Chapter 3
SIGNAL OPERATIONS AND OPERATIONAL APPROVAL

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3 SIGNAL OPERATIONS AND OPERATIONAL APPROVAL

3.1 Operational Approval

Traffic signal operational approvals come in two forms:

1. State Traffic-Roadway Engineer (STRE)
2. Region Traffic Engineer (RTE)

The SRTE can approve any operation on State Highways. The STRE has delegated some authority to the RTE. For more information on what design features require STRE or RTE approval, consult Chapter 5 of the ODOT Traffic Manual. The ODOT Traffic Manual also contains valuable information on many ODOT traffic policies, including the process for obtaining the necessary traffic signal Operational Approvals. The ODOT Traffic Signal Policy and Guidelines also contains information on signal operations and approval. These two documents can be viewed online at:

- http://www.oregon.gov/ODOT/Engineering/Docs_TrafficEng/Traffic-Manual-v2016.pdf
- http://www.oregon.gov/ODOT/Engineering/Documents_TrafficStandards/Traffic-Signal-Policy-Guidelines.pdf

The Region Traffic Section is responsible for processing any necessary signal operational approvals; all RTE approvals are completed by Region Traffic and all requests for STRE approval are submitted by Region Traffic to the STRE for completion. The signal designer is responsible for obtaining a copy of the Operational Approval and designing the signal according the requirements as stated within. Contact either the Region Traffic Section or the Traffic-Roadway Section to obtain a copy of the Operational Approval.

NOTE: The Operational Approval is NOT the Design Approval of the plans and specifications. See Chapter 2 for information on Design Approval.

Regardless who the operational approval is from, the signal designer needs this information before design work is started. Operational Approvals generally come in the form of a letter which will outline specific constraints and parameters to be used in the design of the traffic signal. They are accompanied by an engineering study requesting approval, and either the Preliminary Signal Operations Review (PSOR) form for minor changes or the Preliminary Signal Operations Design (PSOD) form for major changes. These forms provide a quick glance summary of the operational requirements, which is useful during the design process. The full engineering study is available upon request if more in-depth information regarding the operational requirements is desired. See section 3.10 for examples of Operational Approvals.

The Operational Approval letter typically contains the information listed below, as applicable to the project:

- Specific location (Highway, Milepoint, County)
- Number of lanes & lane use for each approach
- Normal Phase Rotation
- Crosswalk closures
- Traffic Signal Communications (Interconnect)
- Emergency preemption
- Railroad preemption
- Transit priority
- Other unique requirements (e.g. the signal at 1st and Main must be removed before the construction of a new signal at 2nd and Main)

NOTE: Failure to have an Operational Approval or failure to have a signal plan that matches the operational approval is a fatal flaw and will result in major delays to the project.

It is critical that the signal design, roadway geometry, signing, and striping at the intersection match the requirements shown in the Operational Approval. Any discrepancies between the design plans and the Operational Approval must be resolved by either a revision to the Operational Approval or by modifying the design plans.

3.2 Number of Lanes and Lane Use

The number of lanes and lane use needed for each approach of the intersection will be detailed in the engineering study and shown in the PSOR or PSOD form that accompanies the STRE or RTE approval letter. Depending on the type of project, projected traffic volumes, and phasing requirements, there are a couple of options:

- No change to the existing number of lanes,
- No change to the existing number of lanes, but a change to the existing lane use,
- Increase in the existing number of lanes; or
- Decrease in the existing number of lanes.

If changes to the number of lanes are necessary on the project, it is important to be in communication with the roadway designer early on in the process as the roadway design is the foundation of the signal design. Also, communication with the striping designer and the sign designer will be important.

If changes to existing lane use (but not to the existing number of lanes) are necessary on the project, it is important to be in communication with the striping designer and the sign designer early on in the process as these types of changes usually necessitate the need for a striping plan and a signing plan.

3.3 Normal Phase Rotation

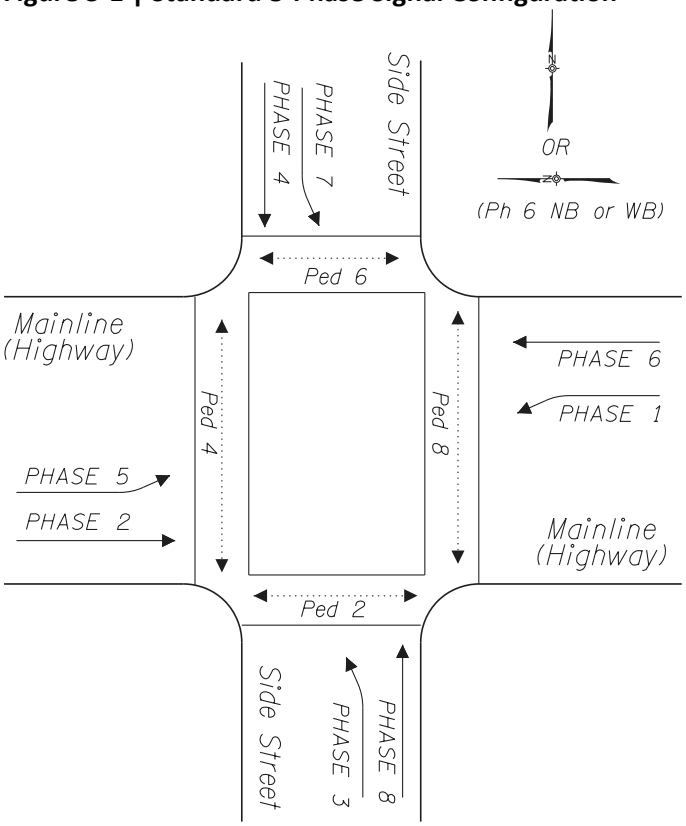
In order to design a traffic signal, a basic understanding of traffic operations and phasing is required. The phasing and operation of the traffic will also be shown on the plan sheets. For more detailed information, the following resources should be consulted:

- Traffic Signal Operations Engineer,
- Region Traffic Operations Engineer; and
- ODOT Signal Timing Policy.

The phasing of the traffic signal is shown on the signal plans. Figure 3-1 shows a typical 8-phase signal configuration and Figure 3-2 shows the corresponding ring & barrier diagram. Typical 8-phase signal configurations have the following characteristics:

- Protected left turns are odd numbered phases (ø1, ø3, ø5, and ø7).
- Through movements and permissive right (or left turns) are even phases (ø2, ø4, ø6, and ø8). Typically, phase 6 is mainline northbound (or westbound).
- Pedestrian phases are even phases corresponding to the compatible through phase (ped 2, ped 4, ped 6, and ped 8).
- The main line through phases are 2 and 6, with corresponding left turn phases 1 and 5. The sum of the phases for each mainline approach equals 7 (2+5=7, and 1+6=7).
- The side street through phases are 4 and 8, with corresponding left turn phases 3 and 7. The sum of the phases for each side street approach equals 11 (4+7=11, and 3+8=11).

Figure 3-1 | Standard 8-Phase Signal Configuration



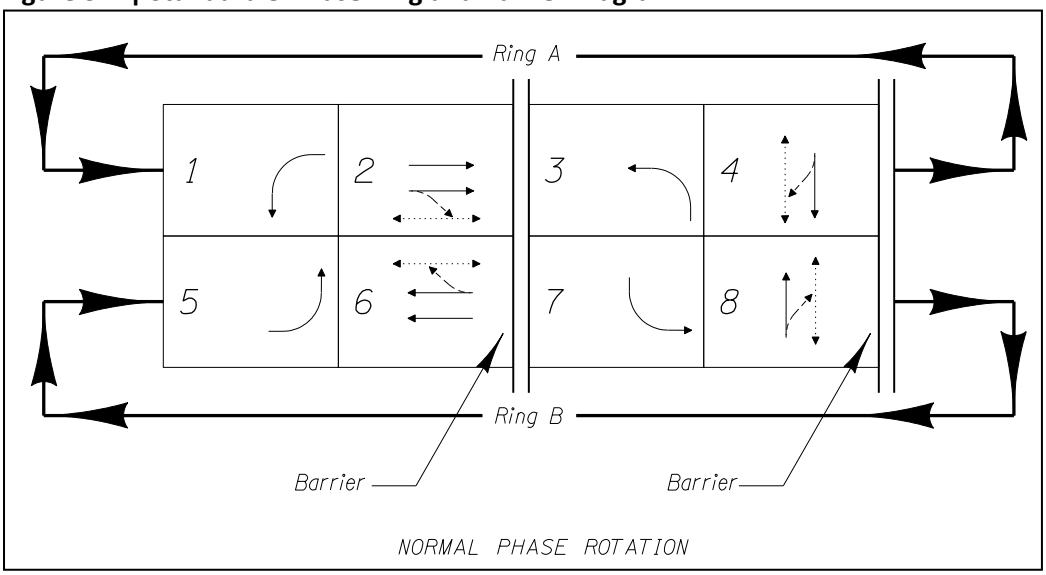
3.3.1 Ring and Barrier Diagram

Modern U.S. practice for signal control organizes phases by grouping them in what is called a ring and separating the crossing or conflicting traffic streams with time between when they are allowed to operate, either by making the movements sequential or adding a barrier between the movements.

A ring consists of two or more sequentially timed and individually selected conflicting phases arranged so as to occur in an established order. In Ring A of the Normal Phase Rotation diagram shown in Figure 3-2, phase 1 must terminate prior to phase 2, which must terminate prior to phase 3, which must terminate prior to phase 4, which must terminate prior to returning to phase 1. The majority of traffic signals use two rings.

