks. In addition, sufficient intersection sight distance shall be provided on all approaches at a point 50 feet from

the circulatory roadway. Intersection sight distance shall be calculated using a critical headway of five (5) seconds. Fastest path speeds shall be used to compute all stopping and intersection sight distances.

5108.8.12 Signing and Striping

All signing and striping shall comply with the latest edition of the Manual on Uniform Traffic Control Devices (MUTCD).

5108.8.13 Illumination

Lighting shall be distributed to sufficiently cover all merge and diverge points, curb noses, and pedestrian crossings. Roadway luminaires shall not be located directly above any crosswalks or in the central island. Poles and their locations shall conform to AASHTO Roadside Design Guide principles.

5108.8.13.1 Illumination Analysis Procedure

The procedure used to analyze the horizontal and vertical illumination shall be consistent with the recommendations in the most recent version of the Illuminating Engineering Society publication, Design Guide for Roundabout Lighting and the most recent version of FHWA Roundabout Guide.

5108.8.13.2 Illumination Requirements

The horizontal luminance values shall be within $\pm 20\%$ and vertical luminance values shall be no less than 20% of the recommendations summarized in the most recent version of the Illuminating Engineering Society publication, Design Guide for Roundabout Lighting.

5108.8.14 Curbs

Roundabout curbs shall be used as depicted in the latest edition of the ISPWC Standard Drawings – ACHD Supplement. Six (6) inch high roundabout curb shall be used around the outside of the roundabout, outside of the approaches, and around the splitter and central islands. Three (3) inch high roundabout curb shall be used between the roadway and truck aprons. On the entry approaches, the outer curb shall extend at least as far back from the circulatory roadway as the splitter islands. On the exit approaches, the outer curb shall extend at least as far back from the circulatory roadway as the crosswalk or bicycle ramp, if one is provided. Gutters shall be provided where necessary.

5108.8.15 Access Control

Access control and intersection spacing with roundabouts shall be in compliance with the ACHD Development Policy Manual and its driveway and intersection spacing requirements.

5108.9 Roundabout Design Exceptions

Exceptions to this policy may be considered at ACHD's discretion and shall not be considered until all impacts and consequences of the exception are clearly quantified and documented to ACHD's satisfaction.