



Revised Construction Approach Technical Report

Multnomah County | Earthquake Ready
Burnside Bridge Project

Portland, OR

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Earthquake Ready Burnside Bridge Revised Construction Approach Technical Report

Prepared for

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CERTIFICATION

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, as a professional engineer.



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Acronyms, Initialisms, and Abbreviations

Couch Extension	Replacement Alternative with Couch Extension
EQRB	Earthquake Ready Burnside Bridge
I-5	Interstate 5
I-84	Interstate 84
IWWW	In-water work window
Long-span Alternative	Replacement Alternative with Long-span Approach
LRT	Light rail train
NEPA	National Environmental Policy Act of 1969
ODOT	Oregon Department of Transportation
Retrofit	Enhanced Seismic Retrofit
ROW	right-of-way
Short-span Alternative	Replacement Alternative with Short-span Approach
UPRR	Union Pacific Railroad
USCG	U.S. Coast Guard

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Executive Summary

The Earthquake Ready Burnside Bridge (EQRB) Project will include complex construction, unique construction techniques, and require extensive planning for many aspects of the project. Several stakeholders with facilities adjacent to or within close proximity to the bridge could be impacted during the Project. With the Project's complexities, the Project team has spent considerable time and effort developing options that could reasonably be built, and within the various bridge alternatives would mitigate large risks typically encountered during construction.

This technical report does not recommend any one specific alternative over another. However, when certain features specific to an alternative are shown, the technical report will specify a feasible and reasonable means and methods approach by which the work could be performed. Means and methods, and features to be included in the final design phase will continue to be refined. The opinions set forth within this technical report are based on information available at this time and may be subject to change.

When applicable, this technical report describes differences in anticipated work, construction techniques, and construction approaches between the various alternatives and their impacts on the various Project stakeholders. The following differences between alternatives will be described in further detail within the technical report. Further, a summary of differences can be found in Appendix H.

The construction schedule for the Project is anticipated to last between 3.5 and 6.5 years. The Enhanced Seismic Retrofit (Retrofit) alternative with no temporary bridge would be completed quickest, while Replacement Alternatives with a temporary bridge would take longest.

For all alternatives, the use of cofferdams is anticipated for river piers. The Replacement Alternative with Long-span Approach (Long-span Alternative) would have the least number of cofferdams because there would be one less pier in the water and ground improvements would not be required at Pier 1. The Replacement Alternative with Short-span Approach (Short-span Alternative) and Replacement Alternative with Couch Extension (Couch Extension) would have 3 full (4-sided) cofferdams and one 3-sided cofferdam adjacent to the harbor wall for anticipated ground improvements at Pier 1. The Retrofit alternative would also require a 3-sided cofferdam at Pier 1 and counting the upstream and downstream 3-sided cofferdams for the main river piers separately, this alternative would require 6 cofferdams.

For the Replacement Alternatives, it is feasible that the drilled shafts would be installed in open water (i.e., with no cofferdam) by coring through the existing foundations for a portion of the drilled shafts. Once all shafts were completed, perched foundations would be constructed on top of the drilled shafts using either a modified cofferdam and/or precast concrete units.

The Retrofit alternative would require substantial work to temporarily relocate the City of Portland's sewer pipes on the west side of the river as well as removing and replacing an approximately 175-foot-long section of harbor wall. All other alternatives mitigate having to perform this work. As part of the mitigation for the sewer line and the harbor wall, the

Short-span Alternative and Couch Extension shift the pier away from the river into Tom McCall Waterfront Park to avoid the sewer and harbor wall impacts. It is noted, however, that all alternatives except for the Long-span Alternative require ground improvements in the vicinity of Pier 1. This poses a risk to the integrity of the timber piles under the harbor wall and Pier 1. If the risk of destroying timber piles during ground improvement operations cannot be reasonably mitigated during design, sewer line relocation and harbor wall replacement would be required for all alternatives excepting the Long-span Alternative.

The Long-span Alternative shifts the pier away from Pier 1 further west into Tom McCall Waterfront Park, thus avoiding the sewer lines and harbor wall.

For all alternatives except for the Long-span Alternative, substantial ground improvements will be required at Pier 1 on the west side as well as Pier 4 and Bents 22, 24/25, and 26 on the east side. For the Long-span Alternative, ground improvements will only be required at proposed Bent 8 of the cable stay option but is not anticipated for the tied arch option.

