2.22 Maintenance of Traffic

2.22.1 *General*

The Design-Builder shall perform all Work necessary to meet the requirements associated with Maintenance of Traffic (MOT), including providing for the safe and efficient movement of people, goods, and services through and around the Project, while minimizing adverse impacts to residents, commuters, and businesses.

The Design-Builder shall prepare a Transportation Management Plan (TMP), including temporary traffic control, Transportation System Management and Operations, and Public Information Strategies, and shall conduct all on-site activities relating to traffic maintenance in accordance with this Section.

The Design-Builder shall be responsible for coordinating with other projects within the vicinity of the Project, at a minimum, scheduling of lane closures, detours, ramp closures, temporary alignments, and staging of construction activity. Construction activities shall be scheduled to minimize the number of required closures and to maximize the opportunities available to perform Work during closures required by other projects. The Design-Builder shall coordinate and schedule activities to minimize impact on other projects. The Design-Builder shall coordinate with the Toll Vendor to provide traffic control for their toll equipment installation and testing activities as provided in the Contract.

Refer to Section 2.1, *General Information,* for projects anticipated to be under construction at the same time as the Project. The Design-Builder shall coordinate with Local Agencies and Utility companies to identify other projects scheduled for construction during the duration of the Project.

2.22.2 *Mandatory Standards*

The following is a list of Mandatory Standards that shall be followed for all design and construction related to this Section as referenced in Section 2.2, *Mandatory Standards*.

1. Special Provisions (Appendix B)
2. Standard Specifications M 41-10 (Appendix B)
3. WSDOT *Design Manual* M 22-01 (Appendix D)
4. Standard Plans M 21-01 (Appendix D)*
5. WSDOT *Traffic Manual* M 51-02 (Appendix D)

6. WAC 468-95 *Washington State Modifications to the Manual on Uniform Traffic Control Devices*, 2009 Edition with Revisions 1 and 2 dated May 2012 (Appendix D)
7. *U.S. Access Board Revised Draft Guidelines for Accessible Public Rights-of-Way, November 2005* (Appendix D)
8. WSDOT *Materials Manual* M 46-01 (Appendix D)
9. WSDOT *Construction Manual* M 41-01 (Appendix D)
10. WSDOT *Sign Fabrication Manual* M 55-05 (Appendix D)
11. WSDOT *Plans Preparation Manual* M 22-31 (Appendix D)
12. WSDOT *Maintenance Manual* M 51-01 (Appendix D)
13. WSDOT *Plan Sheet Library – Work Zone Traffic Control**
14. WSDOT *Secretary's Executive Order E 1060 Speed Limit Reduction in Work Zone* (Appendix T)
15. WSDOT *Secretary's Executive Order E 1001 Work Zone Safety and Mobility* (Appendix T)
16. *King County Parks Requirement for the Sammamish River Trail (Appendix S)*
17. *FHWA Manual on Uniform Traffic Control Devices for Streets and Highways,* (MUTCD) 2009 Edition with Revisions 1 and 2, dated May 2012 (Appendix D)
18. *AASHTO Manual for Assessing Safety Hardware (MASH 16), 2016*
19. *NCHRP Report 350: Devices in Work Zones,* February 2004, Revised April 2004
20. *AASHTO A Policy on Design Standards - Interstate System*
21. *AASHTO A Policy on Geometric Design of Highways and Streets*
22. *AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals,* 1st Edition, 2015
23. *AASHTO Roadside Design Guide,* 2010
24. *Transportation Research Board Highway Capacity Manual, Sixth Edition: A Guide for Multimodal Mobility Analysis, 2016*
25. *ITE Traffic Control Devices Handbook*
26. *FHWA Traffic Control Systems Handbook*
27. *FHWA Traffic Monitoring Guide*
28. *FHWA Developing and Implementing Transportation Management Plans for Work Zones*
29. *ITE Traffic Engineering Handbook, 6th Edition*

30. *ITE Manual of Transportation Engineering Studies*
31. *ATSSA Quality Guidelines for Work Zone Traffic Control Devices*
32. *U.S. Access Board ADA Accessibility Guideline*
33. *FHWA Final Rule on Work Zone Safety and Mobility* (23 CFR Part 630 Subpart J)

*The plans contained in these Mandatory Standards shall be made Site-specific if used for Traffic Control Plans (TCPs). The Plan Sheet Library is located at this link: https://wsdot.wa.gov/engineering-standards/all-manuals-and-standards/plan-sheet-library/work-zone-typical-traffic-control-plans-tcp

2.22.2.1 Conformance to Established Standards

TCPs, signs, and all traffic control devices and procedures furnished or provided shall conform to the standards established in the latest WSDOT adopted edition (in accordance with WAC 468-95) of the MUTCD, published by the U.S. Department of Transportation. Flagging shall also be in accordance with WAC 296-155-305 and pedestrian traffic control shall also be in accordance with the *Public Rights-of-Way Accessibility Guidelines* (PROWAG). Judgment of the quality of devices furnished will be based upon *ATSSA Quality Guidelines for Work Zone Traffic Control Devices*, published by the American Traffic Safety Services Association. The condition of signs and traffic control devices shall be new or "acceptable" as defined in the *ATSSA Quality Guidelines for Work Zone Traffic Control Devices* and will be accepted based on a visual inspection by the Traffic Control Supervisor (TCS). WSDOT may also identify devices that are unacceptable based on the *ATSSA Quality Guidelines for Work Zone Traffic Control Devices*. The WSDOT Engineer's decision on the condition of a sign or traffic control device will be final. The Design-Builder shall remove and replace a sign or traffic control device determined to be unacceptable within 12 hours of notification.

In addition to the standards of the MUTCD described above, WSDOT enforces crashworthiness requirements for most work zone devices. The *MASH 16* has superseded the *NCHRP Report 350* as the established requirements for crash testing. Temporary traffic control devices manufactured after December 31, 2019, shall be compliant with the *MASH 16* crash test requirements, as determined by WSDOT, except as follows:

1. In situations where a *MASH 16* compliant traffic control device does not exist and there are no available traffic control devices that were manufactured on or before December 31, 2019, then a traffic control device manufactured after December 31, 2019, that is compliant with either *NCHRP 350* or the 2009 edition of the *AASHTO Manual for Assessing Safety Hardware (MASH 09)* is allowed for use with approval of the WSDOT Engineer.
2. Temporary traffic control devices that were manufactured on or before December 31, 2019 and were successfully tested to *NCHRP 350* or

MASH 09 may continue to be used on WSDOT projects throughout their normal service life.

3. Small and lightweight channelizing and delineating devices, including cones, tubular markers, flexible delineator posts, and plastic drums, shall meet the requirements of either *NCHRP 350*, *MASH 09*, or *MASH 16* as determined by the manufacturer of the device.
4. A determination of crashworthiness for acceptance of trailer-mounted devices such as arrow displays, temporary traffic signals, area lighting supports, and portable changeable message signs is currently not required.

2.22.3 *Performance Requirements*

2.22.3.1 General

The Design-Builder shall prepare a TMP including a Traffic Incident Management Plan (TIMP) to the WSDOT Engineer for Review and Comment and establish a MOT task force prior to any construction activity that may impact traffic. The WSDOT Engineer may permit shoulder closures for activities such as surveying or environmental and other design-related Work prior to approval of the TMP, provided the Design-Builder prepares TCPs in accordance with the requirements of this Section. The Design-Builder shall make changes to the TMP any time the personnel or conditions of the original TMP or TIMP change. TCPs that are within the jurisdiction of the City of Bothell, the City of Woodinville, the City of Kirkland, King County, Snohomish County, Community Transit, and Sound Transit will require approval from the affected Local Agency.

2.22.3.2 Transportation Management Plan

The Design-Builder shall develop a TMP that includes the items from the *Transportation Management Plan Checklist* (Appendix T), and the following items:

- Descriptions of traffic staging, including conceptual TCPs, to accommodate construction staging
- Descriptions of the requirements for temporary roadways
- Procedures to identify and incorporate the needs of transit operators, Utility Owners, schools, and business owners in the Project corridor
- Procedures for obtaining concurrence of stakeholders and implementing road and lane closures
- Processes for developing and obtaining agreement among stakeholders for switching procedures
- Procedures to identify and incorporate the needs of Local Agencies affected by the Work
- Procedures to identify and incorporate the needs of Environmental Justice (EJ) and Limited English Proficiency (LEP) populations affected by the Work

- Processes for signing transitions during construction from one stage to the next, and from interim to permanent signing
- Procedures to identify and incorporate the needs of emergency service providers, law enforcement entities, and other related corridor users. The Design-Builder shall also include procedures to ensure all information required by these agencies to protect the public is made available.
- Procedures for providing job Site access point for emergency service provider and law enforcement entities
- Provisions for incident and emergency response
- Processes to identify, produce, and receive acceptance for designs of temporary traffic signals
- Methods and frequency of inspection and maintenance of all traffic control throughout the Project limits, including response times to correct, modify, or implement changes to pavement marking, signing, temporary lane configurations, and changes in Temporary Concrete Barrier (TCB) configurations.
- Descriptions of contact methods, personnel available, and response times for any conditions requiring attention during off-hours. Include a Communications Plan to WSDOT Seattle Radio at (206) 440-4490 and field offices.
- Identification of measurable limits for the repair and replacement of traffic control devices, including pavement markings.
- Processes to determine the need for revised traffic signal timings, and if revisions are required, detail the procedures for the development, approval, implementation, testing, and maintenance of all affected signals.
- Provisions to maintain existing access to all properties within the Project limits for the duration of the Project, except as provided by other Sections
- Procedures to modify existing access within Project limits
- Provisions to provide continuous access to established truck routes, Hazardous Material routes, transit routes, and school bus routes
- Procedures to modify the plans as needed to adapt to current Project circumstances
- Procedures to determine detour routes, and for obtaining acceptance from all stakeholders for all proposed detour routes. The Design-Builder shall identify special needs for emergency service providers, transit service, and truck routes.
- Procedures to communicate MOT information to the WSDOT's Communications Team, and to notify the public of MOT issues in accordance with Section 2.9, *Communications*.

- Procedures to accommodate adjacent projects' TCPs and strategies, if applicable
- Procedures to modify the TCPs when the staging schedule of the Project or any adjacent project changes
- Procedures to coordinate and provide MOT for the Toll Vendor
- Descriptions of traffic staging prior to Toll Infrastructure Completion and Toll Commencement as required in Section 2.26, *Toll Infrastructure*
- Procedures for pavement marking and signing work prior to Toll Commencement
- Descriptions of traffic staging, including conceptual TCPs, after Toll Commencement
- Identify haul routes

2.22.3.3 Traffic Incident Management Plan

During construction, MOT will become increasingly sensitive to incidents such as equipment malfunctions, traffic crashes, inclement weather, and special events. The Design-Builder shall prepare and implement a formal TIMP to address how these incidents shall be managed.

2.22.3.3.1 *General*

The TIMP shall identify methods for immediate incident detection and verification, response, Site management, clearance, and motorist information. The TIMP shall include procedures for interaction with the Northwest Region Traffic Management Center (TMC). In addition, if any Local Agencies along the Project corridor have adopted incident management guidelines, the Design-Builder shall be responsible for coordinating with local policies and procedures.

The TIMP shall reflect proposed construction staging. The Design-Builder shall modify and implement the TIMP in conjunction with planned special events. The TIMP shall include specific time limits for the detection, verification, and classification of incidents, as well as for the dissemination of information about the incidents. The TIMP shall provide a mechanism to review and capture lessons learned from incidents.

The Design-Builder shall coordinate the TIMP development and updates with the Toll Vendor and include the Toll Vendor in TIMP communications.

The TIMP shall identify and provide for the incorporation of design elements to aid incident management, including turn-around for emergency vehicles, emergency access points, incident investigation sites, and signing to help motorists report the location of incidents in the Project.

2.22.3.3.2 *Incident Response Team*

Immediately upon detection, the Design-Builder shall notify the Traffic Management Center of any vehicles blocking traffic lanes, disabled vehicles on shoulders, or debris on the roadway that may present a traffic hazard to the public

or cause traffic to deviate from normal traffic pattern. The Design-Builder will not be required to provide additional Incident Response Team equipment or personnel; however, the Design-Builder shall make materials and equipment available that are on-site as requested by the WSDOT Engineer, WSDOT Incident Response Team, or the Washington State Patrol (WSP). Removal of animal carcasses on the roadway shall be in accordance with Section 2.29, *Maintenance During Construction*.

2.22.3.3.3 *Drop Sites*

The Design-Builder shall identify a minimum of six drop sites—four on I-405 and two on SR 522—within the vicinity of the Project where disabled vehicles can be safely towed off the freeway and motorists can be assisted. A phone and shelter shall be available at the drop sites for motorists to use. The drop sites may be retail establishments, such as a hotel, airport, gas station, or repair shop, and shall be located within 1 mile of the Project limits.

2.22.3.3.4 *Temporary Emergency Turnouts*

Temporary emergency turnouts shall be provided on segments where shoulder widths are less than 8 feet for sections longer than 4,000 feet in length. The minimum emergency turn-out width shall be 14 feet from the edge line for a minimum of 150 feet in length, not including transitions. The approach transitions shall be made at 15:1 (Length:Width) or greater. The departure transitions shall be made at 25:1 or greater. The emergency turnouts shall have a paved surface and shall not be subject to ponding or other weather-related conditions that could render them ineffective. Emergency turnouts shall be located on the right side of the travel lanes. Advance signing shall be provided 0.25 mile in advance of the approach transition, and an R8-7 “Emergency Stopping Only” sign shall be installed adjacent to the emergency turn-out.

2.22.3.3.5 *Emergency Vehicle and Law Enforcement Access*

The Design-Builder shall provide coordination with local and regional emergency service providers, law enforcement entities, and other related corridor users including timely communication of Lane Closure Plans, Detour Plans, and other Project elements that may affect the appropriate delivery of time-sensitive services. Emergency vehicle and law enforcement access shall be maintained through all nighttime, weekend, and evening closures.

2.22.3.3.6 *Maintain Camera Surveillance*

Refer to Section 2.18, *Intelligent Transportation Systems*, for maintenance requirements of the Closed-Circuit Television system during construction.

2.22.3.3.7 *Variable Message Signs*

Refer to Section 2.18, *Intelligent Transportation Systems*, for maintenance requirements of the existing Variable Message Sign (VMS).

Existing VMS approaching the Project on I-405 and adjacent roadways (SR 525, I-5, SR 527 and SR 522) may be used, with the WSDOT Engineer's concurrence, to provide motorists with incident and construction-related information prior to entering the Work zone. VMS shall not be used in lieu of PCMS as the primary messaging tool. The Design-Builder shall coordinate with the Northwest Region TMC to provide timely, accurate information regarding planned closures, and updated traffic and construction information.

The Design-Builder shall also provide PCMS to provide information to motorists, in accordance with this Section.

2.22.3.3.8 *Highway Advisory Radio*

A portable Highway Advisory Radio (HAR) may be provided and operated by the WSDOT Engineer. The Design-Builder shall provide and maintain signing for a portable HAR when requested by the WSDOT Engineer.