Barriers assure there will be no concurrent selection and timing of conflicting phases for traffic movement in different rings. Both ring A and ring B cross the barrier simultaneously to select and time phases on the other side. These barriers separate the mainline phases (ø1, ø5, ø2, and ø6) from the side street phases (ø3, ø7, ø4, and ø8). In this example, phase 2 and 6 must terminate at the same time before the next phases (ø3 and ø7) can be serviced. Similarly, phase 4 and phase 8 must terminate at the same time before the next phases (ø1 and ø5) can be serviced. There is no barrier between phases 1 & 5 and 2 & 6; therefore, phase 1 and 5 do not have to terminate at the same time. If phase 1 terminates prior to phase 5, the next phase in Ring A may be serviced (phase 2), resulting in phase 2 and 5 being serviced together. Using this same logic, compatible phases can be determined. For example: phase 1 may operate concurrently with phase 5 and phase 6 (but not with phase 2 which is in the same ring as phase 1, and not with any phases located beyond the barrier: 3, 4, 7 & 8), phase 2 may operate concurrently with phase 5 and phase 6 (but not with phase 1, 3, 4, 7, & 8), phase 8 may operate concurrently with phase 3 and phase 4 (but not with phase 7, 1, 2, 5, & 6)

Figure 3-2 | Standard 8-Phase Ring and Barrier Diagram



When reading a ring and barrier diagram, vehicular movements drawn with solid lines do not have any conflicting movements associated with them. In Figure 3-2 that would be phases 1, 3, 5, 7, and thru movements for phase 2, 4, 6, 8. Vehicular movements drawn with large dashed lines have conflicting movements associated with them that require the motorist to yield during a green indication (permissive movement). In Figure 3-2 that would be the right turn movement for phases 2, 4, 6, and 8 (the conflicting movement that the right turn must yield to is the associated pedestrian phase). Pedestrian movements are drawn with small dashed lines with dual arrow heads, because pedestrians can move either direction in a crosswalk. Barriers are indicated by dual vertical lines.

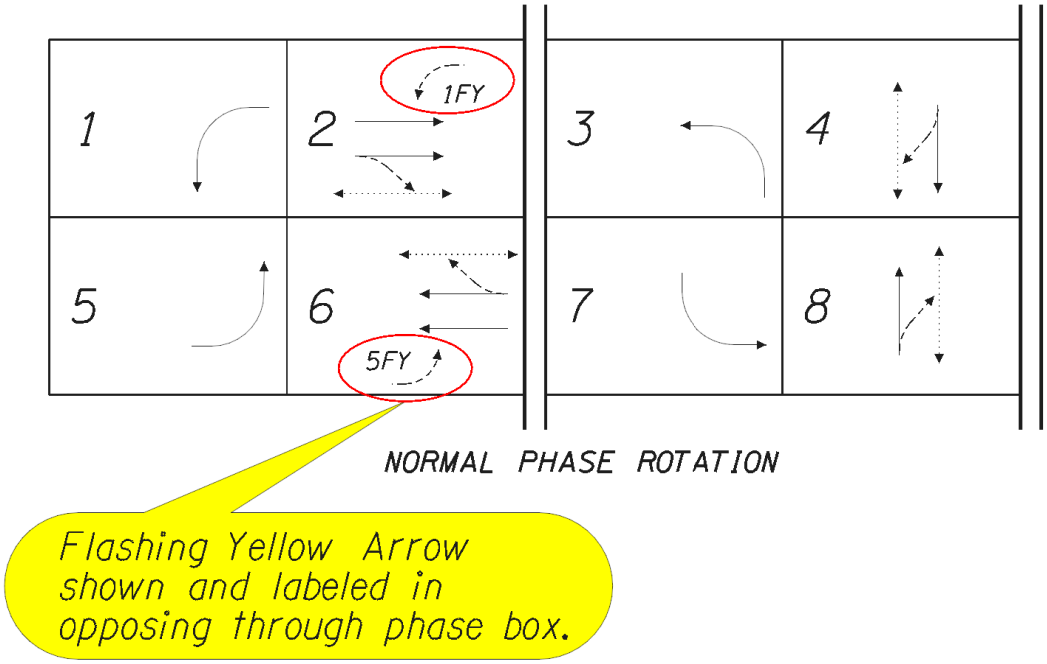
Depending on the operational requirements of the traffic signal, there can be many variations to the phasing and signal timing, and some of these variations might change by time-of-day or day-of-week. It is important to obtain the current STRE or RTE approval and to work with the Region Signal Operations Engineer regarding proper phasing. If the project has a signal that will have multiple signal timing configurations based on time-of-day/day of week, only the ring and barrier diagram that will be used the majority of the time is shown on the plan sheet (multiple normal phase rotation diagrams are NOT shown on the plan sheet).

NOTE: The main purpose of the Ring and Barrier diagram is to clearly show which movements are compatible and which movements require conflict monitoring. This diagram is critical for developing proper signal timing and the proper conflict monitor configuration.

3.3.2 Flashing Yellow Left Turn Arrow

The flashing yellow arrow display is the current standard for protected/permissive left turn movements. The permissive phase is shown in the opposing through phase box and labeled "FY". See Figure 3-3.

Figure 3-3 | Ring and Barrier Diagrams: Flashing Yellow Left Turn Arrow



3.3.3 Flashing Yellow Left Turn Arrow with NOT-PED

Flashing yellow arrow with NOT-PED refers to timing that restricts the permissive left turn (flashing yellow arrow) from being served if the pedestrian phase crossing the lane used by the permissive left turn is active (active ped phases options include: 1.) the WALK indication only, 2.) the WALK indication and a portion of the FLASHING DON'T WALK indication, or 3.) the WALK indication and the entire FLASHING DON'T WALK indication). For example, if pedestrian phase 2 is displaying the WALK indication (or FLASHING DON'T WALK indication), the phase 1 left turn indication will display a solid RED arrow.

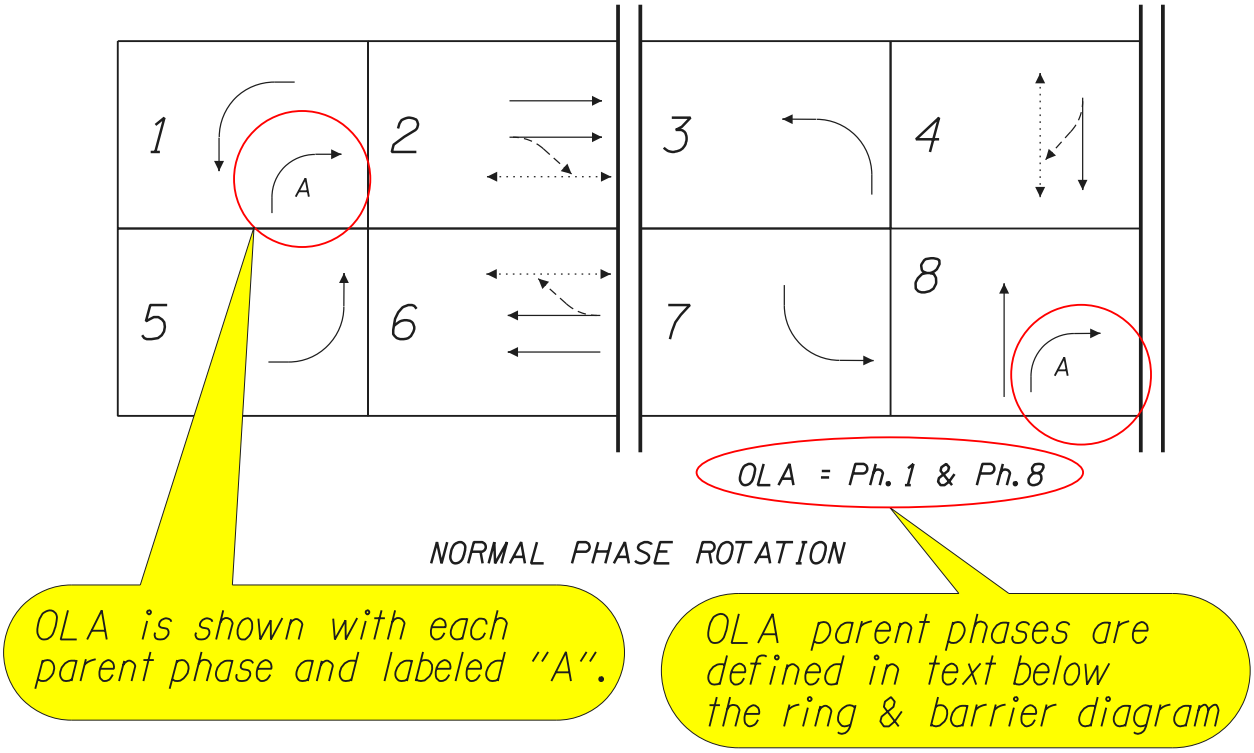
The flashing yellow arrow NOT-PED timing feature is NOT shown in the ring and barrier diagram as it is not a conflict that results inappropriate signal operations if the flashing yellow arrow and pedestrian phase are served together (MUTCD section 4D.17 paragraph 04 allows a permissive left turn phase and the pedestrian phase crossing the lane used by the permissive left turn to be active at the same time). See Section 3.3.2 for how to show the ring and barrier diagram.

3.3.4 Vehicle Overlap Phases

Overlap phases are typically associated with right turns and become beneficial when right turn traffic volumes are high. They may also be used in other circumstances to address unique intersection geometry or improve signal timing efficiency.

An overlap phase is assigned to "parent phases" such that whenever the parent phase is green, the overlap phase is also green. For example, the parent phases for a right turn overlap are the adjacent thru phase (side street thru phase 8) and the non-conflicting left turn phase (mainline left turn phase 1). It is shown in each parent phase box and labeled with the appropriate letter (A, B, C, D, etc.). Below the ring and barrier diagram in text, the overlap parent phases are listed. See Figure 3-4.