It is feasible that the Long-span Alternative could be constructed using the existing deck as a work platform. If this were done, weekend closures of Interstate 5 (I-5) and the Interstate 84 (I-84) ramp could be largely reduced and instead, night closures utilized when required for erection work (demolition would still require weekend closures). For all other alternatives, several weekend and nightly directional closures are anticipated to demolish the existing bridge and construct the new.

Vera Katz Eastbank Esplanade (Eastbank Esplanade) closures are expected to be in the range of 2.5 to 3 years for all alternatives with the exception of the Long-span Alternative, which is expected to impact the Eastbank Esplanade for approximately 1.5 years. With construction of pedestrian/bicycle ramps to connect the Eastbank Esplanade to Burnside Bridge, a large portion of the Eastbank Esplanade will need to be removed, stored, and placed back at the end of the project to allow for equipment access.

The Burnside Skatepark would need to be closed for the duration of work for the Retrofit alternative due to work that needs to occur within the skatepark. For all other alternatives, the skatepark could remain open the majority of the time with intermittent closures for overhead work such as demolition and girder erection.

Residences and businesses would largely be unaffected by the bridge replacement work with the exception of the Couch Extension. This alternative would require regrading of E 3rd Avenue as well as relocation of several access points to buildings because of the new bridge construction.

TriMet's light rail train (LRT) tracks would need to be shut down and shifted to bus bridges several times during construction, in order to perform retrofit or replacement work. For all replacement alternatives, the anticipated closure time is 5 weeks (10 weeks if a temporary bridge is used) of cumulative shutdowns to demolish the existing bridge and erect new slab girders. For the Retrofit, the anticipated closure time is 8 weeks (16 weeks if a temporary bridge is used) of cumulative shutdowns.

During 2021, the Project team developed a refined alternative of the Long-span Alternative referred to as the Replacement Long-span Alternative (Narrowed). This alternative incorporated some of the value engineering (VE) ideas noted in Section 2.13

and included several revised features including updated perched foundations, a narrower roadway and sidewalk section, girder spans with an additional pier on the west side and a long span approach (either tied arch or cable-stay bridge) on the east side. The impacts and timelines associated with the Replacement Long-span Alternative (Narrowed) generally follow that of the Replacement Long-span Alternative.

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1 Introduction

As a part of the preparation of the Environmental Impact Statement for the Earthquake Ready Burnside Bridge (EQRB) Project, this technical report has been prepared to identify and evaluate the approach to construction of the various alternatives within the Project Area.

The *EQRB Construction Approach Technical Report* describes the anticipated approach to the work for each bridge alternative. Further, the technical report includes detailed phasing/staging considerations, and anticipated durations of work.

The anticipated alternatives studied include (Figure 1):

1. Enhanced Seismic Retrofit of the Existing Bridge (Retrofit)
2. Replacement Alternative with Short-span Approach (Short-span Alternative)
3. Replacement Alternative with Long-span Approach (Long-span Alternative)
4. Replacement Alternative with Couch Extension (Couch Extension)

Each of the above alternatives was studied with and without a Temporary Detour Bridge Option (Temporary Bridge) for the following modes:

1. All modes
2. Transit, bicycles and pedestrians only
3. Bicycles and pedestrians only

Further, the *EQRB Construction Approach Technical Report* is organized into two major categories for each bridge alternative:

1. Construction Approach and Impacts
2. Construction Schedule

Addition of Replacement Long-span Alternative (Narrowed):

In 2021, the Project team studied potential design refinements to the Preferred Alternative, known as the Replacement Long-Span Alternative, that was evaluated in the *EQRB Draft Environmental Impact Statement* (Multnomah County 2021d). The Project Alternatives evaluated in the Draft EIS are summarized in Chapter 2 of the Draft EIS and described in detail in the *EQRB Description of Alternatives Report* (Multnomah County 2021c). Briefly, the Draft EIS evaluated a No-Build Alternative and four Build Alternatives. One of the Build Alternatives, the Long-span Alternative, was identified as the Preferred Alternative. The primary refinement from the Draft EIS Long-span Alternative is that the bridge would be narrower; these refinements are collectively referred to as the "Replacement Long-span Alternative (Narrowed)". All of the proposed design refinements evaluated and how they differ from the Draft EIS Long-span Alternative can be found in the *EQRB Supplemental Draft Environmental Impact Statement* (Multnomah County 2022a) and are described below.

