MEMORANDUM

City Attorney's Office

To: Mayor and City Council
From: Bill Kirby, City Attorney
Peter Arellano, Public Works Director
Jabra Khasho, City Transportation Engineer
Date: January 27, 2013
Re: Timing of Yellow Light Intervals at Signalized Intersections

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Contents

Questions have arisen regarding the duration of the City of Beaverton's yellow traffic signals and whether the timing of the yellow phase meets applicable standards under federal, state, and local laws, guidelines, and/or rules. The issue arises in the context of the city's "photo red light" program, but potentially affects all traffic signals in Beaverton.

Some have suggested the city uniformly add a half second to all yellow light traffic signals to account for variations between the yellow phase timing programmed into a traffic controller and the actual yellow

phase observed by a driver. An ancillary issue regards whether videos showing drivers failing to obey traffic signals are admissible as evidence at trial on a charge of failing to obey a traffic control device.

This memo reviews the law regarding the traffic offense of failure to obey a traffic control device, how the city proves a person committed the offense, and how a person can defend against the charge if the person can prove that a traffic signal is operating outside established standards. Those standards are discussed in depth and applied to the four intersections in Beaverton that have photo red lights. The conclusion is that the duration of the yellow change intervals at signalized intersections in Beaverton appears to meet all applicable federal, state, and local laws, guidelines, and/or rules.

I. Failure to Obey a Traffic Control Device

When the city issues a photo red light ticket, whether for running a red light or turning right on a red light without stopping, the ticket is issued for a violation of Oregon Revised Statute (ORS) 811.265: driver failure to obey traffic control device.[1] The failure to obey traffic control device is categorized as a Class B traffic violation. The maximum penalty for an individual committing a Class B violation is a fine of $1,000, but the presumptive penalty imposed under ordinary circumstances is a $260 fine.[2]

To prove a violation of ORS 811.265, the city must prove by a preponderance of the evidence seven essential facts: (1) the date of the offense, (2) the place of the offense, (3) the defendant's identity, (4) that the defendant was driving at the time of the offense, (5) that the vehicle the defendant drove was a "vehicle" as defined by law, (6) that the place where the defendant drove was a public highway, and (7) that the defendant "failed to obey [a] specific traffic control device described in ORS 811.260" in the manner required by that section.

The traffic control devices described in ORS 811.260 include a list of 16 traffic control devices, from green lights to yield signs, and the appropriate driver response for each.[3] A driver is in violation of ORS 811.265 if the driver responds to a traffic control device in a manner that is not permitted under ORS 811.260. For red, yellow and green lights, ORS 811.260 requires a driver to respond as follows:

Red Light

A driver facing a steady circular red signal light alone shall stop at a clearly marked stop line, but if none, before entering the marked crosswalk on the near side of the intersection, or if there is no marked crosswalk, then before entering the intersection. The driver shall remain stopped until a green light is shown except when the driver is permitted to make a turn under ORS 811.360 (When vehicle turn permitted at stop light).

Yellow Light

A driver facing a steady circular yellow signal light is thereby warned that the related right of way is being terminated and that a red or flashing red light will be shown immediately. A driver facing the light shall stop at a clearly marked stop line, but if none, shall stop before entering the marked crosswalk on the near side of the intersection, or if there is no marked crosswalk, then before entering the intersection. If a driver cannot stop in safety, the driver may drive cautiously through the intersection.

Green Light

A driver facing a green light may proceed straight through or turn right or left unless a sign at that place prohibits either turn. A driver shall yield the right of way to other vehicles within the intersection at the time the green light is shown.

In effect, ORS 811.260 requires a driver to stop at a yellow light unless the driver cannot safely stop, in which event the driver may proceed through the intersection cautiously. The statute also requires a driver to stop at a red light and remain stopped until a green light is shown except when the driver is permitted to make a turn under ORS 811.360 (When vehicle turn permitted at stop light). When a person fails to do either of these actions when required, the person may be cited for failure to obey a traffic control device under ORS 811.265.

II. Courtroom Proceedings

When a traffic ticket goes to trial, the city has the burden of proving the alleged violation by a preponderance of the evidence.[4] The decision whether a person committed the offense is made by a judge, not a jury.[5] To prove something by a preponderance of the evidence means to prove something more likely than not. It is not proof beyond all doubt, or even reasonable doubt: there can be significant doubt about something that is proven by a preponderance of the evidence. If absolute certainty is 100% proof, a preponderance of certainty is anything over 50% proof.

With regard to the city's photo red light enforcement program, the existence of a video of the alleged traffic violation does not affect the seven essential facts the city must prove to establish a violation of ORS 811.265. The video is relevant evidence of the violation, admissible at trial under the rules of the Oregon Evidence Code.[6] Unquestionably, the video is very helpful in establishing a violation of ORS 811.265. A picture really is worth a thousand words.

