

OR569: Roosevelt Blvd – Coburg Rd Work Zone Safety Pilot Project



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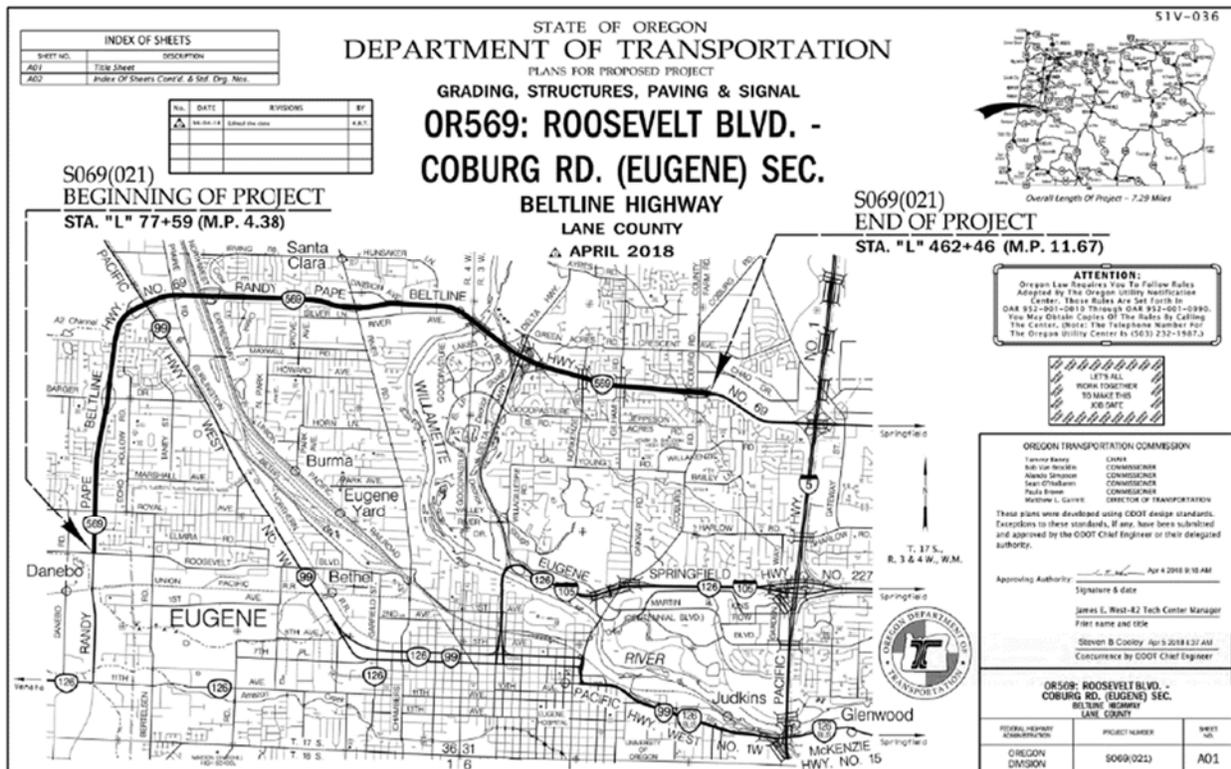


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Summary

This report was prepared as a cooperative effort between the Oregon Department of Transportation (ODOT) and Knife River Corporation (KR) to document the work zone safety pilot project developed and completed during the summer and fall of 2017 on Randy Pape Beltline (Beltline) Highway in Eugene, Oregon. The report is intended to provide the reader an understanding of the efforts to develop this work zone safety pilot project after the project had bid, the planning and execution of the project, things that went well, and things that didn't.

Approximately half of the project was constructed using traditional work zone traffic control methods and limited work hours and production windows. The other half was constructed during a series of five (5) weekend full closures of one direction of the highway with traffic crossed over onto the opposite side of the barrier. Comparisons of production rates and labor, equipment and material differences are also evaluated in this report.



Project Overview

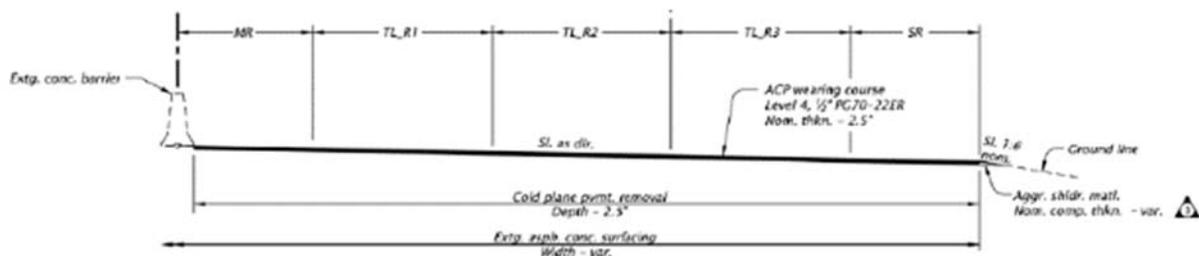
This project began and was developed and bid as a typical pavement preservation project to replace old open graded asphalt concrete pavement (ACP) with a new wearing course of dense graded ACP.

The project limits were from MP 4.38 (slightly north of Roosevelt Blvd) to MP 11.67 (Coburg Road) and included the following major work items:

- 59,600 tons of Level 4, ½" dense graded ACP
- 317,000 SY of 2.5" cold plane pavement removal
- 2,200 SY of 5" cold plane pavement removal
- 15,800 SY of 7" cold plane pavement removal
- Full roadway reconstruction at two bridges (both ends)
- Rolled or polymer waterproofing membranes on 7 bridges
- 211,500 LF of permanent thermoplastic striping

Beltline includes 2 lanes in each direction divided by a center median barrier. All intersections are grade separated and access is limited to a handful of on-ramps and off-ramps within the project limits. There are several bridges with within the project limits, some with concrete wearing surfaces and others that required new membranes and ACP.

The majority of the project required a 2.5" inlay ACP inlay as depicted in the following typical section from one direction of travel.



Deeper grinding and multi-lift ACP were required paving in some areas of the project including some bridge ends. Full ACP and aggregate base removal and reconstruction was required at two bridges, over Highway OR99 and Northwest Expressway.

The project was bid as a traditional paving project which only allowed lane closures Sunday – Thursday nights between 9:00 pm and 5:00 am. Some work zone safety elements that had been developed prior to this project were included, including a “Smart Work Zone” slow traffic warning system and rolling slowdowns to provide a gap in traffic for crews removing traffic control devices from the roadway each morning.

Bids were opened on April 12, 2017 and Knife River was awarded the project for \$7,098,709.87. Notice to proceed was issued on May 8, 2018.

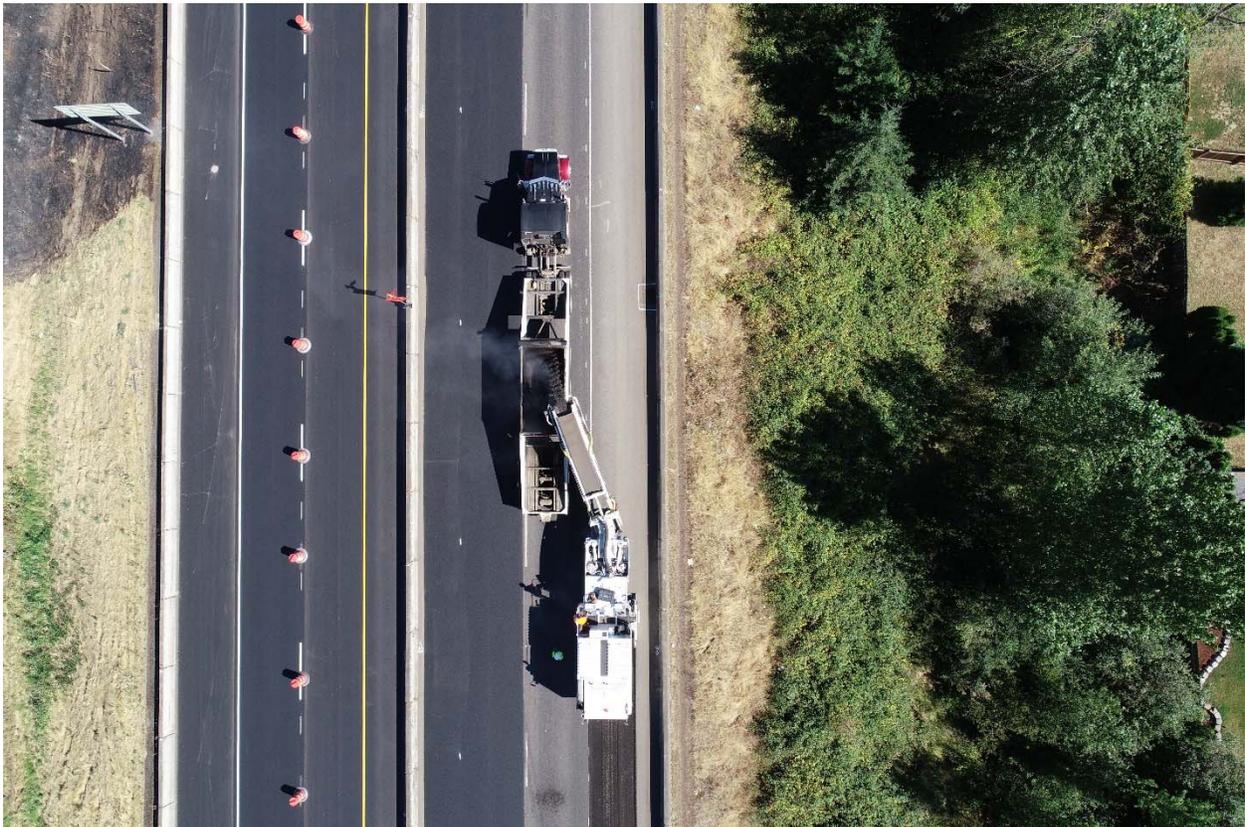
The specified completion date was September 30, 2018.

Work Zone Safety Pilot Project Idea

There was political will and support for work zone safety pilot projects. ODOT Director Garrett convened the Work Zone Executive Strategy Sessions Committee in December of 2013 to explore opportunities for improving safety in highway work zones. The Work Zone Executive Strategy Sessions Committee is a partnership of executive representatives of stakeholders whose intent is to enhance work zone safety for the traveling public and workers in the work zone. Members include Oregon Department of Transportation, Oregon State Police, Association of General Contractors, Oregon Trucking Association, Triple A of Oregon and Idaho, and Oregon State University. In December 2015, WZESSC adopted the Work Zone Guiding Principle Document.

At a work zone safety committee meeting in December 2017 ODOT identified the Beltline paving preservation project as a potential candidate where new work zone safety procedures could be implemented, but due to the project schedule, any requested changes would need to be developed and implemented as a cooperative effort between the contractor who was awarded the project and the ODOT construction office administering the contract.

KR has been an active participant in developing and implementing work zone safety strategies throughout Oregon. Within days of the bid, KR reached out to ODOT and requested that we begin working to develop a work zone safety pilot project. The same team from both KR and ODOT that had just completed a similar paving project on Interstate-5 was refocused on this new challenge and work began immediately.



Work Zone Safety Pilot Approach

One of the first things discussed was what type of work zone safety approach would be selected for the project or sections of the project. The team endeavored to provide positive separation, like concrete barrier, between high speed public traffic and the work zone as much as possible. This goal had to be balanced with peak volumes during commute times, freight mobility, public traffic safety, and public information and understanding of the impacts of a different approach to the work. Two separation strategies were considered:

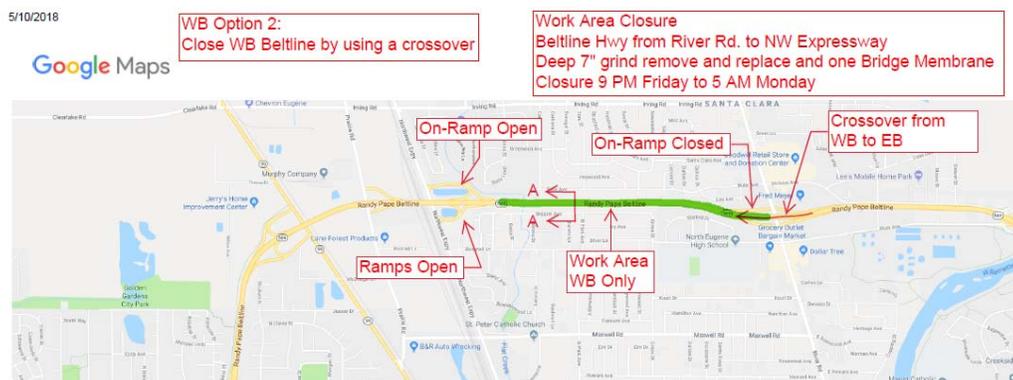
- **Full directional closures with detour**

The initial idea centered on using a series of directional closures of sections of the highway with detours onto alternate local routes. This option was carried forward as an option to Lane County and the City of Eugene, but was quickly eliminated due to unpredictable traffic patterns, signal timing concerns, and difficulties public outreach and education.



- **Full directional closures with crossovers**

Full directional closures included closing a complete side of the highway and crossing public traffic over to the opposite side of the road, and removing the existing concrete barrier at specific points. This approach was selected for several reasons, most notably the ability to keep through traffic on the route they were expecting thereby limiting driver confusion.



Dividing the project

Upon deciding on the full directional closure with crossover approach, the team discussed where this approach would work well and those locations where the team felt it would not work well.

Volumes and on/offramp locations to be accommodated were the first consideration. Beltline Highway has increasing traffic volumes from west to east. 2016 traffic counts show 27,400 vehicles per day average annual daily traffic (AADT) at the west end, 55,600 AADT at Northwest Expressway, and 84,100 AADT at River Road. East of River Road, there is a major interchange at Delta Highway and large volumes of traffic entering and existing Beltline at Coburg Road to access Costco, Delta Oaks, Oakway Center and a route to downtown Eugene. Traffic volumes quickly pointed the team to start on the west end of the project.

The type of construction required was the next consideration, focusing on those areas that would most benefited from directional closures. Again this led the team to the west end of the project where there were pavement reconstruction sections, bridge membranes, deep lift paving, and other things that KR would have been challenged to complete within an 8-hour work window.

Other considerations are listed in detail later in this report.

The project was initially split as follows:

Traditional work zone safety methods:

- Beltline EB MP 7.16 to MP 11.67
- Beltline WB MP 8.44 to MP 11.67

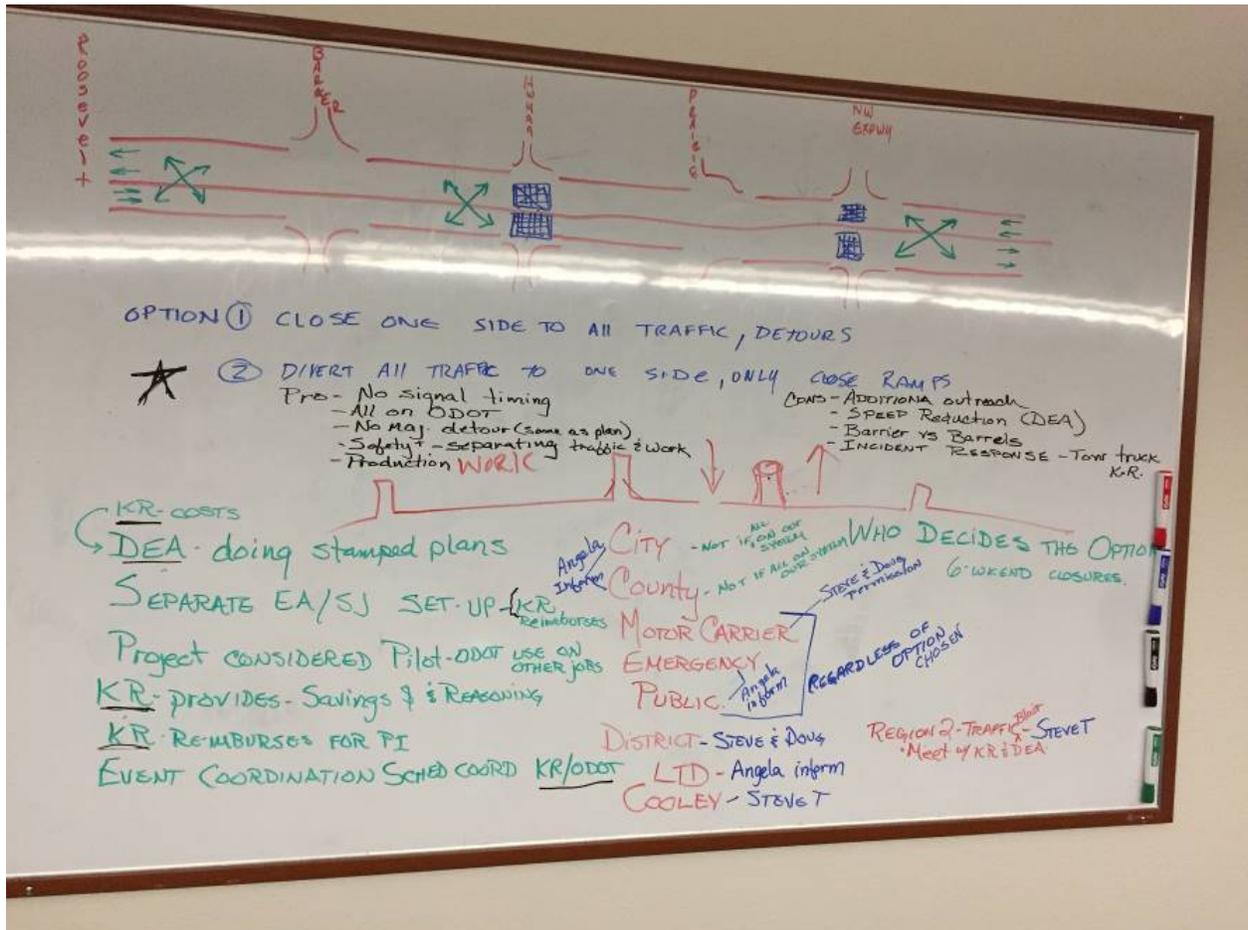
Full directional closures with crossovers:

- Beltline EB MP 4.38 to MP 7.16
- Beltline WB MP 4.38 to MP 8.44



Planning and Development of Full Directional Closures

There was an extremely limited time to develop comprehensive plans between the Award and the need to start work on the project to ensure the project would be completed on time. In fact, work began on the east end of the project while details for the full directional closures were still being developed. The project timeline included as Attachment 'A' summarizes the work that took place during this short time.



White board notes from initial brainstorming meeting

Key items considered in the planning and development were as follows:

- In Once and Done** - Early in the development, the ODOT/KR team developed an approach that, if we were going to ask the public to accept the full closures, the team would make every effort to complete all work within the work zone during the weekend closures. This included all roadway reconstruction, paving, permanent striping, shoulder aggregate and delineators. This was driven by ODOT/KR's goal of ensuring all workers involved on the project would benefit from the additional safety being provided by this approach and, once the public was impacted in an area, they would not be impacted again after it reopened to traffic on Monday morning.

- **Holidays and Special Events** – Holidays and Special Events are normally added to the contract as additional restrictions on lane closures. Since this project was developed as only allowing weekday nighttime closures, Special Events had to be reconsidered when planning for these full directional closures.

Quickly, the team determined the Fourth of July holiday and the Oregon Country Fair, which generates a lot of traffic on Beltline Highway dictated that we could not have any full closures until after mid-July, leaving a limited amount of weekends before Labor Day. Furthermore, the weekend closures needed to be completed prior to the start of University of Oregon football season home games.

On May 10, 2018 ODOT and KR set the dates for 5 continuous weekend closures starting on July 20, 2018. Each weekend closure would begin Friday night at 9pm with traffic begin restored to the normal alignment the following Monday mornings by 5am, a total of 56 hours each.

Further into development, the team realized that Junction City’s annual Scandinavian festival was planned for August on one of the closure weekends. The team ensured that the ramps from Beltline to Junction City were not impacted on that specific weekend and additional signing and public information was added to provide information to people headed to that event.