- Bridge Width: The total width of the bridge over the river would be about 80-90 feet (rather than about 110-120 feet for the replacement alternatives evaluated in the

Draft EIS). This would accommodate approximately 78 feet for vehicle lanes, bike lanes and pedestrians in both directions.

- The narrower bridge would accommodate four vehicle lanes (rather than five as evaluated in the Draft EIS). Several different lane configuration options are being evaluated, including:
 - Option 1 (Balanced): 2 westbound lanes (general-purpose) plus 2 eastbound lanes (1 general-purpose and 1 bus-only lane)
 - Option 2 (Eastbound Focus): 1 westbound lane (general-purpose) plus 3 eastbound lanes (2 general-purpose and 1 bus-only)
 - Option 3 (Reversible Lane): 1 westbound lane (general-purpose) plus 2 eastbound lanes (1 general-purpose and 1 bus-only) plus on reversible lane (westbound AM peak and eastbound PM peak)
 - Option 4 (General-Purpose with Bus Priority): 2 westbound general-purpose lanes plus 2 eastbound general-purpose lanes, plus bus priority access (e.g., queue bypass) at each end of the bridge.
- The width of vehicle lanes could vary from 10 to 11 feet, depending on how the total width is allocated between the different modes.

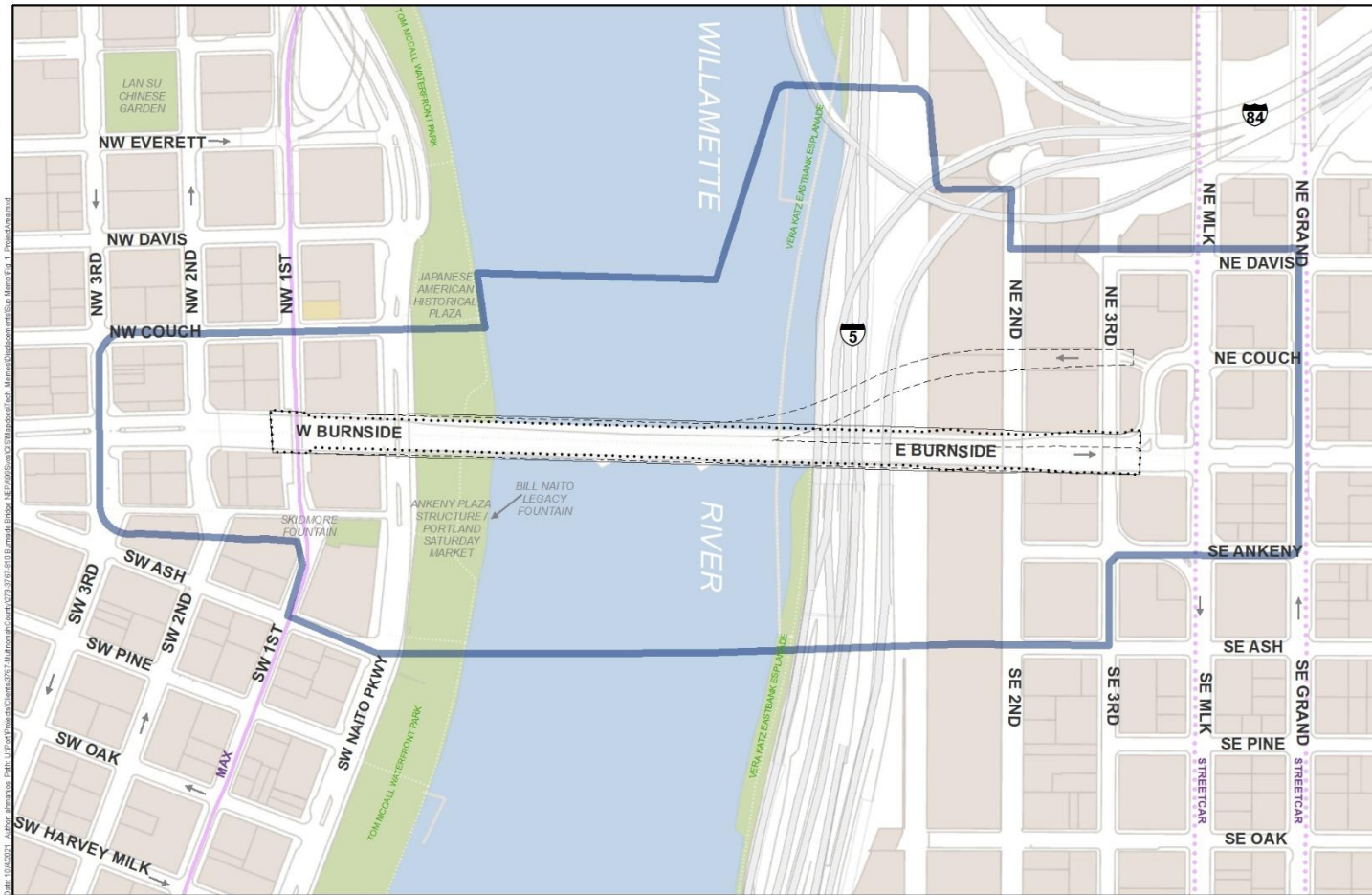
1.1 Project Location

The Project Area is located within the central city of Portland. The Burnside Bridge crosses the Willamette River connecting the west and east sides of the city. The Project Area encompasses a one-block radius around the existing Burnside Bridge and W/E Burnside Street, from NW/SW 3rd Avenue on the west side of the river and NE/SE Grand Avenue on the east side. Several neighborhoods surround the area including Old Town/Chinatown, Downtown, Kerns, and Buckman. Figure 1 shows the Project Area.

1.2 Project Purpose

The primary purpose of the Project is to build a seismically resilient Burnside Street lifeline crossing over the Willamette River that would remain fully operational and accessible for vehicles and other modes of transportation following a major Cascadia Subduction Zone earthquake. The Burnside Bridge would provide a reliable crossing for emergency response, evacuation, and economic recovery after an earthquake. Additionally, the Project would provide a long-term safe crossing with low-maintenance needs for 100 years.

Figure 1. Project Area



EARTHQUAKE READY
 BURNSIDE BRIDGE

Source:
 City of Portland, Oregon
 HDR, Parametrix

0 125 250 500 Feet

- Project Area
- Retrofit
- Short-span Alternative
- Long-span Alternative
- Refined Long-span Alternative
- Couch Extension Alternative

Project Area

Earthquake Ready Burnside