The Design-Builder shall coordinate with the Northwest Region Construction Traffic Control Office (CTCO) to provide timely, accurate information regarding planned closures, and updated traffic and construction information.

2.22.3.3.9 *Design-Builder Response Time*

The TCS, with the Design-Builder, shall coordinate the resources and equipment necessary to respond to emergency situations. The resources shall be on-site within 45 minutes of notification of an emergency situation. The TCS and Design-Builder shall ensure the support staff is of sufficient size and has the equipment and materials necessary to respond to issues affecting traffic flow, such as displaced pre-cast concrete traffic barrier, pothole repair, water on the roadway, closing lanes, ramps, setting up detours, and other issues that have the potential of affecting safety of the motoring public.

2.22.3.4 Traffic Control for Toll Vendor

The Design-Builder is advised that WSDOT has a Toll Vendor to establish a Toll System for the Project. The Design-Builder shall provide access and MOT for the Toll Vendor during Tolling Equipment installation and testing activities. The Design-Builder shall provide Design Documents and develop TCPs for the Toll Vendor for the following work elements:

- Design and Release for Construction all TCPs required to support the installation of toll equipment at each toll point. This includes, but is not limited to, ramp, Express Toll Lanes (ETL), and general-purpose lane(s) closure plans and detour routes when applicable. See Section 2.26, *Toll Infrastructure*, for additional requirements.
- The Design-Builder shall provide MOT for the following Toll Vendor requested closures:
    - 32 ramp closures
    - 7 shoulder closures

- 24 single-lane closures
- 12 double-lane closures

- The Design-Builder shall allow up to three traffic control closures during one working shift as requested by the Toll Vendor provided the provisions described in Section 2.22.4.3 are met for each closure type described above. For closures that require two or more lanes to be closed, the Design-Builder shall assume individual lane closures can be sequenced. For bidding purposes, the Design-Builder shall assume sequenced lane closures are counted as one closure. For example, if the ETL lane is closed at 10:00 p.m. and then the adjacent lane is closed at 11:00 p.m., this is counted as one closure (ETL lane plus one adjacent lane).
- During Toll Equipment installation and testing phases, the Design-Builder shall give priority to the Toll Vendor-requested lane and ramp closures over other lane closures. If proposed lane closures between the Design-Builder and Toll Vendor are in conflict and cannot be resolved, WSDOT reserves the right to approve or reject proposed lane closures.

The Design-Builder shall provide access and traffic control for the Toll Vendor's activities through Toll Commencement. The Toll Vendor will provide traffic control for the Toll Vendor's activities after Toll Commencement of the Project, including lane and shoulder closures. The Design-Builder shall provide access to the Toll Vendor after Toll Commencement if additional lane closures are needed. The Toll Vendor will coordinate all closures through the WSDOT Engineer and the Design-Builder. The Design-Builder shall keep a record of the types of closures and the dates closures were provided to the Toll Vendor.

2.22.3.5 Access to Install Transit Components

The Design-Builder shall provide affected Transit Agencies and its vendors access to install BRT Infrastructure in accordance with Section 2.27, *Transit* and Appendix S.

2.22.3.6 Maintenance of Traffic Task Force Meetings

The Design-Builder shall establish and chair a MOT task force, which shall include Design-Builder personnel, the WSDOT Engineer, and other WSDOT personnel; the City of Bothell, the City of Woodinville, the City of Kirkland, King County, Snohomish County, Community Transit, Sound Transit; and other agencies that are affected by the TCPs.

The MOT task force will serve as an advisory committee to the Design-Builder. The Design-Builder shall consider all recommendations and input provided by the task force; however, final design and implementation remain the responsibility of the Design-Builder.

The Design-Builder shall schedule and chair MOT task force meetings twice each month from Contract execution to Substantial Completion. The meeting schedule

and frequency of meetings may be adjusted upon agreement by the MOT task force members.

The purpose of the meetings shall be to achieve the following:

- Further refine and develop the TCPs and strategies.
- Review the Design-Builder's MOT details.
- Disseminate Project MOT information to task force meeting attendees.
- Obtain MOT input from task force meeting attendees.
- Develop, refine, and review the TIMP and its implementation.
- Review the TCS log.
- Review MOT traffic operations and discuss signal timing and phasing improvements to the traffic signal system during all construction stages.
- Identify and coordinate upcoming closures affecting Emergency turn arounds with Washington State Patrol.
- Identify the need for improvements based on traffic control implemented previously.
- Discuss comments/complaints about traffic control from the WSDOT Engineer and the public, and determine how they will be addressed.
- Discuss Work zone related crashes and identify appropriate revisions to traffic control to prevent future crashes.
- Identify potential haul routes to the task force meeting attendees.
- Review the 3-week look ahead schedule.

The Design-Builder shall prepare the agenda, meeting minutes, exhibits, and Design Plans required for the meetings, and shall invite representatives from adjacent projects to the meetings.

2.22.4 *Design and Construction Requirements*

2.22.4.1 Work Zone Traffic Engineering Manager

The Work Zone Traffic Engineering Manager (WTEM) shall be responsible for ensuring that the design of all elements related to construction staging, Work zone safety, and Work zone traffic control are completed and all applicable design requirements are met. The WTEM shall be on-site once a week for the duration of the construction staging and TCP development unless otherwise approved by the WSDOT Engineer. The WTEM shall also be available for approval of modifications to the staging or TCP through Substantial Completion. The WTEM shall be a Professional Engineer.

The WTEM shall have at least 5 years of recent temporary traffic control design, traffic engineering experience, or both, on complex, urban interstate projects in design, construction, or both. The WTEM shall understand the concepts of traffic modeling and have experience designing construction staging, Work zone safety, and Work zone traffic control.

The WTEM shall be responsible for the following design elements including, at a minimum:

- Detours
- Staging and TCPs
- Temporary Plans for signals, ITS, lighting, signing, and pavement markings

2.22.4.2 Traffic Control Plans

The Design-Builder shall prepare documentation to justify all proposed road closures, detour routes, and reductions in lane storage at traffic signals or ramp meters. Traffic Analysis shall follow Section 2.21, *Traffic Operations*. The documentation shall be submitted to the WSDOT Engineer for Review and Comment with the proposed TCPs.

The Design-Builder shall use the procedures in the TMP to develop detailed Site-specific TCPs that provide for all construction stages and identify opportunities to expedite construction throughout the course of the Project. The TCPs shall be prepared under the direction of the Design-Builder's WTEM.

All construction signs, flaggers, and other traffic control devices shall be shown on the TCPs, except for emergency situations. The TCPs shall show locations of all required advance warning signs, and a safe, protected location for the flagging station.

The TCPs shall show the necessary construction signs, flaggers, uniformed police officers, and other control devices required to support the Work. The Design-Builder shall be responsible for submitting proposed TCPs to the WSDOT Engineer for Review and Comment; releasing the drawings for construction; and providing copies of the TCPs to the TCS.

TCPs shall include, at a minimum, the following items:

- Complete plan sheets and details for all stages of construction. This shall include construction sequencing plans that show the overall approach to Project staging.
- The appropriate details when temporary construction of traffic signals, detour routes, bridges, retaining structures, drainage, and other miscellaneous construction is required to maintain traffic.
- Provide applicable closure hours as specified in Appendix T.
- Roadway plan sheets showing all existing traffic control devices that will be retained, relocated, or removed; and all temporary traffic control devices that will be installed, retained, relocated, or removed.
- The spacing, size, color (legend and background, if applicable), and quantity of all traffic control devices.
- Work areas including ingress and egress for construction vehicles.

- Roadway plan sheets with the location of each sign so it can be easily read in relation to the roadway and other traffic control devices. A small-scale layout of each sign shall be shown on the corresponding roadway plan sheet where the sign is to be placed.
- Provisions for using temporary barriers and attenuators to satisfy clear zone requirements, and to protect the traveling public and the Design-Builder's personnel, including lateral displacement distance behind barrier.
- Temporary lighting, signalization, and ITS details, as required.
- Layouts showing the locations of ground-mounted and overhead signs, special sign details, clear zones, and structural and foundation requirements.
- Drawings on how to fabricate any sign not detailed in the WSDOT *Sign Fabrication Manual* showing dimensions, background color, and legend.
- Methods for covering, partially covering, or modifying signs when not applicable to the current phase of construction.
- Methods for covering, partially covering, or modifying signals when needed for the current phase of construction.
- Striping, crosswalks, intersection details, and traffic delineators.
- Type and location of all pavement markings to be installed, removed, or renewed for each stage of construction, and locations of the final pavement markings.
- Cross-sections covering each significant change in configuration including, at a minimum, reduction in lane or shoulder widths; reduction or increase in number of lanes; and changes of lateral barrier placement or type. Cross-sections shall show lane configuration (including direction of travel) and widths, shoulder widths, lateral buffer distance behind barrier, Work areas, and pavement marking type. Cross-sections shall identify locations of vertical drop-offs or fixed objects adjacent to the roadway and how they will be protected. Cross-sections shall include the station limits the section applies to. Cross-sections shall be provided covering the entire length of the segment included in the TCPs.
- Typical sections shall identify direction of travel, lane widths, lane type (general purpose, shoulder, ETL, turn lane, etc.), and number of lanes.
- Provisions for maintaining toll collection and operations during construction and phase switching.
- Access and control of bicyclists and pedestrians including persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA) through the traffic control zones.
- TCPs to show how access to transit stops will be maintained.
- Detail modifications to the TCPs to address wintertime conditions or periods of suspended Work.

- A switching procedure for each traffic control stage change identified in the TCPs. The switching procedure shall include information jointly determined by the Design-Builder and the WSDOT Engineer, sufficient to facilitate discussion of each traffic control stage change in the MOT task force meetings.
- The TCPs shall be complete. Typical traffic control configurations such as those found in the MUTCD may be used to assist in developing the TCPs. Only Site-specific TCPs that have been Released for Construction (RFC) shall be used by the Design-Builder. Typical plans are not acceptable unless incorporated as details into the TCPs.
- Temporary drainage plan and profile sheets showing all existing drainage that will be retained, relocated, or removed; and all temporary drainage facilities that will be installed, retained, relocated, or removed in accordance with Section 2.14, *Stormwater*.

The Design-Builder shall maintain an updated log for the approved TCPs in the document control system. The log shall be available for WSDOT to review at any time.

2.22.4.2.1 *Design Vehicle*

The design vehicle and vehicle accommodation shall conform to the requirements listed in Section 2.11, *Roadway* and Section 2.27, *Transit* for temporary facilities, including intersections, freeway mainline, freeway ramps, and local roads. See WSDOT *Design Manual* Chapter 1310 for Accommodating vs Designing for Vehicles.

The Design-Builder shall evaluate traffic patterns and vehicle classifications to determine an appropriate design vehicle for each Traffic Control Plan. Provisions for oversized vehicles shall be coordinated with the WSDOT Engineer when detours or limited vertical clearance are required by the TCPs.

2.22.4.3 Allowable Closures

This Section lists the allowable lane closure hours for the Project. Any restrictions for roadway segments not listed in this Section require the WSDOT Engineer approval. No lane closures shall occur outside of the hours specified within this Section, unless approved in advance and in writing by the WSDOT Engineer. The Design-Builder shall notify the public in advance of closures. Any required Traffic Analysis related to closures shall follow Section 2.21, *Traffic Operations*.

No temporary lane closures or restrictions, including set-up and removal of traffic control devices, will be allowed except during the hours permitted by this Section. In addition, no Work that restricts or interferes with traffic will be allowed from noon on the day preceding through noon on the day following a holiday or holiday weekend. Holidays that occur on Friday, Saturday, Sunday, or Monday are considered a holiday weekend. January 1, the third Monday of January, the third Monday of February, Memorial Day, June 19, July 4, Labor Day, November 11, Thanksgiving Day, the day after Thanksgiving, and Christmas Day shall be

considered holidays. When any of these holidays fall on a Sunday, the following Monday shall be considered a holiday. When any of these holidays fall on a Saturday, the preceding Friday shall be considered a holiday.

The Design-Builder shall coordinate their Work activities with other local events in the area, so that the events will not be impacted. In addition, road, ramp, and lane closures will not be allowed during the following events:

- Evergreen State Fair – The Design-Builder shall not close freeway lanes on I-405 or SR 522 or the ramps connecting I-405 and SR 522 between 2 hours prior to and 2 hours after the hours of operation of the Evergreen State Fair. The fair generally runs between the last week of August through the first week of September.
- The Design-Builder shall not close freeway ramps at the I-405/SR 522 Interchange two hours prior to and two hours after events with an attendance over 2,500 during a Chateau Ste. Michelle concert or event.
- The Design-Builder shall identify any organized event, such as 5k runs, half-marathons, marathons, and bicycle rides, on the Sammamish River Trail or North Creek Trail within the work zone and shall adjust closure times to minimize impacts to these events. No trail closures or trail detours shall be implemented on event days.
- Scheduled roadway closures of SR 520 between I-405 and I-5
- Scheduled roadway closures of I-90 between I-405 and I-5
- Annual Seafair Hydroplane Race weekend from noon Friday to 8:00 p.m. Sunday
- The Design-Builder shall also identify any major event, such as a sporting event or any combination of events, with an anticipated combined attendance over 30,000 and shall adjust closure times to minimize the impact to traffic in accordance with Section 2.9, *Communications*. No traffic restrictions shall be implemented between 2 hours prior to and 2 hours after the end of events.
- Additional limitations shall be placed on traffic restrictions such as lane closures, ramp closures, and detours during the holiday period from November 15 of each year through January 2 of the following year. No shifts to traffic patterns of lane configurations, city street closures, or extended ramp closures shall be made during the holiday period unless approved by the WSDOT Engineer.

The Design-Builder shall accommodate passage of superloads (as defined by the WSDOT Commercial Vehicle Services), wide loads or other permit loads through the temporary traffic control area and exceptions to the allowable lane closures may be necessary to do so. In addition, the Design-Builder shall coordinate with adjacent concurrent projects to provide continuity in the lane configurations.

WSDOT reserves the right to not approve traffic restrictions and freeway closures.

Liquidated damages will be assessed for failure to complete Work and open all lanes and ramps to traffic by the specified times, in accordance with Section 1-08 of the *General Provisions*.

2.22.4.3.1 *Lane Closures*

The Design-Builder shall maintain the existing lane channelization configuration, except at the I-405/SR 522 Interchange, at all times outside of the allowable closures described in this Section, unless otherwise permitted in this Section. At the I-405/SR 522 Interchange, the Design-Builder shall maintain the minimum required channelization at all times outside the allowable closures described in this Section, unless otherwise permitted in this Section.

See Appendix T for a list of allowable lane closures on I-405, SR 527, SR 522, and other local streets and trails in the Project vicinity.

The Design-Builder shall coordinate with WSDOT to develop allowable mainline closure hours for use after Toll Commencement. These hours will supersede and may differ from those provided in this Section and Appendix T. WSDOT will use traffic data from 12 months prior to Toll Commencement to generate mainline closure hours for use after Toll Commencement. After Toll Commencement, vehicles will not be allowed to cross the double white lines between the ETL and general purpose lanes.