As an example, below is video of a driver of a white truck who was cited for disobeying a traffic control device at the intersection of SW Allen and Lombard.

Failure to Obey a Traffic Control Device[7]

The video shows the traffic control signal going from green, to yellow, to red, and the truck entering the intersection on the red light. Assuming all other required elements of the offense are duly established, a court has the legal authority to convict the driver of failure to obey a traffic control device if the court finds by a preponderance of the evidence that the driver in the video either failed to stop at a red light or failed to stop at a yellow light at which the driver could have safely stopped but did not.

III. The Legality of Traffic Control Devices

When the city seeks to prove that a person violated ORS 811.265, the city is not legally required to initially establish any facts other than the seven essential facts listed earlier. The amount of time a yellow

light is displayed before a traffic signal turns to red is not among the seven essential facts that must be shown to establish a person failed to obey a traffic control device.

Although the city initially does not need to establish the length of a yellow light to prove a person violated ORS 811.265, the yellow light interval can legitimately become a contested issue if the length of the yellow interval is raised by the driver in his or her defense. This is because a driver can defend against a charge of failure to obey a traffic control device if the driver can prove the traffic control device at issue was not operating lawfully when the offense allegedly occurred.

For example, if a homeowner were to put up a stop sign at a nearby intersection on his or her own initiative, and a police officer then issued a citation to someone who ran the stop sign, the driver could defend against the charge of failure to obey a traffic control device by proving the stop sign was not a legal sign. The same concept can apply to traffic signals. If a traffic signal is not operating within legally required specifications, a driver can defend against the charge of failure to obey a traffic control device on grounds that the device was not operating lawfully.

IV. Applicable Standards and Guidelines

Legally required specifications for traffic control devices installed on roadways in Oregon are found in the Manual on Uniform Traffic Control Devices (MUTCD), published by the Federal Highway Administration (FHWA). Pursuant to ORS 810.200[8] and Oregon Administrative Rule (OAR) 734-020-0005,[9] traffic control devices installed on roadways in Oregon must conform to the MUTCD. These roadways include all state highways and public roadways under the jurisdiction of cities and counties within the State of Oregon. The current version of the MUTCD officially adopted in Oregon is the 2009 Edition, available here.[10]

In some situations, deviations to the MUTCD are published in the Oregon Supplement to the MUTCD, available here.[11] Deviations to the MUTCD are made when Oregon law deviates from the MUTCD; for example, in connection with left turns being allowed in Oregon on flashing yellow arrows. These deviations are adopted through the Oregon administrative rule process and by approval of the FHWA. With regard to traffic control signals and the duration of the yellow change interval, however, there is no Oregon supplemental rule applicable to yellow change intervals.

With specific regard to traffic signals, ODOT also publishes its own policies and guidelines to address traffic signal-related items that are not addressed in the MUTCD or the Oregon Supplement to the MUTCD or are addressed in one or both of those publications, but that still need further clarification. The publication is called the Traffic Signal Policy and Guidelines (TSPG), available here.[12] Among the items clarified in the TSPG is the Oregon Department of Transportation's policy regarding yellow light change intervals.[13] The policies and guidelines of the TSPG are binding only on ODOT in relation to traffic signals on the state highway system, but ODOT encourages other Oregon jurisdictions to consult and follow the TSPG so to promote uniformity in the location, operation, and maintenance of traffic signals in Oregon.[14]

In sum, with regard to traffic signals in Oregon, the FHWA's MUTCD is the principal resource to be consulted and ODOT's TSPG contains policies and guidelines supplementing the MUTCD , which ODOT encourages local jurisdictions to follow, but does not require them to follow. One might expect that the MUTCD and TSPG would endorse the same standards for yellow change intervals, but this is not the case. The differences between the two are described below.

A. The MUTCD

Section 4D.26 of the MUTCD concerns yellow change intervals.[15] Section 4D.26.03 of the manual provides that transportation engineers must exercise their professional judgment in deciding the duration of yellow change intervals. The section states that the specific duration of the yellow change interval for a particular intersection is to be determined using "engineering practices." The discretion conferred on transportation engineers to determine the length of a yellow change interval is not unfettered, however. Guidelines are provided. Section 4D.26.14 of the MUTCD, for example, specifies that the duration of the yellow change interval should be between 3 and 6 seconds, and Section 4D.26.07 suggests that engineering practices for determining the duration of yellow change intervals should include consultation of two books published by the Institute of Traffic Engineers (ITE): the "Traffic Control Devices Handbook" and the "Manual of Traffic Signal Design."