2 Construction Approach and Impacts

The EQRB Project poses unique construction challenges for each of the three alternatives. Within these alternatives, many of the construction approaches will be similar, if not identical. However, there will also be differences between the alternatives that would affect the construction approach dramatically.

Similar construction approaches and challenges will be discussed as a whole, while differences in construction approaches will be discussed specific to each alternative. In order to focus construction approaches and challenges, these have been broken down by construction type.

2.1 Construction Access

In order to construct the Project, the contractor would need access alongside the bridge in as many locations as possible. The access needs would be similar for all alternatives along the existing alignment. Additionally, for the Couch Extension, the contractor would need access along the Couch tie-in and the alignment of the Couch couplet. For all cases, the contractor would need additional width outside the bridge footprint, so that equipment such as cranes can service the work. Although preferable to allow the contractor as much room as possible, the Project should allow the contractor 30 feet to 40 feet work areas, where feasible, on each side of the bridge. Where 30 or 40 feet is not available; minimal space, approximately 10 feet, would be required to traverse equipment back and forth. In some cases, where the buildings butt up to the bridge and there is physically no room, the contractor would need to access these points from directly beneath the bridge or from adjacent City of Portland (City) streets.

Access to the Burnside Bridge will be challenging and more complex than typical bridge projects. Access is complex for several reasons:

- Work bridge access on the west side would be from sensitive areas through a Portland Parks facility and near the Japanese American Historical Plaza
- Existing sewer pipes on the west side running adjacent to the harbor wall complicate installation of the work bridge and permanent work
- Low headroom on east side under existing freeway and freeway ramps
- Union Pacific Railroad (UPRR) railroad tracks on east side
- Numerous buildings directly adjacent to the bridge on both east and west approaches
- Truck access is feasible, but constrained on City streets and would need to move through heavy city traffic to access site
- Navigable river with large vessels travelling through the construction site

In order to access the site, several likely means have been developed. For a full layout of access routes, see Appendix A.