2.22.4.3.2 *Full Freeway, Highway, and Roadway Closures*

The Design-Builder will be allowed to close all lanes of mainline freeways, highways, and roadways on I-405 and SR 522 in accordance with this Section and Appendix T upon Written notification to the WSDOT Engineer and upon prior approval by the WSDOT Engineer and all Local Agencies impacted by the detour routes.

The Design-Builder shall provide Written notification to the WSDOT Engineer and the affected local agencies of the planned closure, including the date and time of the closure, the Work activities scheduled for Work preceding the full closure, and the applicable traffic control, at least 60 Calendar Days in advance of the full freeways, highways, and roadways closure. A traffic analysis shall be conducted for all full freeway mainline closures as described in Section 2.21, *Traffic Operations*, and shall be provided to WSDOT and affected agencies as part of this notification.

The Design-Builder shall submit the scheduled closure to the WSDOT Engineer for Review and Comment at least 14 Calendar Days prior to the date on which the closure is scheduled. WSDOT will provide a response acknowledging the closure request within 2 business days. All freeways, highways, and roadways closures not confirmed by the Design-Builder as scheduled shall be canceled.

Detour routes shall be provided by the Design-Builder for all freeways, highways, and roadways closures. Detours shall be approved by impacted Local Agencies a minimum of 30 Calendar Days prior to implementing the closure. The Design-Builder shall coordinate the closure with nearby projects and WSDOT

Maintenance activities to ensure no conflicting Work activities are planned, including ramp or roadway closures that have conflicting or overlapping detours.

Roadway closures, detours, and alternate routes must be analyzed by WSDOT for disproportionate impacts to EJ and LEP communities, in accordance with Section 2.8, *Environmental*. If an EJ or LEP community is identified along a proposed route and will be disproportionately impacted, appropriate mitigation must be coordinated between WSDOT Communications and the Design Builder. When additional changes are made to the route, it should be evaluated to determine if the detour adds congestion, noise or creates safety issues for adjacent residences and businesses and/or adds considerably longer distance to access residences/businesses that may affect low income and minority population. WSDOT will work with local agencies and conduct public outreach as necessary, to ensure that the proposed route will not have a disproportionately high and adverse effect on EJ or LEP populations.

The Communications Plan must include appropriate accommodations for identified populations and businesses.

A submittal that does not conform to the Contract Time limits, is incomplete, unintelligible, or includes inaccurate information, will be returned to the Design-Builder for correction. The Design-Builder will be notified promptly of a disapproved closure or a closure that will require coordination with other parties, including EJ and LEP, as a condition of approval.

Detour routes proposed by the Design-Builder shall be evaluated to determine if the detour adds congestion, noise or creates safety issues for adjacent residences and businesses and/or adds considerably longer distance to access residences/businesses that may affect low income and minority population, including EJ and LEP populations.

All detours shall be in place, including all advance-signing, prior to closure of the freeways, highways, and roadways.

Full closure of the freeways and highways shall require WSP enforcement as part of the traffic control strategy and use of WSP be reflected on the TCPs.

The Design-Builder shall complete all Work within the specified closure times prior to opening the freeways, highways, and roadways to traffic.

Advance notification, public notification, and signing requirements shall be in accordance with this Section and Section 2.9, *Communications*.

The Design-Builder shall provide the WSDOT Engineer with a Contingency Plan for re-opening closed freeways, highways, and roadways to public traffic in the event of equipment breakdown, shortage of materials, lack of production of materials, or other production failure; or when it becomes necessary to re-open the closure for use by public traffic. The Design-Builder shall furnish an hour-by-hour schedule of all Work activities to be performed during the full freeways, highways, and roadways closure, including the Work activities scheduled for Work preceding the full closure. The Design-Builder shall also furnish a Contingency Plan for this closure including re-opening lanes for general public

traffic. The Contingency Plan and its acceptance by the WSDOT Engineer shall not relieve the Design-Builder from the liquidated damages as specified in this Section and Section 1-08.9 of the *General Provisions*.

2.22.4.3.3 *Entrance and Exit Ramp Closures*

The Design-Builder will be allowed to close ramps during the hours listed in Appendix T. The Design-Builder shall maintain the existing ramp configurations, or the ramp configurations provided in the minimum required configuration plan as provided in Appendix T, at all times outside of the allowable closures described in this Section, unless otherwise permitted in this Section. Refer to Section 1-08 of the *General Provisions* for liquidated damages associated with failure to fully re-open ramps by the opening time given in the table below. If two or more ramps within the Project limits are planned to be closed concurrently, and the closed ramps have overlapping detours, the Design-Builder shall conduct an analysis of the detour routes in accordance with Section 2.21, *Traffic Operations*, and submit it to the WSDOT Engineer. If overlapping detours are determined to be unacceptable by the WSDOT Engineer, then only one ramp closure will be allowed. Closure durations shall be reduced based on the results of this analysis.

The Design-Builder will be allowed to close ramps upon Written notification to WSDOT and upon prior approval by the WSDOT Engineer and all affected Local Agencies, provided that the requirements for ramp access are satisfied, and provided that the closure is shown on an RFC TCPs. Consecutive off-ramps or consecutive on-ramps shall not be closed concurrently unless approved by the WSDOT Engineer.

The Design-Builder shall provide a Written ramp closure schedule to the WSDOT Engineer at least 14 Calendar Days in advance of a ramp closure. The schedule shall show the locations and times of all ramp closures and the allowable closure time limits specified in the Contract. A schedule that does not conform to the Contract Time limits, is incomplete, unintelligible, or includes inaccurate information, will be returned to the Design-Builder for correction. The Design-Builder will be notified promptly of any disapproved closures or any closure that will require coordination with other parties as a condition of approval. Requests for ramp closures made less than 14 Calendar Days in advance will not be approved.

The Design-Builder shall confirm all scheduled closures with the WSDOT Engineer at least 7 Calendar Days prior to the date on which the ramp closure is scheduled. All ramp closures not confirmed by the Design-Builder as scheduled shall be canceled. Confirmed ramp closures that are canceled for unsuitable weather may be rescheduled for the next allowable day.

The Design-Builder shall provide detour routes for ramp closures and all roadway closures. Detours shall be approved by impacted Local Agencies a minimum of 14 Calendar Days prior to implementing the closure. All detours shall be in place, including all signing, prior to closure of the ramp. If more than one ramp or

roadway will be closed at the same time, all detour routes shall be shown on the same plan.

The Design-Builder shall coordinate ramp closures with nearby projects in accordance with Section 2.1, *General Information*, to ensure consecutive ramps or off-ramps are not closed simultaneously or result in conflicting or overlapping detours.

The Design-Builder shall complete all ramp Work within the specified allowable closure times prior to opening the ramps to traffic.

2.22.4.3.4 *Allowable Shoulder Closures*

Shoulder closures will be permitted during the allowable lane closure hours. In addition, temporary mainline shoulder closures will be permitted in accordance with the RFC TCPs as follows:

- Between 9:00 a.m. and 2:00 p.m. daily, including weekends, in accordance with the TCPs

Shoulders that are adjacent to a closed lane shall be closed. Metered ramp shoulder lanes shall not be closed unless the ramp is fully closed.

2.22.4.4 Traffic Operations During Construction

The Design-Builder shall notify WSDOT's Seattle Radio at (206) 440-4490 when setting up and removing all lane, shoulder, and roadway closures.

The Design-Builder shall use protective vehicles with warning beacons for protection of Work zones on roadways with a posted speed limits less than 45 mph and Transportable Attenuators (TAs) for protection of Work zones on roadways with a posted speed limit equal to or greater than 45 mph.

Haul routes shall not use private roadways located within the project limits.

2.22.4.4.1 *Mainline During Construction*

Existing shoulders can be used as traveled lane or Work zone truck access in accordance with Section 2.7, *Pavement*.

There may be existing facilities in the existing roadway shoulder that may not be adequate for traveled lane or Work zone truck access operations. These may include, at a minimum, drainage structures, junction boxes, cable and drainage vaults, manholes, pull boxes, and the lids for these facilities. Prior to using an existing shoulder as all or part of the Traveled Way, the Design-Builder shall inspect all existing facilities within the roadway shoulder which may be used as traveled lane or Work zone truck access and remediate any existing facilities within the roadway shoulder which are not adequate to support sustained traffic. All damaged facilities shall be replaced at the Design-Builder's expense.

Mainline and Auxiliary Lanes shall be a minimum of 11 feet wide and shall not exceed 14 feet wide unless otherwise specified. Shoulders shall be a minimum of 5 feet wide where adequate room is available.

When shoulders are less than 5 feet wide, construction signs shall be barrier-mounted or placed behind the barrier at an elevated height to ensure visibility from a height of 3 feet from the roadway surface.

Tripod-mounted signs are allowed when shoulders are greater than 5 feet wide.

The Design-Builder shall not clip construction signs. When placement of a sign edge is within 2 feet of the Traveled Way, the Design-Builder may implement one of the following strategies:

- Use a sign smaller than the typical 48- by 48-inch size (roughly 67 inches wide diagonally).
- Omit the sign and provide additional advance warning at other locations.
- Design special rectangular signs to convey the same message but with a reduced width.

When shoulders are greater than 10 feet wide, the Design-Builder shall place drums at 80-foot spacing, 10 feet from the edge line, supplemented by a minimum of two transverse devices at 500-foot spacing.

The Design-Builder shall provide an 8-foot right shoulder/distress lane, when feasible. Each shoulder shall be a minimum of 2 feet wide and shall be paved. Wider shoulders may be required to accommodate the necessary sight distance.

The Design-Builder shall design any temporary construction or widening to withstand the anticipated traffic volumes and loadings during the applicable stage of the Project.

Mainline general purpose lanes in the same direction of travel shall not be split or separated.

Design-Builder shall maintain access at all times from SR 522 to the WSDOT Maintenance Stockpile sites under the I-405/SR 522 Interchange.

Once one or more signals on SR 522 are operational, the Design-Builder shall maintain the proposed minimum configuration on SR 522 between the Campus Way intersection and the northbound I-405 to eastbound SR 522 off-ramp at all times outside the allowable closures as shown in Appendix T.

The Design-Builder shall maintain the existing number of ETLs and toll access points in each direction on I-405 at all times prior to toll commencement within the Project limits. Refer to Section 2.26, *Toll Infrastructure*, for additional toll system rollout requirements. After toll commencement, the Design-Builder shall maintain the number of ETLs and access points as defined in the basic configuration.

The Design-Builder shall maintain the existing buffer between the ETL lanes and the adjacent general purpose lanes. All locations where the existing buffer width cannot be maintained, a minimum a 2-foot buffer shall be provided with a double solid white line separation, except at existing ETL access locations, during all construction stages of the Project.

ETL lane shifts shall not be allowed within 50 feet upstream and downstream of existing toll gantries and the existing edge line and buffer striping shall be maintained as to not disrupt tolling operations. After replacement Toll Points are operational and toll collection has shifted to the new toll point, refer to Section 2.26, *Toll Infrastructure*, for provisions on lane shifts.

Disruptions to the toll system that impact revenue collection shall be subject to liquidated damages as specified in this Section and Section 1-08.9 of the *General Provisions.*

2.22.4.4.1.1 Design Criteria

The design speed for temporary conditions shall not be less than the posted speed on I-405, and on SR 522 between milepost (MP) 10.70 and 11.90. The design speed for temporary conditions shall not be less than 35 mph on SR 522 between Kaysner Way to MP 10.70. All mainline shifting tapers and lane closure tapers shall be in conformance with standards provided in the latest version of the MUTCD.

2.22.4.4.1.2 Temporary Lane Closures

The Design-Builder shall provide Written notification to the WSDOT Engineer and all affected Local Agencies a minimum of 7 Calendar Days prior to each closure. Each lane closure shall have one sequential arrow board per closed lane, as part of the traffic control layout. No closures shall be scheduled until the TCPs are RFC.

For lane closures longer than 500 feet, the Design-Builder shall use a minimum of two transverse devices in the closed lane at 500-foot spacing.

2.22.4.4.1.3 Law Enforcement

Law enforcement shall be provided for rolling slowdowns, full freeway closures, and to control intersections when traffic signals are temporarily turned off. Law enforcement for the Work zone shall be included in the Proposal Price.

2.22.4.4.1.4 Sequential Arrow Displays

Each vehicle used to place, maintain, or remove components of a traffic control system on multi-lane highways shall be equipped with a sequential arrow display that shall be in operation when the vehicle is in use. Vehicles equipped with sequential arrow displays not involved in placing, maintaining, or removing components when operated within a stationary-type lane closure shall display only the four-corner flash caution mode. The operator of the vehicle shall control the arrow display while the vehicle is in motion. Sequential arrow displays used in moving lane closures shall be truck-mounted. This requirement applies to all vehicles placing, maintaining, and removing traffic control devices, including concrete barrier trailers and “cherry pickers".

2.22.4.4.1.5 Advance Signing

The Design-Builder shall furnish and install four G24-501 (modified) signs with the Project hotline phone number within the Project limits: One sign in the northbound direction and one in southbound direction of I-405 near where traffic enters the Project, and one sign in the westbound direction and one sign in the eastbound direction of SR 522 near where traffic enters the Project. The signs shall be installed within 30 Calendar Days of the date the Contract is executed, and prior to all other construction activity on the Project. The signs shall remain in place until Physical Completion and be maintained by the Design-Builder. Coordination with nearby projects may be required for placement of the signs.

WSDOT will supply the Project identification sign. The Design-Builder shall be responsible for coordination, transportation, and installation of the sign, including supplying the posts for the sign and placards with the Project amount and Design-Builder's name. Refer to the *Project Identification Sign Detail* (Appendix W). These signs shall be located a minimum of 800 feet away from any guide sign and motorist information signs.

The Design-Builder shall pick up the sign at the address below, and shall coordinate the receipt of the Project identification signs by contacting:

Scott Hammersmith
WSDOT Traffic Maintenance, Building 12
6431 Corson Avenue South
Seattle, WA 98105-3145
Phone: (206) 768-5882

If it is necessary to relocate advance signing for any reason, the Design-Builder shall be responsible for relocation.

2.22.4.4.2 *Ramps During Construction*

2.22.4.4.2.1 Design Criteria

The Design-Builder shall provide acceleration and deceleration lanes to ensure vehicles are within 10 mph of the mainline speed at the point they must merge or diverge from mainline lanes. Exit speeds shall be posted for all ramps. For ramps where the design speed during construction is reduced from existing conditions, black on orange construction signs shall be used for the exit speed signs.

The NE 160th Street on-ramp to southbound I-405 shall maintain the existing two-lane general purpose and HOV configuration during construction or until the in-line freeway transit station at Brickyard is operational.

After the I-405 northbound to SR 522 westbound flyover ramp is demolished, the Design-Builder shall maintain at least two lanes on the I-405 southbound to SR 522 westbound ramp at all times during construction.