The current ITE Traffic Engineering Handbook (6th Edition)[16] recommends the following formula to calculate a yellow change Interval:

$$Y = t + \frac{V}{2a + 2Gg}$$

Where:
Y = yellow interval in seconds;
t = reaction time (typically 1 second);
V = designed speed (ft/second);
a = deceleration rate (typically 10 ft/s/s);
G = acceleration due to gravity (32.2 ft/s/s); and
g = grade approach (percent / 100, downhill is negative grade).

The ITE yellow change interval formula can be expressed in a table, providing the calculated yellow change interval at an intersection with a level grade at various speeds:[17]

Speed in MPH	Recommended Yellow Change Interval in Seconds
25 and below	3.0
30	3.2
35	3.6
40	3.9
45	4.3
50	4.7

While the MUTCD encourages transportation engineers to look to the ITE for guidance on transportation engineering issues, the engineers are not limited to the MUTCD and ITE publications in determining signal timing. The ITE's website states that the Traffic Control Devices Handbook:

> "…provides guidance and information to implement the provisions of the MUTCD. The objective of the Handbook is to bridge the gap between the MUTCD requirements and field applications. The Handbook does not establish policy, procedures, or standards for an agency, or set the "standard-of-care" for decisions on traffic control devices. It is meant as guidance material to assist in determining the appropriate device(s) for a specific condition based on judgment and/or study."[18]

Transportation engineers are encouraged to look at a variety of factors to determine signal timing at any particular intersection. This includes consideration of the posted speed, traffic volumes, terrain, slope and the overall design and engineering of the intersection. In metropolitan areas like Portland, it is appropriate, too, to look at how the state and other nearby local jurisdictions in the region set signal timing, so drivers have a uniform expectation of signal timing. Drivers expect to experience the same device and its operation throughout their travels, within and outside of their jurisdiction.[19]

B. The TSPG

Signal timing on state highways is set by ODOT in accordance with the policies and guidelines set forth in the TSPG. With regard to yellow change interval, the manual states:

> "The steady yellow signal indication is displayed following every steady green signal indication to warn vehicle traffic of an impending change in the right-of-way. The amount of time that the steady yellow signal is displayed is referred to as the yellow change interval. The duration of the yellow change interval is based on the driver's perception-reaction time, deceleration rate, the approach speed, and the approach grade. The duration of the yellow change interval should allow, at a minimum, for a driver to comfortably decelerate to a stop prior to entering the intersection.
>
> "The yellow change interval in use at traffic signals on state highways shall meet or exceed ODOT's minimum yellow change interval, as shown in Table 3-1. These yellow change intervals are based on Formula 1 from the Institute of Transportation Engineers (ITE) Informational Report, "Determining Vehicle Signal Change and Clearance Intervals." The ODOT minimum yellow change intervals shown in Table 3-1 are applicable for approaches where grades (downgrades) are 3 percent or less.
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> "Table 3-1: ODOT Minimum Yellow Change and Red Clearance Intervals[20]
> (These values may be increased as deemed necessary by engineering judgment. Factors that should be considered for increasing red clearance interval include intersection width, vehicle and pedestrian conflict points, large percentage of trucks, and approach speed.)

Posted Speed (mph)	Minimum Yellow Change Intervals[(1)(2)] (sec)	Minimum Red Clearance Interval[(2)] (sec)
25	3.5	0.5
30	3.5	0.5
35	4.0	0.5
40	4.3	0.5
45	4.7	0.7
50	5.0[(3)]	1.0
55	5.0[(3)]	1.0

[(1)] Applies to approaches with a downgrade of 3 percent or less.

[(2)] Some intersections may require more than the minimum times.

[(3)] ODOT limits the yellow change interval to 5 seconds. The sum of the yellow change and red clearance intervals shall exceed the length of yellow interval calculated from ITE Formula 1.

"For grades exceeding 3 percent, the ITE Formula 1 shown below, should be used. Left turns may be treated as 25 mph approaches. ODOT's minimum yellow change interval is 3.5 seconds and maximum yellow is 5.0 seconds.

$$y = t + \frac{v}{2a + 2Gg}$$

"Where:
y = length of yellow interval, nearest 0.1 seconds;
t = driver perception-reaction time, recommended as 1.0 seconds;
v = velocity of approaching vehicle, in ft/second;
a = deceleration rate, recommended at 10 ft/s/s;
g = acceleration due to gravity, 32 ft/s/s; and
G = grade approach (3% downgrade would appear as -0.03)."

Based on the above, it is evident that the ODOT yellow change interval varies from the yellow change interval recommended by the MUTCD and ITE. For example, the MUTCD suggests that the duration of the yellow change interval should be between 3 and 6 seconds, but the TSPG sets the range between 3.5 and 5.0 seconds. This difference is guidance is evidence of how "engineering practices" and judgment affect signal timing.