Figure 3-4 | Ring and Barrier Diagrams: Overlap Phases



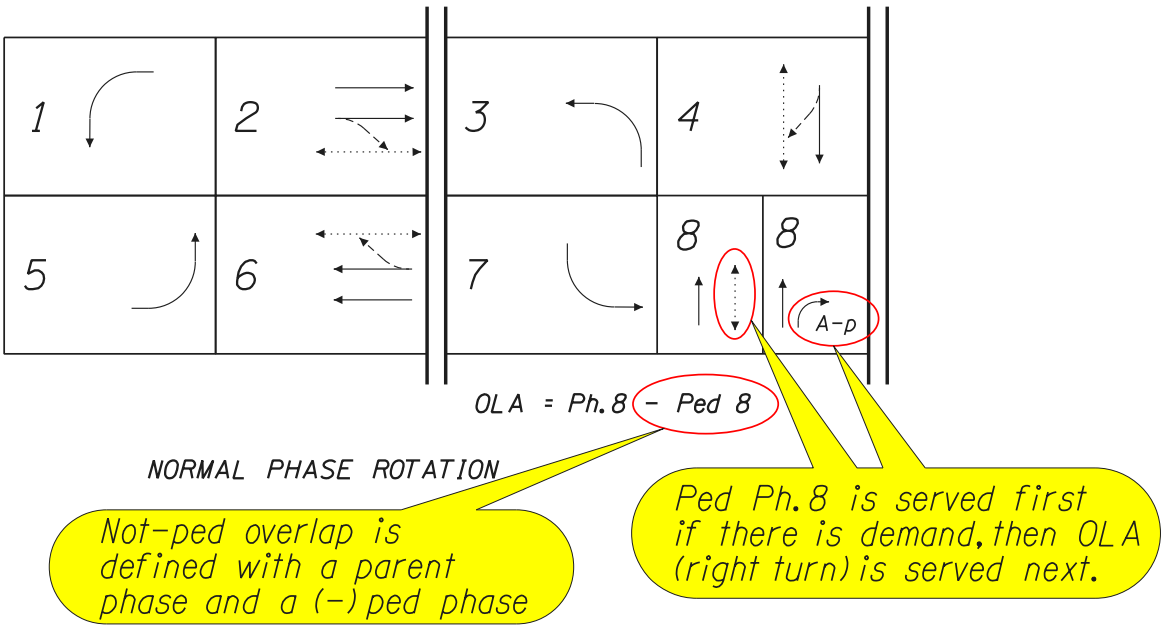
3.3.5 Not-Ped Overlap Phases

Another common overlap phase is called a "not-ped" overlap. This is used with a right turn overlap when there is a conflicting pedestrian phase (the pedestrian phase located to the right of the right turn lane). The new traffic signal software allows the controller to easily separate the pedestrian phase from the right turn overlap, resulting in no conflicting phases and enabling the use of a simpler signal indication.

Not-ped overlaps are shown by separating out the two possible conditions in the ring and barrier diagram. Below the ring and barrier diagram in text, the non-ped overlap phase is defined. See Figure 3-5.

Note: A not-ped overlap phases is NOT the same as a not-ped used with flashing yellow arrow. See Section 3.3.3 for information about flashing yellow arrow with not-ped.

Figure 3-5 | Ring and Barrier Diagrams: Not-Ped Overlap Phases



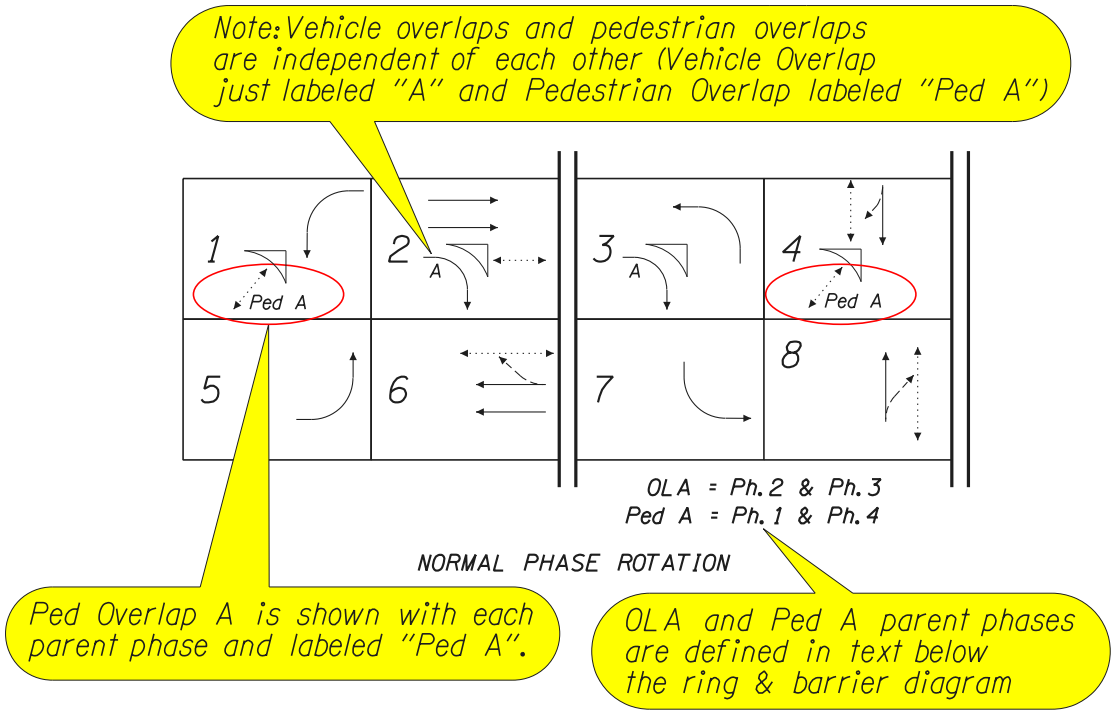
3.3.6 Pedestrian Overlap Phases

Pedestrian overlap phases are typically used when the geometry of the intersection allows the pedestrian crossing served by 2 (or more) phases, which can decrease the amount of wait-time for the pedestrian.

Similar to the vehicle overlap phase, the pedestrian overlap phase is assigned to "parent phases" such that whenever the parent phase is green (and for actuated ped systems, the push button has been activated), the overlap pedestrian phase is also active. As shown in Figure 3-6 below, the parent phases for a pedestrian overlap that crosses a signalized right turn lane are the non-conflicting mainline left turn phase (phase 1) and the non-conflicting side street thru phase (phase 4).

The pedestrian overlap is shown in each parent phase box and labeled with the appropriate letter (Ped A, Ped B, Ped C, Ped D, etc.). Below the ring and barrier diagram in text, the Pedestrian overlap parent phases are listed. See Figure 3-6.

Figure 3-6 | Ring and Barrier Diagrams: Pedestrian Overlap Phases



3.3.7 Split Phases/Exclusive Phases

Split phasing describes an operation where all movements on one approach are served prior to all movements on the opposing approach. This is typically used if the geometry of the intersection, traffic volumes and/or crash history creates a conflict with normally non-conflicting movements. Split phasing requires STRE Operational Approval. Use of split phasing requires specific signal indications depending on the lane use. See Chapter 5 for signal head layout examples.

Split phases may be shown as either sequential without a barrier or sequential with a barrier. See **Figure 3-7**. However, there are cases where exclusive phases shall be shown with a barrier to avoid confusion. See **Figure 3-8**.

Figure 3-7 | Ring & Barrier Diagrams: Exclusive Phases that can be shown with or without a barrier