- **East Side Site Access West of UPRR Tracks:** In order to construct the new or retrofitted bridge, either of the properties immediately north or south of the bridge, or both properties, would need to be purchased as part of the project. The Project team assumes that a portion of these properties would be utilized as staging yards during construction. As such, a temporary railroad crossing could be installed from one of the properties to access the Oregon Department of Transportation (ODOT) access road that runs north/south adjacent to UPRR's tracks between SE Stark Street and the bridge site. Once a temporary crossing is installed, the contractor would have direct access over the tracks without having to bring equipment, trucks, etc. into live traffic.
- **Willamette River East Work Bridge:** The Project team assumes that the eastern piers (existing Pier 3/new Bent 9 (Bent 8 for the Long-span Alternative) and new Pier 4/new Bent 10) would be accessed by a work bridge extending from the east bank. For a detailed description of pier/bent layout and numbers, see the *EQRB Bridge Replacement Technical Report* (Multnomah County 2021a). Work bridge "fingers" would need to be installed around three sides of Pier 3/Bent 9 (Bent 8 for the Long-span Alternative), and one finger would be installed at Pier 4/Bent 10 (for at least the Pier 4 demolition). As studied, the channel side of Pier 3/Bent 9 (Bent 8 for the Long-span Alternative) would need to be kept clear to allow for maximum navigational width. Due to low headroom issues with the Morrison exit ramp off I-5, the work bridge would need to be built several hundred feet to the north of Burnside Bridge to a point where it could turn under the highway with sufficient headroom to install the work bridge and mobilize large equipment in and out. The east work bridge would connect to the ODOT access road, allowing direct connectivity between the east side "storage yard(s)" and the eastern river piers. See Appendix A for more detail.

As an alternative to an extensive work bridge that provides access from land, the contractor could build a work bridge around the east river pier only. If this were done, the contractor would need to lift pieces of the crane and drill equipment onto the work bridge from a barge, and build the equipment on the work bridge. This process would be tedious but would avoid a lengthy work bridge. With this option, materials would likely need to be brought in via barge.

- **East Approach Access:** Access to the east approach work would be accomplished through a combination of property acquisition and temporary construction easements on City streets to allow for space on either side of the bridge for equipment. The contractor would need to bring equipment in, on, and around City streets for accomplishing the work. When girders are erected, large cranes would need to be set up on each end of the span, to lift the girders into place in tight constraints. It is likely that short-term closures would be required on City streets to allow for large equipment such as cranes to stage for specific operations.
- **West Side Site Access to Bridge:** Access from the west side of the Project would likely be from Naito Parkway. The area around the bridge would be a necessary staging area for equipment and materials. The contractor would need a minimum of 40 feet outside the bridge limits on the north side, in order to gain access to a work bridge in the river. For equipment and material staging, the contractor would need to

use the area encompassing the Japanese American Historical Plaza, the area under the bridge, and a large area south of the bridge in Park property.

- **Willamette River West Work Bridge:** The Project team assumes that the western river pier (Pier 2/Bent 8 (Bent 7 for the Long-span Alternative)) would be accessed by a work bridge extending from the west bank, just north of the existing bridge. Depending on which alternative is selected, the existing Pier 1 may need to be accessed by a work bridge as well. Work bridge “fingers” would extend around three sides of Pier 2/Bent 8 (Bent 7 for the Long-span Alternative), with the channel side of the pier kept clear for river traffic.
- **West Approach Access:** The west approach crosses Tom McCall Waterfront Park with active bicycle/pedestrian paths, TriMet’s MAX line, and City streets. The contractor would need to bring equipment in, on, and around City streets and adjacent to TriMet’s tracks to accomplish the work. Additionally, the parking lot adjacent to Mercy Corps would need to be used for equipment placement during work. When girders are erected, large cranes would need to be set up on each end of the span, to lift the girders into place in tight constraints. Access to the various spans would require short-term closures to allow for large equipment such as cranes, to stage for specific operations.
- **Barges:** Due to limited space available for equipment and material laydown/storage onsite, it is likely that the contractor would need to supplement any available storage yards with barges. Barges provide large areas to store and/or pre-build materials such as rebar cages and allow the contractor the ability to move barges in and around work as needed. Although barges are versatile, moving them around is a cumbersome and arduous task, taking substantial time and typically affecting production while workers wait for barges to be positioned. Further, barges are expensive to keep on hand.
- **Offsite Staging Yard:** Due to limited storage space onsite, it is anticipated that the contractor would require an offsite storage yard. In order to provide maximum value with the expectation for onsite barges, the Project team expects that an offsite storage yard would need to have a dock or at least have riverfront access with potential to construct a temporary dock. This would allow the contractor to pre-stage materials and equipment at the yard, and then load onto barges as needed, to be shipped to the project. Multnomah County may or may not secure the property, prior to bringing a contractor onboard. Should the Multnomah County elect not to secure a property ahead of time, the contractor would do so during the pre-construction phase in preparation for the work. For potential locations of offsite storage yards, please see Appendix B. Other sites may be available for contractor use, based on contractor’s preference.