The number of lanes and lane configurations shall equal or exceed the existing configuration or the minimum required configuration during construction of the SR 522 interchange provided in Appendix T. Adequate storage for queuing and

throughput volumes at traffic signals and ramp meters shall be maintained. Ramp meters shall be maintained on all on-ramps and the existing storage shall be considered the minimum. On-ramps shall have adequate ramp storage and shall meter the appropriate number of lanes based on the criteria provided in the WSDOT *Northwest Region ITS Design Requirements* during all construction phases. Ramp meters shall not operate with two vehicles per green indication. Lanes shall be a minimum of 11 feet wide on entrance and exit ramps. Paved shoulders shall be provided on both sides of each ramp and shall be a minimum of 2 feet wide. Wider ramp widths than these minimums shall be required where necessary to satisfy AASHTO design widths for turning roadways and horizontal stopping sight distances, and to accommodate WB-67 on General Purpose ramps and Bus-45 with bike rack on ETL ramps for design vehicle tracking. Refer to the WSDOT *Design Manual*. All exit ramp tapers shall use a desirable taper rate of 20:1, and a minimum taper rate of 15:1.

Turning movements at the ramp terminals shall be designed to accommodate a WB-67 design vehicle on General Purpose ramps and a Bus-45 with bike rack design vehicle on ETL ramps.

2.22.4.4.3 *Local Roads During Construction*

The Design-Builder shall maintain the existing local street configuration at all times outside the allowable closures from the Local Agencies, unless otherwise permitted in this Section.

All TCPs affecting local roads shall meet the minimum channelization requirements and allowable closure hours as identified in Appendix T, and shall follow the requirements of each Local Agency impacted. The Design-Builder shall be responsible for submitting plans and obtaining approvals from the Local Agencies for each planned closure and detour route. Allowable closure hours for lane and roadway closures on local roads shall be approved by the corresponding Local Agency. The Design-Builder shall coordinate with City of Bothell, City of Woodinville, City of Kirkland, King County, Snohomish County, Sound Transit, and Community Transit regarding concurrent construction work along city cross-streets that may be affected by traffic control for the Project; see *Right of Way Use Permits*, if any.

The Design-Builder shall provide Written notice to the WSDOT Engineer and the affected Local Agencies a minimum of 30 Calendar Days prior to restricting local traffic. The Design-Builder shall be responsible for obtaining approval for each planned closure from WSDOT and the Local Agencies affected by the Work. The Design-Builder shall be responsible for obtaining all necessary permits from Local Agencies associated with lane closures on local streets. The Design-Builder shall maintain access to all affected businesses and residences during the lane closures. The Design-Builder shall maintain access to all affected residences on NE 155th Street during full closures.

2.22.4.4.3.1 Design Criteria

The design speed of all local roads during construction shall be the existing posted speed limit. Any reduction from the existing posted speed limit shall be identified in the TMP and requires approval by the corresponding Local Agency.

The existing number of lanes, intersection turn pockets, and intersection signal phasing shall be maintained at all times except as approved by the WSDOT Engineer and the affected Local Agency. All lanes for local roads shall be a minimum of 11 feet wide, measured to the front of gutter, unless the existing lane width is less than 11 feet, in which case the lane shall not be less than the existing width.

2.22.4.4.3.2 Detours

All detours shall be in place, including all signing, prior to closure of any road. Detours using local roads shall follow traffic control permit requirements for each Local Agency impacted. Detours shall not be permitted on private roadways and the Design-Builder shall provide appropriate signing restricting the use of such private roadways as detours.

Detour signing for interstate/freeway, roadway, or entrance ramp closures shall include specific route shield, cardinal direction, and arrow of appropriate orientation comprised on one sign of either 48- by 48-inch (posted speeds of 45 mph or greater) or 36- by 36-inch (below 45 mph) in size.

The Design-Builder shall identify all bus routes, including school bus routes, which may be affected by the detour; and shall coordinate with the bus agency regarding impacts to the schedule and location of the bus stops.

2.22.4.4.3.3 Park and Rides During Construction

The Canyon Park and Brickyard Park and Ride facilities shall remain fully operational and maintain their existing configuration and transit services at all times during construction except as allowed in Appendix S and Appendix T.

The Canyon Park and Brickyard Park and Ride facilities work shall conform to the Bothell Municipal Code, and Transit requirements outlined Section 2.27, *Transit*.

2.22.4.4.4 *Temporary Guardrail, Barrier Attenuators, and Glare Screen*

2.22.4.4.4.1 Vehicle Protection

The Design-Builder shall be responsible for using temporary guardrail, barrier, and attenuators to protect the traveling public from the following:

- Fixed objects within the clear zone
- Drop-offs as required by this Section
- Slopes steeper than 4H:1V (Horizontal:Vertical)

2.22.4.4.4.2 Barrier and Glare Screen

Opposing traffic lanes of mainline I-405 and SR 522 shall be separated by permanent barrier or TCB in accordance with WSDOT design requirements.

TCB placed along the edge of a bridge structure shall be anchored.

The end of TCB shall not be placed within the clear zone of approaching traffic unless an appropriate attenuator is used. Refer to the WSDOT *Design Manual* for minimum taper rates and additional details.

The Design-Builder shall provide a lateral displacement distance behind all barriers (including TCB) equal to or greater than the longitudinal barrier deflection shown in Exhibit 1610-3 of the WSDOT *Design Manual*. The lateral displacement area shall be kept clear of fixed objects and shall not be used as a Work area.

When mainline median crossovers are used, temporary glare screen, in accordance with Sections 8-25 and 9-16 of the Standard Specifications, using slats shall be placed on top of the median TCB to reduce the headlight glare of approaching vehicles. All concrete barriers shall have reflectorized barrier delineators of the appropriate color with 20-foot maximum spacing. The barrier delineators shall be side-mounted.

2.22.4.4.5 *Pedestrian and Bicycle Access During Construction*

The Design-Builder shall maintain existing pedestrian access on all sidewalks, transit facilities, and intersections, except as permitted in this Section and Appendix T. The Design-Builder shall also maintain safe pedestrian access and passage for all pedestrian facilities. Pedestrian sidewalks and paths shall be maintained and continue to conform to the Public Rights of Way Accessibility Guidelines (PROWAG) requirements (www.access-board.gov/prowag). Occupational safety regulations that apply to the Project limits shall also be considered the minimum standard for personal safety to pedestrians. If Work will be performed over any pedestrian and bicycle routes, temporary lighted covered walkways shall be provided to protect pedestrians and bicyclists from overhead hazards.

When the Design-Builder allows Work areas to encroach upon a sidewalk or crosswalk area and a minimum clear width of 48 inches cannot be maintained for pedestrian use, an alternative accessible pedestrian route shall be provided. Separation of pedestrians from the Work area and vehicular traffic is required.

Protective barricades, fencing, and bridges, together with warning and guidance devices and signs, shall be used so that the passageway for pedestrians is safe, well defined, and accessible. Whenever pedestrian walkways are provided across excavations, they shall be provided with handrails in accordance with ADA requirements. Footbridges shall be designed in accordance with AASHTO LRFD specifications; have a slip-resistant coating; and be free of cracks, holes, and irregularities that could cause tripping. Ramps with a maximum slope of 8.3 percent shall be provided at the entrance and exit of all raised footbridges. The

maximum cross slope shall be 2 percent. When the existing facility is illuminated or TCPs require illumination, illumination shall be provided during the hours of darkness. Retroreflective delineation, with or without illumination, shall be provided during hours of darkness.

Where accessible pedestrian routes are allowed to be closed by the Design-Builder during construction, an alternate accessible pedestrian route shall be provided that complies with the MUTCD, the PROWAG requirements, and this Section. The alternate accessible pedestrian route shall not have abrupt changes in grade or terrain. Pedestrian channelizing devices shall be detectable to pedestrians who have visual disabilities and a handrail meeting PROWAG requirements. Where it is necessary to divert pedestrians into the roadway, barricading or channelizing devices shall be provided to separate the pedestrian route from the adjacent vehicular traffic lane. Barricading or channelizing devices used to separate pedestrian and vehicular traffic shall be crashworthy in accordance with the WSDOT *Design Manual* Chapter 1610, and, when struck by vehicles, present a minimum threat to pedestrians, workers, and occupants of impacting vehicles. At no time shall pedestrians be diverted into a portion of the street used concurrently by moving vehicular traffic.

The Design-Builder shall maintain an ADA accessible pedestrian access, per PROWAG requirements, across I-405 at all times to and from the Canyon Park Park and Ride and transit stops located on the I-405 ramps, except per the allowable closures listed in Appendix S and T. The crossing shall have lighting and be protected from work zone vehicles, equipment, and other hazardous activities at all times. The Design-Builder shall restrict pedestrians from deviating from pedestrian facilities in to work zone areas by utilizing barricades, channelizing devices, flaggers, or Design-Builder traffic control personnel.

The Design-Builder shall not park motor vehicles or construction equipment on an open pedestrian sidewalk or path, or use an open pedestrian sidewalk or path for loading operations, stockpiling of materials, or allowing demolished or spoil materials to be deposited on the surface of an open pedestrian sidewalk or path. Any surface of a pedestrian sidewalk or path affected by the Work shall be restored to meet ADA requirements prior to re-opening to pedestrian traffic. The pedestrian sidewalk or path surface shall be swept or washed free of debris including, at a minimum, mud, gravel, grease, and excavated, spoiled, or stockpiled materials.

Pedestrian and bicycle routes shall not be closed except during full closures of the adjacent roadways or trails. During full closures of the adjacent roadways or trails, a Pedestrian and Bicycle Access Plan shall be implemented with a minimum of 14 Calendar Days advance notice provided to all pedestrians and bicyclists. The Design-Builder shall notify the affected local agencies prior to the closure of any trails. A Pedestrian and Bicycle Access Plan shall not require pedestrians or bicyclists to travel more than 0.5 miles longer than the preconstruction distance, with the exception of allowable full closures of trails as identified in Appendix T. Advance notice shall consist of signs located at the construction limits and all accesses serving the affected area; and public

notification in accordance with Section 2.9, *Communications*. All access closures and Pedestrian and Bicycle Access Plans shall be shown in the TCPs. All detours and Work Sites shall be signed in accordance with MUTCD, ADA requirements, and this Section. Refer to Chapters 1510 and 1520 of the WSDOT *Design Manual* and the *King County Parks Requirement for the Sammamish River Trail* (Appendix S) for Sammamish River Trail closures.

2.22.4.5 Public Convenience and Safety

2.22.4.5.1 *Construction Under Traffic*

The Design-Builder shall conduct all operations with the least possible obstruction and inconvenience to the public. The Design-Builder shall not have under construction a greater length or amount of Work than can be prosecuted properly with due regard to the rights of the public. To the extent possible, the Design-Builder shall finish each section of Work before commencing Work on the next section. The Design-Builder shall enter interstate highways only through legal movements from existing roads, streets, and other access points specifically permitted by the Contract.

In order to minimize public traffic disruption, the Design-Builder shall permit traffic to pass through the Work zone with the least possible inconvenience or delay. The Design-Builder shall maintain existing roads and streets within the Project limits, keeping them open, and in a good, clean, safe condition at all times except at allowable closure times per this Section. Deficiencies caused by the Design-Builder's operations shall be repaired at the Design-Builder's expense. Except where noted in this Section and Section 2.29, *Maintenance During Construction,* deficiencies not caused by the Design-Builder's operations shall be repaired by the Design-Builder, when directed by the WSDOT Engineer, at WSDOT's expense. Pothole damage shall be repaired by the Design-Builder at the Design-Builder's expense. The Design-Builder shall also maintain roads and streets adjacent to the Project limits when affected by the Design-Builder's operations. Snow and ice control will be performed in accordance with Section 2.29, *Maintenance During Construction*. The Design-Builder shall perform the following:

- Remove or repair any condition resulting from the Work that might impede traffic or create a hazard.
- Maintain operation of traffic signals and highway lighting systems as the Work proceeds.
- Maintain the striping on the roadway.
- Maintain existing permanent signing. Sign repairs will be at WSDOT's expense, except those damaged due to the Design-Builder's operations.
- Keep drainage structures clean to allow for free flow of water.

To protect the rights of abutting property owners, the Design-Builder shall perform the following:

- Conduct the construction so that abutting property owners are inconvenienced as little as possible.
- Provide and maintain transit access to transit facilities. Transit only facilities shall remain open except as allowed in Appendix S and Appendix T.
- Maintain access to driveways, houses, and buildings within the Project limits.
- Provide temporary approaches to crossing or intersecting roads and keep these approaches in good condition.
- Provide another access before closing an existing access whenever the Contract calls for removing and replacing an abutting owner's access.

When traffic must pass through grading areas to access private property, the Design-Builder shall perform the following:

- Make cuts and fills that provide a reasonably smooth, even roadbed.
- In advance of other grading Work, place enough fill at all culverts and bridges to permit traffic to cross.
- After rough grading or placement of any subsequent layers, prepare the final roadbed to a smooth, even surface free of humps and dips, suitable for use by public traffic.
- Settle dust with water or other dust palliative.

If grading Work is on or next to a roadway in use, the Design-Builder shall finish the grade immediately after rough grading and place surfacing materials as the Work progresses.

Where planing is performed, live traffic will be allowed to drive on the ground surface for a maximum of 5 Calendar Days before an overlay is required in the planed section. Planing shall be performed either parallel or perpendicular to the current channelization.

The Design-Builder shall conduct all operations to minimize any drop-offs (abrupt changes in roadway elevation) left exposed to traffic during non-working hours. Grinding shall not be allowed after the final paving lift is completed. Drop-offs left exposed to traffic during nonworking hours shall be protected as follows and shall be shown in the RFC TCP submitted in accordance with this Section:

1. Drop-offs up to 0.20 foot may remain exposed with appropriate warning signs alerting motorists of the condition. The drop-offs shall not remain open for more than 3 Calendar Days.
2. Drop-offs more than 0.20 foot that are in the Traveled Way or Auxiliary Lane will not be allowed unless protected with appropriate warning signs and further protected as indicated in 3b or 3c below.
3. Drop-offs more than 0.20 foot, but no more than 0.50 foot, that are not within the Traveled Way or Auxiliary Lanes shall be protected with

appropriate warning signs and further protected by using one of the following:

a. A wedge of compacted stable material placed at a slope of 4H:1V or flatter.

b. Channelizing devices (Type I barricades, plastic safety drums, or other devices 36 inches or more in height) placed along the traffic side of the drop-off and a new edge of pavement stripes placed a minimum of 3 feet from the drop-off. The maximum spacing between the devices in feet shall be the posted speed in mph. Pavement drop-off warning signs shall be placed in advance and throughout the drop-off treatment.

c. A TCB or other approved barrier installed on the traffic side of the drop-off with a new edge line paced a minimum of 2 feet from the traffic face of the barrier. The barrier shall have a lateral offset from the edge of the drop-off to the back of the barrier as follows:

i. A minimum offset of 3 feet for temporary Type F or Type 2 concrete barrier when unanchored.

ii. A minimum offset of 1-foot for temporary Type F or Type 2 concrete barrier when anchored on hot mix asphalt pavement as shown on WSDOT Standard Plan C-60.10 or K80.35.

iii. A minimum offset of 1-foot for temporary Type F concrete barrier when anchored on cement concrete pavement as shown on WSDOT Standard Plan C-60.10

iv. A minimum offset of 9 inches for temporary Type F or Type 2 concrete barrier when anchored on cement concrete pavement and/or concrete bridge decks as shown on WSDOT Standard Plan K-80.35

v. A minim offset of 6 inches or 9 inches for temporary Type F or Type 2 narrow base concrete barrier when anchored on cement concrete pavement and concrete bridge decks as shown on WSDOT Standard Plan K-80.37.

vi. A minimum offset following manufacturer recommendations for temporary steel barrier when not anchored; or when anchored on hot mix asphalt pavement, cement concrete pavement, or concrete bridge decks.

vii. A minimum offset as directed by the WSDOT Engineer for any barrier type or configuration not shown in this Section.