Aerial view of Weekend 3 Full Closure – NW Expressway Bridge End Reconstruction

- **Roadway Geometry** – Roadway geometry including vertical and horizontal alignment as well as on/off ramp locations restricted available locations to cross traffic over. The beginning and end of some segments where traffic had to cross over to the opposite side during the weekend closures had to be paved ahead of time at night using traditional traffic control methods to cover the entire project.
- **Existing barrier** – The entire project had existing concrete barrier in the median, some of which was cast in place and could not be moved. The west portion of the job where full closures were planned had older pin-and-loop barrier that could be removed and replaced. Segments of barrier were removed for short periods of time to open up the median to allow for the weekend crossovers. Originally, KR planned to remove the barrier from the median to a stockpile site, but upon further development, it was found more cost effective to move the barrier adjacent to the existing barrier and protect the ends allowing the barrier to be removed or reset in one shift per occurrence.
- **Match production to segment length** – Matching section length and crossover locations to KR ACP production capability was critical to ensuring the work could be completed in the times allowed. In addition, ramp closures, truck ingress/egress, were all developed into the plans. These draft plans were given to the Traffic Control Plan Engineer to use in development of the Traffic Control Plans by David Evans & Associates (DEA).
- **Opposing Traffic separated with Temporary Plastic Drums** – When developing this idea, there was concern with putting traffic in a temporary configuration where traffic was not separated by hard barrier. However, by doing so, the weekend closure would not have been an option. The concerns were mitigated by reducing the barrel spacing (20 feet on center) and temporarily reducing the speed through these areas from 55mph to 40mph.



Separated work zone during final weekend closure

- **Engineered Traffic Control Plans** – KR retained David Evans & Associates (DEA) to develop engineered Traffic Control Plans for the full closures with crossovers. They too were on an expedited schedule, beginning on June 1, 2018 with Final Plans submitted on July 6, 2018.

Traffic control experts that would be reviewing the plans from ODOT were brought into the initial meetings so they could have a firm understanding of the plans as they were developed. Interim reviews of specific details were done on the fly between DEA, KR, and ODOT to ensure the final product would meet expectations. In just over a month, DEA provided an engineered traffic control plan for the full closures with crossovers that was approved by KR and ODOT. The TCP is included as Attachment 'B' to this report.

- **Motor Carrier Transportation Division Coordination** – MCTD coordination is part of every ODOT project. However, the normal process involved MCTD to get their input and support before plans are developed to any detail. In this case, MCTD was aware of the potential for a pilot project due to their participation on the work zone safety committee, but did not have any details.

ODOT/KR developed details to present to the MCTD committee and planned to present them at a meeting. However, after the MCTD saw the details of the widths provided and the public outreach, they provided support for the project without having to provide more details. Their network of trucking contacts was used through the normal 28-day restriction online process to let carriers know of the construction impacts and ramp closures.



Weekend 2 looking SB at Barger Drive

- **Oregon State Police Work Zone Enforcement**– Static Oregon State Police presence was utilized on the project and was very effective. They helped slow traffic during the weeknight construction phase. They didn't pull vehicles over until they were outside the work area to avoid traffic impacts.

- **Emergency Services Coordination** – Emergency Services and local towing companies started getting informed during the very early stages. A meeting was held with these local partners early in the planning process to get their concerns and feedback which were considering in the planning. As plans developed further, these partners were kept notified of all final plans so their response time through the work zone was understood.
- **Local Partner Agency Coordination** – In addition to emergency services, ODOT reached out to the City of Eugene, City of Springfield, and Lane County to get their support for the weekend closures. After the local agencies learned ODOT’s plan would keep through traffic on the state system their input was minimal. But this was an important step to ensure any events or surrounding projects could be coordinated.
- **ODOT incident response** – The crossover plan reduced traffic to a single lane in each direction with narrow shoulders. Risk of an accident or breakdown impeding traffic and forcing them off the highway was not acceptable. Initially the team considered hiring of a towing company to be on site through the weekend closures. However, after getting cost estimates, it was determined that ODOT Incident Response could provide better, more experienced in assessing traffic situations and getting disabled vehicles from the road. They also have portable changeable message sign (PCMS) boards on their vehicles, to provide specific messages to help move traffic through. District 5 provided IR support between 7am and 7pm each weekend day and were available as needed at other times.
- **Subcontractor management** – Since the crossover closures were not a part of the original contract, many of the subcontractors sought additional compensation for the change to the project staging and sequencing. KR worked closely with the subcontractors and was able to negotiate the change without additional costs after they understood how taking advantage of these closures would increase their production rates and efficiency as opposed to working multiple night shifts in small work zones.



Two Cold Plane Pavement Removal Machines Working in Tandem

- **Backup Equipment and Materials** – A backup plan was put in place in case there was a significant asphalt plant breakdown. A second plant with approved mix design, aggregates and process control was available if it was needed. There was also a backup paving machine and rollers available.
- **Permanent Striping** – ODOT requires permanent striping contractors to provide a manufacturer representative on site during application. In order to reduce the risk of failures, these companies have an unwritten rule to allow pavement to cure for approximately two weeks before placement of permanent striping. However, this approach is contrary to the industry literature which says that the products can be placed within hours of paving. Permanent striping is regularly applied immediately after paving in other applications like airport runways.

As noted above, the goal to complete the entire segments drove the need to change. The striping subcontractor and manufacturer contended that the thermoplastic striping could not be installed immediately following ACP placement because they were concerned with fresh asphalt binder oil in the ACP would discolor the stripe when it was placed and paving trucks would track tack oil onto the new striping. After a lot of discussion, the striping manufacturer reluctantly agreed to provide the warranty.



- **Public information and outreach** – Numerous steps were taken to inform the public of the coming traffic control changes. The following is a list of considerations and work done by ODOT Public Information Officers:



- The Eugene Airport was notified of the coming traffic control changes.
- Informational videos were produced and linked to in Trip Check. A link to an example is here <https://youtu.be/jettECtukUI>
- Flyers were printed and distributed to businesses, large employers, and churches in the surrounding areas.
- Information was also included in the nearby community of Veneta’s water bills.
- Interviews were given with the local television news in mid-June and at a press conference in July, just before the first crossover event.
- Radio advertisement spots were purchased and recorded.
- www.tripcheck.com was updated daily to provide accurate up to date information on the work progress.
- Variable message signs on I-5, Beltline Highway, and Delta Highway were updated several times a day with accurate and timely messaging.
- The Highway Advisory Radio (HAR) System was activated during each closure, with signs telling people where to tune their AM radios to for information. Information regarding the closures were broadcast throughout the metro area each weekend.
- Sketch maps of each weekend’s closure and detour routes were developed and made available through the Trip Check portal.

Contract Change Order

When the pilot was first discussed, the assumption by both ODOT and KR was there would be a net savings to the project and agreed to share the any savings of the alternative approach 50/50 as allowed in the Cost Reduction Proposal section of the contract.

Attachment ‘C’ includes details of the changes that were made as part of the Contract Change Order. The table was used by the project team to capture costs which were then used to negotiate a CCO for the crossover closures. There was a lot more Traffic Control Devices (TCD) required to make the crossovers work as engineered, most notably the 880 additional temporary plastic drums. Other items included barrier moves, temporary impact attenuators, and retaining DEA to engineer traffic control plans.

After it was developed, the approach changed more than traffic control, it impacted production rates, materials costs, trucking costs resulting in approximately \$80,000 of additional costs, which ODOT and KR split 50/50. A complete copy of the executed CCO is included as Attachment ‘D’.

Weekend Full Closure Execution

Weekend Closure 1:	WB Beltline MP 4.38 to MP 6.09
Dates:	7/20/2018 – 7/23/2018
Ramps Closed:	WB at Barger Road on and off ramps
ACP placed:	6,310 tons
Section complete:	Yes
Comments:	Traffic was much lighter than expected the first weekend. It appeared that many travelers avoided the area. Delays through the work zone averaged less than 5 minutes.
Weekend Closure 2:	EB Beltline MP 4.38 to MP 6.09
Dates:	7/27/2018 – 7/30/2018
Ramps Closed:	EB at Barger Road on and off ramps
ACP placed:	6,100 tons
Section complete:	Yes
Comments:	Traffic was much heavier than the first weekend, but still lighter than expected. Delays through the work zone averaged 5-10 minutes.
Weekend Closure 3:	WB Beltline MP 6.09 to MP 7.44
Dates:	8/3/2018 – 8/6/2018
Ramps Closed:	WB Hwy99 on and off ramps WB Prairie Road offramp WB NW Expressway on ramp
ACP placed:	5,030tons
Section complete:	No, this weekend the striping was not completed due to the truck breaking down. Temporary stripe was placed and KR had to complete permanent striping under night closures.
Comments:	The full depth bridge end rebuild sections were included in this weekend. WB had an additional travel lane between OR 99 and Barger Blvd to pave.
Weekend Closure 4:	EB Beltline MP 6.09 to MP 7.44
Dates:	8/10/2018 – 8/13/2018
Ramps Closed:	EB Hwy99 on and off ramps EB Prairie Road onramp EB NW Expressway off ramp
ACP placed:	4,860 tons
Section complete:	Yes
Comments:	The full depth bridge end rebuild sections were included in this weekend.
Weekend Closure 5:	WB Beltline MP 7.44 to MP 8.46
Dates:	8/17/2018 – 8/21/2018
Ramps Closed:	WB River Road on ramp WB NW Expressway off ramp
ACP placed:	6,050 tons
Section complete:	Yes
Comments:	This section included deep multiple lift paving that would have been very difficult to complete in normal night shift construction.

Details from the Full Closures

- Work Schedules** – Knife River developed hourly schedules for the weekend crossovers down to each hour, which also included key personnel and their contacts. These detailed schedules were extremely important to track progress, especially for the first weekend. The ODOT PM crew also developed a schedule to assure adequate staffing was present. These hourly schedules were critical for the team to monitor progress and adjust plans to ensure the sections would be completed before the Monday morning deadlines.

ACTIVITY	MP/STA START	MP/STA END	SF	TONS	CREW RESP.	FRIDAY								SATURDAY																								
						8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8								
						PM	PM	PM	PM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	AM	PM															
15057 OR569: Roosevelt Blvd - Coburg Rd																																						
EAST BOUND HEADING																																						
Traffic Control																																						
Place Barrel Delineation	239+55	301+50			KRC			X																														
Rolling Slow Downs for Crossover Setup	239+55	301+50			KRC				X																													
Setup Crossovers	239+55	301+50			KRC					X																												
Rolling Slow Downs for Crossover Setup	239+55	301+50			KRC						X																											
Remove Barrel Delineation	239+55	301+50			KRC							X																										
WEST BOUND HEADING																																						
Mainline & Ramp Paving																																						
7" CPPR - Slow Lane & TL3	270+50	289+62	29982	1672	PWY																																	
2.5" Median/Ends	271+00	292+00	50958	961	PWY																																	
7" CPPR - Fast Lane	240+50	292+00	73200	2500	PWY																																	
7" CPPR - Slow Lane + TL3	242+19	270+50	33972	1486	PWY																																	
2.5" Base Lift HMAC Paving TL3	275+35	280+71	7100	113	BRENT																																	
2.5" Base Lift HMAC Paving Slow Lane	270+50	289+62	22944	366	BRENT																																	
2" Base Lift HMAC Paving TL3	275+35	280+71	7100	91	BRENT																																	
2" Base Lift HMAC Paving Slow Lane	270+50	289+62	22944	293	BRENT																																	
2.5" Base Lift HMAC Paving Fast Lane	242+19	289+62	56916	907	BRENT																																	
2.5" Base Lift HMAC Paving Slow Lane	242+19	270+50	33972	541	BILLY																																	
2" Base Lift HMAC Paving Fast Lane	242+19	289+62	56916	726	BILLY																																	
2" Base Lift HMAC Paving Slow Lane	242+19	270+50	33972	433	BILLY																																	
2.5" Top Lift HMAC Paving	239+55	301+50	189667	3023	JESSE																																	
Saw & Seal Joints	301+50	301+50	50	LF	BCC																																	
Permanent Striping & Signage																																						
Shoulder Rock & Delineator Removal	239+55	301+50			KRC																																	
Striping Layout	239+55	301+50			KRC																																	
Install Delineators	239+55	301+50			BAKER																																	
Permanent Striping	239+55	301+50			AAL																																	
TRUCKING/SUPERVISION																																						

Sample Knife River hour by hour schedule for closure 5

- Work hours** – In order to meet the schedule requirements, KR worked both weeknights on the east end of the job and all weekend on the closure sections. By the 3rd weekend, fatigue began to be evident throughout the team so KR began resting most crews on Monday nights, using those breaks to move traffic control devices and set up for the next shifts.

Both KR and ODOT had to work closely with staff and ensure people were getting rest periods and safety was not compromised. However, by the end of the 5 weeks, most KR and ODOT staff were exhausted from the pace of the work and discussed that 5 weeks was on the top end of what was possible with the same crews and more breaks should be considered for similar projects in the future.

For ODOT, people assigned to the project working nights during the week, stayed on nights during the weekend. Weekend day shifts were inspected by ODOT staff that were assigned to other projects on day shift during the week, they were brought in to cover day shifts. All office staff were involved in covering the project during the weekend. ODOT employees were given one day off per week when balancing shifts.

CLOSURE 4						
Date	8/10	8/11	8/11	8/12	8/12	8/13
Day	F-S	Sat	S-Su	Sun	Su-M	M-T
Shift	Night	Day	Night	Day	Night	Night
Activity	Exc, deep pave	grind, inlay	INLAY	Pave, delin, Saw & seal	STRIPE	
Start Shift	830p	730a	630p	600a	530p	
End Shift	900a	800p	700a	630p	600a	
Donna	OFF	OFF	OFF	OFF	OFF	OFF
Paige	NIGHT	OFF	NIGHT	OFF	OFF	OFF
Thomas	NIGHT	OFF	NIGHT	OFF	OFF	OFF
Dave	FLEX	OFF	OFF	OFF	NIGHT	OFF
Justin	OFF	DAY	OFF	DAY	OFF	OFF
Kris	OFF	DAY	OFF	DAY	OFF	OFF
Nate	OFF	OFF	OFF	OFF	OFF	OFF
Doug	OFF	DAY	OFF	OFF	OFF	OFF
Shane	OFF	OFF	OFF	OFF	OFF	OFF
Pat	OFF	OFF	OFF	DAY	OFF	OFF
Colton	NIGHT	OFF	NIGHT	OFF	OFF	OFF

Example ODOT Weekend Closure Work Schedule

- **Job Site Safety** – The crossovers separated the workers from public traffic but did not eliminate other safety risks on the project like trucks traversing the closed work zone, equipment backing, and tight work spaces. KR had safety personnel on site many times watching for hazards.

There was an incident where an ACP delivery truck rear ended another truck in the queue at low speed, presumably by not paying attention when pulling forward. The trucks radiator was punctured causing a small antifreeze leak on site.

The KR team worked approximately 18,000 total man hours and completed the project injury free. The KR team recorded 15 near misses throughout the project.



Minor truck accident within work zone

- **Traffic Control Supervisor** – The Traffic Control Supervisor (TCS) and support labor were very important in getting the traffic control changes made, between regular weekly work and the weekend closures, to keep traffic flowing safely. The TCS also patrolled the work zone for barrels out of line, but there wasn't much of that.
- **ODOT Incident Response** - The ODOT Incident Responders were very beneficial to the success of the weekend closures. They have special training and equipment to promptly respond to any situation. Their use should during peak travel times, from 7am to 7pm each day prevented small problems from escalating of any emergency. They were able identify peak traffic flows and then located themselves, with PCMS on, just before vertical or horizontal curve which could obscure the slowed traffic ahead.
- **Oregon State Police Work Zone Enforcement Presence** – OSP work zone static enforcement static during nightly paving shifts had a very positive impact on slowing and focusing traffic through the work zone. OSP was on site during the first weekend closure and their presence was effective at slowing down traffic, but this caused unwanted slowing at points impeding traffic flow. Once traffic shifted through the crossover, the speeds were governed by the traffic volumes and OSP was asked not to sit in the work zone the following weekends. They still continued to provide enforcement during nightly shift work.



Looking south at Barger Road Interchange during Weekend 2

- Permanent Striping** – As mentioned above, permanent striping on fresh pavement and the warranty was a concern. During the third weekend closure, the thermoplastic striping truck experienced a mechanical problem in route to the job and the subcontractor was unable to find another truck. The subcontractor installed temporary paint markings to reopen the segment to traffic before the deadline.

There were no problems with the placement or performance of the permanent stripe to date. The manufacturer’s representative indicated that he did not have any concerns with warranting the installation of the thermoplastic product as it was being installed. ODOT is continuing to monitor the striping and will be using it as an example for placing permanent striping in lieu of temporary striping on future projects.
- KR Work Force** – KR’s Mid-Willamette Valley Division employs 3 separate paving crews. KR attempted to complete the first 4 shutdowns with 2 separate paving crews, in order to minimize disruptions to the schedules of other projects in the region as a result of shift changes and hours of service rules. This resulted in the paving crews working extremely long shifts (over 24 hours in one case). KR added a 3rd paving crew for the final weekend. Scheduling the crossover closures for 5 consecutive weekends with night time closures during the week between closures resulted in Knife River’s employees and supervisors working a significant amount of overtime during that period of the project.
- ODOT Work Force** – All of the construction crew worked at some point to balance the work load. Lead inspectors were assigned for each shift along with several inspectors to support them. Assignments were made in 12 hour shifts with some overlap between shifts during the weekend. Inspectors adapted to the work taking place at the time and divided up the work amongst themselves.
- Paving Quality** – Starts and stops were drastically reduced due to the continuous operation and lack of short work windows. The reduction in start and stop joints improved the ride quality and the project received two paving awards.

 - The National Asphalt Paving Association, Excellence in Construction Award.
 - The Asphalt Paving Association of Oregon (APAO), first place award for High Volume Highway Projects.



- **QA/QC Testing** – This project was also a pilot project with the ACP density test locations to be determined by ODOT, which required additional attention. The ODOT Region 2 QA group was also needed for verification testing during the week and on the weekends.
- **Trucking** - KR used 8-10 belly dump trucks for mainline grinding and paving operations during the weeknight lane closures. There was a significant increase in trucking needs during weekend closures. KR dispatched nearly 50 separate trucks/drivers

On the weekend, more trucks were available to dedicate to the project during all of the various shifts. KR used end dumps and truck & pups for mill & fill operations. Belly dump trucks were dedicated to the paver.

- **Asphalt Production** – Scheduling of asphalt binder oil during the weekend closures was challenging. KR’s Eugene facilities did not have enough capacity to store all the asphalt binder oil required to produce the 6,500 tons of ACP needed during the weekend closure. Therefore, multiple deliveries were scheduled throughout the weekend to replenish inventories.

During the first shutdown, KR deliveries of binder oil fell behind ACP production. A sufficient quantity of binder oil had been ordered, but the timing of the deliveries was behind production. This resulted in the KR asphalt plant running out of binder oil for approximately 3 hours on Sunday morning. The KR plant eventually received an additional load of binder oil in time to open the highway as scheduled, but resulted in a transverse cold joint in the asphalt mat. It also resulted in standby time of crews, equipment, and trucks.

Lessons Learned

As shown above, a lot of planning went into the full closures. The team learned things and made adjustments each week based on things we’d learn as we go. The following items have large impacts that need to be considered for future projects with similar challenges:

- **Fatigue** - Due to the long shifts and working weekends (day and night) and weeknights, many people were getting fatigued. In future projects like this, consideration should be given to doing 2 or 3 consecutive weekends, skip one, and then 2 or 3 more.
- **Trucking Hours** – Because of the busy season, third party truck drivers were working on other jobs during the week and coming to work on this project during the weekend closures. Some truck drivers would run out of behind-the-wheel hours and would leave the project without notifying KR. This introduced many challenges with material delivery that KR had to manage constantly.