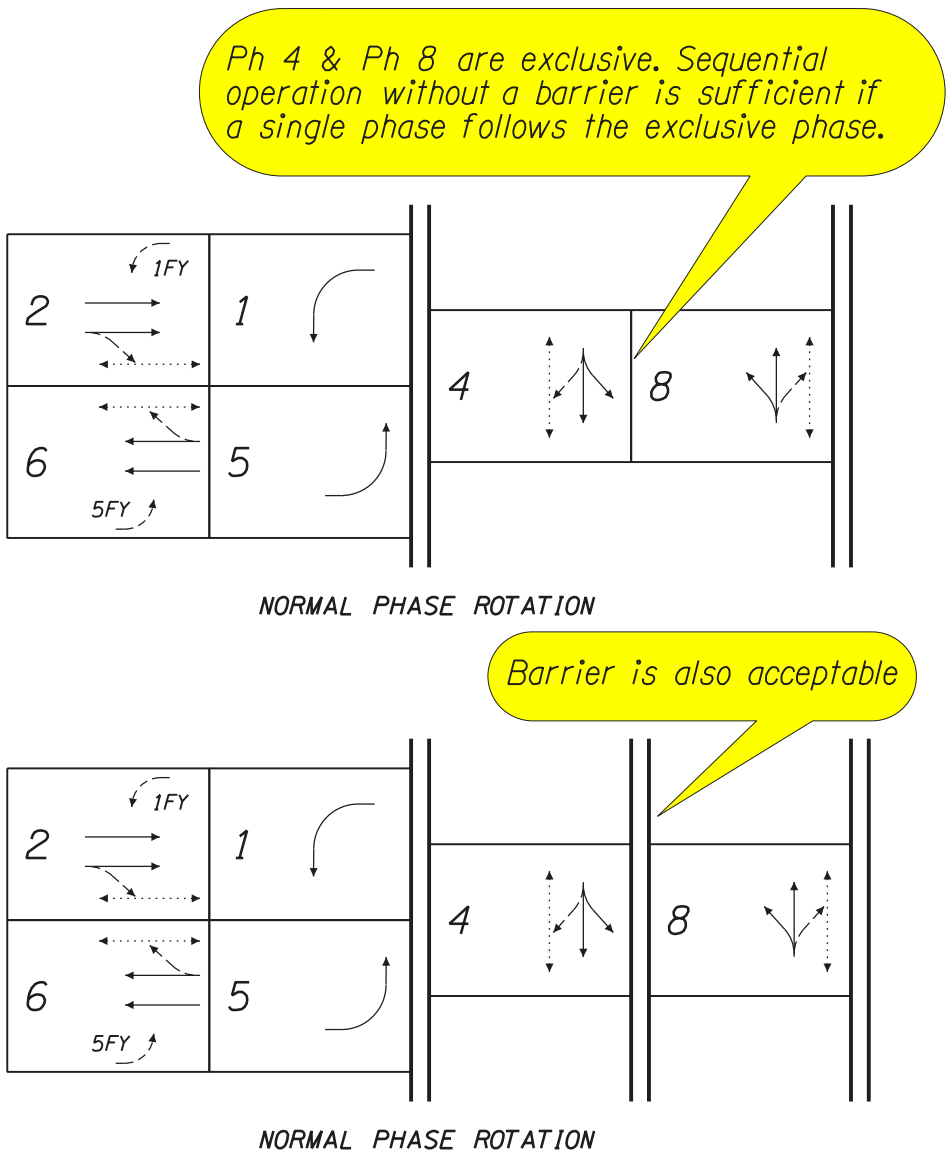
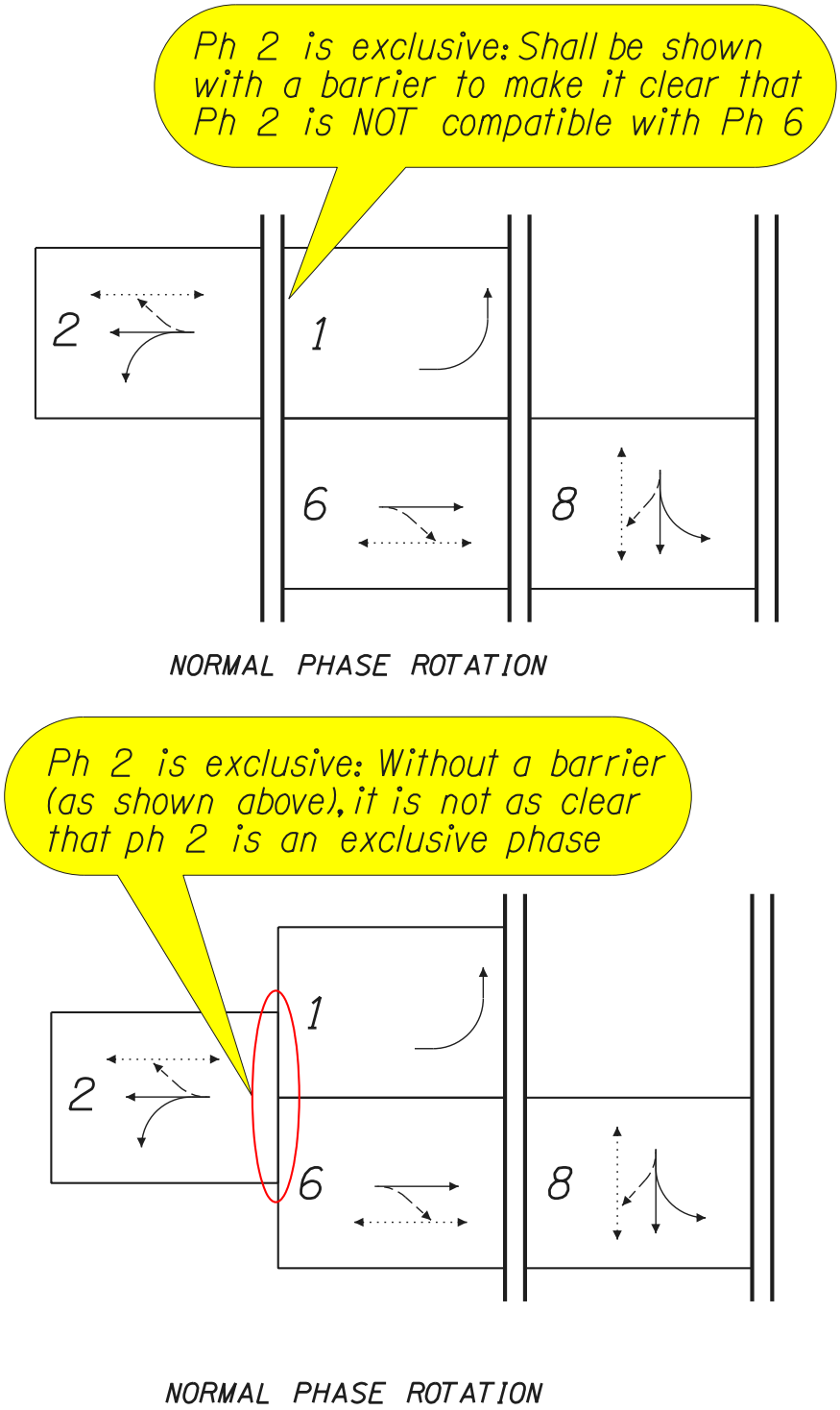


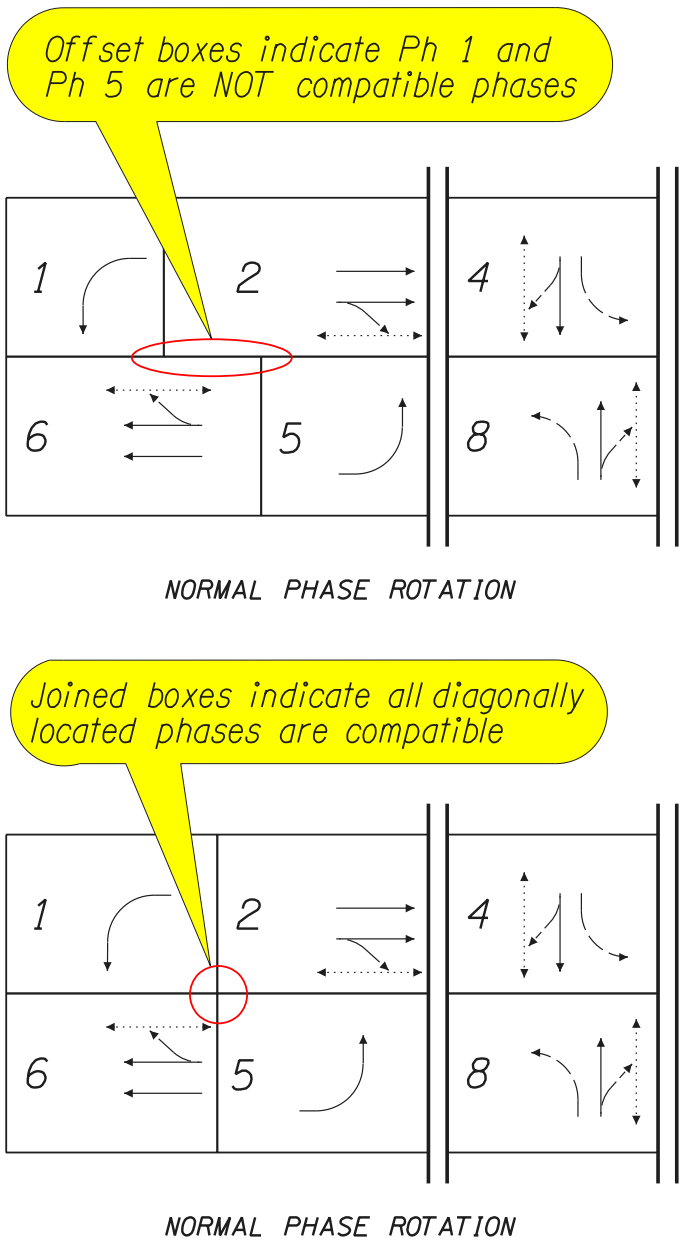
Figure 3-8 | Ring & Barrier Diagrams: Exclusive Phases that shall be shown with a barrier



3.3.8 Incompatible Left Turn Phases

Opposing left turn phases are typically compatible, however if the intersection geometry cannot accommodate the truck turning templates from opposing left turns concurrently, then the left turning phases must be separated from each other (either by split phasing the approaches, See 3.3.7, or by lead-lagging the left turn phases and maintaining separation between them). If the lead-lag method is used, it is shown by a physical separation of the ring and barrier phase boxes. See **Figure 3-9**.

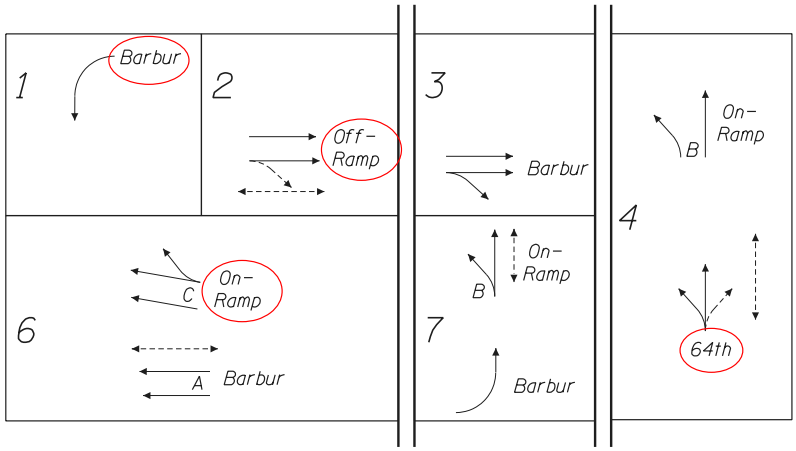
Figure 3-9 | Ring & Barrier Diagrams: Incompatible Left Turn Phases



3.3.9 Multiple Intersections using a Single Controller

Two intersections are sometimes operated with a single controller if the intersections are very close together. The intersection of a divided highway typically operates like two very closely spaced intersections using a single controller. The ring and barrier diagram should combine both intersections into one ring and barrier diagram, with each intersection's cross street labeled in the phase rotation boxes. See **Figure 3-10**, **Figure 3-11**, and **Figure 3-12**.