An approved terminal, flare, or impact attenuator shall be required at the approach end of the barrier run and is required at the trailing end of a barrier run in two-way operations when shown on the RFC TCPs or as directed by the WSDOT Engineer. For night use, the barrier shall have standard delineation such as paint, reflective tape, lane markers, or warning lights.

4. Drop-offs more than 0.50 foot not within the Traveled Way or Auxiliary Lane shall be protected with appropriate warning signs and further protected as indicated in 3a, 3b, or 3c above, if all of the following conditions are met:

a. The drop-off is less than 2 feet.

b. The total length throughout the Project is less than 1 mile.

c. The drop-off does not remain for more than 3 Calendar Days.

d. The drop-off is not present on any holiday or holiday weekend described in this Section.

e. The drop-off is only on one side of the roadway.

5. Drop-offs more than 0.50 foot that are not within the Traveled Way or Auxiliary Lane and are not otherwise accounted for by No. 4 above, shall be protected with appropriate warning signs, and further protected as indicated in 3a or 3c above.

6. Open trenches within the Traveled Way or Auxiliary Lane shall have a steel-plate cover placed and anchored over them. A wedge of suitable material, if required, shall be placed for a smooth transition between the pavement and the steel plate. Warning signs shall be used to alert motorists of the presence of the steel plates.

2.22.4.5.2 *Work Zone Clear Zone*

The Work Zone Clear Zone (WZCZ) applies during working and non-working hours. The WZCZ applies only to temporary roadside objects introduced by the Design-Builder's operations and does not apply to preexisting conditions or permanent Work. Those work operations that are actively in progress shall be in accordance with TCPs and these Technical Requirements.

During nonworking hours equipment or materials shall not be within the WZCA unless they are protected by permanent guardrail or temporary concrete barrier. The use of temporary concrete barrier shall be permitted only if the WSDOT Engineer approves the installation and location.

During actual hours of active construction Work, unless protected as described above, only materials absolutely necessary for construction shall be allowed within the WZCZ; and only construction vehicles absolutely necessary for construction shall be allowed within the WZCZ or allowed to stop or park on the shoulder of the roadway. No equipment shall be stored within the WZCZ between shifts of active construction Work.

The Design-Builder's nonessential vehicles and employee's private vehicles shall not be permitted to park within the WZCZ at any time, unless protected as described above.

Deviation from the above requirements shall not occur unless the Design-Builder has requested the deviation in writing and the WSDOT Engineer has provided Written approval.

Minimum WZCZ distances are measured from the edge of the Traveled Way, and shall be determined as follows:

Minimum Work Zone Clear Zone Distance

Posted Speed	Distance from Traveled Way (feet)
35 mph or less	10
40 mph	15
45 to 50 mph	20
55 to 60 mph	30
65 mph or greater	35

Construction vehicles using a closed traffic lane shall travel only in the normal direction of traffic flow, unless expressly allowed in the RFC TCPs. Construction vehicles shall be equipped with flashing or rotating amber lights.

Work over an open lane of traffic shall not be allowed, unless a plan for the protection of the traveling public from debris falling onto the Traveled Way is approved by the Engineer of Record. This protection shall remain in place during construction and shall meet minimum vertical clearance for the highway.

2.22.4.5.2.1 Controlled Access

The Design-Builder shall not be allowed any special access, egress, including leaving the roadway shoulder to enter the Work area, or breaks in limited access, other than normal legal movements or movements as approved by the WSDOT Engineer. The Design-Builder shall be allowed short-duration shoulder stops in the Work area, using light vehicles properly equipped with amber warning lights.

All ingress and egress to the Work area shall be shown on Site-specific RFC TCPs. The Design-Builder shall provide appropriate warning signs and traffic control devices when vehicles will be departing or entering highway and city streets. Ingress and egress to the Work area shall not be located at a gore.

The Design-Builder shall close a lane of traffic in locations where the length and width of the shoulder is not adequate for construction vehicles to decelerate from departing the mainline traffic to enter the Work area or to accelerate from exiting the Work area to merge with the mainline traffic. The design speed for departing and merging into a mainline shall not be less than 10 mph below the design speed of the mainline. Access for large construction vehicles to and from an open lane, meeting the criteria above, shall only be between the hours of 9:00 a.m. and 3:00 p.m. daily, and during the lane closure hours described in this Section. Light vehicles properly equipped with amber warning lights shall be allowed access to the Work area to and from an open lane, meeting the criteria above, at all times.

Lane closures and ingress and egress to the Work area shall be restricted to the hours described in this Section, unless otherwise approved by the WSDOT Engineer.

Access to the Work area from adjacent properties outside of the Right of Way shall be in accordance with Section 1-07.16(1) of the *General Provisions*.

Design-Builder vehicles or equipment, marked or personal, shall not use private roadways to travel to or from and/or access the Work area.

For an approved break in limited access, the Design-Builder shall prohibit unauthorized use of the access from adjacent property. Access from outside the limited access lines shall be closed by use of a locked gate when the access point is not being used.

The access location shall not adversely affect wetlands or other sensitive areas. Airborne particulates created as a result of using the access shall be effectively controlled. The continuity of the existing drainage system shall be maintained throughout the access Site.

At the Completion of the Project, the Design-Builder shall restore the area of the access Site to its original, pre-Contract, condition. Any damage to the Traveled Way, shoulders, Auxiliary Lanes, side slopes or other areas caused by the access shall be repaired. All Work to comply with this provision or to build, maintain, provide erosion control, control airborne particulates, ensure that drainage continues throughout the access Site, provide traffic control, when necessary, remove the temporary access, and restore the surrounding area when no longer required for use is the responsibility of the Design-Builder. The Design-Builder shall include all related costs in the Proposal Price of the Contract.

2.22.4.5.2.2 Work During Hours of Darkness

Work during hours of darkness may be required for the Project. The Design-Builder shall obtain any required noise variance or exemption for such Work. The Design-Builder shall, at no additional cost to WSDOT, make all arrangements for operations during hours of darkness.

Flagger station illumination shall meet the requirements of the MUTCD and these Technical Requirements. The Design-Builder shall provide portable lighting equipment capable of sufficiently illuminating a flagger and their station without creating glare for oncoming motorists yet will meet the mobility requirements of the operation. The lighting stations shall be located on the same side of the roadway as the flagger and aimed either parallel or perpendicular to the traveled lanes to minimize glare. The lighting devices shall be located 5 to 10 feet from the edge of the travel lane with a mounting height of 15 to 25 feet above the ground. The flagger shall be visible and discernable as a flagger from a distance of 1,000 feet.

Lighting for construction activity shall be directed away from maintained traffic to minimize glare to motorists.

Refer to this Section and Section 1-07 of the *General Provisions* for additional requirements.

2.22.4.5.2.3 Signs and Traffic Control Devices

All signs and traffic control devices for lane and roadway closures shall be installed only during the hours specified in this Section. If placed earlier than the specified hours of closure, the construction signs shall be turned or covered so as not to be visible to motorists.

2.22.4.5.2.4 Advance Notification

The Design-Builder shall submit TCPs for lane and shoulder closure requests in writing to the WSDOT Engineer 14 Calendar Days in advance of the proposed closure.

2.22.4.5.2.5 Hour Adjustment

If the permitted closure hours adversely affect traffic, causing queues that extend beyond 1.5 miles or delay traffic for longer than 15 minutes for any lane or total roadway closure, the Design-Builder shall evaluate the Contract hours and recommend new hours to the WSDOT Engineer for Review and Comment.

2.22.4.5.2.6 Public Notification

The Design-Builder shall furnish and install information signs that provide advance notification of ramp and roadway closures a minimum of 7 Calendar Days prior to the scheduled closure. The signs shall have a black legend on a white reflective background. Sign locations, messages, letter sizes, and sign sizes shall be shown in the TCPs. For ramp and local road closures, PCMS shall be used to supplement the required signs. The Design-Builder shall notify the WSP, local fire departments, police departments, city engineering departments, public transit agencies, and the affected school districts in writing a minimum of 7 Calendar Days prior to scheduled closures. The Design-Builder shall provide these notifications to WSDOT.

2.22.4.5.2.7 Mast Arm Erection and Traffic Block Allowance

During erection of mast arm assemblies, the Design-Builder may, with the prior authorization from the WSDOT Engineer, block all traffic for intervals of a maximum of 5 minutes between midnight and 4:00 a.m. These 5-minute blockages shall be separated by an interval long enough to allow the delayed vehicles to clear.

2.22.4.5.3 *Construction and Maintenance of Detours*

Unless otherwise approved, the Design-Builder shall maintain two-way traffic during construction. The Design-Builder shall build, maintain in a safe condition, keep open to traffic, and remove when no longer needed, the following:

- Detours and detour bridges that will accommodate traffic diverted from the roadway or bridge during construction
- Detour crossings of intersecting highways

- Temporary approaches

The Design-Builder shall pay all costs to build, maintain, and remove any other detours, whether built for the Design-Builder's convenience or to facilitate construction operations. Any detour proposed by the Design-Builder shall conform to the requirements of the Contract. Surfacing and paving shall be consistent with traffic requirements.

Upon failure of the Design-Builder to immediately provide, maintain, or remove detours or detour bridges, the WSDOT Engineer may, without further notice to the Design-Builder or the Surety, perform any of the above and deduct all of the costs from any payments due or coming due to the Design-Builder.

2.22.4.6 Construction Requirements

2.22.4.6.1 *General*

The Design-Builder shall plan, manage, supervise, and perform all temporary traffic control activities required to support the Work using labor, equipment, and materials provided by the Design-Builder (except when such labor, equipment, or materials are to be provided by WSDOT specifically identified herein).

The Design-Builder shall be responsible for all MOT starting at 12:01 a.m. on the day following Notice to Proceed (NTP). The temporary traffic control devices, including temporary signal systems, shall be continually and adequately monitored and maintained to ensure proper placement and working order, and to ensure the safe and efficient flow of all traffic through and adjacent to the Project. Such responsibility and maintenance shall continue until 11:59 p.m. on the day of Completion of the Project. The WSDOT Engineer may, in writing, temporarily suspend such responsibility in conjunction with an official suspension for weather or other reasons.

2.22.4.6.2 *Materials*

All materials shall meet the requirements of Section 9-35 of the Standard Specifications. Additionally, all materials shall conform to the requirements of the Special Provisions.

2.22.4.6.3 *Traffic Control During Construction*

The Design-Builder shall provide flaggers and all other personnel required for traffic control activities, unless specified in the Contract as being provided by WSDOT.

The Design-Builder shall perform all procedures necessary to support the Work.

The Design-Builder shall provide signs and other traffic control devices not otherwise specified in the Contract as being provided by WSDOT. The Design-Builder shall erect and maintain all construction signs, warning signs, detour signs, and other traffic control devices necessary to warn and protect the public at all times from injury or damage as a result of the Design-Builder's

operations which may occur on or adjacent to highways, roads, or streets. No Work shall be done on or adjacent to the roadway until all necessary signs and traffic control devices are in place.

The traffic control resources and activities described shall be used for the safety of the public, the Design-Builder's employees, and WSDOT personnel; and to facilitate the movement of the traveling public. Traffic control resources and activities may be used for the separation or merging of public and construction traffic when such use is in accordance with the RFC TCPs.

Upon failure of the Design-Builder to immediately provide flaggers; erect, maintain, and remove signs; or provide, erect, maintain, and remove other traffic control devices when requested to do so by the WSDOT Engineer, the WSDOT Engineer may, without further notice to the Design-Builder or the Surety, perform any of the above and deduct all of the costs from any payments due or coming due to the Design-Builder.

The Design-Builder shall be responsible for providing adequate labor, sufficient signs, and other traffic control devices; and for performing traffic control procedures needed for the protection of the Work and the public at all times regardless of whether or not the labor, devices, or procedures have been ordered by the WSDOT Engineer, provided by the WSDOT Engineer, or paid for by WSDOT.

When performing Work, the Design-Builder's equipment shall follow normal and legal traffic movements. The Design-Builder's ingress and egress of the Work area shall be accomplished with as little disruption to traffic as possible. Traffic control devices shall be removed by picking up the devices in a reverse sequence to that used for installation. This may require backing up through the Work area. When located behind barrier or at other locations shown on RFC TCPs, equipment may operate in a direction opposite to adjacent traffic.

Under the Contract, the Design-Builder is responsible for all traffic control, and any such participation by law enforcement personnel in traffic control activities shall be preceded by an agreement. Nothing in the Contract is intended to create an entitlement, on the part of the Design-Builder, to the services or participation of the law enforcement organization.

2.22.4.6.4 *Signing, Pavement Markings, and Traffic Control Devices During Construction*

The Design-Builder shall inspect all signing (existing and temporary) daily noting damaged signs, misplaced signs, and graffiti affecting legibility of the signs. Every detour route shall be driven hourly to ensure all detour signing is in place. Signing for detours shall be covered or removed when detours are not in use. The Design-Builder shall provide a schedule for repairing, cleaning, or replacing signs; procedures shall address rectifying incorrect or misleading signing that may present a hazard to road users.

The Design-Builder shall ensure there are no conflicting or misleading signs due to adjacent projects. The Design-Builder shall coordinate with adjacent projects

and relocate signs as required to avoid conflicting information. Temporary pavement markings shall be installed in accordance with Sections 8-23 and 9-34 of the Standard Specifications.

The Design-Builder shall ensure temporary pavement markings do not conflict with existing pavement markings including recessed and raised markings. If a conflict occurs with existing recessed pavement markings the Design-Builder shall remove the recessed pavement markings by filling the recess with hot mix asphalt for prelevel in accordance with Section 5-04 of the Standard Specifications.

The Design-Builder shall use temporary removable tape for temporary pavement marking configurations in areas that will not be ground or overlaid. Refer to Section 2.20, *Pavement Marking,* for tape specification. Temporary pavement markings shall be identified on the TCPs and the TMP. If paint or temporary removable tape is used for temporary markings that will remain in place for 48 hours or longer, the markings shall be supplemented with Type 2 Raised Pavement Marker (RPM) installed at 40-foot spacing and in accordance with Standard Plan M-20.30. In areas where Type 2 RPM are used to supplement temporary removable tape, the adhesive for the Type 2 RPM shall be butyl rubber. The Design-Builder shall follow all manufacturers' preparation and application procedures for this product. In areas that will be ground or overlaid, Standard Plan M-20.50 shall be used for striping configurations lasting more than 30 Calendar Days.