The variation in the recommended duration of yellow light intervals is legally permissible because both recommendations are based on the exercise of sound engineering judgment. The exercise of engineering judgment to set yellow change intervals is appropriate and necessary because there is a trade-off between intersection safety and intersection operations when implementing yellow change intervals. Extremely short yellow light durations may not provide an adequate level of safety, whereas excessively long durations are counterproductive to efficient intersection operation.[21] This required balancing of competing transportation interests is one of the principal reasons why the MUTCD, the TSPG, and all ITE publications describe the duration of yellow change intervals as recommendations and not as mandates.

The situation involving the differences in yellow light interval timing suggested by various transportation engineering publications is perhaps best summarized by the Insurance Institute for Highway Safety. According to the Insurance Institute for Highway Safety:

> "There is no universal definition or agreement among transportation engineers concerning a 'properly timed signal.' Rather, signal timing is a complex undertaking without a simple formula applicable to all intersections alike. Motorists approach intersections at different speeds, in a range of vehicle types, in varying weather conditions, etc. Signal change intervals are timed to accommodate the range of circumstances."

V. Standards as Applied to the City of Beaverton

Given that a driver may defend against a photo red light ticket based on a traffic control device operating unlawfully and outside required specifications, it is appropriate to determine whether the duration of the yellow change intervals of the city of Beaverton's traffic signals is defensible as consistent or compatible with state law, ITE publications, the MUTCD, and ODOT policies and guidelines.

Below is a list showing the duration of the yellow change interval as programmed into the traffic signal controller at four different Beaverton intersections. Each of the intersections is a photo red light enforced intersection, but the signal settings on camera-equipped intersections in Beaverton are programmed the same as other intersections in the city.

The first three intersections have a "level grade" per ODOT standards, in that none has a downgrade more than three percent. The fourth intersection has a "level grade" northbound on Scholls Ferry Road, but about a 4.2 percent downgrade westbound on Hall Boulevard.

Each of the four intersections is located inside Beaverton city limits, but Hall Boulevard and Scholls Ferry Road are state routes. The city maintains the traffic signals at this intersection pursuant to an intergovernmental agreement, but the city programs the intersection's signal timing at ODOT's direction.

The duration of the yellow change intervals as programmed into the traffic signal controller at the four intersections are as follows:

Beaverton–Hillsdale Highway at Griffith Drive
Posted speed: 30 mph, eastbound and westbound
Yellow change interval (as programmed): 3.5 seconds.

Allen Boulevard at Lombard Avenue
Posted speed: 30 mph, eastbound and westbound.
Yellow change interval (as programmed): 3.5 seconds.

Walker Road at Cedar Hills Boulevard
Posted speed: 35 mph, eastbound and westbound.
Yellow change interval (as programmed): 4.0 seconds.

Hall Boulevard & Scholls Ferry Road

Posted speed: 35 mph westbound (Scholls Ferry Rd) & 40 mph northbound (Hall Blvd).
Yellow change interval (as programmed): 4.0 seconds.

For every listed intersection, the length of the yellow change interval programmed into the intersection's traffic controller unit is either programmed at ODOT's direction (SW Hall Blvd & Scholls Ferry Rd) or is programmed at the direction of the city's traffic engineer. Every one of the intersections programed by the city exceeds the minimum length recommendation set out in the ITE table above and is consistent with ODOT's recommended timing as set out in the TSPG.

While the yellow change interval programmed into each intersection's traffic controller unit meets ODOT recommendations and/or exceeds the ITE's minimum recommended length, city transportation engineers know that the length of a yellow change interval at any particular intersection can vary on account of the technical capabilities of the intersection's traffic controller unit. The yellow change interval programmed into a traffic controller will not always be the actual interval observed by a driver.

To get a sense of how significant this variation is, the city sampled approximately 90 traffic signal cycles taken over an hour's time at the intersection of SW Allen and Lombard. The yellow change interval observed at that intersection ranged from 3.40 seconds to 3.56 seconds, with the average yellow change interval being 3.48 seconds.

While the average yellow change interval observed is less than the 3.5 seconds programmed into the traffic controller, all observed intervals were more than the ITE recommended 3.2 second yellow change interval for a 30 MPH intersection.

Under these circumstances, the city is confident that the timing of the yellow change interval of its traffic signals is consistent with state law, the MUTCD, relevant ITE publications, and various ODOT policies and guidelines. No one has offered evidence showing that a yellow change interval in Beaverton operates below ITE recommendations or is programmed other than how ODOT would program the traffic controller if the controller were under ODOT jurisdiction. The city has no reason to conclude that its traffic control signals operate outside legally required specifications.