Figure 3-10 | Ring & Barrier Diagrams: Multiple Intersections Using a Single Controller, Example 1



OL A = Ph. 6
OL B = Ph. 4 & Ph. 7
OL C = Ph. 6

NORMAL PHASE ROTATION

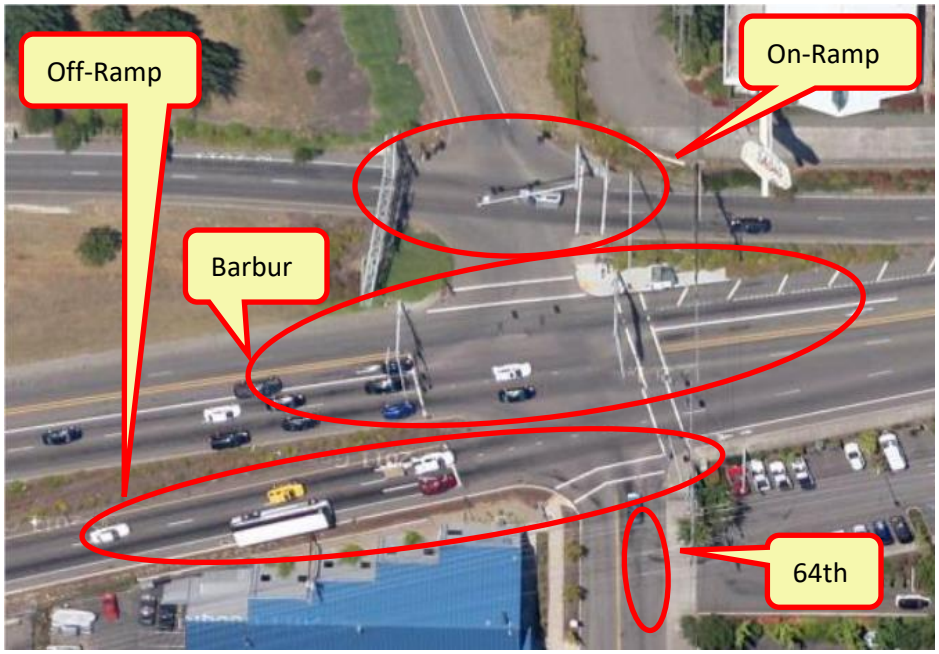
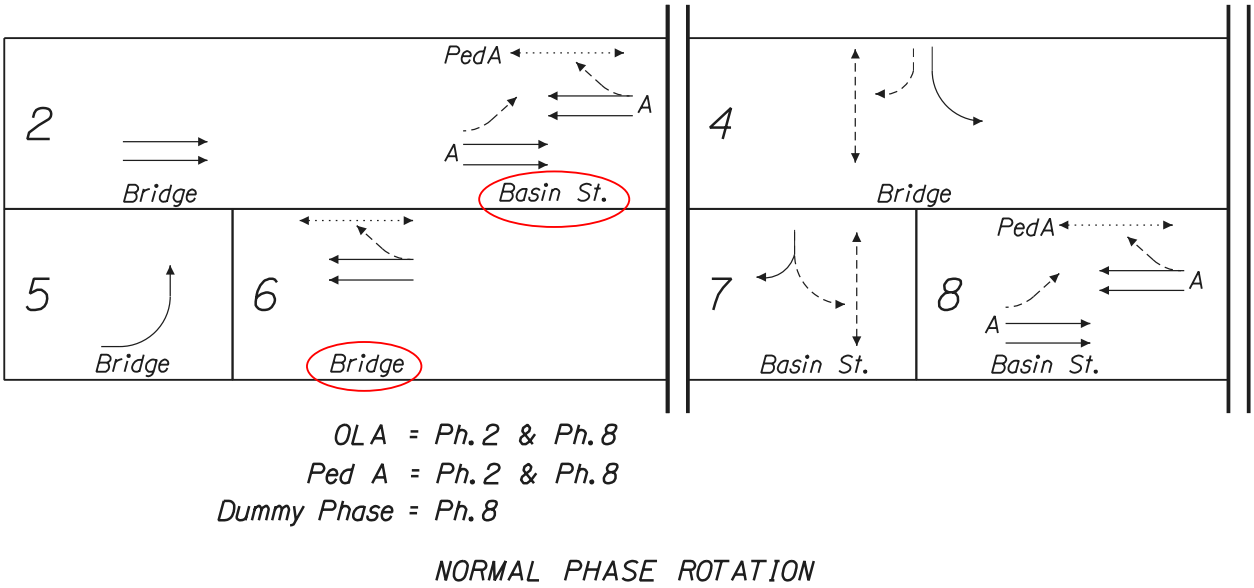


Figure 3-11 | Ring & Barrier Diagrams: Multiple Intersections Using a Single Controller, Example 2



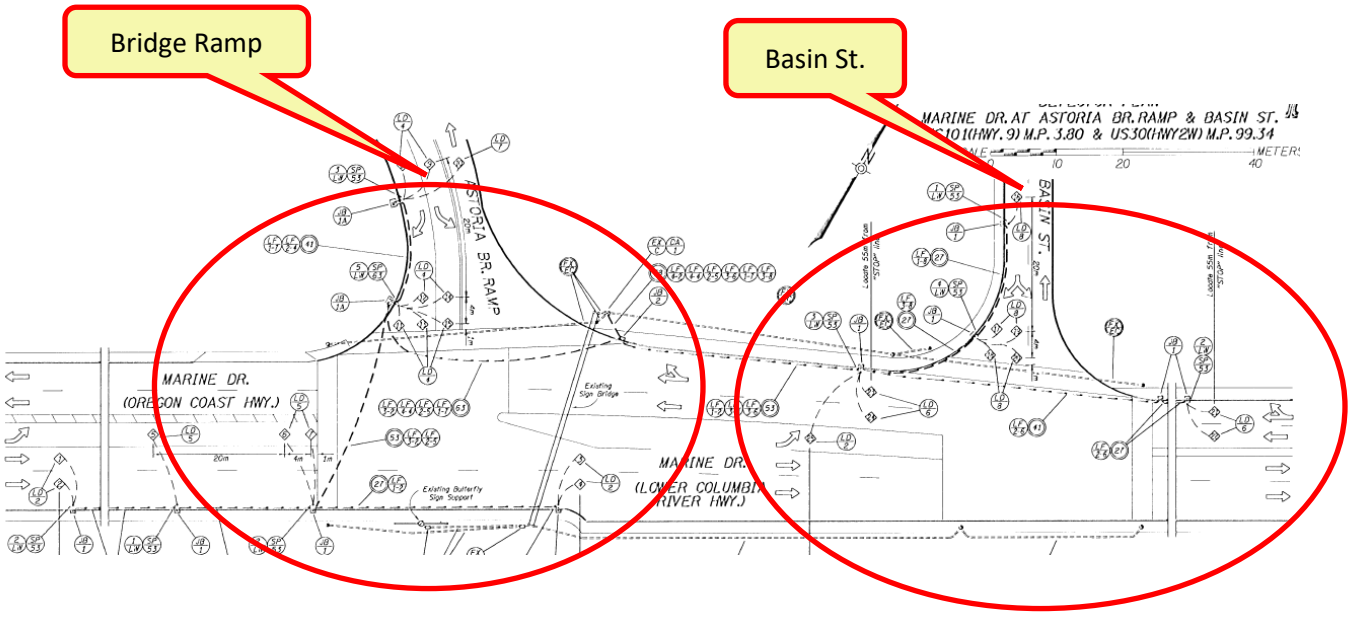
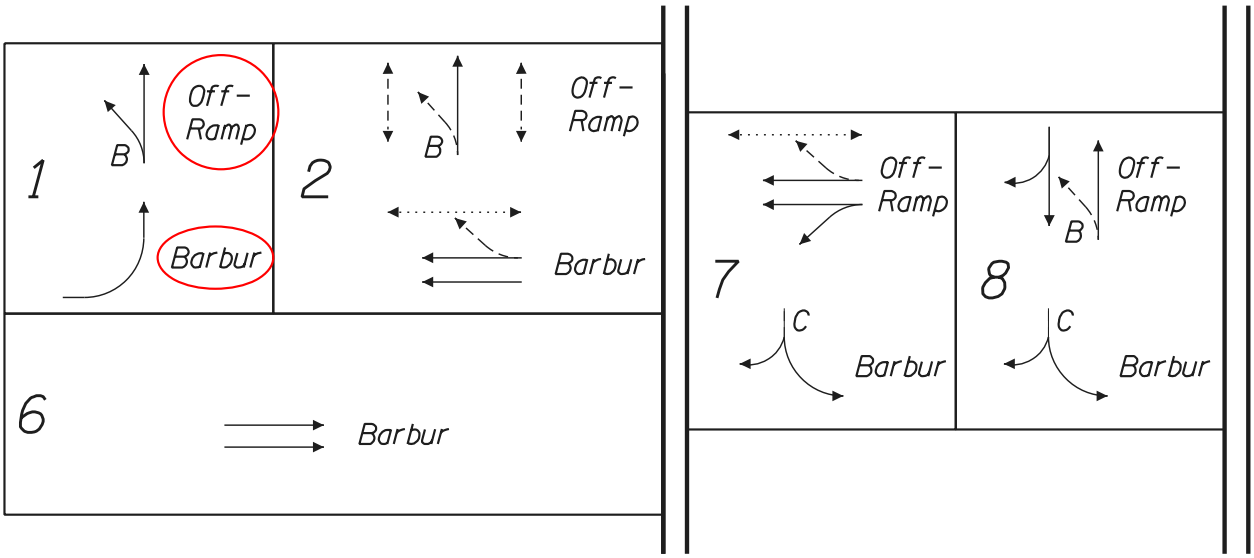
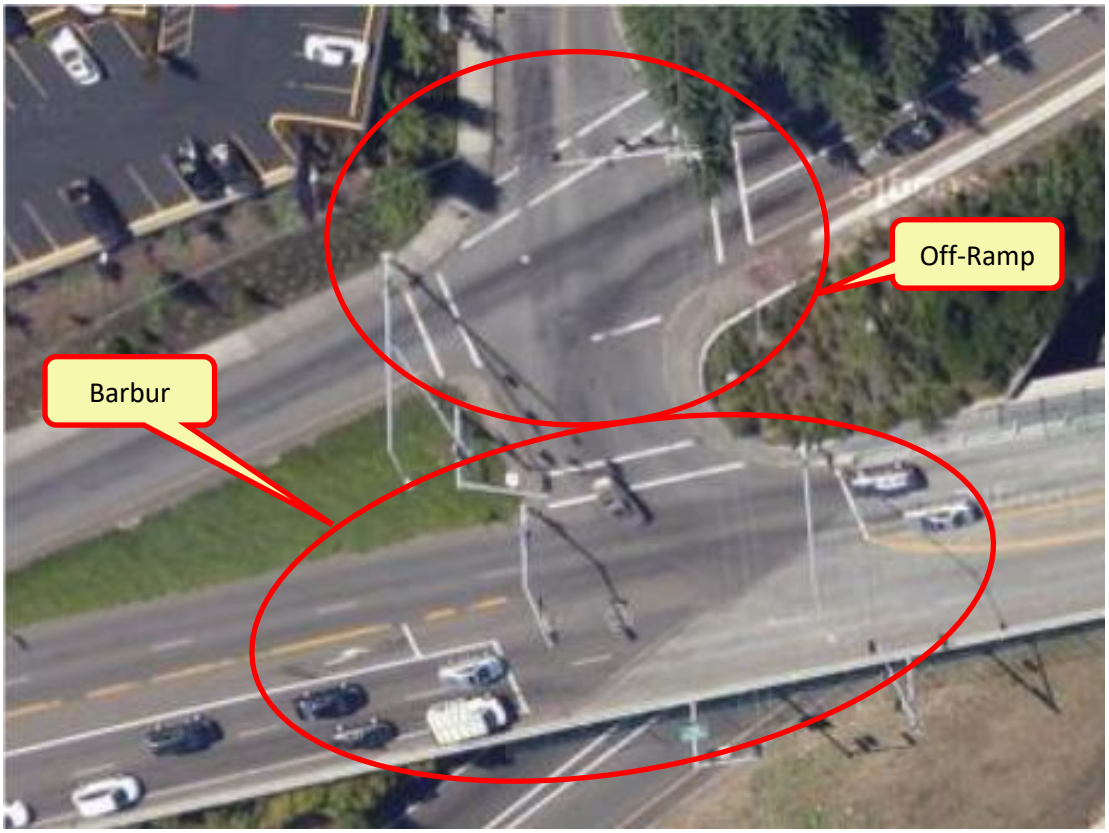