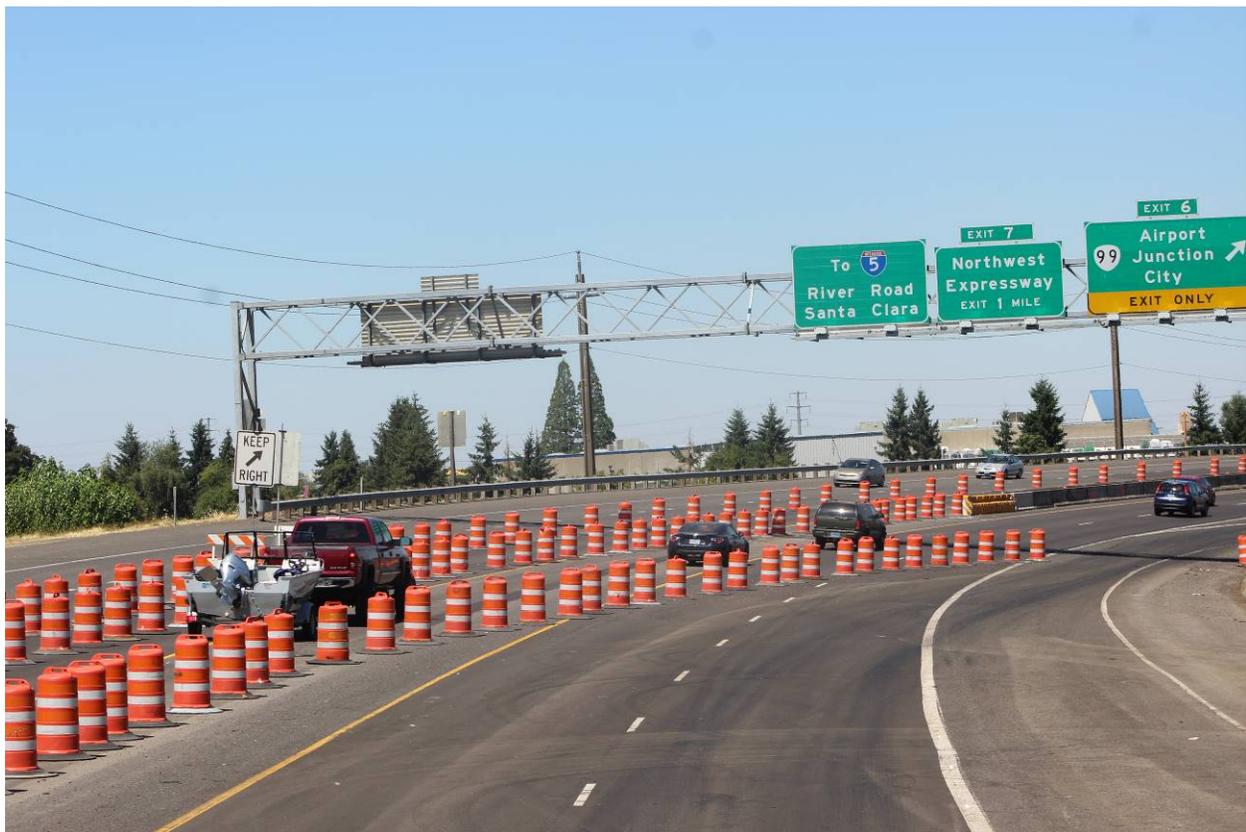


Bridge end roadway reconstruction at OR99

- **Onramp/Offramp spacing** - Weekend 3 crossover put all traffic on the EB traffic lanes between Highway OR99 and Northwest Expressway. The ramps are close together and the merging traffic caused already slow traffic to become congested. At times, traffic would almost clear, but platoons of traffic from signals would plug things again. In hindsight, it would have been beneficial to close the Prairie Road onramp to smooth traffic flow through the area.
- **Traffic Control Supervisor** – In the CCO, TCS shifts were anticipated to have been reduced as part of the efficiency, but actually increased due to double shift weekends in addition to the weeknight work shifts. The bridge membrane work took a lot of shifts also.
- **Weather** – When planning for the closure, we talked about weather being a concern – a brief rain shower at the wrong time could have derailed the best planning efforts. The project was also fortunate in that we had 5 consecutive weekends with good weather. The forecast was watched closely as each closure approached, making sure the weather would be favorable.

- **Public Feedback** – The project was received favorably by the public. Once the public saw they could get where they wanted to go with little delay, concerns from the public were offset and feedback became more positive. We got a lot of positive feedback to develop more projects with shorter windows even if there are larger impacts as long as those impacts are communicated to the public.

A home improvement store located adjacent to one of the interchanges affected by the closures, had been notified of the changes and knew they were coming, but did not inform us until the day of the closure that they had an anniversary sale during the weekend the ramps would be closed near their store. The store modified their radio ads, which were on the air that day, to include directions through the construction to get to them. They also printed flyers with detour directions and distributed them to customers as they left the store and there were no issues as a result.



Crossover on North end of Weekend 2 Full Closure

Comparison of Nightly Closures vs. Full closures

- 28,350 tons of Level 4 ACP were laid down during the 5 weekend closures.
- 29,016 tons of L4 ACP were laid down during the normal weeknight paving over 10 weeks.
- Mainline paving production was 12% better during weekend closures compared to mainline paving done under nightly closures. KR crews averaged 16.38 tons/man-hour for nightly closures, and 18.35 tons/man-hour on weekend closure mainline paving.
- Approximately 40 shifts of early evening traffic control set ups and early morning removals were avoided by the weekend closures. These set ups and removal times are when traffic control is changing during live traffic and a lot of workers are exposed on foot or in slow moving vehicles proximate to high speed traffic.

Conclusion

Pulling together a major change to a construction contract in two months' time was a huge challenge for the project team to be tasked with. These projects are usually developed over two or more years by a large group of designers, engineers, planning, and public outreach staff. All of this was done by the ODOT construction office in Springfield, OR and KR in Eugene and Tangent, OR. A large reason this was a success was the same two teams from KRC & ODOT had completed the challenging I-5: Willamette River Bridge – Woodburn Project in 2017. There was a common language, a generally understanding of each other's abilities, a high level of trust, and an eagerness to partner to improve work zone safety coming away from that previous project.

ODOT will be challenged to deliver a similar project using traditional design/bid/build techniques in the future. As noted above, there was a lot of detail that was added to the planning from both sides that allowed the full closures to be a success. If design/bid/build techniques are used, flexibility for closure numbers, locations, material quantities, access, etc. all need to be built into the contract or need to be vetted through constructability reviews with industry. Another option would be to use alternative project delivery techniques (Design/Build; CMGC, etc.) to develop the project details needed to enhance work zone safety cooperatively.

Attachments

- A Safety Pilot Project Development and Construction Key Dates**
- B Traffic Control Plans**
- C Contract Change Order Analysis**
- D Contract Change Order**

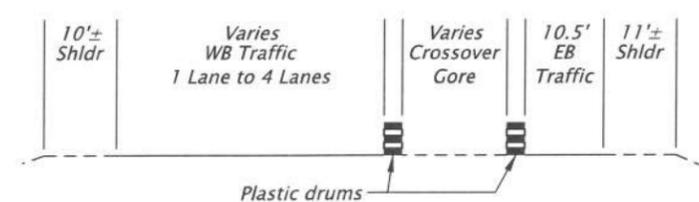
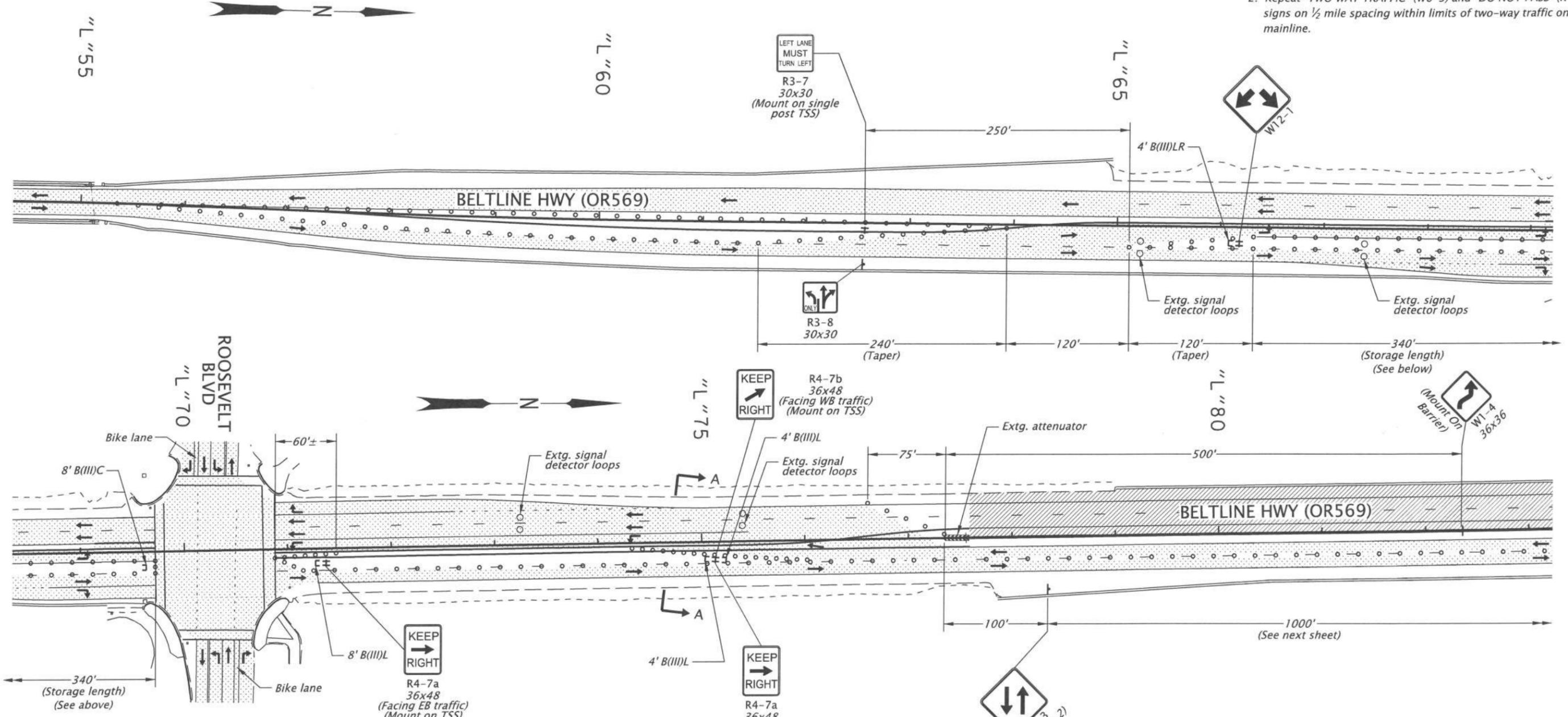
Attachment ‘A’

Safety Pilot Project Development and Construction Key Dates

04/12/2018	Bid Opening
04/17/2018	Notice of Intent to Award; KRC informal proposal to ODOT to utilize weekend closures instead of nightly lane closures. Two options considered, 1) full directional closures with detours and 2) crossovers with shared lanes.
04/23/2018	Notice of Award
05/08/2018	Notice to Proceed
05/10/2018	ODOT PM email & County response. County preference given to crossover option.
05/10/2018	Cooperative (Partnering) Agreement entered into.
05/10/2018	ODOT + Knife River Closure Options Meeting (Crossover concept agreed to, 5 weekend closure dates set → Ready, Fire, Aim!)
05/14/2018	Start of Construction – Mobilization, Signage
05/17/2018	Scoping of full closure with crossovers, TCP modification with ODOT, KR, & DEA
05/21/2018	KR issues limited NTP for DEA to proceed with crossover closure traffic control re-design & TMP update with motor carrier coordination.
05/29/2018	Start of Bridge Membrane phase
06/01/2018	KR executes sub-consultant agreement with DEA.
06/01/2018	ODOT creates PR fliers for EMS partners, including scheduled weekend crossovers.
06/08/2018	DEA draft submittal – detour plans & crossover drawings
06/09/2018	DEA draft TMP revisions
06/11/2018	ODOT begins public outreach effort
06/12/2018	KR & ODOT review comments provided to DEA
06/23/2018	DEA resubmittal of detour plans & crossover drawings
07/06/2018	DEA submits final signed crossover drawings
07/09/2018	Start of Mainline Paving phase
07/18/2018	Contract Change Order to Modify Traffic Control Plan
07/19/2018	Press conference with local news media
07/20/2018	Crossover Closure #1 – all weekend closures have hourly schedule and contractor contact lists. ODOT makes weekend staffing schedule with emergency contacts.
07/27/2018	Crossover Closure #2
08/03/2018	Crossover Closure #3
08/10/2018	Crossover Closure #4
08/17/2018	Crossover Closure #5
10/07/2018	Substantially Complete

STAGE I
WB Crossover

- GENERAL NOTES:
1. For ramp closure signage, see detour sheets.
2. Repeat "TWO WAY TRAFFIC" (W6-3) and "DO NOT PASS" (R4-1) signs on 1/2 mile spacing within limits of two-way traffic on mainline.



SECTION A-A

- | | |
|---------------------------------|--|
| † Sign on portable sign support | Temp. impact attenuator (Narrow site system) |
| c Barricade | Under traffic |
| c0 Barricade & sequential arrow | Under construction |
| c± Barricade & TSS | Temp. plastic drums on 10' max. spacing |
| ± TSS | Temp. plastic drums on 20' max. spacing |
| → Through traffic arrow | |
| ↗ Right traffic arrow | |
| ↖ Left traffic arrow | |

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OREGON
JANUARY 10, 2017
TAISEI IMAMURA

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OR569: ROOSEVELT BLVD. - COBURG RD. (EUGENE) SEC.
BELTLINE HIGHWAY
LANE COUNTY

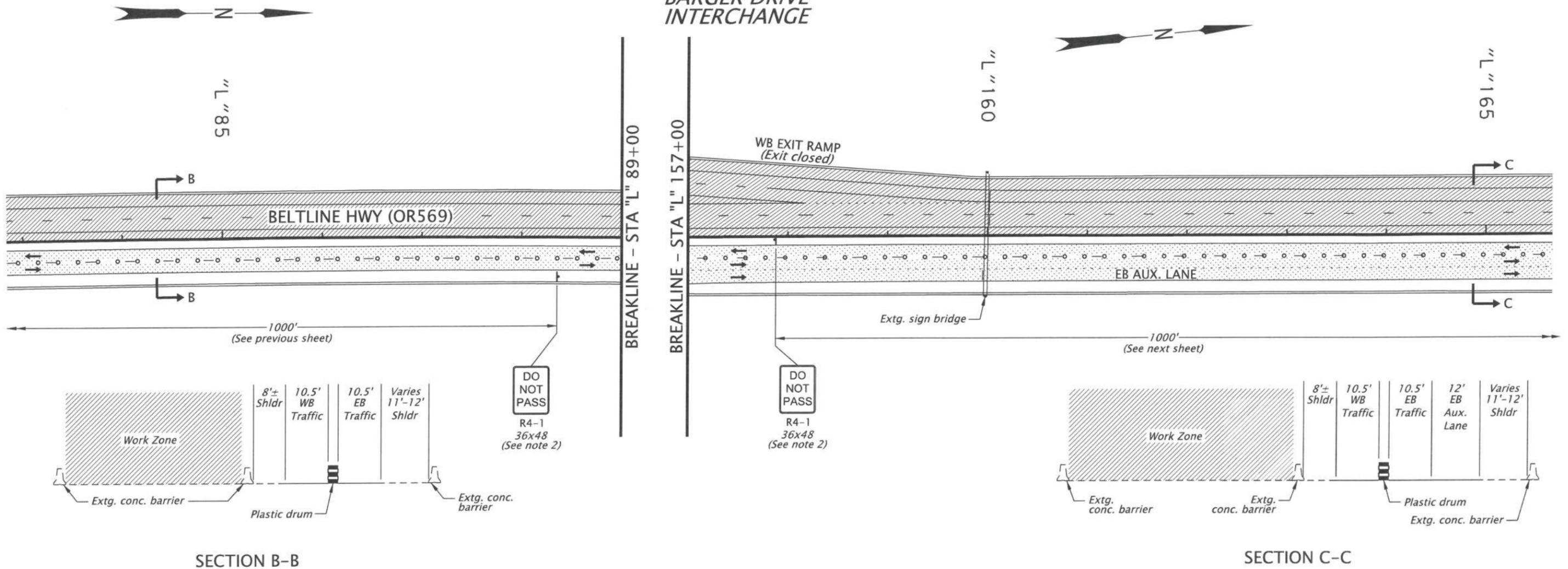
Designer: Tai Imamura
Reviewer: Scott McCanna
Drafter: Ryan Berger
Checker: Paul Tappana

TRAFFIC CONTROL PLAN

SHEET NO. EF01

STAGE I
WB Crossover

BARGER DRIVE
INTERCHANGE



SECTION B-B

SECTION C-C

† Sign on portable sign support	Temp. impact attenuator (Narrow site system)
c Barricade	Under traffic
c0 Barricade & sequential arrow	Under construction
c± Barricade & TSS	Temp. plastic drums on 10' max. spacing
± TSS	Temp. plastic drums on 20' max. spacing
→ Through traffic arrow	
↗ Right traffic arrow	
↖ Left traffic arrow	

GENERAL NOTES:
 1. For ramp closure signage, see detour sheets.
 2. Repeat "TWO WAY TRAFFIC" (W6-3) and "DO NOT PASS" (R4-1) signs on 1/2 mile spacing within limits of two-way traffic on mainline.

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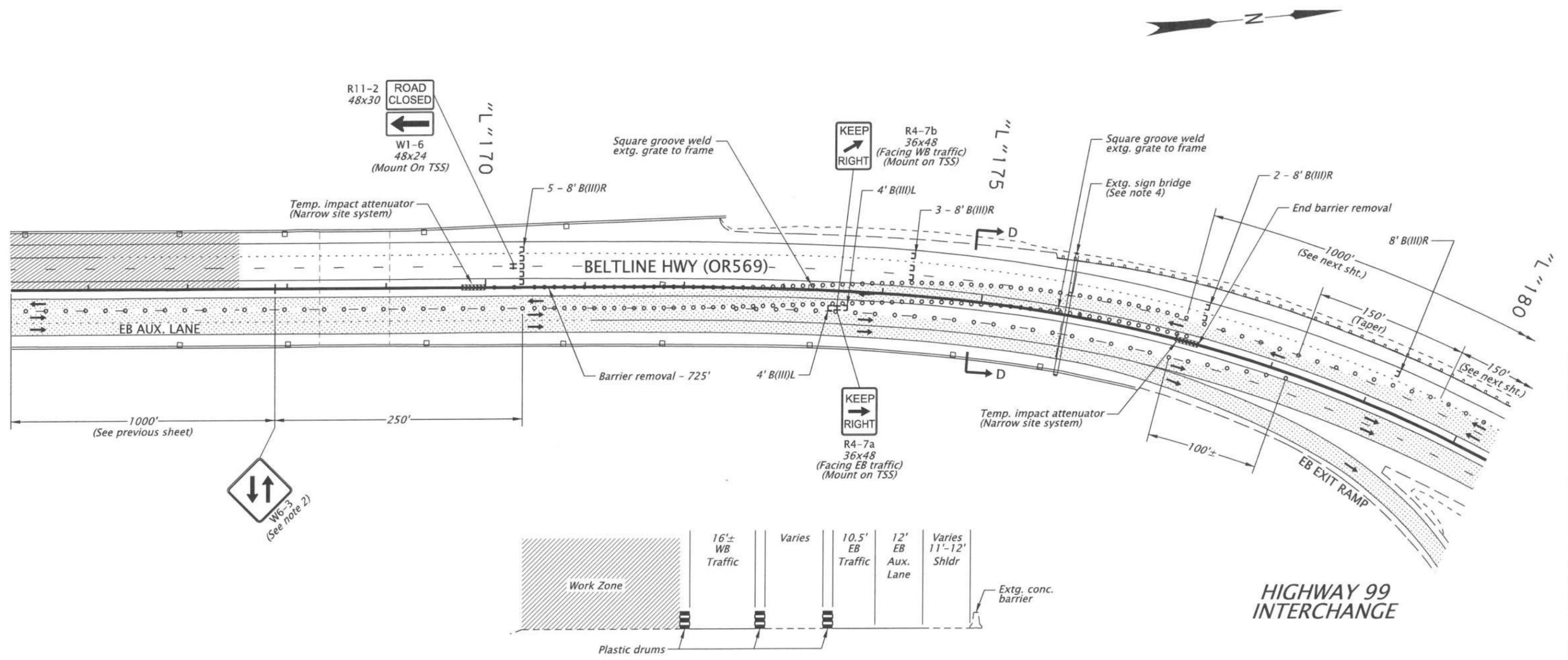
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 BELTLINE HIGHWAY
 LANE COUNTY

Designer: Tai Imamura Reviewer: Scott McCanna
 Drafter: Ryan Berger Checker: Paul Tappana

TRAFFIC CONTROL PLAN SHEET NO. EF02

STAGE I
WB Crossover



†	Sign on portable sign support		Temp. impact attenuator (Narrow site system)
c	Barricade	Under traffic
c 0	Barricade & sequential arrow		Under construction
c ±	Barricade & TSS	o o o o o	Temp. plastic drums on 10' max. spacing
±	TSS	o o o o	Temp. plastic drums on 20' max. spacing
→	Through traffic arrow		
↗	Right traffic arrow		
↖	Left traffic arrow		

SECTION D-D

- GENERAL NOTES:
1. For ramp closure signage, see detour sheets.
 2. Repeat "TWO WAY TRAFFIC" (W6-3) and "DO NOT PASS" (R4-1) signs on 1/2 mile spacing within limits of two-way traffic on mainline.
 3. Where barrier is removed between Stages I & II, place plastic drums at 10' spacing in the place of removed barrier.
 4. Cover existing "BARGER DR" and "EXIT ONLY" sign legend facing westbound OR569 traffic on sign bridge located at Sta. 175+80.
 5. Weld existing inlet grates and frames as directed, per specification 00560.26(b). Remove welds after Stage II crossover work in completed.