2.2 Dredging/Rip Rap Removal

Prior to installing any piling, drilled shafts, or cofferdams, any rip rap in the vicinity of the work, and notably in the areas close to the main river piers, would need to be removed. The rip rap would be removed by using a crane mounted on a barge using a clam shell bucket to remove rip rap and placing it on a barge to be disposed of properly.

There is a strong likelihood that remnants from the first, or existing Burnside Bridge are still present within the channel, as well as potential debris, old cars/pieces, or the like that may have been deposited into the river. These items (such as the foundation for the old swing bridge) would need to be removed or cut down below the “new” riverbed elevation.

In addition to the above-mentioned activities, if the piers are demolished using wire sawing techniques, the area directly around the existing piers would need to be dredged to expose the “cut line” of the wire sawing. As currently envisioned, existing piers would need to be removed to a minimum of three feet below the natural riverbed/bottom, meaning that dredging would need to be done to at least four feet below river bottom to be one foot below the wire saw line.

2.3 Temporary Bridge

A temporary bridge may be constructed in conjunction with any of the bridge alternatives to allow construction of the main river spans to take place while maintaining either vehicular, bicycles and pedestrians traffic (all modes), or bicycles and pedestrians only traffic during construction. A temporary bridge would be constructed to the south of the permanent bridge and tie into both the east and west approach spans (see Appendix A for approximate locations). Due to the tie-in locations, the last several spans of the east and west approaches would need to be constructed in halves to accommodate traffic. See Section 2.3.4 for additional details on this construction.

The temporary bridge would be founded on steel piles, both on land and in the water (Willamette River). Piling would either extend all the way to caps that support the temporary deck girders or would be encapsulated in pile caps with columns constructed on top of the pile caps. Piling would be driven using conventional methods, and it is assumed that vibration monitoring equipment would be placed throughout the site to monitor vibration caused by pile driving. During the final design phase, it may be determined that certain utilities are more vulnerable or sensitive to vibration, in which case, the pile holes could be pre-drilled to avoid vibratory installation techniques.

Over the active navigation channel (between Piers 2 and 3), the temporary bridge would need to be constructed to accommodate river traffic up to 147 feet tall. This would be accomplished by installing a movable lift section in the temporary bridge that would raise to Elevation 167.1 (NAVD 88) when needed to accommodate river traffic. Although several options would be feasible for a temporary lift bridge, the Project has shown a modular truss as a feasible option for spanning the channel and being able to provide enough width to carry all modes. The modular bridge would be pre-constructed on a barge, then floated into place on a barge and hoisted into position using the temporary bridge’s lifting cables. A temporary closure of the navigation channel would be required to hoist the temporary lift bridge into place.

Water that falls on the temporary bridge will need to be collected and treated prior to being released either into the river or into an appropriate drainage facility. To do this, several options would be available to the contractor including treatment catch basins on the temporary bridge, temporary detention swales, or other temporary treatment facilities. It is likely that the contractor would install temporary piping on the temporary bridge and

pipe the runoff water to either side of the river to Baker tanks. The water would then be filtered, tested, and released.

If a temporary bridge were incorporated into the project, there would be several complications associated with completing the work, as described in more detail in the following sections.

For a temporary bridge accommodating all modes, either the alignment of the temporary bridge would need to be significantly shifted to accommodate constructing the second half of the approach, or the Project would need to wait for the main spans to be completed. Once the main spans are complete, there would be sufficient space for traffic to occupy approximately half of the newly built bridge allowing the temporary bridge to be disconnected and the second half of the approaches constructed. The schedules in Appendix G assume that the main spans would be completed prior to shifting traffic.

For a temporary bridge accommodating bicycles and pedestrians only, the alignment could potentially be adjusted to intersect the completed portion of approach span to allow construction of the second half of the approach spans prior to the main spans being complete. Further, the construction of a temporary bridge accommodating bicycles and pedestrians only would be narrower, thus allowing for more of the approach spans to be built during the initial phase.