Figure 3-12 | Ring & Barrier Diagrams: Multiple Intersections Using a Single Controller, Example 3



OLB = Ph. 1 & Ph. 2 & Ph. 8
OLC = Ph. 7 & Ph. 8

NORMAL PHASE ROTATION



3.3.11 Dummy Phases

A dummy phase is defined as a phase that does not have an output, but is still used in the controller software to achieve a certain operation. Typical applications are complex geometry with overlaps (see Figure 3-13) and one-lane, two-way temporary traffic signals (see Figure 3-14). The movements (or all-red time clearance time, in the case of a one-lane, two-way temporary traffic signal) are shown in the appropriate phase block. Below the ring and barrier diagram in text, the dummy phases are listed. See Figure 3-13 and Figure 3-14.

Figure 3-13 | Ring & Barrier Diagrams: Dummy Phases, Example 1

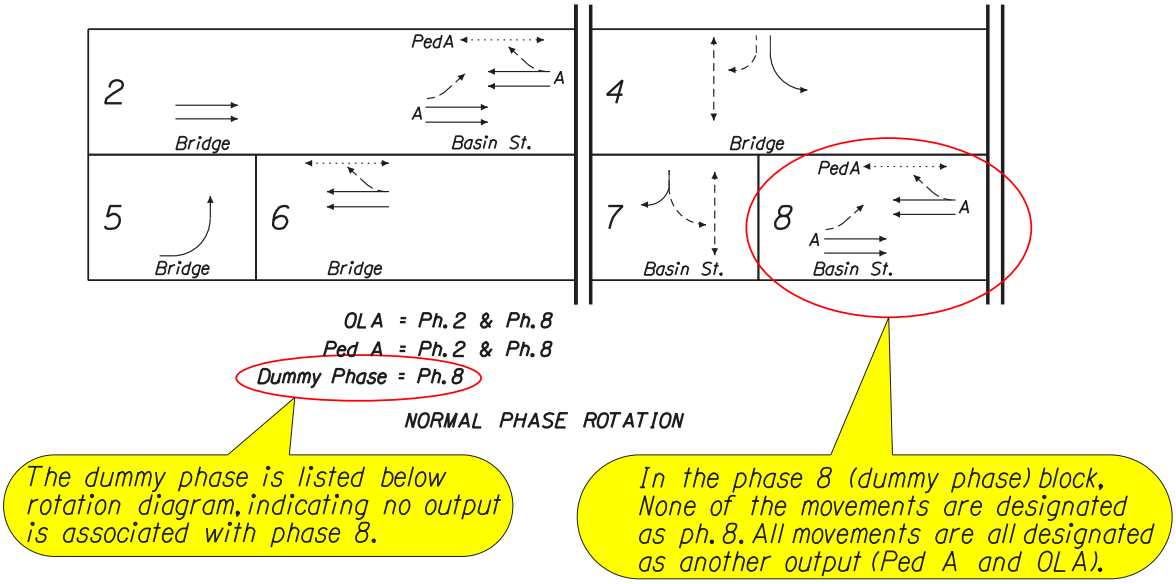
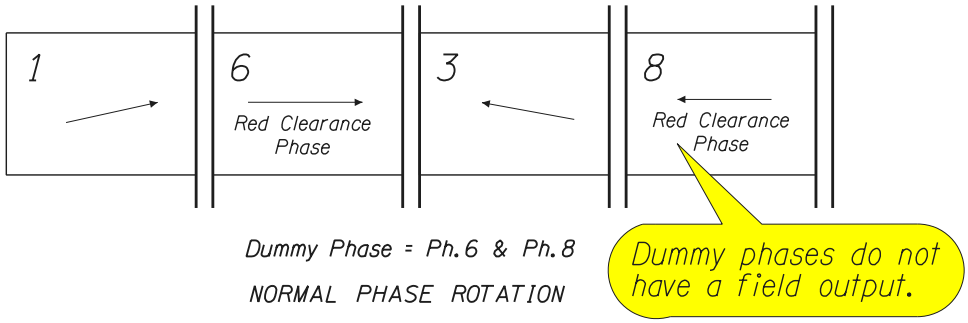


Figure 3-14 | Ring & Barrier Diagrams: Dummy Phases, Example 2



Note:
With current software, dummy phases may not be required to provide a red clearance interval (This phasing was used with older software that had limited red clearance timing, which necessitated a dummy phase in order to provide the proper amount of red clear time). Confirm with the Region Signal Timer.

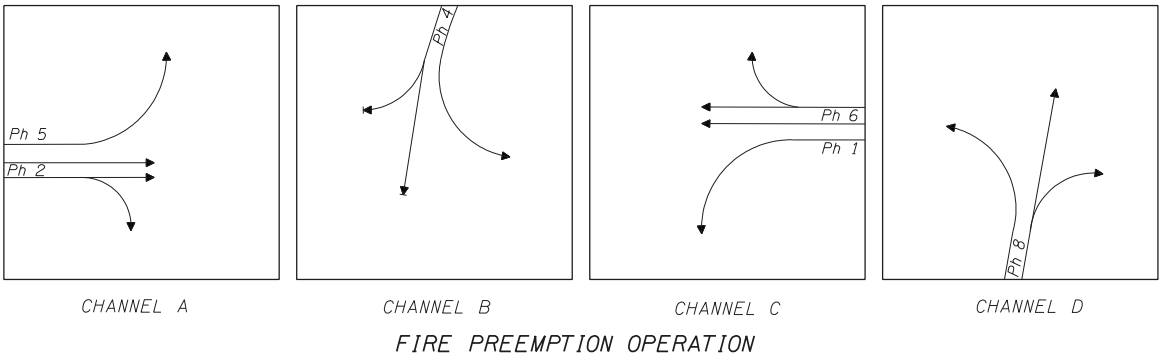
3.4 Emergency Preemption

When an emergency service provider is granted permission (by ODOT) to use emergency preemption, the traffic signals within the geographic area of service will require emergency preemption. The majority of ODOT signals are within areas requiring emergency preemption. To check if an area has permission to use emergency preemption, contact the Traffic Signal Operations Engineer.