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RENEWS: 06-30-2019

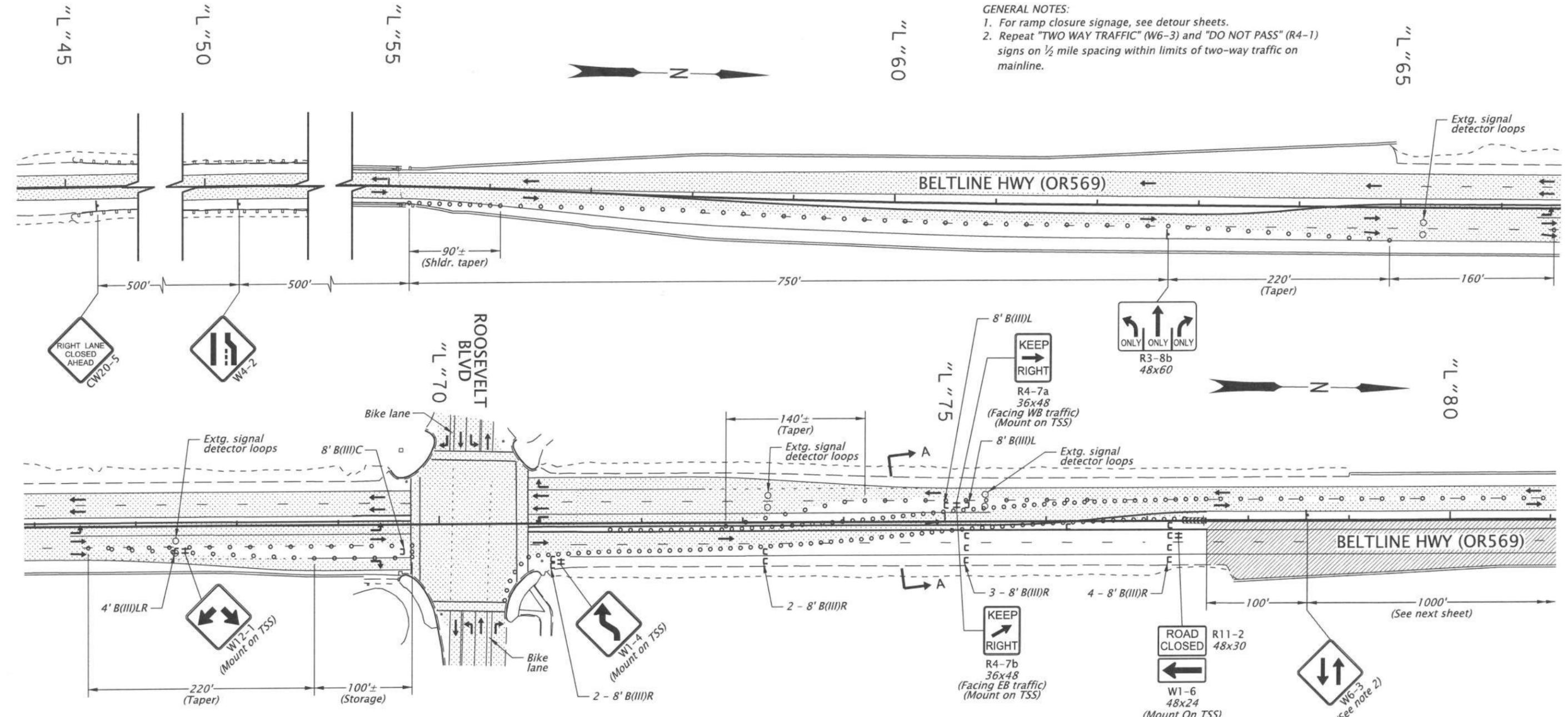
DAVID EVANS AND ASSOCIATES INC.
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OR569: ROOSEVELT BLVD. - COBURG RD. (EUGENE) SEC.
BELTLINE HIGHWAY
LANE COUNTY

Designer: Tai Imamura
Reviewer: Scott McCanna
Drafter: Ryan Berger
Checker: Paul Tappana

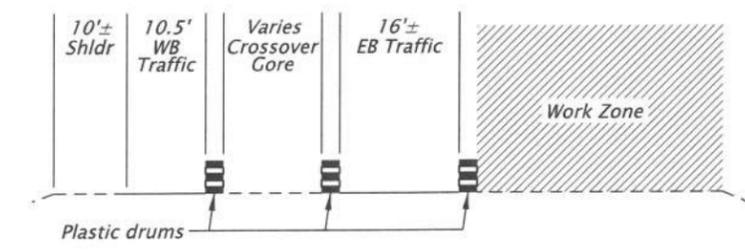
TRAFFIC CONTROL PLAN
SHEET NO. EF03

STAGE II
 EB Crossover



GENERAL NOTES:
 1. For ramp closure signage, see detour sheets.
 2. Repeat "TWO WAY TRAFFIC" (W6-3) and "DO NOT PASS" (R4-1) signs on 1/2 mile spacing within limits of two-way traffic on mainline.

- † Sign on portable sign support
- ▬ Barricade
- ▬▬ Barricade & sequential arrow
- ▬± Barricade & TSS
- ± TSS
- Through traffic arrow
- ↗ Right traffic arrow
- ↖ Left traffic arrow
- ▬▬▬ Temp. impact attenuator (Narrow site system)
- ▬▬▬ Under traffic
- ▬▬▬ Under construction
- ○ ○ ○ ○ Temp. plastic drums on 10' max. spacing
- ○ ○ ○ ○ Temp. plastic drums on 20' max. spacing



SECTION A-A

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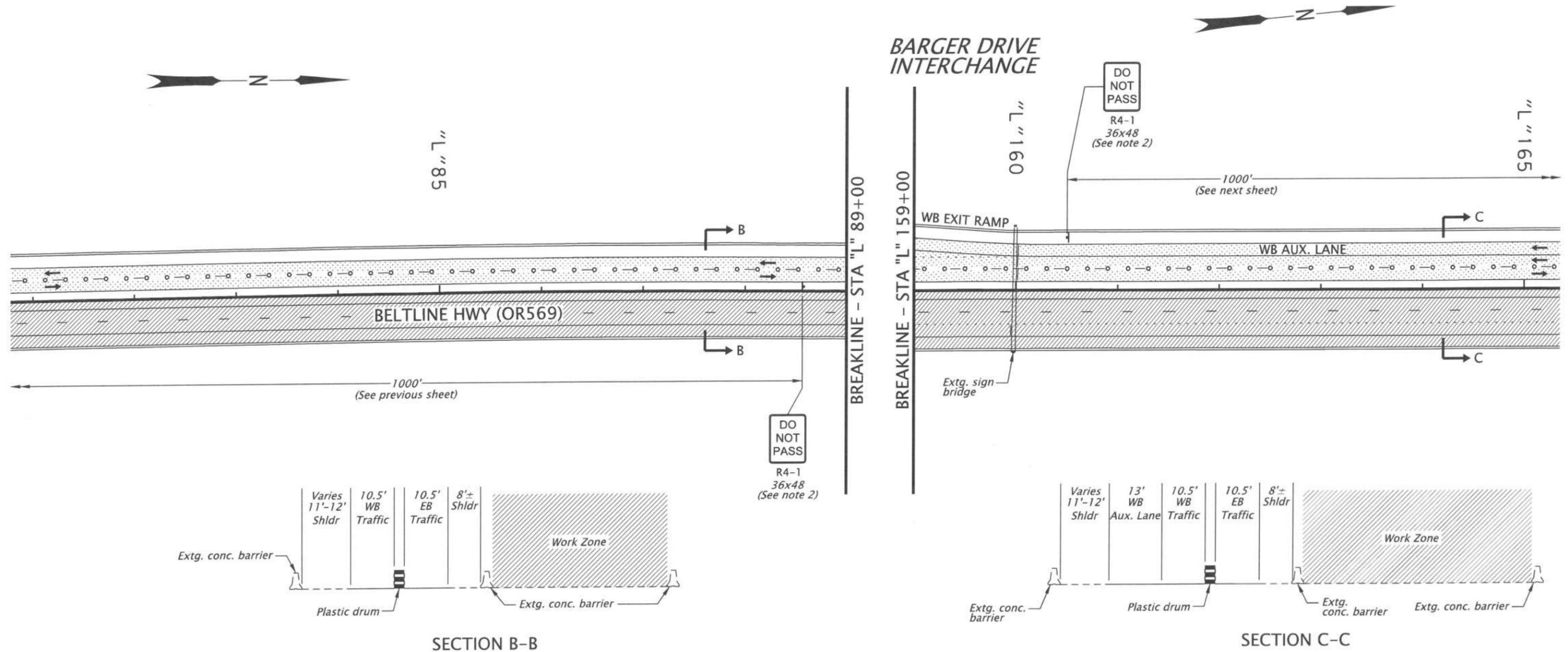
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OR569: ROOSEVELT BLVD. - COBURG RD. (EUGENE) SEC.
 BELTLINE HIGHWAY
 LANE COUNTY

Designer: Tai Imamura Reviewer: Scott McCanna
 Drafter: Ryan Berger Checker: Paul Tappana

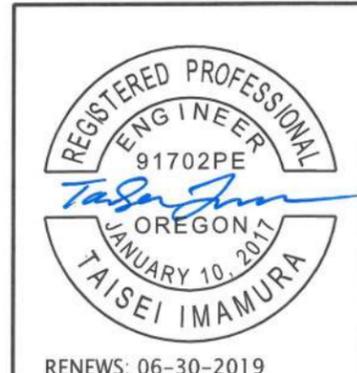
TRAFFIC CONTROL PLAN SHEET NO. EF05

STAGE II
EB Crossover



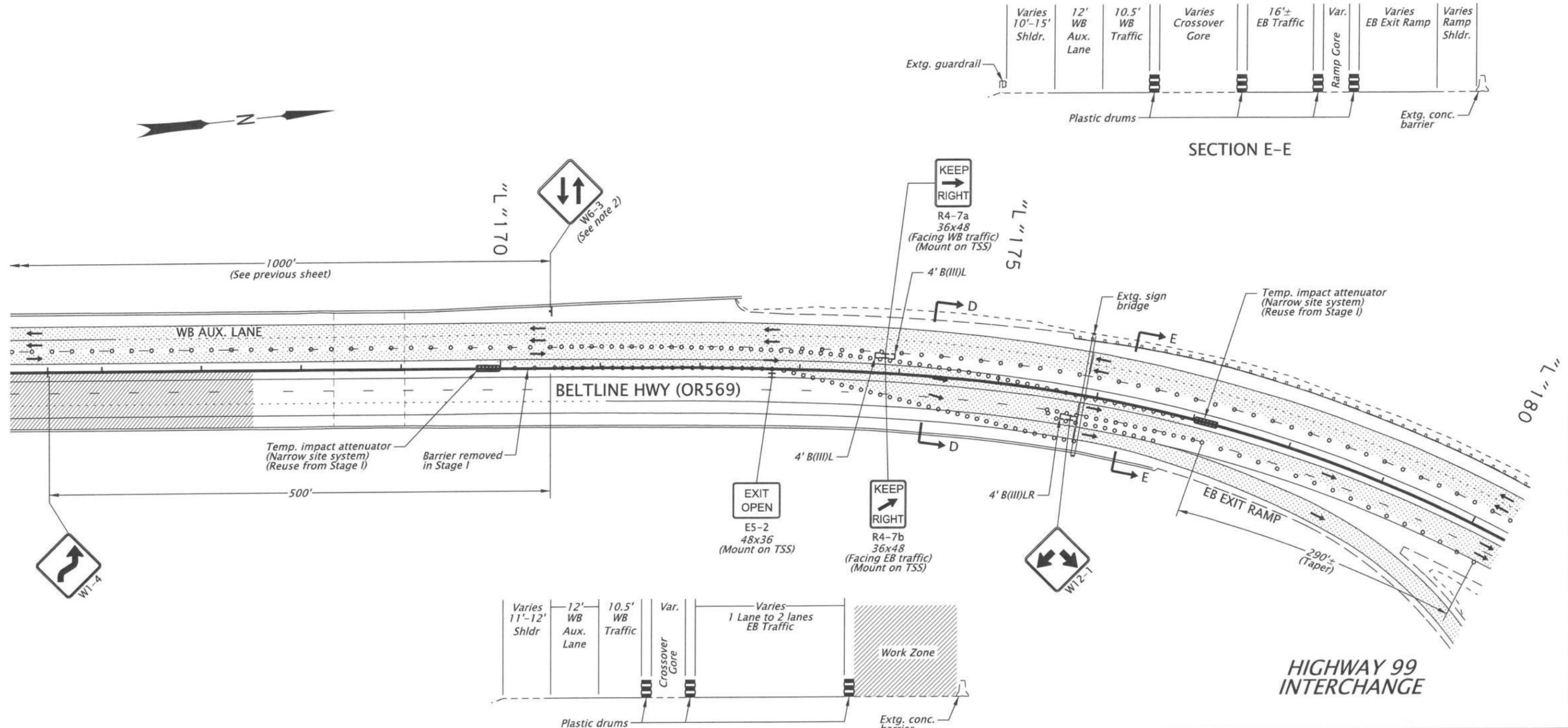
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c	Barricade	Under traffic
c0	Barricade & sequential arrow		Under construction
c±	Barricade & TSS	o o o o o	Temp. plastic drums on 10' max. spacing
±	TSS	o o o o	Temp. plastic drums on 20' max. spacing
→	Through traffic arrow		
↗	Right traffic arrow		
↖	Left traffic arrow		

GENERAL NOTES:
 1. For ramp closure signage, see detour sheets.
 2. Repeat "TWO WAY TRAFFIC" (W6-3) and "DO NOT PASS" (R4-1) signs on 1/2 mile spacing within limits of two-way traffic on mainline.



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OR569: ROOSEVELT BLVD. - COBURG RD. (EUGENE) SEC. BELTLINE HIGHWAY LANE COUNTY		
Designer: Tai Imamura	Reviewer: Scott McCanna	
Drafter: Ryan Berger	Checker: Paul Tappana	
TRAFFIC CONTROL PLAN		SHEET NO. EF06

STAGE II
 EB Crossover



- † Sign on portable sign support
- c Barricade
- c0 Barricade & sequential arrow
- c± Barricade & TSS
- ± TSS
- Through traffic arrow
- ↗ Right traffic arrow
- ↖ Left traffic arrow
- Temp. impact attenuator (Narrow site system)
- Under traffic
- Under construction
- Temp. plastic drums on 10' max. spacing
- Temp. plastic drums on 20' max. spacing

SECTION D-D

GENERAL NOTES:
 1. For ramp closure signage, see detour sheets.
 2. Repeat "TWO WAY TRAFFIC" (W6-3) and "DO NOT PASS" (R4-1) signs on 1/2 mile spacing within limits of two-way traffic on mainline.

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 JANUARY 10, 2017
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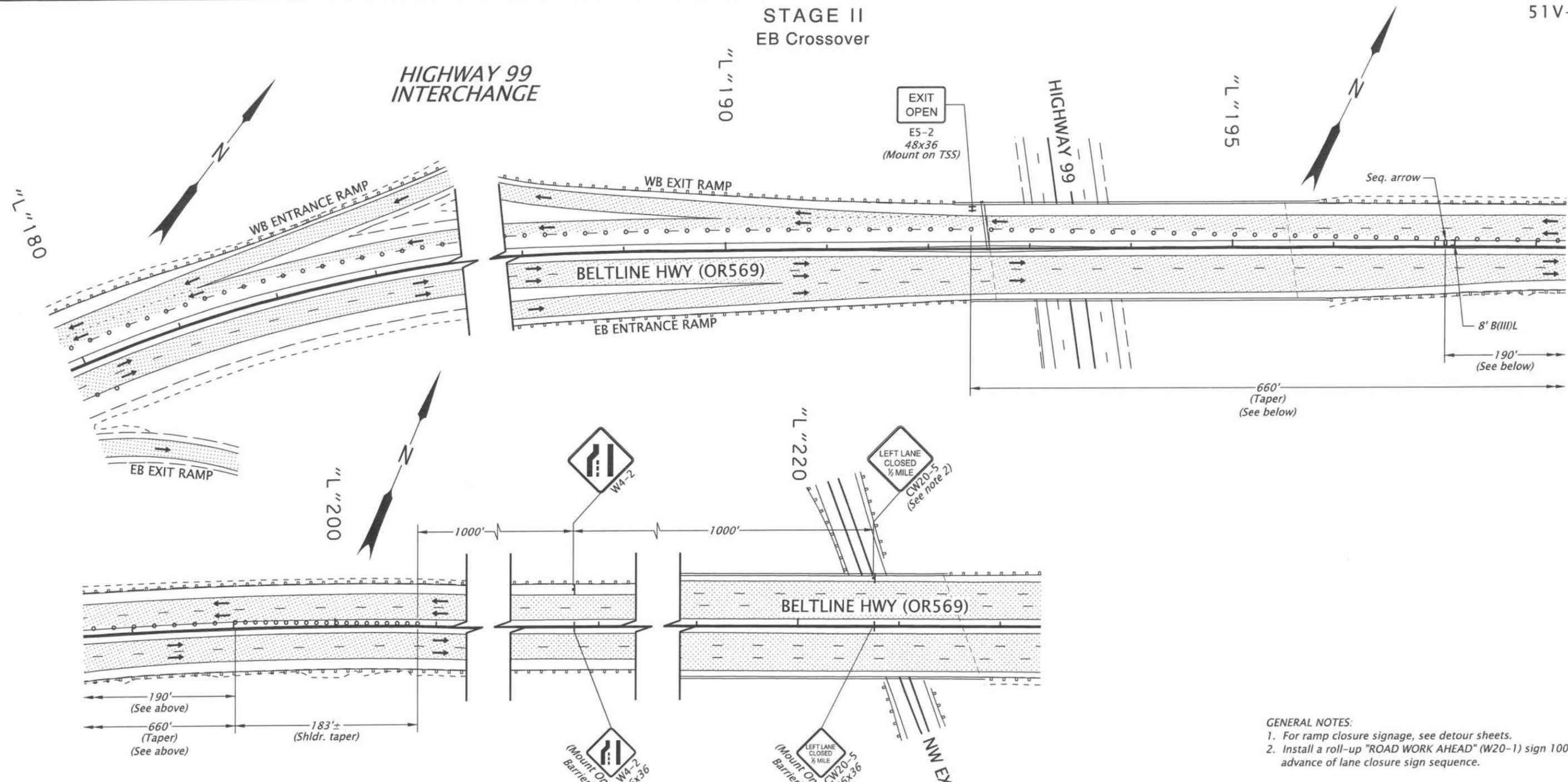
DAVID EVANS AND ASSOCIATES INC.
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OR569: ROOSEVELT BLVD. - COBURG RD. (EUGENE) SEC.
 BELTLINE HIGHWAY
 LANE COUNTY

Designer: Tai Imamura
 Drafter: Ryan Berger
 Reviewer: Scott McCanna
 Checker: Paul Tappana

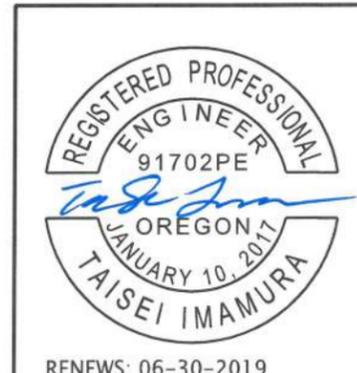
TRAFFIC CONTROL PLAN

SHEET NO. EF07



- GENERAL NOTES:**
1. For ramp closure signage, see detour sheets.
 2. Install a roll-up "ROAD WORK AHEAD" (W20-1) sign 1000' in advance of lane closure sign sequence.