VI. Yellow Light Timing Variances

The city programs the duration of a yellow change interval at a set amount of time on a cycle-by-cycle basis at any given traffic signal. Despite this, the actual duration of a traffic signal's yellow change interval may vary slightly from cycle to cycle on account of the mechanics of traffic signal equipment. The technical capabilities of the controller unit and other traffic signal equipment does not allow for invariable yellow change interval timing. Some variation in the duration of the yellow change interval is to be expected.

For example, at an intersection of a 30 MPH road programmed to have a yellow change interval of 3.5 seconds, one driver may have a yellow light for 3.40 seconds while the next driver may have a yellow

light for 3.56 seconds. This .16 second difference in treatment does not rise to the level of a deprivation of a person's civil rights on equal protection or due process grounds under either the state or federal constitution.

Broadly speaking, the reason there is no constitutional violation present under these circumstances is because the .16 second difference does not cause the actual amount of time the driver has a yellow light to fall outside the three to six second permissible range for the timing of a yellow light allowed for by the MUTCD and ORS 811.265. Under ordinary circumstances, each driver seeing the traffic signal turn from green to yellow has a reasonable amount of time to safely stop before entering an intersection.

VII. Conclusions

The function of yellow change interval is to warn traffic of an impending change in the right-of-way assignment and to give drivers a reasonable amount of time to stop before entering an intersection. The duration of the yellow light interval needed to accomplish these objectives is not etched in stone. There are a variety of methods used to calculate the duration of yellow change intervals.

The MUTCD states that a yellow change interval should have a minimum duration of 3 seconds and a maximum duration of 6 seconds. ODOT sets the yellow change interval at a minimum duration of 3.5 seconds and a maximum duration of 5.0 seconds. Within those parameters, yellow change intervals may lawfully be adjusted as necessary, based on professional engineering judgment, to fit site conditions at any particular intersection.

All yellow change intervals at signalized intersections in Beaverton, including photo enforced intersections, allow a reasonably alert driver the time needed to "comfortably decelerate to a stop prior to entering the intersection."[22] Reasonable minds may differ on the optimal duration of the yellow change interval at any particular intersection, but no yellow change interval at any intersection in Beaverton appears to fall outside recommended standards.

To the extent there ever may be a problem with the duration of the yellow change interval at any particular intersection, the problem should be dealt with specifically as to that intersection. There is no evidence to suggest that there is a systemic failure of traffic control signals in Beaverton to meet applicable yellow change interval standards. To the contrary, the duration of the yellow change intervals at any signalized intersection in Beaverton is consistent with signal timing practices in neighboring jurisdictions and appears to meet all applicable federal, state, and local laws, guidelines, and/or rules.

End Notes

[1] ORS 811.265 provides in full:

1) A person commits the offense of driver failure to obey a traffic control device if the person drives a vehicle and the person does any of the following:
(a) Fails to obey the directions of any traffic control device.
(b) Fails to obey any specific traffic control device described in ORS 811.260 (Appropriate driver responses to traffic control devices) in the manner required by that section.
(2) A person is not subject to this section if the person is doing any of the following:
(a) Following the directions of a police officer.
(b) Driving an emergency vehicle or ambulance in accordance with the privileges granted those vehicles under ORS 820.300 (Exemptions from traffic laws).
(c) Properly executing a turn on a red light as authorized under ORS 811.360 (When vehicle turn permitted at stop light).
(d) Driving in a funeral procession led by a funeral lead vehicle or under the direction of the driver of a funeral escort vehicle.
(3) The offense described in this section, driver failure to obey a traffic control device, is a Class B traffic violation.

[2] ORS 153.018 and 153.019.

[3] ORS 811.260 relating to the appropriate driver responses to traffic control devices, provides in full:

Except as provided in ORS 811.265(2), a driver is in violation of ORS 811.265 if the driver makes a response to traffic control devices that is not permitted under the following:

(1) Green signal. A driver facing a green light may proceed straight through or turn right or left unless a sign at that place prohibits either turn. A driver shall yield the right of way to other vehicles within the intersection at the time the green light is shown.

(2) Green arrow. A driver facing a green arrow signal light, shown alone or in combination with another signal, may cautiously enter the intersection only to make the movement indicated by such arrow or such other movement as is permitted by other signals shown at the same time.

(3) Green bicycle signal. A bicyclist facing a green bicycle signal may proceed straight through or turn right or left unless a sign at that place prohibits either turn. The bicyclist shall yield the right of way to other vehicles within the intersection at the time the green bicycle signal is shown.

(4) Steady circular yellow signal. A driver facing a steady circular yellow signal light is thereby warned that the related right of way is being terminated and that a red or flashing red light will be shown immediately. A driver facing the light shall stop at a clearly marked stop line, but if none, shall stop before entering the marked crosswalk on the near side of the intersection, or if there is no marked crosswalk, then before entering the intersection. If a driver cannot stop in safety, the driver may drive cautiously through the intersection.