Emergency preemption alters the normal phasing of the traffic signal to allow green indications for an emergency vehicle (typically fire or ambulance) approaching the intersection. This is shown on the signal plan sheet. Figure 3-15 below shows the standard channel assignments for fire preemption operation:

- Channel A = phase 2 & 5
- Channel B = phase 4 & 7
- Channel C = phase 6 & 1
- Channel D = phase 8 & 3

Figure 3-15 | Standard Fire Preemption Channel Assignments

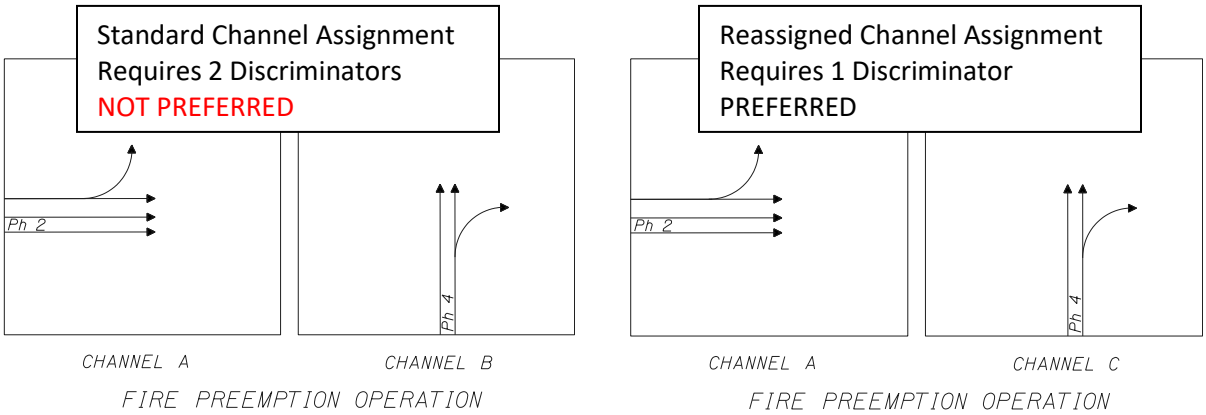


When reading a fire preemption operation diagram, all vehicular movements are drawn as solid lines, indicating that that movement is protected (no conflicting movements requiring the motorist to yield). Pedestrian phases are not serviced during preemption.

There are times when non-standard channel assignments are preferred, such as an intersection that requires use of only two channels. See Figure 3-16. This is due to the termination layout for the fire preemption discriminators located inside the controller cabinet. Each discriminator is able to monitor up to two channels. One discriminator is always used for Channels A & C, and one discriminator is always used for Channels B & D. To save the expense of installing two discriminators for only two channels (using the standard channel assignments), the phases assigned to the channels will be reassigned in the controller software, thus only requiring one discriminator. For example, if an intersection only had phase 2 and phase 4 (downtown, one-way grid system), channel A should be assigned to phase 2 and Channel C should be reassigned

to phase 4 (uses 1 discriminator) vs. Channel A being assigned to phase 2 and Channel B being assigned to phase 4 (standard channel assignment, uses 2 discriminators).

Figure 3-16 | Two Channel Fire Preemption Channel Assignments



3.5 Railroad Preemption

If a signalized intersection is located within 215 feet of a rail crossing, rail preemption is required. If a signal requires rail preemption, a Rail Crossing Order is needed. The rail crossing order will state specific design and operational requirements that must be met.

Rail preemption alters the normal phasing of the traffic signal to allow pedestrians to clear the intersection and vehicles to clear the tracks prior to the train arrival. This is the highest order of preemption and takes precedence over all other forms of preemption. See Chapter 16 for more in-depth discussion on rail preemption operation and how it is depicted on the plan sheets.

3.6 Transit Priority

In large metropolitan areas, there may be a need to accommodate transit priority on the traffic signal within the geographic area of service.

Transit priority does not have the ability to alter the normal phasing of the traffic. Instead, transit priority just alters the cycle of the normal phasing, typically by either extending or delaying green time for the appropriate approach to allow minimal to no delay for the transit vehicle. Because transit priority does not alter the normal phasing, the operation is NOT shown on the plan sheets (only contained within the signal timing sheets).

3.7 Crosswalk Closures

It is ODOT policy to provide pedestrian crossings for all approaches at a signalized intersection unless an engineering study and STRE approval deem a crosswalk closure is necessary. Often, the need to close a crosswalk is due to unusual roadway geometry, certain lane use (such as dual turn lanes), certain signal phasing (such as a single point urban interchange), and/or crash

history. Closing a crosswalk requires posting signs in a specific way. The details for this signing are typically shown on the signal plan. See the crosswalk section in Chapter 5 for more information.

3.8 Traffic Signal Communications

Closely spaced signals in a corridor typically require central or local communications for the signals to function in a coordinated manner or to use responsive/adaptive signal timing. When communications are required, either an interconnect plan or communication plan is needed. See the Chapter 7 for more information.

3.9 Other Unique Requirements

Other requirement may be listed on the operational approval, specific to the project. Some unique requirements in the Operational Approval include the following:

- Audible pedestrian signals
- Right turn slip lane control (yield, stop or signal control)
- Non-traversable medians/island to restrict/channel turn movements
- Advanced Flashing Beacons on signs
- U-turns

3.10 Examples of Operational Approvals

Several examples of operational approvals are included below for your reference.

Figure 3-17 | Example 1: STRE Approval

FILE

INTEROFFICE MEMO

TECHNICAL SERVICES
Traffic-Roadway Section
Office Phone: (503) 986-3568
Fax Phone: (503) 986-3749

DATE: April 6, 2012

TO: Dan Dorrell, P.E.
Region Traffic Operations Engineer

File Code: Hwy 25 MP 0.62

FROM: Bob Pappe, P.E., P.L.S.
State Traffic/Roadway Engineer

SUBJECT: **Traffic Signal Modification**
Redwood Highway (US199) at Ringuette Street
City of Grants Pass
Josephine County

We have reviewed your request to modify the traffic signal at the intersection of Redwood Highway at Ringuette Street. The modifications at this intersection are in response to a comprehensive mitigation strategy for the removal of the traffic signal at the intersection of Redwood Highway at Fairgrounds/Union Road. The requested signal modifications at Redwood Highway at Ringuette Street include:

1. Adding dual left turn lanes on the south approach by converting the existing center through lane to a through/left option lane.
2. Adding pedestrian crosswalk across the west approach, so that all pedestrian crossings will be provided.
3. U-Turns in both the east and west direction for all vehicles.

Under delegation order TSB-05, I approve this request. The approval is based on our review of the materials you submitted. The design and operation shall be according to requirements stated in the attached Approved Signal Operations Design.

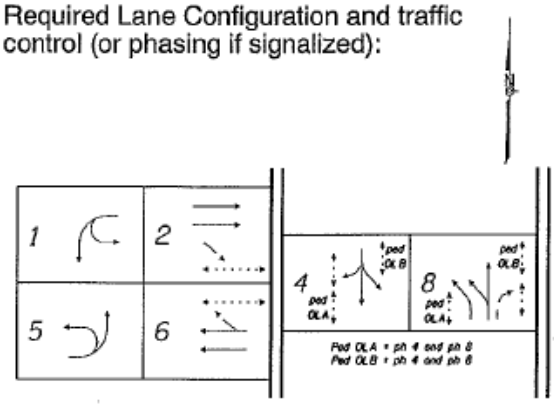
If you have any concerns or questions regarding this approval, please contact Doug Bish at 503-986-3594.

Attachment
KLJ/
Electronic Copies to:
Frank Reading, Reg. 3 Manager
Ron Hughes, Reg. 3 Interim Traffic Manager
Raymond Lapke, Region 3 Traffic
Mike Morris, Region 3 Tech Center
Mark Thompson, Region 3 Tech Center
Jason Sheadel, Region 3 Tech Center
Trenton Glick, Region 3 Traffic White City
William Fitzgerald, Region 3 White City Jerry Marmon, District 8 Manager
Scott Cramer, Traffic Standards

Approved Signal Operations Design

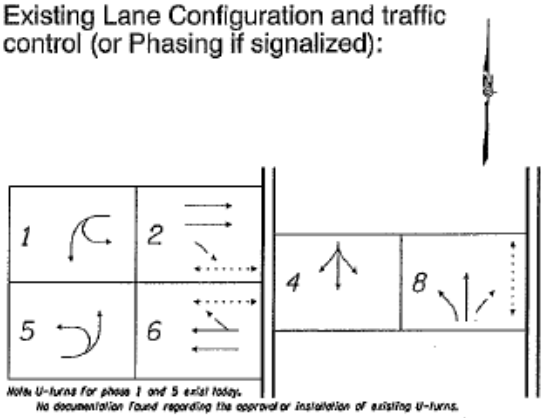
(See Engineering Report, STE Approval Letter, and/or RTE Approval Letter for more in-depth information)

Required Lane Configuration and traffic control (or phasing if signalized):



NORMAL PHASE ROTATION

Existing Lane Configuration and traffic control (or Phasing if signalized):



NORMAL PHASE ROTATION
Adopted from T.M.S. DWG NO. 12773

STE Approved Features, RTE Approved Features, and other Requirements:

1.) Dual left turn lanes on the south approach by converting the existing center lane through lane to a through/left option lane
2.) Adding a pedestrian crosswalk across the west approach, so that all pedestrian crossings will be provided
3.) Ringuette Street will continue to operate as split-phase
4.) U-turns in both the east and west direction for all vehicles.
5.) Modifications to intersection at Redwood Hwy at Fairgrounds/Union Road required as per the Approved Signal Operations Design for Redwood Hwy at Fairgrounds/Union Roads.