† Sign on portable sign support	Temp. impact attenuator (Narrow site system)
c Barricade	Under traffic
c0 Barricade & sequential arrow	Under construction
c± Barricade & TSS	Temp. plastic drums on 10' max. spacing
± TSS	Temp. plastic drums on 20' max. spacing
→ Through traffic arrow	
↗ Right traffic arrow	
↖ Left traffic arrow	



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 BELTLINE HIGHWAY
 LANE COUNTY

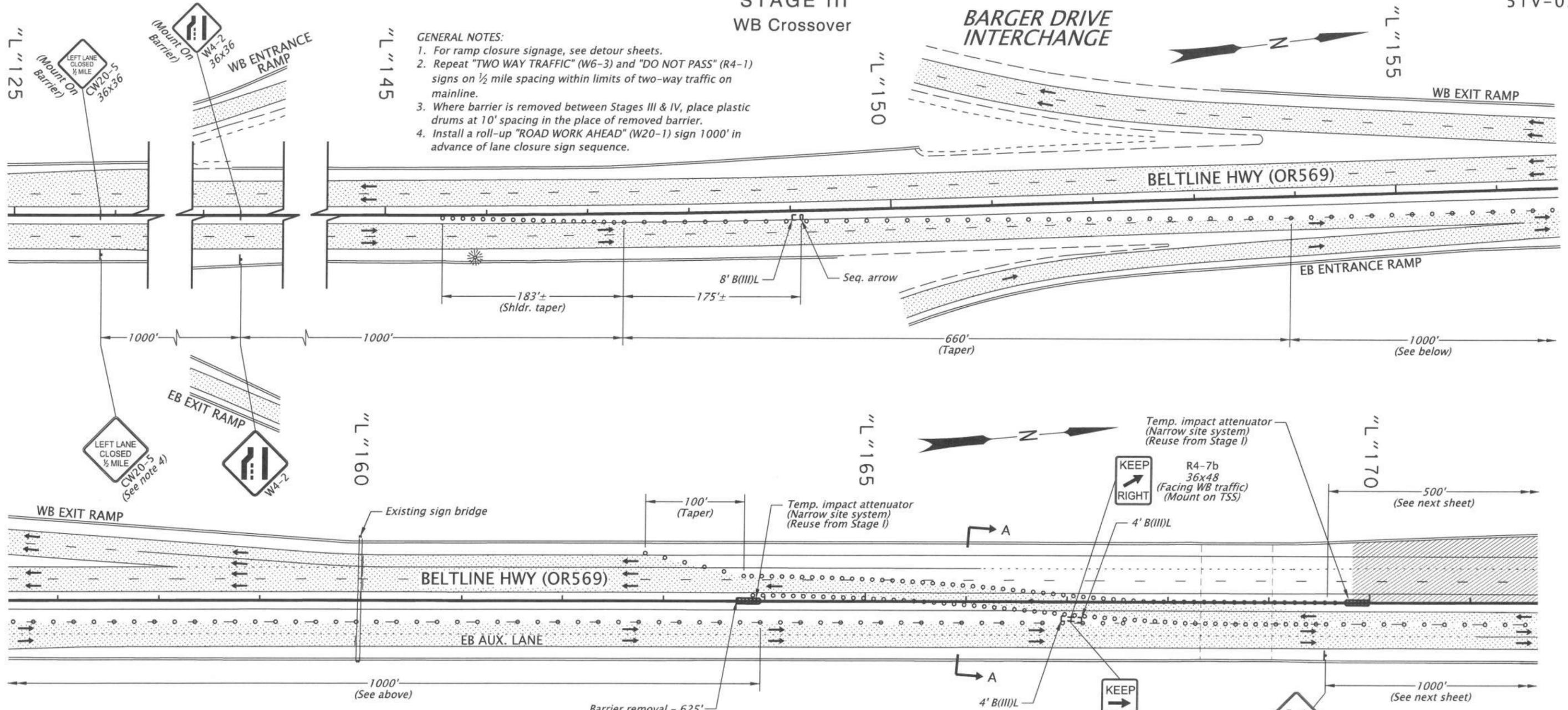
Designer: Tai Imamura Reviewer: Scott McCanna
 Drafter: Ryan Berger Checker: Paul Tappana

TRAFFIC CONTROL PLAN SHEET NO. EF08

STAGE III
 WB Crossover

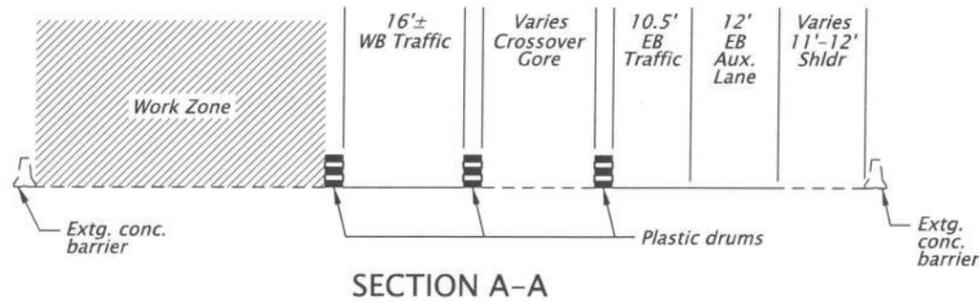
BARGER DRIVE
 INTERCHANGE

- GENERAL NOTES:
 1. For ramp closure signage, see detour sheets.
 2. Repeat "TWO WAY TRAFFIC" (W6-3) and "DO NOT PASS" (R4-1) signs on 1/2 mile spacing within limits of two-way traffic on mainline.
 3. Where barrier is removed between Stages III & IV, place plastic drums at 10' spacing in the place of removed barrier.
 4. Install a roll-up "ROAD WORK AHEAD" (W20-1) sign 1000' in advance of lane closure sign sequence.



BARGER DRIVE
 INTERCHANGE

- | | |
|--|---|
| † Sign on portable sign support | Under traffic |
| c Barricade | Under construction |
| c0 Barricade & sequential arrow | Temp. plastic drums on 10' max. spacing |
| c± Barricade & TSS | Temp. plastic drums on 20' max. spacing |
| # TSS | |
| → Through traffic arrow | |
| Temp. impact attenuator (Narrow site system) | |



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RENEWS: 06-30-2019

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 LANE COUNTY

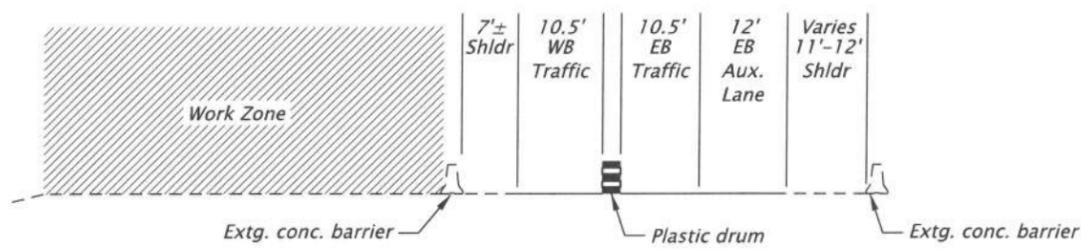
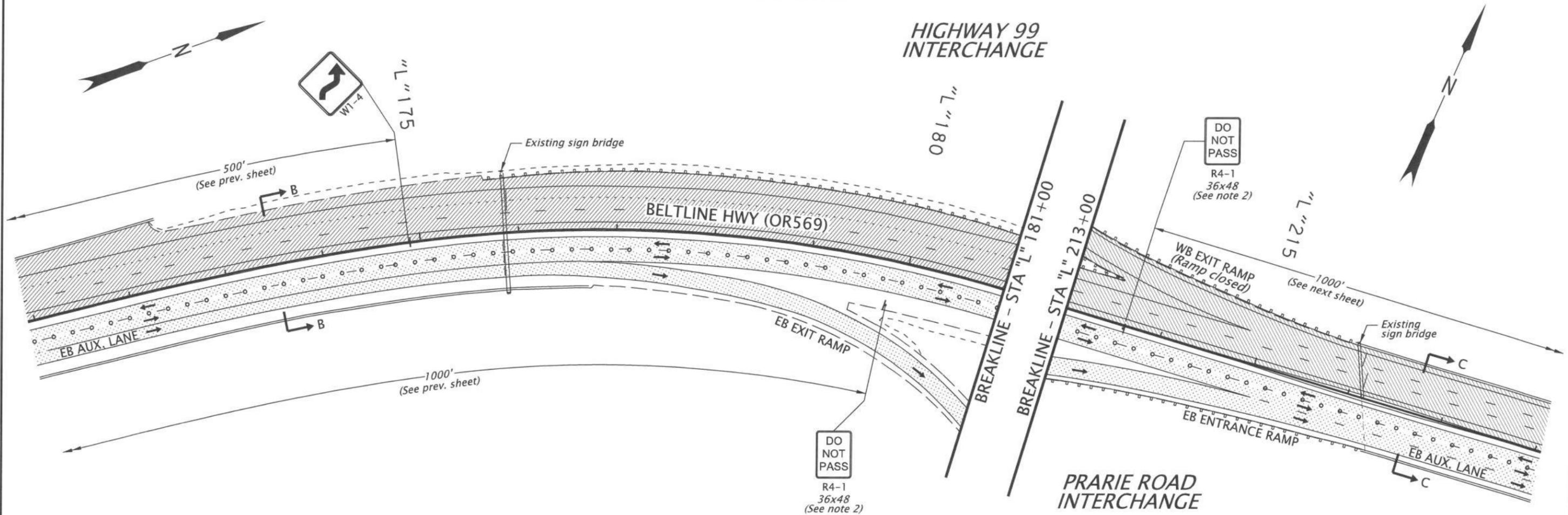
Designer: Tai Imamura
 Drafter: Ryan Berger
 Reviewer: Scott McCanna
 Checker: Paul Tappana

TRAFFIC CONTROL PLAN

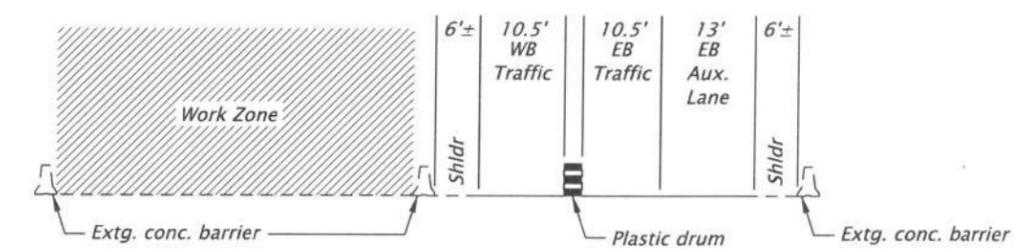
SHEET NO.
 EF09

STAGE III
WB Crossover

51V-036



SECTION B-B



SECTION C-C

- | | | | |
|----|--|-------------|---|
| † | Sign on portable sign support | ▨ | Under traffic |
| c | Barricade | ▩ | Under construction |
| c0 | Barricade & sequential arrow | ○ ○ ○ ○ ○ ○ | Temp. plastic drums on 10' max. spacing |
| c± | Barricade & TSS | ○ ○ ○ ○ | Temp. plastic drums on 20' max. spacing |
| ± | TSS | | |
| → | Through traffic arrow | | |
| | Temp. impact attenuator (Narrow site system) | | |

GENERAL NOTES:
1. For ramp closure signage, see detour sheets.
2. Repeat "TWO WAY TRAFFIC" (W6-3) and "DO NOT PASS" (R4-1) signs on 1/2 mile spacing within limits of two-way traffic on mainline.



RENEWS: 06-30-2019

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BELTLINE HIGHWAY
LANE COUNTY

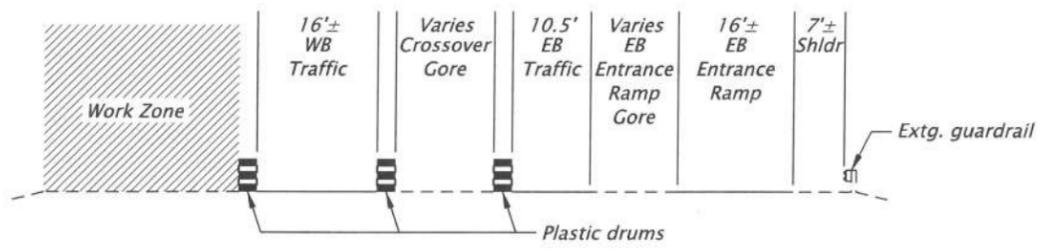
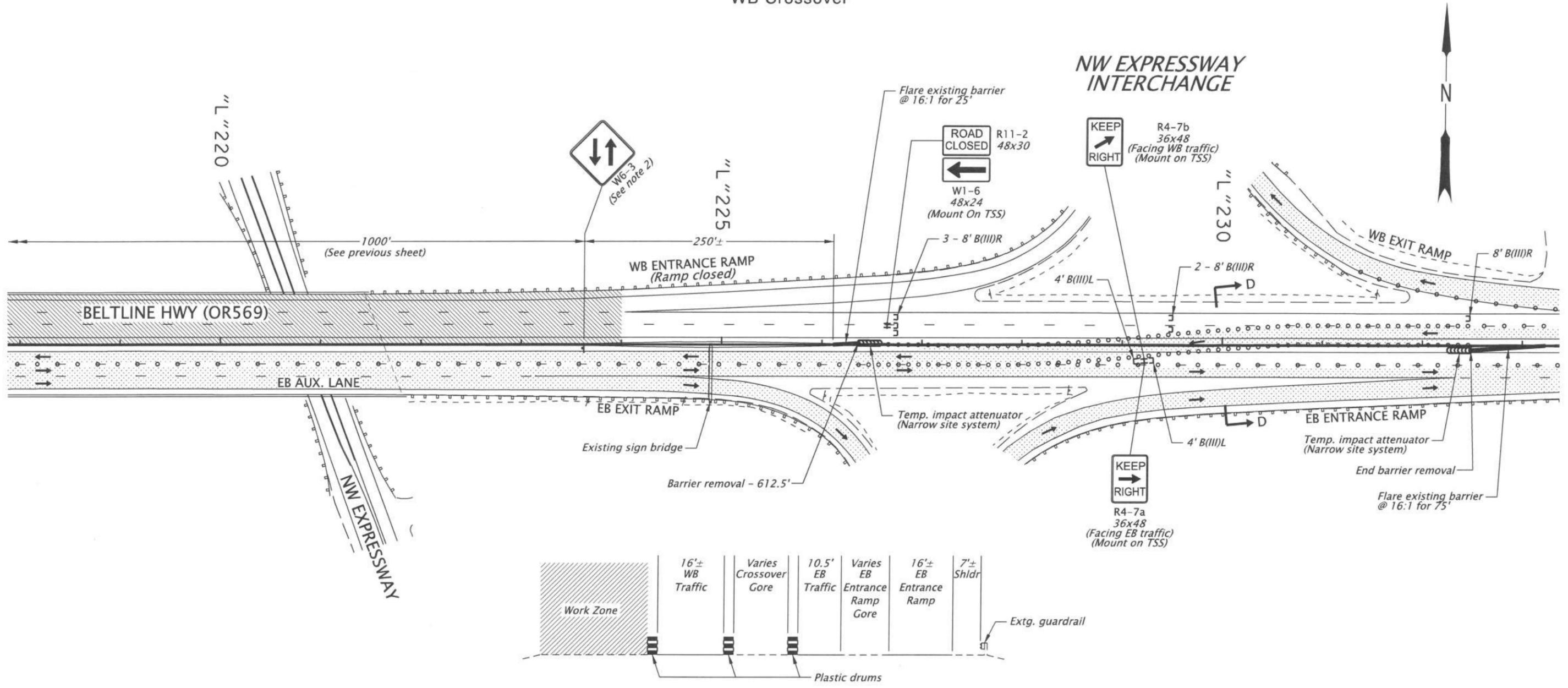
Designer: Tai Imamura
Reviewer: Scott McCanna
Drafter: Ryan Berger
Checker: Paul Tappana

TRAFFIC CONTROL PLAN

SHEET NO.
EF10

STAGE III
 WB Crossover

51V-036



SECTION D-D

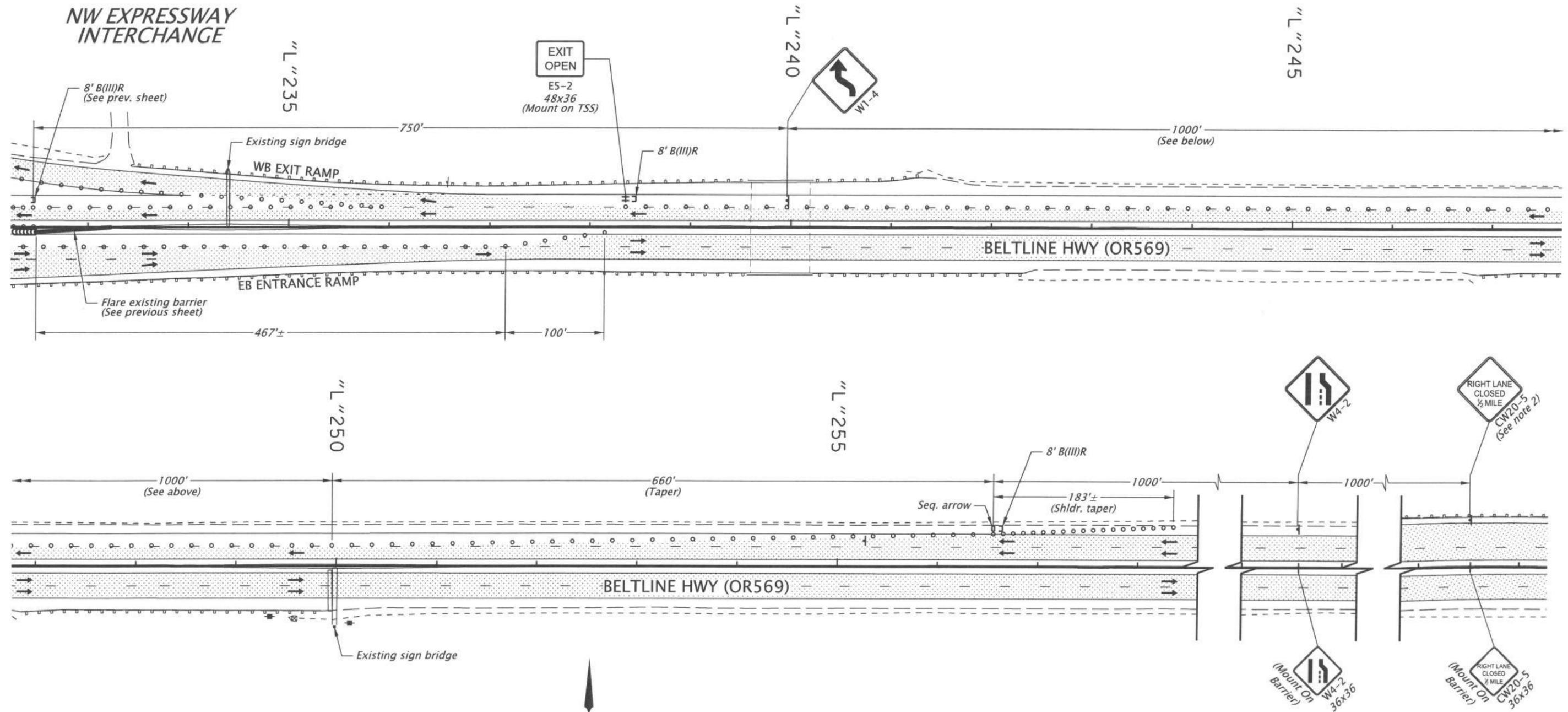
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⊞ Barricade	Under construction
⊞ Barricade & sequential arrow	Temp. plastic drums on 10' max. spacing
⊞ Barricade & TSS	Temp. plastic drums on 20' max. spacing
± TSS	
→ Through traffic arrow	
Temp. impact attenuator (Narrow site system)	

- GENERAL NOTES:
1. For ramp closure signage, see detour sheets.
 2. Repeat "TWO WAY TRAFFIC" (W6-3) and "DO NOT PASS" (R4-1) signs on 1/2 mile spacing within limits of two-way traffic on mainline.
 3. Temporary barrier flares to be removed prior to opening all lanes to traffic.