The Design-Builder shall not use a grinder to remove painted markings. For removal of plastic markings, grinding will be allowed down to the pavement surface.

The Design-Builder shall use a shot blasting machine with a minimum 3-foot-wide cleaning path to remove the ghost stripes and texture the entire width of the traveled way. Ghost striping is defined as the shadow or scarring on the pavement surface where pavement markings have been removed.

All pavement markings that are not in use for the current MOT phase shall be removed by the Design-Builder unless the pavement markings are behind a barrier. Pavement markings to be removed shall be obliterated until they are unidentifiable as a pavement marking. The pavement marking removal shall be considered adequate when any remaining pavement marking material is not visible to a person with normal vision observing the removal area from a standing position looking 40 feet ahead. In no case shall the pavement marking removal or the shot blasting remove more than 0.0625-inch of existing pavement. The shot blasting of the traveled way shall be feathered into the existing shoulders. The Design-Builder shall ensure that the sections of traveled way that receive shot blasting will continue to adequately allow water to drain to the shoulders and there will be no areas where ponding of water remains. Sand or other material deposited on the pavement surface as a result of removing pavement markings shall be removed as the Work progresses to avoid hazardous conditions. Accumulation of sand or other material which might interfere with drainage will

not be permitted. Temporary paint on the final pavement surface shall be placed only in the final pavement marking configuration.

The Design-Builder shall inspect all pavement markings daily. The Design-Builder shall provide a schedule for replacing damaged pavement markings and establish minimum replacement time frames based on the degree of degradation. If missing or damaged pavement markings present a hazardous condition, WSDOT may require the Design-Builder to close lanes or replace the pavement markings within 24 hours.

The Design-Builder shall clean or replace all pavement markings when they become damaged or lose reflectivity.

The Design-Builder shall replace or clean temporary pavement markings whenever the reflectance of the markings has deteriorated to less than 100 mcd/m^2/lux. The Design-Builder shall perform the required tests monthly, at 1-mile intervals or at specific locations requested by the WSDOT Engineer.

As each construction phase is completed, the Design-Builder shall install the signing and pavement markings required to safely open the road to traffic. This Work shall be completed on or before the date of opening. Overhead signs except exit only signs may be temporarily ground-mounted at the Design-Builder's expense.

The Design-Builder shall have adequate spare sections of temporary barrier and the necessary equipment on-site to replace and repair temporary barrier within 4 hours of identification by or notice given to the Design-Builder of damaged barrier. This requirement shall include replacement of impact attenuators. Temporary traffic control shall be set up immediately upon notice of damage to ensure vehicle safety.

2.22.4.6.5 *Temporary Signalization*

This Section applies to new temporary signals necessary for detour routes or other construction staging, if any. Any modifications to existing traffic signals must be shown in the TCPs and approved by the operating agency. Modifications proposed for signal timing or staging shall be supported with a traffic analysis based on the requirements in Section 2.21, *Traffic Operations*, and coordinated with and approved by the operating agency. A traffic signal warrant analysis may be required for approval.

2.22.4.6.5.1 Temporary Signal Requirements

The Design-Builder shall furnish and install all required materials for the temporary signalization. The Design-Builder shall provide vehicle detection methods to optimize all temporary signal system installations. The Design-Builder may use Type 3 induction loops or video image detection for temporary signal installations.

2.22.4.6.5.2 WSDOT Inspection

The Design-Builder shall provide a minimum of 7 Calendar Days' notice to the WSDOT Engineer prior to implementing temporary signalization. The WSDOT Engineer will perform the final electrical inspection and acceptance of temporary signal systems in accordance with WAC 296-46B, *Electrical Safety Standards, Administration, and Installation*. When signals are owned and operated by other Local Agencies, the Design-Builder shall follow that jurisdiction's requirements.

2.22.4.6.5.3 Signal Turn-On

The Design-Builder shall secure and pay for the services of a law enforcement agency to perform traffic control while the traffic signal is being placed into service. Appropriate signing shall be installed by the Design-Builder in advance of signal turn-on. The Design-Builder shall request a timeframe for signal turn-on from the WSDOT Engineer. The request for the signal turn-on shall be submitted 14 days in advance for the desired date, and approval by the WSDOT Engineer shall be obtained at least seven days prior to actual turn-on date.

2.22.4.6.5.4 Operation and Maintenance

The Design-Builder shall develop Timing and Signal Coordination Plans and staging for the temporary signal operation. Timing and Signal Coordination Plans will be reviewed during each construction phase and updated if changes to the number of lanes, intersection spacing, signal phasing, or clearance interval are required. WSDOT or the operating agency will enter the timing parameters into the signal controller. The Design-Builder may be allowed to enter the timing parameters into the signal controller with the approval or at the request of the WSDOT Engineer or the operating agency.

WSDOT or the operating agency will operate the temporary signal systems once the signal is turned on and operational. Maintenance of the temporary signal system shall be the Design-Builder's responsibility. The Design-Builder shall remove all temporary signal systems upon completion and operation of the new permanent signal systems.

2.22.4.6.6 *Temporary Illumination*

The Design-Builder shall evaluate the lighting values of the existing illumination in relation to the temporary configuration to determine if the existing illumination provides the required illumination values. If the required illumination values are not satisfied, the Design-Builder shall provide temporary illumination satisfying the "construction lanes and detours" light level and uniformity ratios in accordance with the WSDOT *Design Manual*.

Where temporary illumination is required, the existing illumination system shall not be removed until the temporary system is operational. Only lighting equipment no longer needed for illumination of the roadway shall be removed.

The Design-Builder shall provide temporary lighting satisfying the "construction lanes and detours" light level and uniformity ratios when existing lighting must be removed or disconnected, and new lighting is not in operation.

The Design-Builder shall provide temporary lighting for all intersections where traffic control devices are in place. The temporary lighting shall satisfy the greater of the "construction lanes and detours" or the specific intersection light level and uniformity ratios.

Temporary lighting is required when an obstruction (such as a new bridge) is placed over an area requiring illumination and shall be installed prior to placing the obstruction.

The Design-Builder shall provide temporary lighting satisfying the "construction lanes and detours" light level.

In addition to the requirements of the WSDOT *Design Manual*, the Design-Builder shall provide temporary lighting satisfying the "construction lanes and detours" light level and uniformity ratios for temporary channelization or traffic control.

Portable light stands shall not be used for temporary roadway lighting.

The Design-Builder shall provide temporary illumination satisfying the "required illumination" described in the WSDOT *Design Manual*. Temporary illumination shall be in place and in operation prior to implementing the TCPs which require the temporary illumination.

2.22.4.6.6.1 General

At a minimum, the Design-Builder shall perform the following:

- Design Temporary Lighting Plans.
- Maintain current levels of roadway illumination for all roadway segments, pedestrian bridges, and intersections that are currently lit.
- Provide all materials and equipment for temporary lighting installations.
- In the clear zone, provide only lighting units that are breakaway or protected from crash potential.
- Provide maintenance for the temporary lighting system. Any damage to the existing illumination system shall be repaired prior to hours of darkness on the following day.

Temporary illumination shall be provided in accordance with the requirements for construction lanes and detours in the WSDOT *Design Manual*.

2.22.4.6.6.2 Timber Light Standards

Timber light standards may be used for temporary lighting where breakaway or slip bases are not required. Timber light standards must be outside of the clear zone or protected by barrier.

2.22.4.7 Traffic Control Personnel

The Design-Builder shall plan, conduct, and safely perform the Work. The Design-Builder shall manage temporary traffic control.

The Design-Builder shall provide all personnel for flagging; execution of all procedures related to temporary traffic control; and setup, maintenance, and removal of all temporary traffic control devices and construction signs necessary to control traffic during construction operations.

2.22.4.7.1 *Traffic Control Management*

One or more of the Design-Builder's supervisors, who are actively involved in the planning and management of field contract activities, shall assume the responsibilities for traffic control management. The Design-Builder shall provide the WSDOT Engineer with a copy of the formal assignment. The duties of traffic control management shall not be Subcontracted.

The Design-Builder's traffic control management personnel shall be responsible for the following:

1. Overseeing and approving the actions of the TCS to ensure that proper safety and traffic control measures are implemented and consistent with the specific requirements of the Project. An alternate form of oversight shall be in place and effective when the traffic control management personnel are not present at the Work area.
2. Providing the Design-Builder's designated TCS with RFC TCPs which are compatible with the Work and traffic control for which they will be implemented.
3. Discussing proposed traffic control measures and coordinating implementation of the TCPs with the WSDOT Engineer.
4. Coordinating all traffic control operations, including those of Subcontractors and suppliers and the Toll Vendor, with each other and with any adjacent construction or maintenance operations.
5. Coordinating the Project's activities (such as ramp closures, road closures, and lane closures) with appropriate police, fire control agencies, city or county engineering, medical emergency agencies, school districts, and transit companies.
6. Overseeing all requirements of the Contract that contribute to the convenience, safety, and orderly movement of vehicular and pedestrian traffic.
7. Reviewing the TCS's diaries daily and being aware of field traffic control operations.
8. Coordination, review, and retention of video log and storage.
9. Have available at all times, on-site, all applicable standards and specifications as described in this Section.

Failure to carry out any of the above-referenced responsibilities shall be considered a failure to comply with the Contract and may result in a suspension of Work as described in Section 1-08 of the *General Provisions*.

2.22.4.7.2 *Traffic Control Supervisor*

The Design-Builder shall designate one or more people to perform the duties of the primary TCS and identify an alternate TCS who can assume the duties of the primary TCS in the event of that person's inability to perform. The TCS shall be responsible for safe implementation of the RFC TCPs.

TCS shall have at least 5 years of practical temporary traffic control experience with design and implementation of TCPs on freeway construction projects.

The TCS shall be certified as a State Traffic Control Supervisor by one of the following agencies:

The Northwest Laborers-Employers Training Trust
27055 Ohio Avenue
Kingston, WA 98346
(360) 297-3035

Evergreen Safety Council
12545 135th Avenue NE
Kirkland, WA 98034
(800) 521-0778 or (425) 814-3868

American Traffic Safety Services Association
15 Riverside Parkway, Suite 100
Fredericksburg, VA 22406
(800) 272-8772 or (540) 368-1701

Integrity Safety

13912 NE 20th Avenue
Vancouver, WA 98686
(360) 574-6607
https://www.integritysafety.com

US Safety Alliance
(904) 705-5660
https://www.ussafetyalliance.com

K&D Services
2719 Rockefeller Avenue
Everett, WA 98021
https://www.kndservices.net/

Possession of a current State flagging card by the TCS is mandatory.

A TCS shall be present on the Project whenever flagging, or other traffic control is occurring; or less frequently, as authorized by the WSDOT Engineer.

During nonworking hours, the TCS shall be on-site within 45 minutes after notification by the WSDOT Engineer.

The TCS shall perform all of the duties listed below:

1. Possess a current set of RFC TCPs; applicable Contract Provisions as provided by the Design-Builder; the *Washington State Modifications to the Manual on Uniform Traffic Control Devices;* the MUTCD; the *ATSSA Quality Guidelines for Work Zone Traffic Control Devices*; and applicable standards and specifications.
2. Inspect traffic control devices and nighttime lighting for proper location, installation, message, cleanliness, and effect on the traveling public. Traffic control devices shall be inspected at least once per hour during working hours, except that Class A signs and nighttime lighting may be inspected only twice a week. Traffic control devices left in place for 24 hours or more shall also be inspected once during nonworking hours when they are initially set up (during daylight or darkness, whichever is opposite of the working hours). The TCS shall correct, or arrange to have corrected, any deficiencies noted during these inspections.
3. Prepare a daily traffic control diary on each day that traffic control is performed using WSDOT Form 421-040A EF, *Contractor's Daily Report of Traffic Control - Summary* and WSDOT Form 421-040B EF *Contactor's Daily Report of Traffic Control – Traffic Control Log*. The Design-Builder shall maintain all copies of the daily traffic control diaries and shall make them available to the WSDOT Engineer no later than the end of the next business day. The Design-Builder may use alternate forms if approved by the WSDOT Engineer. Diary entries shall include, at a minimum, the following:
    a. Time of day when signs and traffic control devices are installed and removed
    b. Location and condition of signs and traffic control devices
    c. Revisions to the TCPs
    d. Lighting used at night
    e. Observations of traffic conditions
    f. Identify TCPs in use and provide location on the Project where TCPs are used
4. Make minor revisions to the TCPs to accommodate Site conditions and minimize obstructions, provided that the original intent of the TCPs is maintained. The revisions shall only shift devices laterally without adding or deleting devices and shall be documented in the daily traffic control diary. The TCPs shall be revised and re-released when determined necessary by the WTEM.
5. Attend traffic control coordination meetings or coordination activities, including meetings and activities for adjacent projects, as necessary, for a complete understanding of the Project and effective performance.

6. Ensure that all required traffic control devices and equipment are available and in good working condition prior to the need to install or use them.
7. Ensuring that all pedestrian routes or access points, existing or temporary, are kept clear and free of obstructions and that all temporary pedestrian routes or access points are detectable and accessible to persons with disabilities as provided for in the RFC TCPs.
8. Have available at all times, on-site, all applicable standards and specifications available as described in this Section.

Provided that the duties of the TCS are accomplished, the TCS may perform other duties described in this Section.

The TCS shall be considered a critical component of the Design-Builder's management team and shall have prior experience managing TCP operations on similarly complex projects. Registration as a Professional Engineer is not required; however, the Design-Builder may elect to use the WTEM in this position. The TCS shall attend all MOT task force meetings. The TCS shall also coordinate activities with the Communications Specialist.

The TCS or a designee shall be available on a 24-hour basis with a single contact phone number throughout the duration of the Project; supervise and verify all changes in the TCP setup; and perform daily Project Reviews to verify that traffic control devices are correctly placed and traffic is safely and efficiently moving through the Project. The TCS or an alternate TCS shall be on-site within 45 of notification of an emergency situation and shall be prepared to positively respond to the need to repair the traffic control system or to provide alternate traffic arrangements. The TCS shall have the resources, ability, and authority to expeditiously correct any deficiencies in the traffic control system, or to de-mobilize any construction operation that is resulting in excessive delays to traffic or creating an unsafe condition.

The TCS shall maintain a 30 Calendar Day advance schedule of all traffic control activities and a long-range schedule for all planned ramp and roadway closures. The TCS shall coordinate with the Design-Builder's Communications Specialist to ensure the information is disseminated to WSDOT, Local Agencies, and the public.