General Requirements:

1.) Lane configuration, phasing, and other requirements shall be designed according to this Approved Signal Operations Design.
2.) The design and operation will be according to the Manual on Uniform Traffic Control Devices (2009 Edition), ODOT's Traffic Signal Policy and Guidelines, and ODOT's Traffic Signal Design Manual.
3.) State Traffic Engineer's Office must approve the final signal design plans.

Location:	US199 @ Ringuette Street
Hwy Name & No.:	Redwood Hwy, No. 25
Mile point.:	0.62
County:	Josephine
City:	Grants Pass

DATE	INFORMATION / HISTORY	APPROVED BY
5/27/2011	Engineering study and RTE request for approval of U-turn	RTE
12/16/2011	Engineering study and RTE request for approval of dual left	RTE
12/16/2011	PSOD and RTE request for approval of west approach crosswalk	RTE
4/6/12	STE approval letter and ASOD	STE

Figure 3-18 | Example 2: STRE Approval - Preliminary Signal Operations Design (PSOD)

INTEROFFICE MEMO

TECHNICAL SERVICES
Traffic-Roadway Section
Office Phone: (503) 986-3568
Fax Phone: (503) 986-4063

DATE: June 28, 2011

TO: Dennis Mitchell, P.E.
Region 1 Traffic Engineer

File Code: Hwy 081 MP 2C4.45

FROM: for Bob Pappe, P.E., P.L.S.
State Traffic/Roadway Engineer

SUBJECT: **Traffic Signal Modification**
SE McLoughlin Blvd/SE Tacoma St NB Ramp Terminal
Pacific Highway East MP 2C4.45
City of Portland
Multnomah County

We have reviewed your request to modify the existing signal at the intersection of SE Tacoma Street at SE McLoughlin Boulevard. This project will add protective/permissive left turns on SE Tacoma Street and re-open the northbound approach to provide access to a proposed Park & Ride facility. Under the Letter of Delegated Authority, I approve this request.

This approval has the following conditions:

- The design and operation of the signal must adhere to the **Manual on Uniform Traffic Control Devices** (2009 edition), ODOT's **Traffic Signal Policy and Guidelines** and ODOT's **Traffic Signal Design Manual;**
- The lane configuration and signal phasing of the intersection shall be designed according to a signed Preliminary Signal Operations Design report provided by your office;
- Obtain an intergovernmental agreement with TriMet to mitigate the vehicle queue that extends from the Johnson Creek Boulevard/SE 32nd Avenue intersection to prevent 95th percentile from spilling into the SE Tacoma Street/SE McLoughlin Boulevard northbound ramp terminal.
- Obtain an intergovernmental agreement with the City of Portland to develop signal timing solutions that prevent vehicle queues from extending into the deceleration portion of the SE McLoughlin Boulevard exit ramps.
- This office must approve the final signal design plans. It is advised that this office be consulted throughout the design phase.

If you have concerns or questions regarding this approval, please contact Don Wence at 503-986-3576.

Electronic Courtesy Copies To:

Kate Freitag, Region 1 Traffic
Scott Cramer, Traffic Standards

MGK/tc

Preliminary Signal Operations Design

Use this form for projects involving new signals or significant modifications to an existing signal.

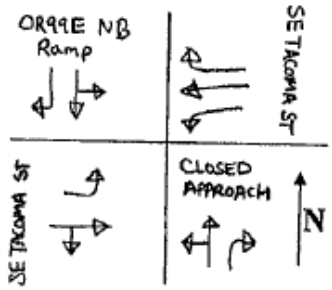
Location: SE Tacoma Street / SE McLoughlin Boulevard Northbound Ramp Terminal Hwy No: 091BQ M.P.: 2.64.45 Date: 10/9/2010

Existing Traffic Information

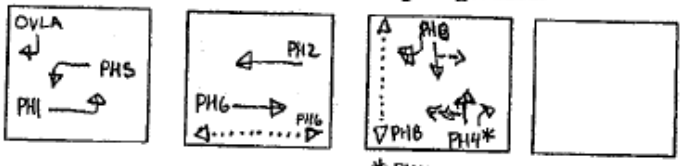
Existing Traffic Control

- ☐ 2-way STOP
- ☐ All-way STOP
- ☒ Signalized

Existing Lane Configuration



Existing Vehicle and Pedestrian Phasing if signalized:



* PH4 CURRENTLY DOES NOT OPERATE TODAY DUE TO THE CLOSED APPROACH

Opening Day Volumes (AM/PM)

RT (202/244) TH (0/0) LT (64/95)	RT (396/138) TH (533/420) LT (0/0)
(56/75) LT (324/685) TH (0/0) RT	(0/0) LT (0/0) TH (0/0) RT

Future Volumes (AM/PM)

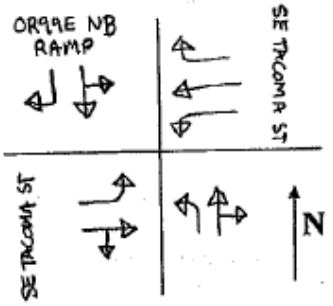
RT (NA/300) TH (NA/5) LT (NA/140)	RT (NA/150) TH (NA/520) LT (NA/20)
(NA/100) LT (NA/820) TH (NA/15) RT	(NA/110) LT (NA/5) TH (NA/50) RT

Other Relevant Information: TRI-MET IS REQUIRED TO MITIGATE THE SPILLBACK QUEUE FROM THE JOHNSON CREEK BLVD / SE 32ND AVE INTERSECTION TO OBTAIN MODIFICATION APPROVAL. SIGNAL TIMING PRIORITY FOR THIS SIGNAL IS GIVEN TO THE PREVENTION OF UNSAFE QUEUES ON OR99E MAINLINE AND OR99E RAMPS.

Preliminary Signal Operations Design

Recommended Signal Design

Recommended Lane Configuration



Pedestrian Crosswalks

☐ All Crosswalks Provided

☒ Following Crosswalks Closed: EAST AND NORTH LEGS

Other Required Features

☐ Signal interconnect to _____

☐ Phone drop or cellular network router

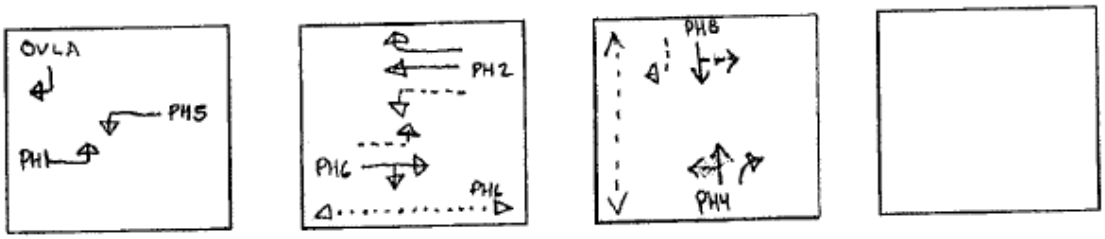
☐ 2070 Controller

☐ Audible/accessible pedestrian signals

☐ RR Pre-emption

☐ Other _____ _____

Recommended Phasing



Notes regarding right turn lane control: RIGHT-TURN ON RED IS PERMITTED FOR ALL APPROACHES PENDING INTERSECTION SIGHT DISTANCE ANALYSIS. THE SOUTHBOUND APPROACH RIGHT-TURN LANE HAS AN OVERLAP PHASE WITH THE EB APPROACH LEFT-TURN

Primary considerations used to determine left turn phasing: FLASHING YELLOW LEFT-TURN PHASING WILL NEED TO HAVE ATLEAST THE MINIMUM STOPPING SIGHT DISTANCE FOR THE DESIGN SPEED OF SE TACOMA STREET.

Design Vehicle info: (to be confirmed with Roadway Engineer) ☐ "Design for" ☒ "Accommodate"

☒ WB - 67 ☐ WB-50 ☐ other_____

Recommended by: Kathleen M. Freitag
Region Traffic Operations Engineer

Figure 3-19 | Example 3: RTE Approval - Preliminary Signal Operations Review (PSOR)

Preliminary Signal Operations Review

Use this form for projects involving only minor modifications or replacement-in-kind of existing signals.

Note to the Designers

Unless a Preliminary Signal Operations Design Report is needed, this form may be used to support the operational aspects of the signalized intersection. It should be completed prior to beginning design work on signal or detector plans. The form should be completed by the designer and signed by the Region Traffic Operations Engineer. The adequacy of existing operational elements (phasing, lane configuration, crosswalks, etc.) is documented by the completion of this form. Minor signal improvements may be specified on this form, but significant modifications (phasing changes, lane configuration changes, etc) are expected to necessitate the use of a Preliminary Signal Operations Design Report. Some geometric features such as curb lines and crosswalk locations can dramatically affect the layout of the signal appurtenances so these should be confirmed with the Region Traffic Operations Engineer as well as other Roadway engineers early in the design process. Failure to show that the necessary communications and decisions have been reached prior to submitting the plans for review may result in delays of approval or the return of plans without review.

Name of Intersection (Major Line): US-101

(Cross Street): Lewis St/Casino Entrance

ODOT Hwy. Number: 9 Mile Point: 236.26

The phasing and lane configurations proposed in these plans are believed to offer the most desirable operations given the project constraints. The Region Traffic Operations Engineer has reviewed the following operational elements of the proposed design and found them to be acceptable.

- Phasing and lane configuration
- Crosswalks (existing open or closed conditions)
- Overlap phasing
- Emergency vehicle and RR preemption systems
- ADA accommodations, i.e. audible pedestrian, ramp design, etc.

Minor changes to the existing signal operations include: Ø1+5 switched from protected to permissive/protected

Comments:

Signature of Region Traffic Operations Engineer

1-21-11
Date

prelim signal operations/review form.doc

Traffic Roadway Section
8/2010