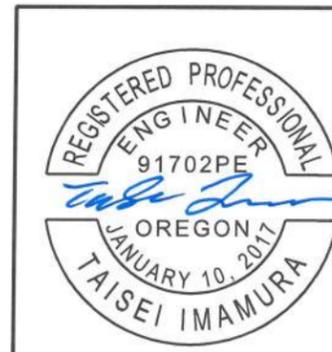
<p>DAVID EVANS AND ASSOCIATES INC. 530 Center Street N.E., Suite 605 Salem Oregon 97301 Phone: 503.361.8635</p>		
<p>OR569: ROOSEVELT BLVD. - COBURG RD. (EUGENE) SEC. BELTLINE HIGHWAY LANE COUNTY</p>		
Designer: Tai Imamura Drafter: Ryan Berger	Reviewer: Scott McCanna Checker: Paul Tappana	SHEET NO. EF11
<p>TRAFFIC CONTROL PLAN</p>		

STAGE III
 WB Crossover



†	Sign on portable sign support		Under traffic
c	Barricade		Under construction
c0	Barricade & sequential arrow	o o o o o	Temp. plastic drums on 10' max. spacing
c±	Barricade & TSS	o o o o	Temp. plastic drums on 20' max. spacing
±	TSS		
→	Through traffic arrow		
	Temp. impact attenuator (Narrow site system)		

- GENERAL NOTES:
1. For ramp closure signage, see detour sheets.
 2. Install a roll-up "ROAD WORK AHEAD" (W20-1) sign 1000' in advance of lane closure sign sequence.
 3. Temporary barrier flares to be removed prior to opening all lanes to traffic.



RENEWS: 06-30-2019

FINAL ELECTRONIC DOCUMENT
 AVAILABLE UPON REQUEST

DAVID EVANS AND ASSOCIATES INC.
 530 Center Street N.E., Suite 605
 Salem Oregon 97301
 Phone: 503.361.8635



OR569: ROOSEVELT BLVD. - COBURG RD. (EUGENE) SEC.
 BELTLINE HIGHWAY
 LANE COUNTY

Designer: Tai Imamura
 Drafter: Ryan Berger
 Reviewer: Scott McCanna
 Checker: Paul Tappana

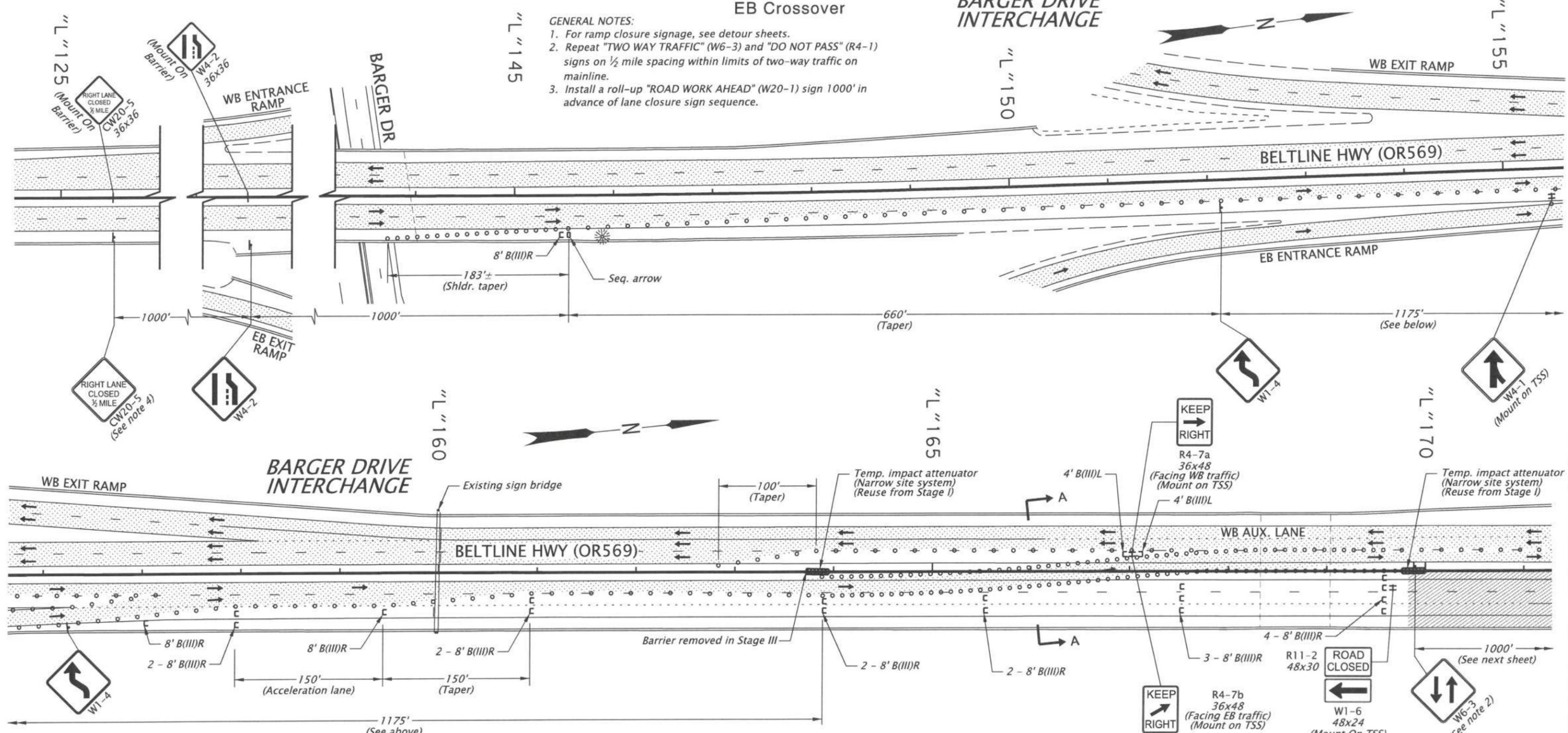
TRAFFIC CONTROL PLAN

SHEET NO.
 EF12

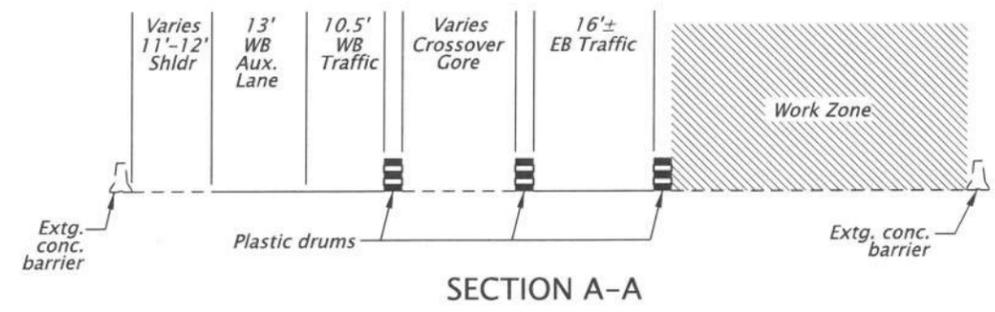
STAGE IV
EB Crossover

BARGER DRIVE
INTERCHANGE

- GENERAL NOTES:
 1. For ramp closure signage, see detour sheets.
 2. Repeat "TWO WAY TRAFFIC" (W6-3) and "DO NOT PASS" (R4-1) signs on 1/2 mile spacing within limits of two-way traffic on mainline.
 3. Install a roll-up "ROAD WORK AHEAD" (W20-1) sign 1000' in advance of lane closure sign sequence.



- † Sign on portable sign support
- c Barricade
- c0 Barricade & sequential arrow
- c± Barricade & TSS
- ± TSS
- Through traffic arrow
- Temp. impact attenuator (Narrow site system)
- Under traffic
- Under construction
- Temp. plastic drums on 10' max. spacing
- Temp. plastic drums on 20' max. spacing



REGISTERED PROFESSIONAL
ENGINEER
91702PE
TAISEI IMAMURA
JANUARY 10, 2017
OREGON

RENEWS: 06-30-2019

DAVID EVANS AND ASSOCIATES INC.
530 Center Street N.E., Suite 605
Salem Oregon 97301
Phone: 503.361.8635

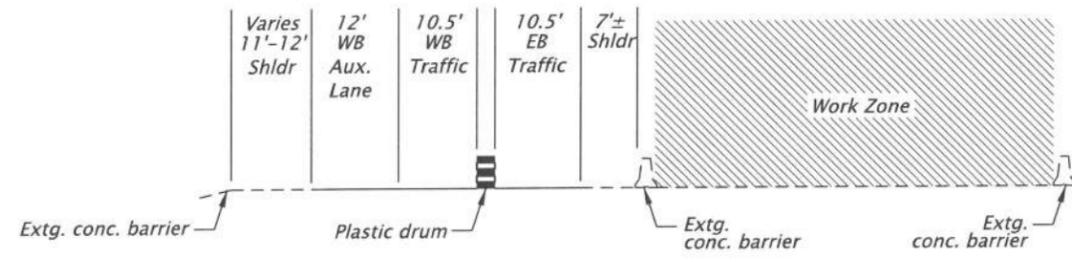
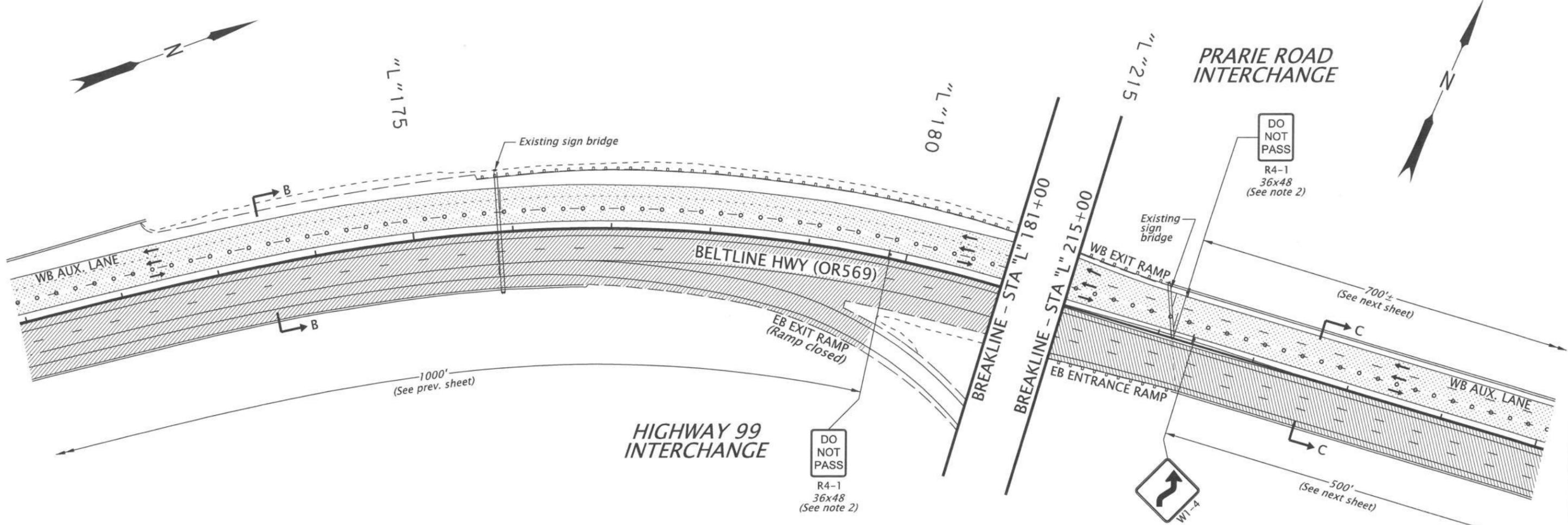
OR569: ROOSEVELT BLVD. - COBURG RD. (EUGENE) SEC.
BELTLINE HIGHWAY
LANE COUNTY

Designer: Tai Imamura
Reviewer: Scott McCanna
Drafter: Ryan Berger
Checker: Paul Tappana

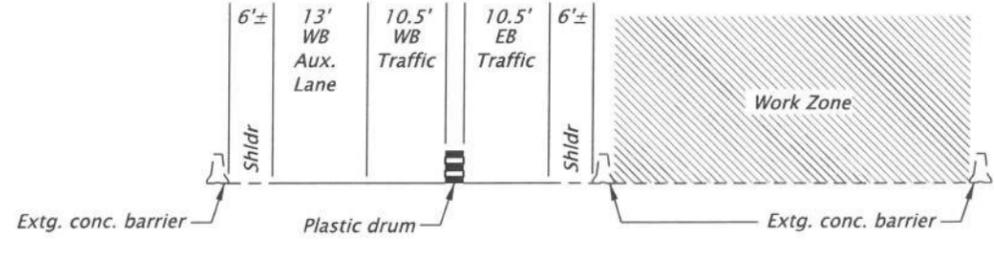
TRAFFIC CONTROL PLAN

SHEET NO.
EF13

STAGE IV
 EB Crossover



SECTION B-B



SECTION C-C

†	Sign on portable sign support		Under traffic
c	Barricade		Under construction
c 0	Barricade & sequential arrow	o o o o o o	Temp. plastic drums on 10' max. spacing
c ±	Barricade & TSS	o o o o	Temp. plastic drums on 20' max. spacing
±	TSS		
→	Through traffic arrow		
	Temp. impact attenuator (Narrow site system)		

GENERAL NOTES:
 1. For ramp closure signage, see detour sheets.
 2. Repeat "TWO WAY TRAFFIC" (W6-3) and "DO NOT PASS" (R4-1) signs on 1/2 mile spacing within limits of two-way traffic on mainline.

REGISTERED PROFESSIONAL
 ENGINEER
 91702PE

 OREGON
 JANUARY 10, 2017
 TAISEI IMAMURA

DAVID EVANS AND ASSOCIATES INC.
 530 Center Street N.E., Suite 605
 Salem Oregon 97301
 Phone: 503.361.8635

OR569: ROOSEVELT BLVD. - COBURG RD. (EUGENE) SEC.
 BELTLINE HIGHWAY
 LANE COUNTY

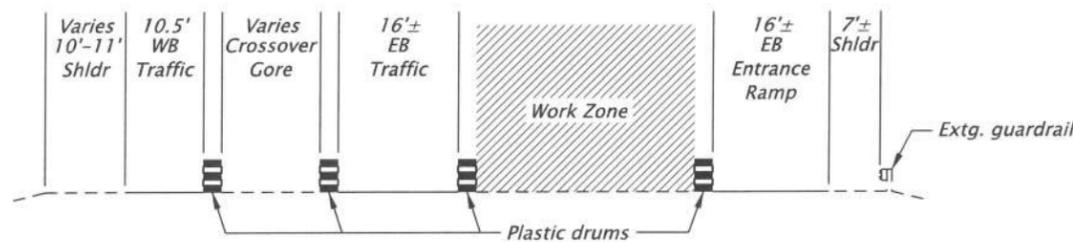
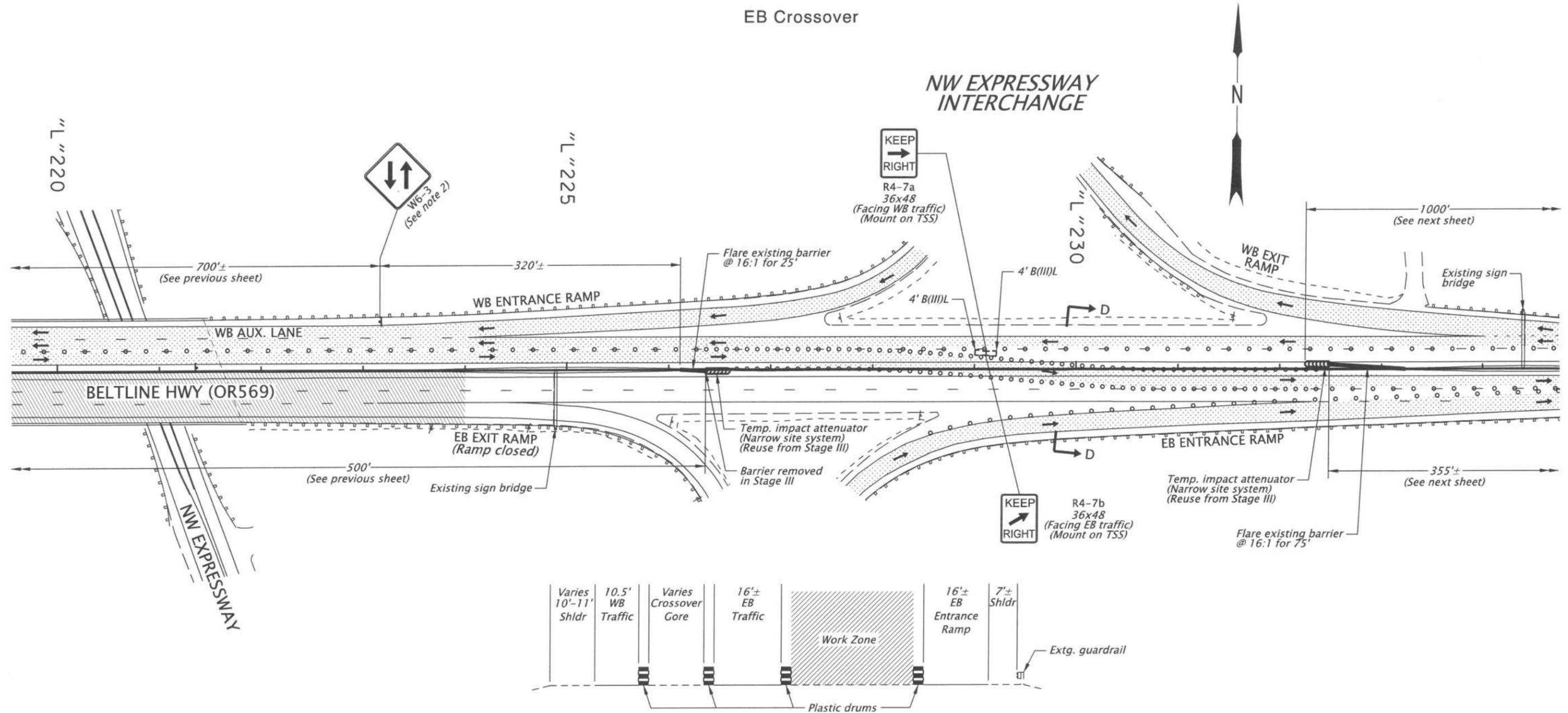
Designer: Tai Imamura
 Drafter: Ryan Berger
 Reviewer: Scott McCanna
 Checker: Paul Tappana

TRAFFIC CONTROL PLAN
 SHEET NO. EF14

RENEWS: 06-30-2019

FINAL ELECTRONIC DOCUMENT
 AVAILABLE UPON REQUEST

STAGE IV
 EB Crossover



SECTION D-D

† Sign on portable sign support	Under traffic
c Barricade	Under construction
c 0 Barricade & sequential arrow	Temp. plastic drums on 10' max. spacing
c ± Barricade & TSS	Temp. plastic drums on 20' max. spacing
± TSS	
→ Through traffic arrow	
Temp. impact attenuator (Narrow site system)	

- GENERAL NOTES:
1. For ramp closure signage, see detour sheets.
 2. Repeat "TWO WAY TRAFFIC" (W6-3) and "DO NOT PASS" (R4-1) signs on 1/2 mile spacing within limits of two-way traffic on mainline.
 3. Temporary barrier flares to be removed prior to opening all lanes of traffic.