(5) Steady yellow arrow signal. A driver facing a steady yellow arrow signal, alone or in combination with other signal indications, is thereby warned that the related right of way is being terminated. Unless entering the intersection to make a movement permitted by another signal, a driver facing a steady yellow arrow signal shall stop at a clearly marked stop line, but if none, shall stop before entering the marked crosswalk on the near side of the intersection, or if there is no marked crosswalk, then before entering the intersection. If a driver cannot stop in safety, the driver may drive cautiously through the intersection.

(6) Steady yellow bicycle signal. A bicyclist facing a steady yellow bicycle signal is thereby warned that the related right of way is being terminated and that a red bicycle signal will be shown immediately. A bicyclist facing a steady yellow bicycle signal shall stop at a clearly marked stop line, but if none, shall stop before entering the marked crosswalk on the near side of the intersection, or if there is no marked crosswalk, then before entering the intersection. If a bicyclist cannot stop in safety, the bicyclist may proceed cautiously through the intersection.

(7) Steady circular red signal. A driver facing a steady circular red signal light alone shall stop at a clearly marked stop line, but if none, before entering the marked crosswalk on the near side of the intersection, or if there is no marked crosswalk, then before entering the intersection. The driver shall remain stopped until a green light is shown except when the driver is permitted to make a turn under ORS 811.360.

(8) Steady red arrow signal. A driver facing a steady red arrow signal, alone or in combination with other signal indications, may not enter the intersection to make the movement indicated by the red arrow signal. Unless entering the intersection to make some other movement which is permitted by another signal, a driver facing a steady red arrow signal shall stop at a clearly marked stop line, but if none, before entering the marked crosswalk on the near side of the intersection, or if there is no marked crosswalk, then before entering the intersection. The vehicle shall remain stopped until a green light is shown except when the driver is permitted to make a turn under ORS 811.360.

(9) Steady red bicycle signal. A bicyclist facing a steady red bicycle signal shall stop at a clearly marked stop line, but if none, before entering the marked crosswalk on the near side of the intersection, or if there is no marked crosswalk, then before entering the intersection. The bicyclist shall remain stopped until a green bicycle signal is shown except when the bicyclist is permitted to make a turn under ORS 811.360.

(10) Traffic control devices at places other than intersections. If a traffic control device that is a signal is erected and maintained at a place other than an intersection, the provisions of this section relating to signals shall be applicable. A required stop shall be made at a sign or marking on the roadway indicating where the stop shall be made, but in the absence of such sign or marking the stop shall be made at the signal.

(11) Flashing red signal. When a driver approaches a flashing red light used in a traffic control device or with a traffic sign, the driver shall stop at a clearly marked stop line, but if none, before entering the marked crosswalk on the near side of the intersection, or if there is no marked crosswalk, then at the point nearest the intersecting roadway where the driver has a view of approaching traffic on the intersecting roadway before entering it. The right to proceed shall be subject to the rules applicable after making a stop at a stop sign. This subsection does not apply at railroad grade crossings. Conduct of a driver approaching a railroad grade crossing is governed by ORS 811.455.

(12) Flashing circular yellow signal. When a driver approaches a flashing circular yellow light used as a signal in a traffic control device or with a traffic sign, the driver may proceed through the intersection or past the signal only with caution. This subsection does not apply at railroad grade crossings. Conduct of a driver approaching a railroad grade crossing is governed by ORS 811.455.

(13) Flashing yellow arrow signal. A driver facing a flashing yellow arrow signal, alone or in combination with other signal indications, may cautiously enter the intersection only to make the movement indicated by the flashing yellow arrow signal or the movement permitted by other signals shown at the same time. A driver shall yield the right of way to other vehicles within the intersection at the time the flashing yellow arrow signal is shown. In addition, a driver turning left shall yield the right of way to other vehicles approaching from the opposite direction so closely as to constitute an immediate hazard during the time when the turning vehicle is moving across or within the intersection.

(14) Lane direction control signals. When lane direction control signals are placed over the individual lanes of a highway, a person may drive a vehicle in any lane over which a green signal light is shown, but may not enter or travel in any lane over which a red signal light is shown.

(15) Stop signs. A driver approaching a stop sign shall stop at a clearly marked stop line, but if none, before entering the marked crosswalk on the near side of the intersection or, if there is no marked crosswalk, then at the point nearest the intersecting roadway where the driver has a view of approaching traffic on the intersecting roadway before entering it. After stopping, the driver shall yield the right of way to any vehicle in the intersection or approaching so closely as to constitute an immediate hazard during the time when the driver is moving across or within the intersection.