The TCS shall perform drive-through inspections as indicated above and immediately after any shift in TCP setup, while crews are still on-site to make modifications. If the Project has signalized intersections, the review shall be done prior to each morning peak traffic period, and each signal cycle shall be reviewed. At least two of the daily inspections each week shall be performed at night so that the arrangement and condition of the lights can be reviewed. The inspections shall also include assurances that pedestrians and bicyclists have a safe travel path around or through the Project area, and that existing businesses have adequate access during business hours, if applicable. The results of the inspections shall be documented in a daily report that, at a minimum, lists the time frame of the drive-through inspection and the defects noted. The report shall also document any maintenance or corrective action ordered as a result of the inspection, and the

name and position of the Design-Builder's personnel who have been directed to provide the maintenance or corrective action. The daily report shall state that the TCP setup and all traffic control devices substantially conform to the Contract requirements, except as noted, and shall be signed by the TCS.

2.22.4.7.3 *Flaggers*

Workers engaged as flaggers shall wear reflective vests and hard hats. High-visibility apparel shall be in accordance with Section 1-07 of the *General Provisions*.

Flaggers shall be posted where shown on the RFC TCPs. All flaggers shall possess a current flagging card issued by the states of Washington, Oregon, Montana, or Idaho. The flagging card shall be immediately available and shown to the WSDOT Engineer upon request.

Flagging stations shall be shown on TCPs at locations where construction operations require stopping or diverting public traffic. Flagging stations shall be staffed only when flagging is required. This staffing may be continuous or intermittent, depending on the nature of the construction activity. Whenever a flagger is not required to stop or divert traffic, the flagger shall move away from the flagging station to a safer location.

During hours of darkness, flagging stations shall be illuminated in a manner that ensures that flaggers can be seen easily, but that does not cause glare to the traveling public. Flagger Station illumination shall meet the requirements of the MUTCD and this Section.

Flaggers shall be equipped with portable two-way radios, with a range suitable for the Project. The radios shall be capable of having direct contact with Project management (e.g., foremen and superintendents).

The Design-Builder shall provide portable lighting equipment capable of sufficiently illuminating a flagger and their station without creating glare for oncoming motorists yet will meet the mobility requirements of the operation. The lighting stations shall be located on the same side of the roadway as the flagger and aimed either parallel or perpendicular to the traveled lanes to minimize glare. The lighting devices shall be located 5 to 10 feet from the edge of the travel lane with a mounting height of 15 to 25 feet above the ground. The flagger shall be visible and discernable as a flagger from a distance of 1,000 feet.

The Design-Builder shall provide the standard stop/slow paddles for all flagging operations. Stop/slow paddles shall conform to the Standard Specifications.

No flaggers shall be used on freeways, ramps, and collector-distributor roadways.

2.22.4.7.4 *WSDOT Electrical Inspector*

The Washington State Department of Labor and Industries has authority over all electrical installations within the State. WSDOT has been granted authority over all electrical installations within the Right of Way of State highways, provided WSDOT maintains and enforces an equal, higher, or better standard of

construction, materials, devices, appliances, and equipment than is required by Applicable Laws. It is the role of the WSDOT Electrical Inspector to ensure that all electrical installations, including Illumination, Traffic Signal, and ITS installations, meet the requirements of the National Electrical Code and Applicable Laws and provisions.

The WSDOT Electrical Inspector will perform the following:

- Act as a resource for the electrical design team
- Assist with electrical system plan reviews (as applicable)
- Perform periodic electrical inspections during construction
- Witness required field tests (as desired)
- Perform inspections required before energizing any new equipment or circuits
- Inspect and approve all electrical installations in accordance with this Contract

2.22.4.7.5 *Other Traffic Control Labor*

In addition to flagging or spotting duties, the Design-Builder shall provide personnel for all other traffic control procedures required by the construction operations; and personnel to install, maintain, and remove any traffic control devices shown on the TCPs.

2.22.4.8 Video Record

A drive-through video of all TCP devices shall be made each week, immediately after each collision causing injuries, and after each shift in TCP setup. The video recordings shall be saved digitally and maintained in a remote, fireproof location, and a log of the video recordings with dates and times shall be provided to the WSDOT Engineer on a monthly basis. The WSDOT Engineer shall have the right to review the video recordings at any time with 24 hours' notice to the Design-Builder.

2.22.4.9 Traffic Control Procedures

2.22.4.9.1 *One-Way Traffic Control*

The Work may require that traffic be maintained on a portion of the roadway using one-way traffic control. If this is the case, the Design-Builder's operation shall be confined to one-half of the roadway, permitting traffic on the other half. If shown on the RFC TCPs or as directed by WSDOT one-way traffic control shall be provided and shall also conform to the following requirements:

- In any one-way traffic control configuration, side roads and approaches shall be closed or controlled by a flagger or by appropriate signing. A side road flagger shall coordinate with end flaggers where there is line of sight and with the pilot car where the end flaggers cannot be seen.

- Queues of vehicles shall be allowed to take turns passing through the Work zone in the single open lane. When one-way traffic control is in effect, Design-Builder vehicles shall not use the open traffic lane except while following the same rules and routes required of the public traffic.

At the end of each Calendar Day the Design-Builder shall leave the Work area in such condition that it can be traveled without damage to the Work, without danger to traffic, and without one-way traffic control. If, in the opinion of the WSDOT Engineer, one-way traffic control cannot be dispensed with after working hours, then the operation shall be continued throughout the nonworking hours.

2.22.4.9.2 *Rolling Slowdown*

When a short-term roadway closure of 15 minutes or less is needed for an infrequent, nonrepetitive Work operation such as traffic signal erection or utility wire crossing, the Design-Builder may implement a rolling slowdown on a multi-lane roadway, as part of an RFC TCP. Rolling slowdown traffic control operations shall not be used for routine Work that can be addressed by standard lane or shoulder closure traffic control. Rolling slowdowns on I-405 and SR 522 will only be permitted between 12:01 a.m. and 4:00 a.m. on Monday, Tuesday, Wednesday, Thursday, and Friday. Rolling slowdowns will not be permitted to set girders or sign structure placement.

Where included in the RFC TCPs, a rolling slowdown shall be accomplished using one traffic control vehicle with flashing amber lights for each lane to be slowed down, plus one control vehicle to serve as a chase vehicle for traffic ahead of the blockade. The Design-Builder shall provide and pay for a minimum of two WSP officers per direction, for mainline rolling slowdowns. The traffic control vehicles shall enter the roadway and form a moving blockade to reduce traffic speeds and create a clear area in front of the moving blockade to accomplish the Work without a complete stoppage of traffic.

A PCMS shall be placed ahead of the starting point of the traffic control to warn traffic of the slowdown. The sign shall be placed far enough ahead of the Work to avoid any expected backup of vehicles.

The location where the traffic control vehicles begin the slowdown and the speed at which the moving blockade is allowed to travel shall be calculated by the Design- Builder to accommodate the estimated time needed for closure. The chase control vehicle shall follow the slowest vehicle ahead of the blockade. The Design-Builder shall not begin the Work operation until the chase vehicle passes the Work area. In the event that the Work operation is not completed when the moving blockade reaches the site, all Work, except the Work necessary to clear the roadway, shall cease immediately, and the roadway shall be cleared and re-opened as soon as possible.

All ramps and entrances to the roadway between the moving blockade and the Work operation shall be temporarily closed with traffic control vehicles. Radio communications between the Work operation and the moving blockade shall be

established and utilized to adjust the speed of the blockade to accommodate the closure time needed.

If more than one rolling slowdown occurs during the same period, the Design-Builder shall ensure that any queues originating from previous rolling slowdowns have fully dissipated.

2.22.4.9.3 *Lane Closure Setup/Takedown*

Where allowed by the Contract, shown on the RFC TCPs or directed by WSDOT, the Design-Builder shall establish traffic control measures to close one or more lanes of a multi-lane facility. When this is scheduled to occur, the Design-Builder shall adhere to the following sequence:

- Set up advance warning signs on the shoulder of the roadway opposite the lane to be closed.
- Set up advance warning signs on the same shoulder as the lane to be closed.
- Move a TA with arrow board into place at the beginning of the closure taper.
- Place channelization devices to mark the taper and the length of the closure as shown on the RFC TCPs.
- Once the lane is closed, the TA/arrow board combination may be replaced with an arrow board without attenuator.

If additional lanes are to be closed, this shall be done in sequence with previous lane closures, using the same sequence of activities. A TA with arrow board is required during the process of closing each additional lane and may be replaced with an arrow board without attenuator after the lane is closed. Each closed lane shall be marked with a separate arrow board at all times.

Traffic control for lane closures shall be removed in the reverse order of its installation.

2.22.4.9.4 *Patrol and Maintain Traffic Control Measures*

When temporary traffic control measures are in place, the Design-Builder shall patrol and maintain these measures, at all times. The Work shall consist of resetting displaced devices; assuring visibility of all devices; cleaning and repairing where necessary; providing maintenance for all equipment, including replacing batteries and light bulbs, as well as keeping motorized and electronic items functioning; and adjusting the quantity and location of devices to respond to actual conditions, such as queue length, unanticipated traffic conflicts, and other areas where planned traffic control has proven ineffective.

This Work shall be performed by the Design-Builder, either by or under the direction of the TCS. Personnel, with vehicles, if necessary, shall be dispatched so that all traffic control can be reviewed at least once per hour during working hours, and at least once during each Calendar Day.

2.22.4.10 Traffic Control Devices

Traffic control devices are used to visually guide drivers through Work zones. Signing, channelizing devices, arrow boards, and warning beacons all display a message to the driver. Work zone credibility is established through the proper use of these devices to send correct messages to drivers. Poor Work zone credibility has a direct, negative impact on Work zone safety by causing driver confusion, frustration, and disrespect, which results in an increased potential for accidents.

All traffic control devices shall be removed from the Work Zone Clear Zone or placed behind barrier or guardrail away from traffic when not in use. Traffic safety drums, traffic cones, tubular markers or tall channelizing devices may remain in the Work Zone Clear Zone if they can be placed off the paved shoulder.

The Design-Builder shall locate traffic control devices so as not to block the existing sidewalk to pedestrians, and to provide adequate space for wheelchairs.

2.22.4.10.1 *Construction Signs*

All construction signs required by the RFC TCPs, as well as any other appropriate signs directed by the WSDOT Engineer, shall be provided by the Design-Builder. The Design-Builder shall provide the posts or supports, and erect and maintain the signs in a clean, neat, and presentable condition until they are no longer required. Post-mounted signs shall be installed as shown in the Standard Plans. Sign attachment to posts shall conform to the applicable detail shown in the Standard Plans. When the construction signs are no longer required, the Design-Builder shall remove all signs, posts, and supports from the Project and they shall remain the property of the Design-Builder.

No passing zones on the existing roadway, if any, that are marked with paint striping and where striping is anticipated to be destroyed by construction operations shall be replaced by “Do Not Pass” and “Pass With Care” signs. The Design-Builder shall furnish and install the signs and posts. The signs shall be maintained by the Design-Builder until they are removed, or upon Physical Completion. When the Project includes striping by the Design-Builder, the signs and posts shall be removed by the Design-Builder when the no-passing zones are re-established by striping. The signs and posts shall become the property of the Design-Builder.

All existing signs, new permanent signs installed as part of the Work, and construction signs installed as part of the Work that are inappropriate for the traffic configuration at a given time, shall be removed or covered in accordance with Section 8-21.3(3) of the Standard Specification.

Construction signs are divided into two classes. Class A construction signs are those signs that remain in service throughout the construction or during a major phase of the Work. They are mounted on posts, existing fixed structures, or substantial supports of a semi-permanent nature. Class A signs shall be designated as such on the RFC TCPs. “Do Not Pass” and “Pass With Care” signs are Class A construction signs. Sign and support installation for Class A signs shall be in accordance with the Contract or the Standard Plans. Class B construction signs

are those signs that are placed and removed daily, or are used for short durations, which may extend for 1 to 3 Calendar Days. They are mounted on portable or temporary mountings.

Class A construction signs mounted behind traffic barrels shall be mounted a minimum of 5 feet above the ground (ground to bottom of sign).

Where it is necessary to add weight to signs for stability, sandbags or other similar ballast may be used, but the top of ballast shall not be more than 4 inches above the Roadway surface and shall not interfere with the breakaway features of the device. The Design-Builder shall follow the manufacturer's recommendations for sign ballasting.

Signs, posts, or supports that are lost, stolen, damaged, destroyed, or which the WSDOT Engineer deems to be unacceptable while used on the Project, shall be replaced by the Design-Builder.

2.22.4.10.2 *Sequential Arrow Signs*

Sequential arrow signs shall be shown on the TCPs either as a stand-alone unit without a TA or as a unit with a TA. When required, and as shown on the TCPs, the Design-Builder shall provide, operate, and maintain sequential arrow signs.

2.22.4.10.3 *Portable Changeable Message Signs*

Refer to Appendix B for requirements.

2.22.4.10.4 *Barricades*

Where shown on the RFC TCPs or when requested by the WSDOT Engineer, the Design-Builder shall furnish, install, and maintain barricades. Barricades shall be kept in acceptable condition, as defined in the *ATSSA Quality Guidelines for Work Zone Traffic Control Devices*.

Where it is necessary to add weight to barricades for stability, the Design-Builder shall follow the manufacturer's recommendations for sign ballasting.

2.22.4.10.5 *Traffic Safety Drums*

Where shown on the RFC TCPs, or when requested by the WSDOT Engineer, the Design-Builder shall furnish, install, and maintain traffic safety drums.

The Design-Builder shall use wide angle prismatic retroreflective sheeting as specified in this Section or Type C steady-burning warning lights and Type III or Type IV reflective sheeting as described in Section 9-28.12 of the Standard Specifications. All traffic safety drums shall be the same type and shall be in accordance with Section 9-35.7 of the Standard Specifications with the exception that retroreflective bands fabricated from prismatic retroreflective sheeting is also permitted as noted below.

Used traffic safety drums may be utilized, provided all drums used on the Project are of essentially the same configuration and in acceptable condition, as defined

in the *ATSSA Quality Guidelines for Work Zone Traffic Control Devices*. Used traffic safety drums shall meet the requirements of this Section.

Traffic safety drums shall be designed to resist overturning by means of a weighted lower unit that shall separate from the drum when impacted by a vehicle.

Traffic safety drums shall be regularly maintained to ensure that they are clean and that the drum and reflective material are in good condition. When a drum has been damaged beyond usefulness, or provides inadequate reflectivity, a replacement drum shall be provided by the Design-Builder at no cost to WSDOT.

When the traffic safety drums are no longer required, they shall be removed from the Project and shall remain the property of the Design-Builder.

2.22.4.10.6 *Traffic Cones*

Where shown on the RFC TCPs, or when requested by the WSDOT Engineer, the Design-Builder shall furnish, install, and maintain traffic cones. The Design-Builder shall not use traffic cones on State highways nor interstates. Traffic cones shall be kept in good repair and shall be removed immediately when directed by the WSDOT Engineer. Where wind or moving traffic frequently displaces cones, an effective method of stabilizing cones, such as stacking two together at each location, shall be employed.