RENEWS: 06-30-2019

DAVID EVANS AND ASSOCIATES INC.
 530 Center Street N.E., Suite 605
 Salem Oregon 97301
 Phone: 503.361.8635

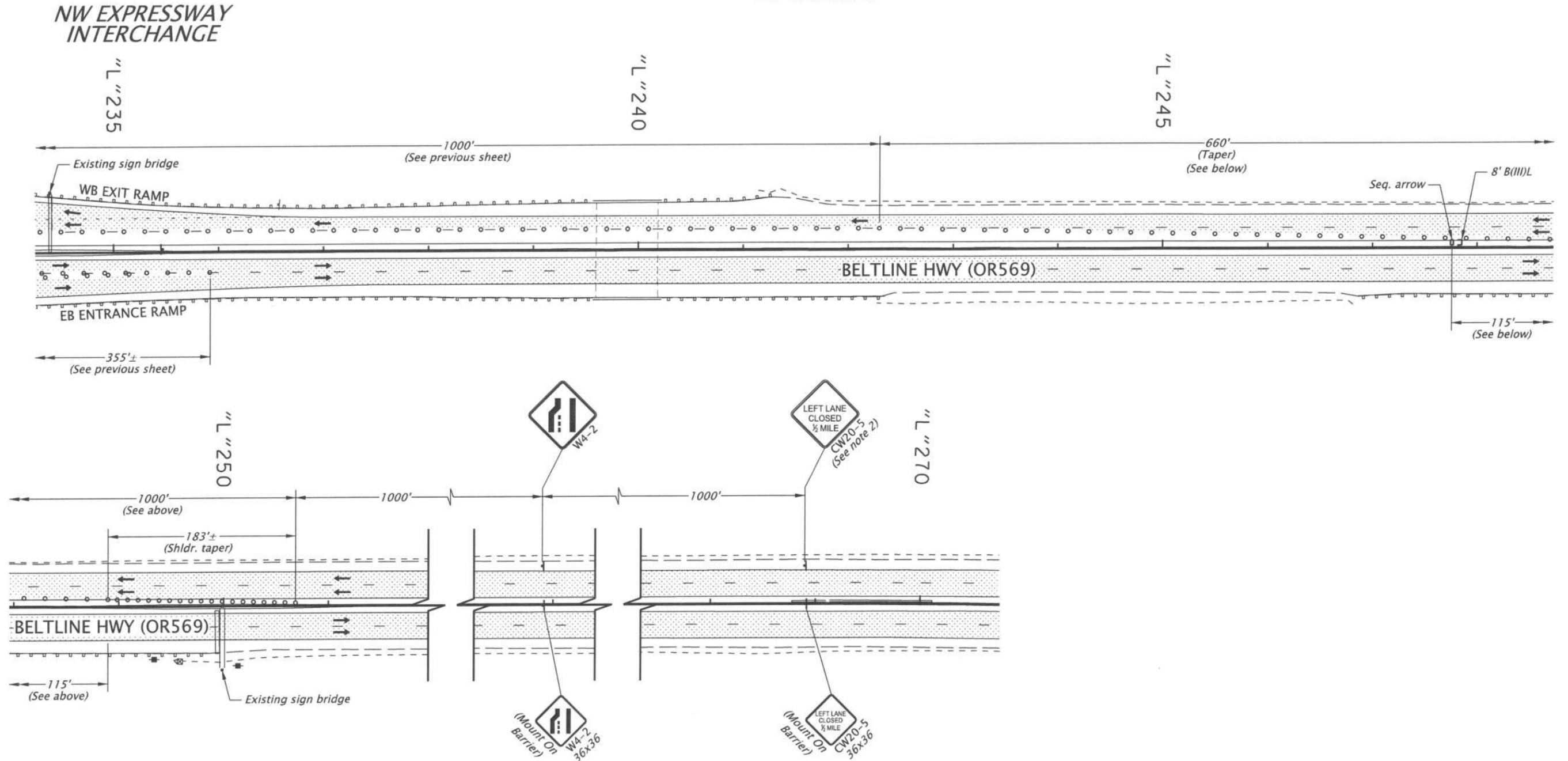
OR569: ROOSEVELT BLVD. - COBURG RD. (EUGENE) SEC.
 BELTLINE HIGHWAY
 LANE COUNTY

Designer: Tai Imamura
 Drafter: Ryan Berger
 Reviewer: Scott McCanna
 Checker: Paul Tappana

TRAFFIC CONTROL PLAN

SHEET NO.
EF15

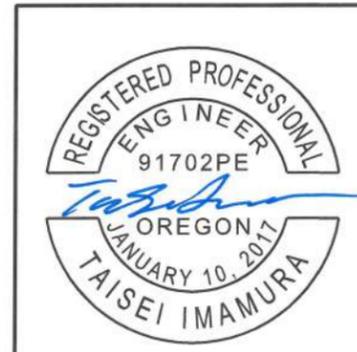
STAGE IV
 EB Crossover



- | | | | |
|-----|--|-------------|---|
| † | Sign on portable sign support | | Under traffic |
| c | Barricade | | Under construction |
| c 0 | Barricade & sequential arrow | o o o o o o | Temp. plastic drums on 10' max. spacing |
| c ± | Barricade & TSS | o o o o | Temp. plastic drums on 20' max. spacing |
| ± | TSS | | |
| → | Through traffic arrow | | |
| | Temp. impact attenuator (Narrow site system) | | |

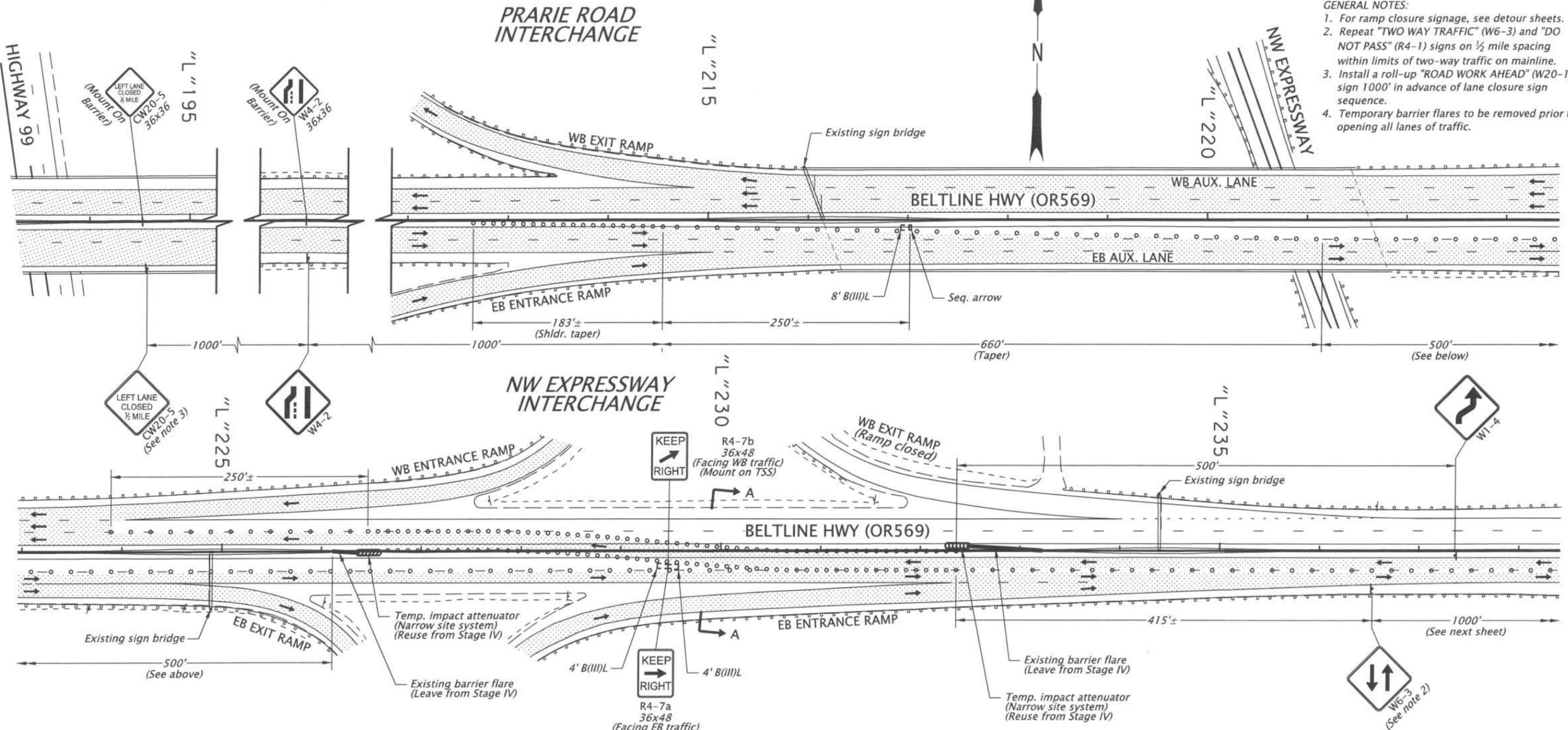


GENERAL NOTES:
 1. For ramp closure signage, see detour sheets.
 2. Install a roll-up "ROAD WORK AHEAD" (W20-1) sign 1000' in advance of lane closure sign sequence.

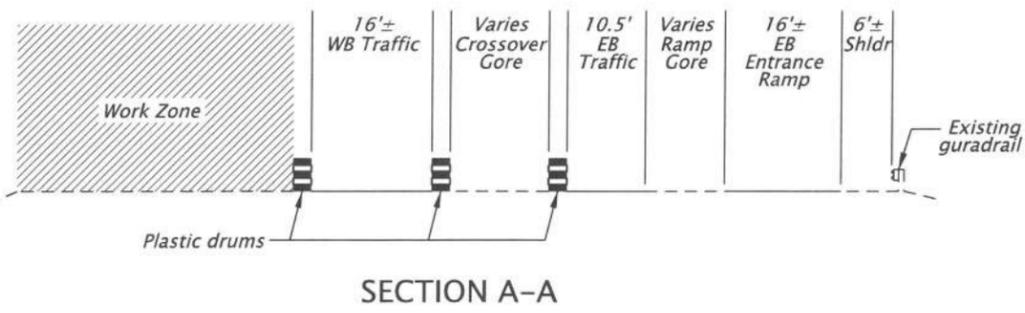


 DAVID EVANS AND ASSOCIATES INC. 530 Center Street N.E., Suite 605 Salem Oregon 97301 Phone: 503.361.8635		
OR569: ROOSEVELT BLVD. - COBURG RD. (EUGENE) SEC. BELTLINE HIGHWAY LANE COUNTY		
Designer: Tai Imamura	Reviewer: Scott McCanna	
Drafter: Ryan Berger	Checker: Paul Tappana	
TRAFFIC CONTROL PLAN		SHEET NO. EF16

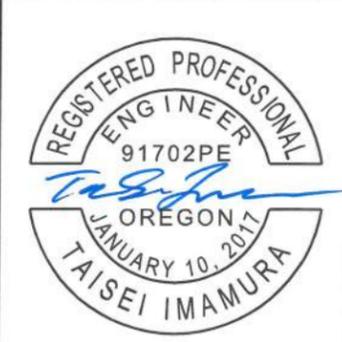
STAGE V
 WB Crossover



- GENERAL NOTES:
1. For ramp closure signage, see detour sheets.
 2. Repeat "TWO WAY TRAFFIC" (W6-3) and "DO NOT PASS" (R4-1) signs on 1/2 mile spacing within limits of two-way traffic on mainline.
 3. Install a roll-up "ROAD WORK AHEAD" (W20-1) sign 1000' in advance of lane closure sign sequence.
 4. Temporary barrier flares to be removed prior to opening all lanes of traffic.



- | | | | |
|----|--|--|---|
| † | Sign on portable sign support | | Under traffic |
| C | Barricade | | Under construction |
| C0 | Barricade & sequential arrow | | Temp. plastic drums on 10' max. spacing |
| C± | Barricade & TSS | | Temp. plastic drums on 20' max. spacing |
| H | TSS | | |
| → | Through traffic arrow | | |
| | Temp. impact attenuator (Narrow site system) | | |



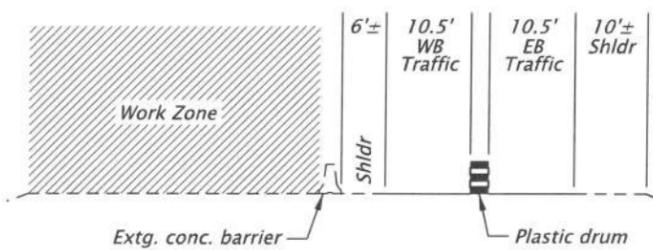
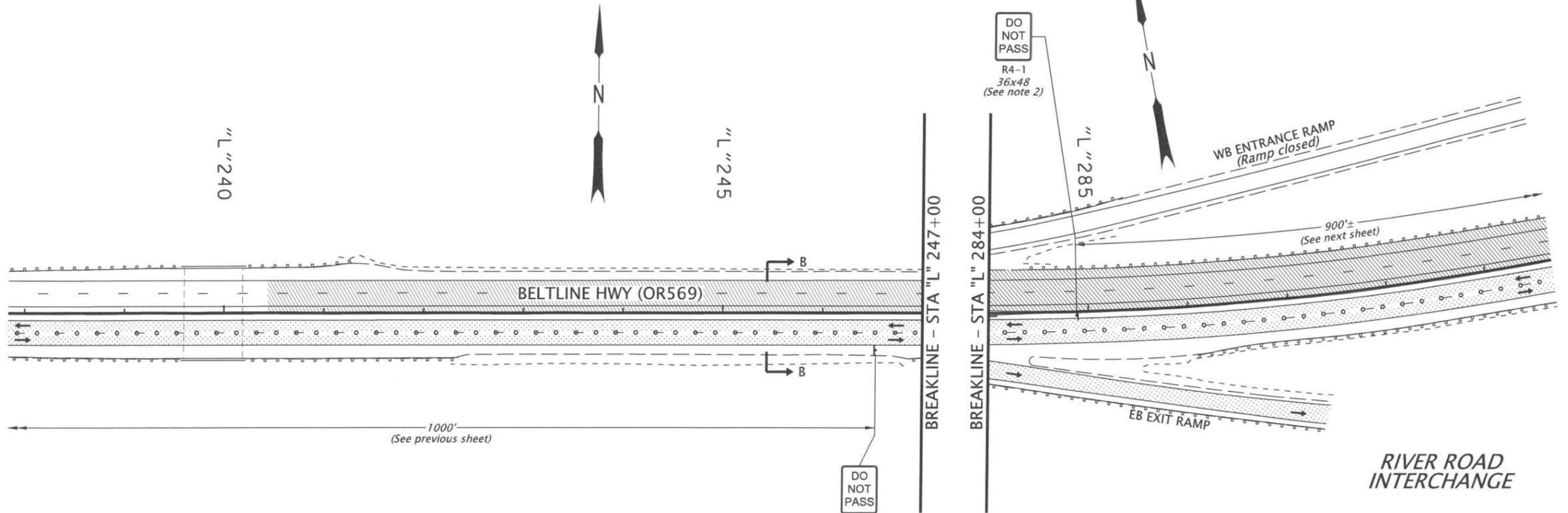
DAVID EVANS AND ASSOCIATES INC.
 530 Center Street N.E., Suite 605
 Salem Oregon 97301
 Phone: 503.361.8635

OR569: ROOSEVELT BLVD. - COBURG RD. (EUGENE) SEC.
 BELTLINE HIGHWAY
 LANE COUNTY

Designer: Tai Imamura Reviewer: Scott McCanna
 Drafter: Ryan Berger Checker: Paul Tappana

TRAFFIC CONTROL PLAN SHEET NO. EF17

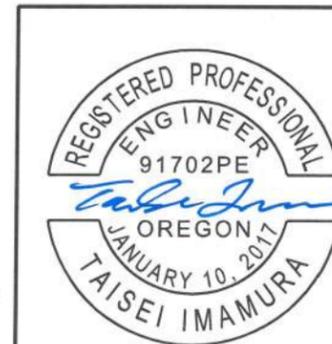
STAGE V
WB Crossover



SECTION B-B

†	Sign on portable sign support		Under traffic
c	Barricade		Under construction
c0	Barricade & sequential arrow		Temp. plastic drums on 10' max. spacing
c±	Barricade & TSS		Temp. plastic drums on 20' max. spacing
±	TSS		
→	Through traffic arrow		
	Temp. impact attenuator (Narrow site system)		

GENERAL NOTES:
 1. For ramp closure signage, see detour sheets.
 2. Repeat "TWO WAY TRAFFIC" (W6-3) and "DO NOT PASS" (R4-1) signs on 1/2 mile spacing within limits of two-way traffic on mainline.



RENEWS: 06-30-2019

FINAL ELECTRONIC DOCUMENT
AVAILABLE UPON REQUEST

DAVID EVANS AND ASSOCIATES INC.
 530 Center Street N.E., Suite 605
 Salem Oregon 97301
 Phone: 503.361.8635

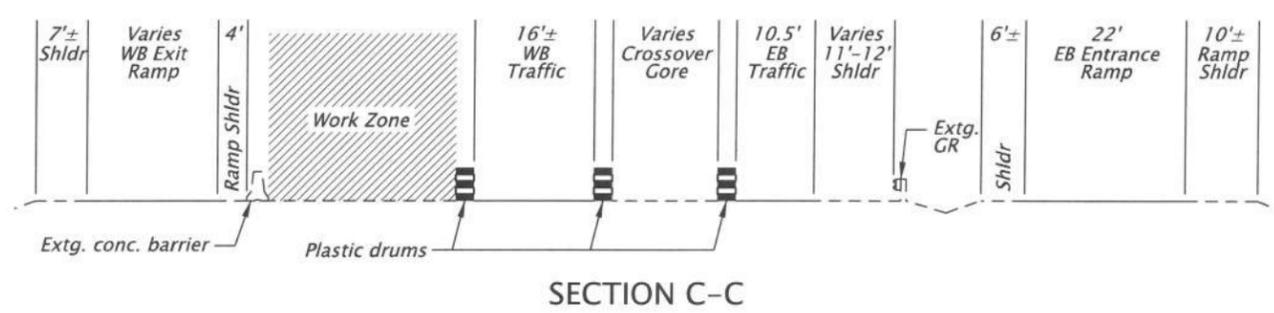
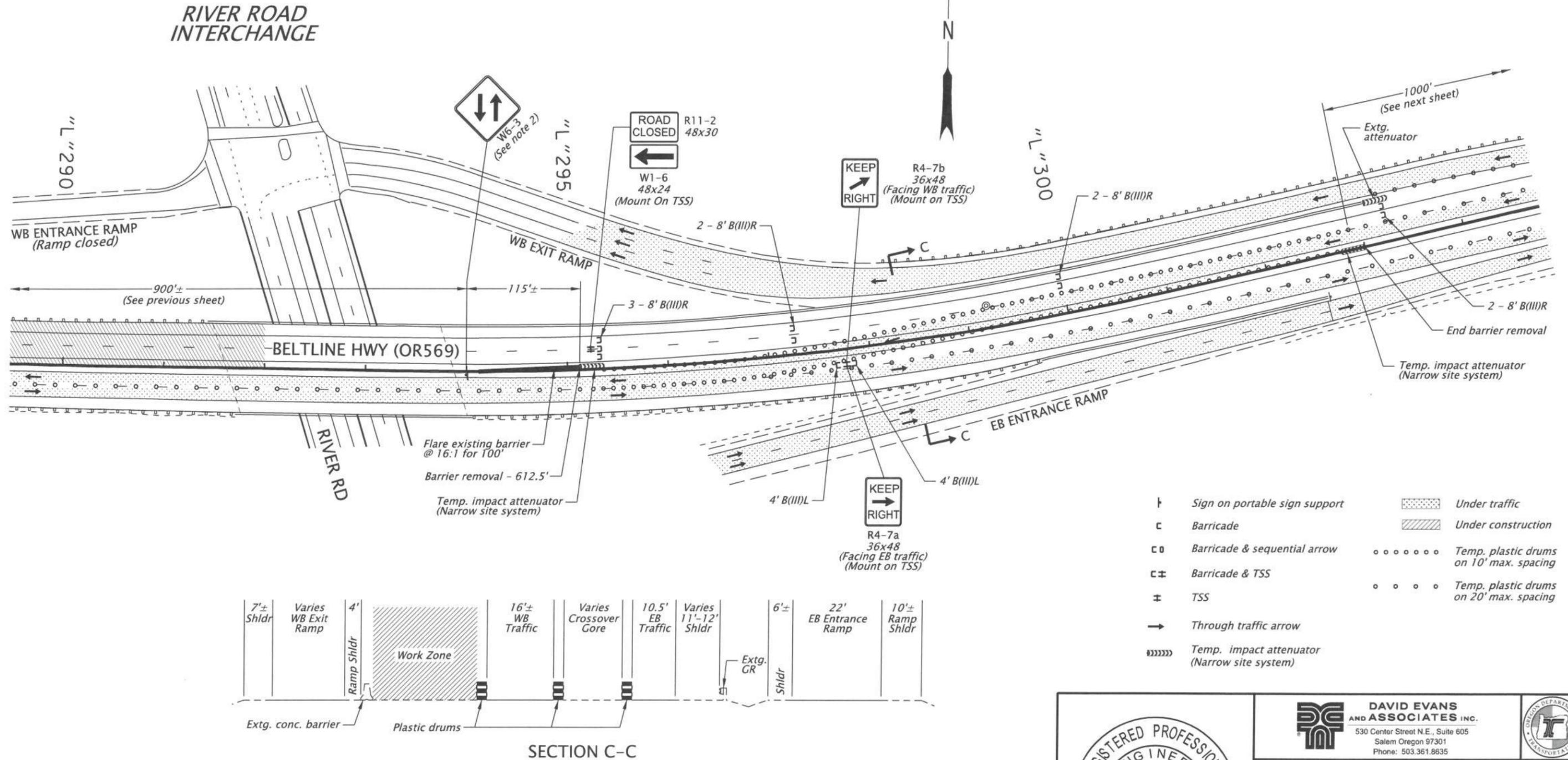
OR569: ROOSEVELT BLVD. - COBURG RD. (EUGENE) SEC.
 BELTLINE HIGHWAY
 LANE COUNTY