(16) Yield signs. A driver approaching a yield sign shall slow the driver's vehicle to a speed reasonable for the existing conditions and if necessary for safety, shall stop at a line as required for stop signs under this section, and shall yield the right of way to any vehicles in the intersection or approaching so closely as to constitute an immediate hazard.

[4] ORS 153.076(2).

[5] ORS 153.076(1).

[6] For purposes of the Oregon Evidence Code, "relevant evidence" means evidence having "any tendency to make the existence of any fact that is of consequence to the determination of the action more probable or less probable than it would be without the evidence." ORS 40.150. Relevant evidence is admissible at trial unless otherwise provided by law. ORS 40.155.

[7] The link only connects if the reader is online inside of the city's firewall.

[8] ORS 810.200, relating to uniform standards for traffic control devices and uniform system of marking and signing highways, provides in full:

(1) The Oregon Transportation Commission may exercise the following authority with respect to the marking, signing and use of traffic control devices in this state:
(a) The commission shall adopt a manual and specifications of uniform standards for traffic control devices consistent with the provisions of the vehicle code for use upon highways in this state.
(b) The commission is authorized to provide a uniform system of marking and signing highways within the boundaries of this state.
(c) The commission is authorized to determine the character or type of traffic control devices to be used in this state.
(2) The authority granted under this section is subject to all of the following:
(a) The system of marking and signing established under this section shall correlate with and, as far as possible, conform to the system adopted in other states. The commission may include in the system signs and signals that show internationally recognized and approved symbols.
(b) So far as practicable, all traffic control devices in this state shall be uniform as to type and location.
(c) All traffic control devices placed or operated in this state shall conform to specifications approved by the commission.
(d) Stop signs and yield signs shall be illuminated at night or so placed as to be illuminated by the headlights of approaching vehicles or by street lights.

[9] OAR 734-020-0005, relating to traffic control and the MUTCD, provides in full:

Traffic Control Devices
(1) Manual on Uniform Traffic Control Devices:
(a) In accordance with ORS 810.200, the 2009 Edition of the Manual on Uniform Traffic Control Devices dated December 2009 (U.S. Department of Transportation, Federal Highway Administration) is hereby adopted by reference as the manual and specifications of uniform standards for traffic control devices for use upon highways within this state.
(b) The Oregon Supplement to the Manual on Uniform Traffic Control Devices dated December 2011 is hereby adopted by reference as a register of deviations to the 2009 Edition of the Manual on Uniform Traffic Control Devices.
(c) The Oregon Temporary Traffic Control Handbook dated December 2011 is hereby adopted by reference as a standard for temporary traffic control for operations of three days or less.
(2) Traffic Control Devices Committee
(a) The Traffic Control Devices Committee is created to serve as an advisory body to the State Traffic Engineer on uniform standards for traffic control devices in this state. The committee shall consist of the following persons:
(A) The State Traffic Engineer of the Department of Transportation;
(B) A State Region Traffic Manager appointed by the Department of Transportation;
(C) The Superintendent of State Police or a representative designated by the superintendent;
(D) Three City Traffic Engineers appointed by the League of Oregon Cities;
(E) Three County Traffic Engineers appointed by the Association of Oregon Counties; and
(F) A Transportation Engineer appointed by the Oregon Sections of the Institute of Transportation Engineers;
(b) Committee members serve a maximum three-year term and may be re-appointed to serve an additional three-year term.
(c) Six Committee members constitute a quorum.

(d) A Chair and Vice-Chair shall be elected by the Committee to serve for the calendar year. The Chair shall prepare the agenda and moderate the meetings. The Vice-Chair shall preside in the absence of the Chair. If both are absent, a temporary Chair shall be chosen by the Committee at the meeting.
(e) The State Traffic Engineer shall serve as Secretary to the Committee assisting the Chair in preparing the agenda, publishing an agenda prior to each meeting, maintaining Committee files, and publishing minutes of meetings.
(f) The Committee shall meet every other month and at such additional times as designated by the Chair or as requested by six or more members of the Committee.

[10] http://mutcd.fhwa.dot.gov/htm/2009/html_index.htm

[11] http://www.oregon.gov/ODOT/HWY/TRAFFIC-ROADWAY/docs/pdf/oregon_supplement_mutcd_2009_edition.pdf

[12] http://www.oregon.gov/ODOT/HWY/TS/pages/publications.aspx

[13] Oregon Department of Transportation (ODOT), Traffic Signal Policy and Guidelines (TSPG), section 3.1: "Yellow Change Interval," 2013, p. 8.

[14] ODOT, TSPG, preface, p. 1.