2.3.1 In-Water Temporary Bridge Piers/Piling

A temporary bridge would require a substantial number of piles to support not only the approach spans and in-water spans, but also to support a movable portion of the temporary bridge to allow for river traffic to continue to traverse the river.

Any of the in-water piles would need to be installed within the in-water work window established for the Willamette River using barge-mounted equipment (cranes) to access the work. The in-water pile driving and vibratory window starts on July 10 and concludes October 15 each year. In addition to the window being fairly short, the contractor would also be limited to a certain number of blows (impact hits) and a limited number of piles per day when driving piles. This restriction does not apply to vibratory installation methods, only to driving piles with impact hammers. Because of this restriction, a contractor would likely need to use a combination of vibratory and driving methods to attain required embedment and stay in compliance with limitations on pile driving. Typically, and in order to maximize pile installation production, this is accomplished by using a vibratory hammer to install a pile as deep as possible and then driving the pile the remainder of the way to refusal. Actual restrictions on pile driving (in terms of number of blows and number of piles) are still in development. For planning purposes, the Sellwood Bridge Project completed by Multnomah County in 2016, had restrictions of 1,000 blows and/or a maximum of 5 piles per day, whichever was reached first.

Once several piles are “pre-driven” using a vibratory hammer, the contractor would then use a pile hammer to drive the piles to refusal. The goal for the contractor would be to maximize the number of blows per day and ensure installing the maximum number of piles to refusal. As such, it would be important for the contractor to pre-drive several piles ahead of the pile driving each day to ensure that they have sufficient time each day to complete impact driving. Typically, a contractor would have enough piles pre-driven such that they could begin the day driving piles to refusal. Once they exhaust the number of

blows or number of piles for the day, the contractor would then switch to vibratory methods to install as many as possible for the next day's work. This process would continue until all piles are driven.

One complication experienced during pile driving in water is the need to use barge-mounted equipment to drive piles. Using barges creates inefficiencies because moving between stations can be slow and cumbersome. This process results in driving downtime and, if not planned well, could result in the contractor missing days of potential driving time. The in-water work window does not allow much time for mishaps. The number of in-water piles estimated for the temporary bridge is 350 and the number of piles estimated for the work bridge is 300. This means that in a standard pile/vibratory in-water work window, the contractor would need to impact 10 piles per day to refusal to install all piles in one in-water work window.

For a temporary bridge accommodating bicycles and pedestrians only, the number of piles would be less than for a temporary bridge that included vehicles because a temporary bridge accommodating bicycles and pedestrians only would be narrower.

Advancement with Replacement Long-span Alternative (Narrowed):

As further details of the Replacement Long-span Alternative (Narrowed) have been established, the Project has received approval for up to 12,000 pile strikes per day and no limit on the number of piles driven.

2.3.2 Movable (Lift) Truss

One of the unique features of the EQRB Project is the possibility of installing a temporary lift bridge over the navigable channel. Installation of the lift truss would require the navigable channel to be shut down while the truss is barged into place and then hoisted into position. The Project team assumes the cables and winch system used to raise and lower the bridge in place would be used to hoist the truss into position. Performing this operation would require substantial planning and coordination with the U.S. Coast Guard (USCG) to ensure a proper window is selected that results in minimal disruption to marine traffic.

A similar closure window would be required at the end of the project in order to remove the temporary lift span, in which the operation would be performed in reverse.

2.3.3 Temporary Bridge Installation over I-5, I-84, and UPRR

The temporary bridge would need to span over mainline I-5, the Morrison off-ramp, the I-84 westbound to I-5 southbound on-ramp, and the I-5 northbound to I-84 eastbound ramp in a single span. This long-span (in the range of 170 feet) would need to be set during a full closure of I-5, I-84 ramps, and the Morrison exit. Due to an assumed limited closure window, it is likely that the temporary bridge would need to be pre-built and launched or lifted into place.

The temporary bridge must also span over UPRR's railroad tracks. Setting the temporary bridge over these tracks would involve coordination with UPRR to ensure that there is a long enough track window to lift the span into place with a crane, which would likely be set up on the ODOT access road adjacent to UPRR tracks.

In addition to affecting I-5, I-84, and UPRR, the City of Portland's Eastbank Esplanade would need to be shut down with Eastbank Esplanade users temporarily detoured, and the Eastbank Esplanade temporarily moved out of its location to allow barge access to set the temporary bridge. Elsewhere in this report, it is noted that other operations on the Project would also impact the Eastbank Esplanade, which would require intermittent and/or long-term (minimum one month) closures.