Designer: Tai Imamura
 Drafter: Ryan Berger
 Reviewer: Scott McCanna
 Checker: Paul Tappana

TRAFFIC CONTROL PLAN

SHEET NO.
EF18

STAGE V
WB Crossover



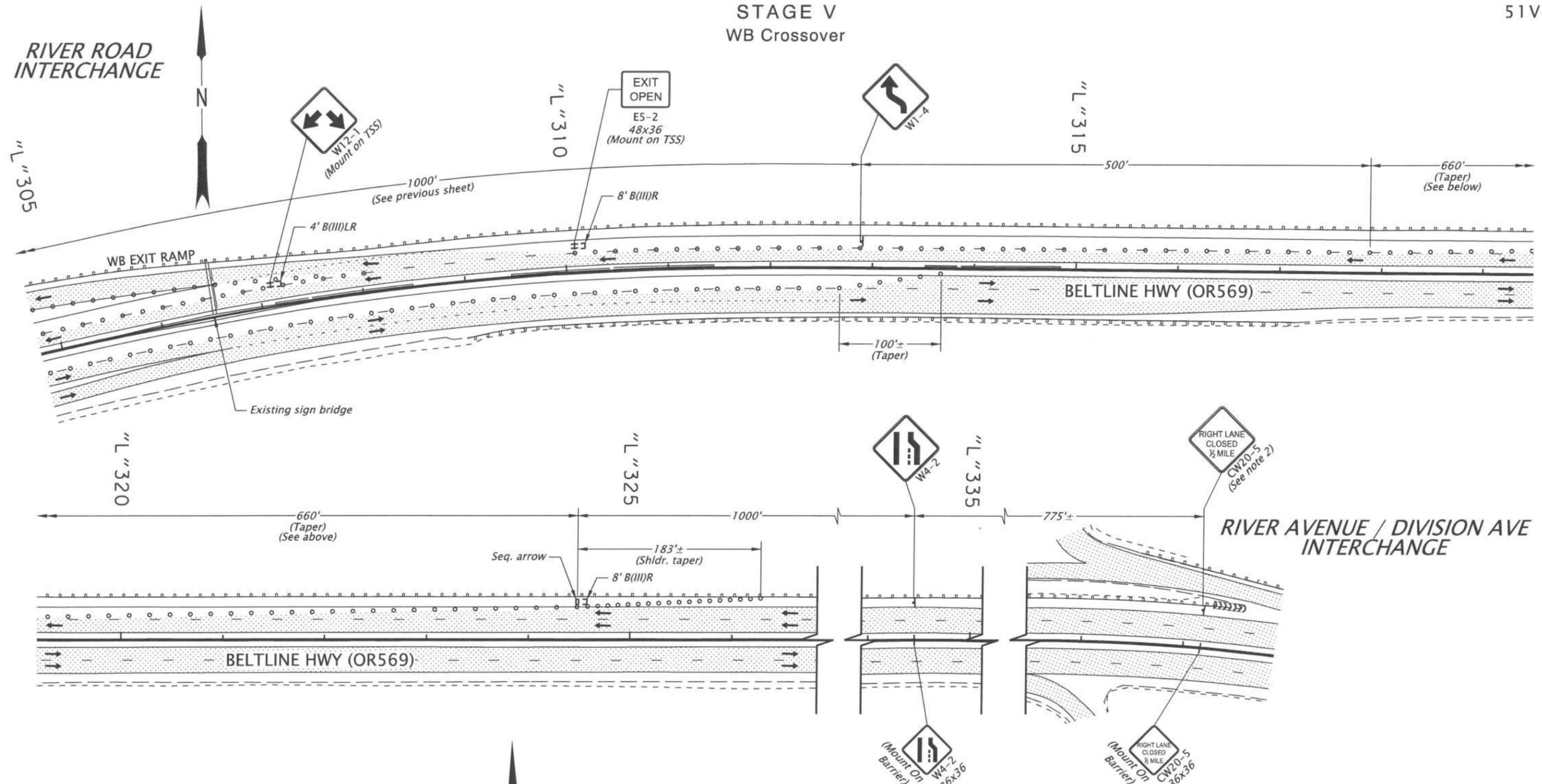
†	Sign on portable sign support	▨	Under traffic
c	Barricade	▩	Under construction
cD	Barricade & sequential arrow	○ ○ ○ ○ ○	Temp. plastic drums on 10' max. spacing
c±	Barricade & TSS	○ ○ ○ ○	Temp. plastic drums on 20' max. spacing
±	TSS		
→	Through traffic arrow		
	Temp. impact attenuator (Narrow site system)		

- GENERAL NOTES:
1. For ramp closure signage, see detour sheets.
 2. Repeat "TWO WAY TRAFFIC" (W6-3) and "DO NOT PASS" (R4-1) signs on 1/2 mile spacing within limits of two-way traffic on mainline.
 3. Temporary barrier flares to be removed prior to opening all lanes of traffic.



<p>DAVID EVANS AND ASSOCIATES INC. 530 Center Street N.E., Suite 605 Salem Oregon 97301 Phone: 503.361.8635</p>		
<p>OR569: ROOSEVELT BLVD. - COBURG RD. (EUGENE) SEC. BELTLINE HIGHWAY LANE COUNTY</p>		
Designer: Tai Imamura Drafter: Ryan Berger	Reviewer: Scott McCanna Checker: Paul Tappana	SHEET NO. EF19
<p>TRAFFIC CONTROL PLAN</p>		

STAGE V
 WB Crossover



†	Sign on portable sign support	▨	Under traffic
c	Barricade	▩	Under construction
c0	Barricade & sequential arrow	○ ○ ○ ○ ○	Temp. plastic drums on 10' max. spacing
c±	Barricade & TSS	○ ○ ○ ○	Temp. plastic drums on 20' max. spacing
±	TSS		
→	Through traffic arrow		
	Temp. impact attenuator (Narrow site system)		



GENERAL NOTES:
 1. For ramp closure signage, see detour sheets.
 2. Install a roll-up "ROAD WORK AHEAD" (W20-1) sign 1000' in advance of lane closure sign sequence.

REGISTERED PROFESSIONAL ENGINEER
 91702PE
 Taisei Imamura
 OREGON
 JANUARY 10, 2017
 Taisei Imamura

RENEWS: 06-30-2019

DAVID EVANS AND ASSOCIATES INC.
 530 Center Street N.E., Suite 605
 Salem Oregon 97301
 Phone: 503.361.8635

OR569: ROOSEVELT BLVD. - COBURG RD. (EUGENE) SEC.
 BELTLINE HIGHWAY
 LANE COUNTY

Designer: Tai Imamura
 Drafter: Ryan Berger
 Reviewer: Scott McCanna
 Checker: Paul Tappana

TRAFFIC CONTROL PLAN

SHEET NO. EF20

OR569: Roosevelt Blvd - Coburg Rd I Work Zone Safety Pilot Project

Attachment 'C' - Contract Change Order Analysis

Bid Item	Description	QTY	Unit	Price	Ext	CCO proposal	10-19-19 dk
							Actual
10	Mobilization	1	LS	\$ 628,536.42	\$628,536.42		
	<i>TC Crew Mobs</i>	-10	EA	\$ 405.00	(\$4,050.00)	(\$4,050.00)	
	<i>AC Crew Mobs</i>	-12	EA	\$ 528.00	(\$6,336.00)	(\$6,336.00)	
	<i>Equipment Mobs</i>	-30	EA	\$ 445.00	(\$13,350.00)	(\$13,350.00)	
20	TP & DT	1	LS	\$ 550,000.00	\$550,000.00		
	<i>Traffic Consultant Engineered Plans</i>	1	LS	\$ 80,000.00	\$80,000.00	\$80,000.00	
30	Temporary Signs	2705	SF	\$ 25.40	\$68,707.00		
	<i>Added detour signage</i>	598	SF	\$ 25.40	\$15,189.20	\$15,189.20	
70	Temporary Plastic Drums	521	EA	\$ 75.00	\$39,075.00		
	<i>Added barrels</i>	879	EA	\$ 75.00	\$65,925.00	\$65,925.00	
	<i>Discount on barrel price</i>	879	EA	\$ (25.00)	-\$21,975.00	(\$21,975.00)	
90	Temporary Striping	422893	FT	\$ 0.10	\$42,289.30		
	<i>Temp Striping not done</i>	-211447	FT	\$ 0.10	-\$21,144.70	(\$21,144.70)	(\$29,705.70)
140	Smart Work Zone System	60	DAY	\$ 425.00	\$25,500.00		
	<i>Reduced number of shifts</i>	-12	DAY	\$ 425.00	-\$5,100.00	(\$5,100.00)	
170	Flaggers	1100	HR	\$ 54.00	\$59,400.00		
	<i>Estimated reduction in flagging hours</i>	-428	HR	\$ 54.00	-\$23,112.00	(\$23,112.00)	(\$31,455.00)
190	TCS original 75 ea @ \$82,500.00	100	EA	\$ 1,100.00	\$110,000.00		
	<i>Estimated reduction</i>	-12	EA	\$ 1,100.00	-\$13,200.00	(\$13,200.00)	\$3,200.00
200	Pilot Cars	800	HR	\$ 70.00	\$56,000.00		
	<i>Estimated reduction in Pilot Cars</i>	-284	HR	\$ 70.00	-\$19,880.00	(\$19,880.00)	(\$34,090.00)
240	General Excavation	2728	CY	\$ 31.60	\$86,204.80		
	<i>Cost Savings on Excavation</i>	-1	LS	\$ 10,000.00	(\$10,000.00)	(\$10,000.00)	
590	Level 4, 1/2 inch ACP	59578	Ton	\$ 64.00	\$3,812,992.00		
	<i>\$5/HR Trucking Premium</i>	1880	HR	\$ 5.00	\$9,400.00	\$9,400.00	
	<i>Crew Efficiency Cost Savings</i>	-25	HR	\$ 1,074.00	-\$26,850.00	(\$26,850.00)	
	<i>Crew Overtime Premium</i>	540	HR	\$ 20.00	\$10,800.00	\$10,800.00	
Misc.	Barrier Moves	1	LS	\$ 27,984.25	\$27,984.25	\$27,984.25	\$18,877.43
Misc.	Temp Impact Attenuators	4	EA	\$ 4,712.50	\$18,850.00	\$18,850.00	\$19,237.50
ODOT	Public Information Costs	1	LS	\$ 15,000.00	\$15,000.00	\$15,000.00	KRC Cost Share
				Total		\$78,150.75	\$39,075.38
				Proposed Change Order Breakdown:			
				Added CCO Costs		\$228,148.45	
				Estimated BI Savings		(\$82,436.65)	
				KRC Credits		(\$82,561.00)	
				ODOT Costs		\$15,000.00	
				Total CO Cost		\$78,150.80	

OR569: Roosevelt Blvd - Coburg Rd I Work Zone Safety Pilot Project

Attachment 'C' - Contract Change Order Analysis

Savings greater than estimated for the following items, specifically attributed to the crossover closures:						
Bid Item	Description	QTY	Unit	Price	Ext	CCO proposal
90	Temporary Striping	422893	FT	\$ 0.10	\$42,289.30	
	<i>Temp Striping not done</i>	-211447	FT	\$ 0.10	(\$21,144.70)	(\$21,144.70) projected
	<i>Temp Striping not done</i>	-297057	FT	\$ 0.10	(\$29,705.70)	(\$29,705.70) Actual
					Better than estimate	\$8,561.00
170	Flaggers	1100	HR	\$ 54.00	\$59,400.00	
	<i>Estimated reduction in flagging hours</i>	-428	HR	\$ 54.00	(\$23,112.00)	(\$23,112.00) projected
	<i>Estimated reduction in flagging hours</i>	-582.5	HR	\$ 54.00	(\$31,455.00)	(\$31,455.00) Actual
					Better than estimate	\$8,343.00
200	Pilot Cars	800	HR	\$ 70.00	\$56,000.00	
	<i>Estimated reduction in Pilot Cars</i>	-284	HR	\$ 70.00	-\$19,880.00	(\$19,880.00) projected
	<i>Estimated reduction in Pilot Cars</i>	-487	HR	\$ 70.00	(\$34,090.00)	(\$34,090.00) Actual
					Better than estimate	\$14,210.00
190	TCS original 75 ea @ \$82,500.00	100	EA	\$ 1,100.00	\$110,000.00	
	<i>Estimated reduction</i>	-12	EA	\$ 1,100.00	-\$13,200.00	(\$13,200.00)
	<i>actual increase</i>	3	EA	\$ 1,100.00	\$3,300.00	\$3,300.00
					Worse than estimate	(\$16,500.00)
Misc.	Barrier Moves	1	LS	\$ 27,984.25	\$27,984.25	\$27,984.25 projected
	<i>Actual Barrier Moves</i>				\$18,877.43	\$18,877.43 Actual
					Better than estimate	\$9,106.82
Misc.	Temp Impact Attenuators	4	EA	\$ 4,712.50	\$18,850.00	\$18,850.00 projected
	<i>Actual impact attenuator</i>	5	EA		\$19,237.50	\$19,237.50 Actual
					Worse than estimate	(\$387.50)
					Net savings greater than estimated	\$23,333.32

CONTRACT CHANGE ORDER (Page 1)

NOTICE: THIS FORM MUST BE TYPEWRITTEN

PROJECT NAME (SECTION) OR569: Roosevelt Blvd. - Coburg Rd. (Eugene) Sec.		KEY NO. 20121	REGION 2	CONTRACT NO. C15057
HIGHWAY Beltline	PROJECT MANAGER Steve Templin, P.E.	AGENCY PROJECT MANAGER N/A		F.A. PROJECT NO. S069(021)
CONTRACTOR NAME AND MAILING ADDRESS Knife River Corporation - Northwest 32260 Old Highway 34 Tangent, OR 97389"		PM (CONSULTANT OR LOCAL AGENCY) NAME AND ADDRESS Steve Templin, P.E. 2080 Laura Street Springfield, OR 97477"		CHANGE ORDER # 02
EMAIL ADDRESS brodie.harvey@kniferiver.com		EMAIL ADDRESS steve.templin@odot.state.or.us		

THIS CONTRACT IS HEREBY MODIFIED AS FOLLOWS (DESCRIPTION AND LOCATION OF WORK COVERED BY THIS ORDER):

Perform work zone safety pilot project to separate traffic from work zone on Beltline Highway in Eugene.

Complete post pilot project analysis and report cooperatively with ODOT to measure impacts to the public, workers, true cost differences, and lessons learned no later than third notification.

SPECIFICATIONS AND PROVISIONS - THE WORK TO BE DONE UNDER THIS ORDER IS TO BE PERFORMED, MEASURED, AND PAID FOR IN ACCORDANCE WITH THE TERMS FOR THE ABOVE CONTRACT EXCEPT AS MODIFIED AS FOLLOWS -

- ✓ *Add Traffic Control Plan Sheets EF01 - EF20 (7/5/2018)
- *Single Lane Closures are allowed for these traffic control plans for 5 consecutive weekends starting July 20, 2018 from Friday night at 9pm to Monday morning at 5am without penalty. Liquidated damages identified in the contract apply outside these times and dates.
- *No additional payment for moving tempoarry impact attenuators.
- *Measurment and payment for removing and replacing existing concrete barrier includes one move to the temporary location adjacent to nearby barrier in the median. No additional payment will be made for replacing barrier to its original position.

PAY ITEM	Sub Job	DESCRIPTION	EST. QTY.	UNIT	UNIT PRICE	AMOUNT
4002A	011	Modify Traffic Control Plan 0200CC25BGAA	1.00	LS	\$1,343.00	\$1,343.00
4002B	011	Increase Item 0030 - Temporary Signs 0200CC25PGAA	600.00	SF	\$25.40	\$15,240.00
4002C	011	Increase item 0070 - Temporary Plastic Drums 0200CC25PGAA	879.00	EA	\$75.00	\$65,925.00
<input checked="" type="checkbox"/> Additional items listed on attached Page 2						TOTAL FROM PAGE 2
						(\$42,882.75)

ESTIMATED NET COST EFFECT OF THIS AGREEMENT ON THE CONTRACT:

INCREASE \$39,625.25
DECREASE

CONTRACTOR SIGNATURE IS IS NOT NECESSARY (EXPLAIN IN SUPPORTING DATA)

CONTRACTOR SIGNATURE MAKES THIS CONTRACT CHANGE ORDER A SUPPLEMENTAL AGREEMENT

FOR SUPPLEMENTAL AGREEMENTS ONLY: Contractor: Please indicate your agreement by signing, dating and returning the original to the Project Manager. Work shall not begin until you are notified that the agreement has either been approved or that work may commence under advance approval. Your signature further indicates agreement that payments in accordance with the agreement constitute full and complete compensation for all costs, both direct and indirect, arising out of the described work covered by this agreement, and releases and discharges the State from other costs except as provided herein.

CONTRACTOR SIGNATURE	DATE	AGENCY PM (ODOT only)	RECOMMENDED <input type="checkbox"/>	APPROVED <input checked="" type="checkbox"/>	DATE
Print _____		Print _____			
Sign Digital Signature ~ 07/18/2018		Sign Digital Signature ~ 07/18/2018			
RECOMMENDED BY LOCAL AGENCY	DATE	AREA MANAGER:	NOTED <input checked="" type="checkbox"/>	RECOMMENDED <input type="checkbox"/>	APPROVED <input type="checkbox"/>
Print _____		Print _____			
Sign _____		Sign Electronic Signature ~ 08/20/2018			
RECOMMENDED BY PM (IF EXTERNAL TO ODOT)	DATE	CONSTRUCTION SECTION:	NOTED <input type="checkbox"/>	APPROVED <input type="checkbox"/>	DATE
Print _____					
Sign _____					

ODOT (Internal): After obtaining Contractor's signature, the Project Manager signs and submits the original through the Area Manager to Construction Section.

ODOT (Outsourced): After obtaining Contractor's signature, the Project Manager submits original to Agency PM (ODOT PM or Local Agency Liaison), as appropriate, who then submits through the Area Manager to Construction.

All Projects: Construction will distribute fully signed copies to the Project Manager, Agency PM, Contractor, and others as appropriate.