[15] Section 4.26 of the 2009 MUTCD relating to yellow change and red clearance intervals provides:

Standard:
01. A steady yellow signal indication shall be displayed following every CIRCULAR GREEN or GREEN ARROW signal indication and following every flashing YELLOW ARROW or flashing RED ARROW signal indication displayed as a part of a steady mode operation. This requirement shall not apply when a CIRCULAR GREEN, a flashing YELLOW ARROW, or a flashing RED ARROW signal indication is followed immediately by a GREEN ARROW signal indication.

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

03. The duration of the yellow change interval shall be determined using engineering practices.

Support:
04. Section 4D.05 contains provisions regarding the display of steady CIRCULAR YELLOW signal indications to approaches from which drivers are allowed to make permissive left turns.

Guidance:
05. When indicated by the application of engineering practices, the yellow change interval should be followed by a red clearance interval to provide additional time before conflicting traffic movements, including pedestrians, are released.

Standard:
06. When used, the duration of the red clearance interval shall be determined using engineering practices.

Support:
07. Engineering practices for determining the duration of yellow change and red clearance intervals can be found in ITE's "Traffic Control Devices Handbook" and in ITE's "Manual of Traffic Signal Design" (see Section 1A.11).

Standard:
08. The durations of yellow change intervals and red clearance intervals shall be consistent with the determined values within the technical capabilities of the controller unit.

09. The duration of a yellow change interval shall not vary on a cycle-by-cycle basis within the same signal timing plan.

10. Except as provided in Paragraph 12, the duration of a red clearance interval shall not be decreased or omitted on a cycle-by-cycle basis within the same signal timing plan.

Option:
11. The duration of a red clearance interval may be extended from its predetermined value for a given cycle based upon the detection of a vehicle that is predicted to violate the red signal indication.

12. When an actuated signal sequence includes a signal phase for permissive/protected (lagging) left-turn movements in both directions, the red clearance interval may be shown during those cycles when the lagging left-turn signal phase is skipped and may be omitted during those cycles when the lagging left-turn signal phase is shown.

13. The duration of a yellow change interval or a red clearance interval may be different in different signal timing plans for the same controller unit.

Guidance:
14. A yellow change interval should have a minimum duration of 3 seconds and a maximum duration of 6 seconds. The longer intervals should be reserved for use on approaches with higher speeds.

15. Except when clearing a one-lane, two-way facility (see Section 4H.02) or when clearing an exceptionally wide intersection, a red clearance interval should have a duration not exceeding 6 seconds.

Standard:
16. Except for warning beacons mounted on advance warning signs on the approach to a signalized location (see Section 2C.36), signal displays that are intended to provide a "pre-yellow warning" interval, such as flashing green signal indications, vehicular countdown displays, or other similar displays, shall not be used at a signalized location.

Support:
17. The use of signal displays (other than warning beacons mounted on advance warning signs) that convey a "pre-yellow warning" have been found by research to increase the frequency of crashes.

[16] Institute of Transportation Engineers (ITE). Traffic Engineering Handbook, 6th Edition. Washington, D.C.: ITE, 2009, p.412.

[17] The deceleration rate of an approaching vehicle has the largest effect on the variance of the calculated change interval. Until 1982, the ITE recommended a deceleration rate of 15 ft/sec^2, which would be less gentle than a deceleration rate of 10 ft/sec^2. National Cooperative Highway Research Program Report 731: Guidelines for Timing Yellow and All-Red Intervals at Signalized Intersections. Washington, D.C.: Transportation Research Board, 2012, p. 13. If the former deceleration rate is used to calculate the yellow change interval at a level intersection, the recommended yellow change intervals would be:

Speed in MPH	Recommended Yellow Change Interval In Seconds
40 and below	3.0
45	3.2
50	3.5

[18] http://www.ite.org/emodules/scriptcontent/Orders/ProductDetail.cfm?pc=IR-112A

[19] National Cooperative Highway Research Program Report 731: Guidelines for Timing Yellow and All-Red Intervals at Signalized Intersections. Washington, D.C.: Transportation Research Board, 2012, p. 51.

[20] "Red Clearance Interval" represents the duration of all red signals at an intersection. Beaverton follows ODOT guidelines in setting red clearance durations. The extra time is generally associated with added time to allow a vehicle that enters an intersection on a yellow light to clear the intersection even after the vehicle's traffic signal has turned red.

[21] National Cooperative Highway Research Program Report 731: Guidelines for Timing Yellow and All-Red Intervals at Signalized Intersections. Washington, D.C. : Transportation Research Board, 2012, p. 49.

[22] ODOT, TSPG, section 3.1: "Yellow Change Interval," p. 8 (stating, "The duration of the yellow change interval should allow, at a minimum, for a driver to comfortably decelerate to a stop prior to entering the intersection").