2.22.4.10.7 *Tubular Markers and Tall Channelizing Devices*

The Design-Builder shall not use tubular markers or tall channelizing devices on State highways nor interstates for temporary lane closures or temporary channelization, unless specifically requested in writing by the Design-Builder and approved by the WSDOT Engineer.

2.22.4.10.8 *Warning Lights and Flashers*

The Design-Builder shall provide and maintain Type C steady-burning lights attached to all traffic safety drums used for lane closures or shifting tapers during hours of darkness in accordance with Sections 9-35.7 and 9-35.11 of the Standard Specifications.

2.22.4.10.9 *Wide Angle Prismatic Retroreflective Sheeting*

The Design-builder shall provide and maintain orange traffic safety drums with two white and two fluorescent orange 6-inch-wide bands of wide angle prismatic retroreflective sheeting as specified below.

The wide angle prismatic retroreflective sheeting is sheeting with optimized performance at traditional observation angles and with extended entrance angle performance. The fluorescent orange sheeting shall be a visible activated fluorescent retroreflector providing higher daytime brightness than ordinary colored sheeting's of similar chromaticity. The white sheeting shall be a high brightness retroreflector providing higher brightness than non-prismatic sheeting's of similar chromaticity.

The retroreflector sheeting shall have a smooth surface with a distinctive interlocking diamond seal pattern visible from the face. The sheeting shall be precoated with a pressure sensitive adhesive backing protected by a removable liner.

2.22.4.10.9.1 Test Methods

Test Conditions: Unless otherwise specified herein, all applied and unapplied test samples and specimens shall be conditioned at the standard condition of 73°F (plus or minus 3°F) and 50 percent relative humidity (plus or minus 5 percent) for 24 hours prior to testing.

Test Panels: Unless otherwise specified herein, when tests are to be performed using test panels, the specimens of retroreflective material shall be applied on smooth aluminum cut from ASTM B-209 Alloy 5052-H36.

2.22.4.10.9.2 Physical Requirements

The wide angle prismatic retroreflective sheeting shall meet the following physical requirements:

Color

The color shall be in conformance to color requirements of Table I.

Table I - Color specification limits for new sheeting (daytime)

Color	Chromaticity Coordinate 1		Chromaticity Coordinate 2		Chromaticity Coordinate 3		Chromaticity Coordinate 4		Total Luminance Factor Limit, YT	
	x	y	x	y	x	y	x	y	min.	max.
White	.305	.305	.355	.355	.335	.375	.285	.325	40	--
Fluorescent Orange	.506	.404	.562	.350	.645	.355	.507	.429	30	-

Fluorescence

The fluorescence shall be in conformance to fluorescence luminance factor requirements of Table II.

Table II

Sheeting Type	Fluorescence Luminance Factor Limit, YF Min.
Fluorescent Orange	15

Conformance to color and fluorescence requirements of Tables I and II shall be determined instrumentally on sheeting applied to aluminum test panels, using a 2-monochromator spectrophotometer employing annular 45/0 (or equivalent 0/45) illuminating and viewing geometry. The total chromaticity coordinates and total luminance factor shall be calculated from the total spectral radiance factors

computed for International Commission on Illumination (CIE) Illuminant D65 in accordance with ASTM E-308, *Practice for computing the colors of objects by using the CIE system* for the CIE 1931 (2 degrees) standard colorimetric observer. The measurement shall be made on a labsphere BFC-450 bispectral fluorescence colorimeter or equivalent.

Coefficient of Retroreflection, R_A

The coefficients of retroreflection shall not be less than the minimum values specified in Table III according to the sheeting type. Testing shall be in accordance with ASTM E-810. The coefficients of retroreflection shall be specified in candelas per lux per square meter.

Table III – Minimum Coefficient of Retroreflection R_A
(Candelas per lux per square meter)

Observation Angles (degrees)	Entrance Angles (degrees)		
	-4	**30**	**45**
White			
0.10	1000	600	180
0.20	550	300	130
0.50	200	100	50
1.00	12	15	15
Fluorescent Orange			
0.10	375	200	50
0.20	200	120	40
0.50	80	50	30
1.00	10	10	10

Gloss

The retroreflective sheeting shall have an 85-degree specular gloss of not less than 50 when tested in accordance with ASTM D-523.

Flexibility

The retroreflective sheeting with the liner removed and conditioned as in the test method described below shall be sufficiently flexible to show no cracking when slowly bent, in one second's time, around a 3.2-millimeter mandrel, with the adhesive contacting the mandrel, at test conditions. Talcum powder shall be spread on the adhesive to prevent sticking to the mandrel.

Adhesive

Protective liner attached to the adhesive shall be removable by peeling without soaking in water or other solutions and without breaking, tearing, or removing any

adhesive from the backing. Protective liner shall be easily removed following accelerated storage for 4 hours at 158°F under a weight of 2.5 pounds per square inch. The adhesive backing of the retroreflective sheeting shall produce a bond to support at 1.75-pound weight for 5 minutes without the bond peeling for a distance of more than 2 inches when applied to a test panel prepared in accordance with this Section. Apply 4 inches of a 1 by 6-inch specimen to a test panel. Condition and then position the panel face-down horizontally, suspend the weight from the free end of the sample, and allow it to hang free an angle of 90 degrees to the panel surface for 5 minutes.

Impact Resistance

The retroreflective sheeting applied according to the sheeting manufacturer's recommendations to a test panel of alloy 6061-T6, 0.04 by 3 by 5 inches, and conditioned in accordance with this Section shall show no cracking outside the impact area when the face of the panel is subjected to an impact of 100 inch-pounds using a weight with a $^{5}/_{8}$-inch diameter rounded tip dropped from a height necessary to generate an impact of 100 inch-pounds, at test temperatures of both 32°F and 72°F.

Resistance to Accelerated Outdoor Weathering

The retroreflective surface of the sheeting shall be weather resistant and show no appreciable cracking, blistering, crazing, or dimensional change after 1 year of unprotected outdoor exposure, facing the equator, and inclined 45 degrees from the vertical. Following weather exposure, panels shall be washed in a 5 percent HCL solution for 45 seconds, rinsed thoroughly with clean water, blotted with a soft, clean cloth, and brought to equilibrium at standard conditions. After cleaning, the coefficient of retroflection shall not be less than 50 percent of the values in Table III when measured according to ASTM E 810. The color shall conform to the chromaticity coordinates of Table I, and the minimum fluorescence luminance factor Y_F shall not be less than 10. The sample shall:

- Show no appreciable evidence of cracking, scaling, pitting, blistering, edge lifting or curling, or more than $^{1}/_{32}$-inch shrinkage or expansion.
- When more than one panel of a color is measured, the coefficient of retroreflection shall be the average of all determinations.

Optical Stability

Three pieces of new retroreflective sheeting applied test panels and conditioned in accordance with this Section shall each first have their photometric properties characterized by measuring the coefficients of retroreflection according to the provisions in this Section at all test geometries shown in Table III. These panels shall then be exposed in an air-circulating oven at 160°F (plus or minus 5°F) for a period of 24 hours. After exposure the panels shall be allowed to condition according to the provisions in this Section. These panels will again be characterized for photometric properties by measuring the coefficients of retroreflection according to the provisions of this Section at all test geometries measured before exposure. The coefficients of retroreflection measured after

exposure shall be between 80 percent and 120 percent of the values shown in Table III.

Resistance to Corrosion

The retroreflective sheeting applied to a test panel and conditioned in accordance with this Section shall show no loss of adhesion, appreciable discoloration or corrosion, and after cleaning shall retain a minimum of 80 percent of the specification minimum when measured at 0.2 degrees' observation, -4 degrees' entrance angle after 1,000 hours' exposure to a 5 percent concentration salt spray at 35 degrees when tested in accordance with ASTM B 117.

General Characteristics

The retroreflective sheeting applied to traffic control devices shall be free from ragged edges, cracks, and extraneous materials.

2.22.4.10.10 *Transportable Attenuator*

Where shown on the RFC TCPs, or when requested by the WSDOT Engineer, the Design-Builder shall provide, operate, and maintain TAs. These TAs shall be available, on-site, for the entire duration of their anticipated use.

The TA shall be placed on each closed lane to separate and protect construction Work zone activities from normal traffic flow. During use, the attenuator shall be in the full down-and-locked position. For stationary operations, the truck's parking brake shall be set.

A TA may be used in lieu of a temporary impact attenuator as part of a stage traffic control shift to protect an object such as a blunt barrier end or a bridge pier column that is located within the WZCZ. This use of a TA is restricted to a maximum of 24 hours unless the WSDOT Engineer approves an extension.

2.22.4.10.11 *Temporary Concrete Barrier*

Impact attenuators shall be used to protect the ends of barrier within the clear zone. Refer to Sections 6-10 and 8-17 of the Standard Specifications and Chapters 1610, 1620, 1010, and 1030 of the WSDOT *Design Manual* for material and construction details regarding the barrier, glare screen, attenuators, and barrier delineators. Glare screen on TCB shall conform to the requirements of this Section and the Special Provisions.

2.22.4.10.12 *Automated Flagger Assistance Device*

Refer to Appendix B for requirements.

2.22.4.10.13 *Radar Speed Display Sign*

Refer to Appendix B for requirements.

2.22.4.10.14 *Smart Work Zone System*

Refer to Appendix B for requirements.

2.22.4.10.15 *Queue Warning System*

Refer to Appendix B for requirements.

2.22.5 *Submittals*

TMP and TIMP require a draft and final submittal prior to commencement of any construction activity that has the potential to impact traffic.

TCPs for individual construction phases require a Preliminary Design Submittal and a Final Design Submittal prior to approval for each phase of construction.

2.22.5.1 Transportation Management Plan

The Design-Builder shall submit an electronic copy of the draft TMP to WSDOT for Review and Comment.

The final TMP shall carry the WTEM's Professional Engineering stamp and signature. The Design-Builder shall submit an electronic copy of the final TMP to the WSDOT Engineer for Review and Comment. All comments to the TMP shall be resolved prior to commencement of any construction activity that has the potential to impact traffic. Changes to the TMP shall be prepared and submitted to the WSDOT Engineer for Review and Comment 14 Calendar Days after the need to change is recognized by the WSDOT Engineer or the Design-Builder.

2.22.5.2 Traffic Incident Management Plan

The Design-Builder shall submit an electronic copy of the draft TIMP to the WSDOT Engineer for Review and Comment within 30 Calendar Days of NTP.

The final TIMP shall carry the WTEM's Professional Engineering stamp and signature. The Design-Builder shall submit an electronic copy of the final TIMP to the WSDOT Engineer for Review and Comment. All comments to the TIMP shall be resolved prior to commencement of any construction activity that has the potential to impact traffic. Changes to the TIMP shall be prepared and submitted to the WSDOT Engineer for Review and Comment 14 Calendar Days after the need to change is recognized by the WSDOT Engineer or the Design-Builder.

2.22.5.3 Temporary Traffic Control Plans

The Design-Builder shall submit TCPs to the WSDOT Engineer for Review and Comment prior to the Preliminary and Final Design Submittals. The Design-Builder may submit TCPs separately for each phase of construction. The TCPs shall meet minimum configurations as shown in Appendix T. The TCPs must be distributed and RFC prior to implementation. All traffic control implemented in the field shall be in accordance with RFC TCPs. The Design-Builder shall consider the review times when planning for implementation of construction phases. Reviews may only be waived or expedited with approval from the WSDOT Engineer in emergency situations.

The Design-Builder shall prepare plan sheets in MicroStation format and in accordance with the Mandatory Standards and the WSDOT *Plans Preparation Manual*.

The Preliminary Design Submittal shall show lane configurations including typical cross-sections, signing, and Work zones. General notes to show the intent of the construction phase shall also be included. Stations and offsets of barriers, lane lines, edge lines, and tapers shall be included in the Preliminary Design Submittal. Stations and offsets of PCMS and signs are not required for the Preliminary Design Submittal. The Design-Builder shall submit one electronic copy of the TCPs to the WSDOT Engineer for Review and Comment.

The Final Design Submittal shall include, but is not limited to, all required details including station and offset for all elements, cross-sections, temporary drainage, pavement marking details, signing, traffic control devices, temporary or modified traffic signals, and temporary lighting. The Design-Builder shall submit one electronic copy of the TCPs to the WSDOT Engineer for Review and Comment.

When all comments from the Final Design Submittal TCPs have been resolved, the Design-Builder shall prepare RFC TCPs, carrying the stamp and signature of a Professional Engineer. For roadways outside of limited access, the Design-Builder shall submit TCPs for review and approval to the Local Agencies responsible for the roadway. The Design-Builder shall provide an informational copy of the submittal to the WSDOT Engineer. The Design-Builder shall allow a minimum of 14 Calendar Days for the Local Agencies to review the plans. If the plans are not approved, they shall be corrected and resubmitted until they are approved. Once approval is received and all requirements of the Quality Management Plan are satisfied, the plans may be RFC. The Design-Builder shall provide four sets of the approved RFC TCPs to the WSDOT Engineer prior to implementation.

The RFC TCPs shall be distributed to all stakeholders a minimum of 14 Calendar Days prior to implementation of any lane, ramp, sidewalk, or roadway closures or detours, in order to allow for public notification.

2.22.5.4 Temporary Signal Plans

Temporary Signal Plans shall be submitted to the WSDOT Engineer, the affected local agency, and the operating agency for Review and Comment prior to commencement of construction for temporary signals. Temporary Signal Plans shall be submitted as part of the TCPs packages for the phase in which they will be required.

2.22.5.5 Temporary Illumination Plans

Lighting level calculations, including electronic files, shall be submitted to the WSDOT Engineer for Review and Comment prior to planning any pavement marking changes. When the analysis shows temporary illumination is required, the Design-Builder shall submit Temporary Illumination Plans as part of the TCPs package for the stage in which the illumination will be required.

2.22.5.6 Temporary Drainage Calculations

Calculations for the design of temporary drainage facilities shall be submitted to the WSDOT Engineer for Review and Comment with the TCPs Preliminary and Final Design Submittals. When the drainage analysis shows temporary drainage is required, the Design-Builder shall submit temporary drainage plans as part of the TCPs package for the stage in which the drainage will be required. Temporary drainage calculations shall meet the requirements in Section 2.14, *Stormwater*, that apply to permanent drainage facilities.

2.22.5.7 Other Submittal Requirements

The Design-Builder shall deliver to the WSDOT Engineer a list of all parties invited to take part in the MOT task force, and the responses to all of the invitations. The Design-Builder shall take meeting minutes and distribute them to all task force members.

A copy of the MOT diary shall be submitted to the WSDOT Engineer monthly. Upon Completion of the Project, the MOT diaries shall be delivered to the WSDOT Engineer.

A Closure Plan shall be submitted for each full highway closure. The Design-Builder shall submit the Closure Plan to the WSDOT Engineer for Review and Comment at least 60 Calendar Days prior to the scheduled closure.

2.22.5.8 Miscellaneous Submittals

At the request of the WSDOT Engineer, the Design-Builder shall deliver to the WSDOT Engineer Work-related submittals that do not fit in the previous categories but are prepared in accordance with this Section.

End of Section