2.3.4 Temporary Bridge Impact on Permanent Construction

There are several temporary bridge considerations being evaluated. These include accommodations for: a) all modes of traffic, b) transit, bicycle, and pedestrian traffic only, or c) bicycle and pedestrian traffic only. Option c) would be approximately half the width of alternatives a) and b). The temporary bridge alignments do not extend beyond the existing abutments on the east and west approaches, due to the close proximity of several existing buildings at either end of the bridge. This would otherwise require large right-of-way (ROW) purchases the entire length of the bridge, which is not practical.

Instead, the temporary bridge would extend beyond the main spans and tie in within the east and west approach spans. The consequence of this is that the east and west approaches would need to be staged in order to complete the work. For the Long-span Alternative, the temporary bridge tie-in is located a little further east in order to clear the end of the long-span terminus.

With this scenario, and the assumption that the temporary bridge would be on the south side of the existing bridge, the north half of the approach (both east and west) would be built first. The south half of the approach could be accomplished in one of three ways:

1. After the north side is constructed, the temporary bridge would be removed, and the bridge effectively shut down to all modes of traffic. This would allow for the south half of the approach spans to be constructed during the same time frame that the main river piers were being constructed by building the south half of the approach spans including the area that had previously been used to accommodate traffic. Of the options involving a temporary bridge, this method would be the most straightforward for the contractor and the least costly option for constructing the south half of the approach spans. This option is not advanced because it would require a lengthy traffic detour (6-12 months) to adjacent bridges.
2. After the north side is constructed, it may be feasible that the temporary bridge could be realigned to move the tie-in point to a section of bridge that had just been constructed/rehabilitated. This would allow for the south side of the approaches to be constructed. Although this option would result in additional cost to relocate the tie-ins and would be dependent upon which alternative was selected, the work could be accomplished within the time the river spans are being constructed given that the river spans would take substantially longer to construct than the approach spans. This option is not considered the baseline because it is dependent on many unknown factors at this time. It is recommended that this approach be investigated during the design phase.
3. After the north side is constructed, the traffic would remain on the temporary alignment until the river spans are completed. After the river spans are complete, traffic is shifted to the north half of the newly constructed bridge, the temporary

bridge is removed, and the south half of the approaches are constructed. This option is shown as the baseline assumption in the schedules in Appendix G.

In addition to the above, constructing the new/retrofitted bridge in halves adds inefficiency and subsequent cost to the project. If the entire bridge footprint was available for the contractor to build in one continuous phase, it would be able to construct more at one time; resulting in better production, a shorter project duration, and lower total cost. A feasible east approach temporary bridge tie-in and east side construction sequence has been developed and can be found in Appendix I.

2.4 Demolition

The following subsections will give a summary of the various features to be demolished, along with a feasible explanation (when applicable) of how the items would be demolished.

2.4.1 Building Demolition

Several buildings would be demolished to allow for bridge expansion and the temporary bridge to be used during construction. The buildings range from an office/storage-type building to warehouses with office space attached. For a full description of properties that would be acquired permanently or properties that would require temporary construction easements, see the *EQRB Right-of-Way Technical Report* (Multnomah County 2021i).

The buildings most likely to be demolished as part of this project are:

- Tax Lot 1N1E34DC 800: Due to its age, it is assumed that the building touching the south side of the bridge on the West Approach could contain large amounts of asbestos and lead (paint, piping, etc.) that would need to be remediated prior to demolition. It may be necessary to perform some “pre-demolition” to expose the asbestos and lead materials. Once asbestos/lead has been removed, the primary demolition could begin.

Soft demolition would be done first to remove interior (plaster or sheet rock) walls, furniture, cabinets, doors, etc. This material would be loaded out and disposed of at a landfill. Once the soft demolition is complete, the remaining structure (CMU block, concrete, steel, brick, etc.) would be demolished. The demolition contractor would need to break the building down in manageable, safe sizes, as not to destroy surrounding buildings, the existing bridge, or cause safety implications for the public. It is likely that a single lane or multi-lane bridge closure would be necessary when hard demolition is occurring.

- Tax Lots 1N1E34DA 1900 and 1N1E34DD 1000: These two buildings are warehouse style buildings, with office space included at the far south end of both buildings. There is a possibility for asbestos and lead materials within the buildings. The demolition approach would be very similar to the West Approach building demolition with the exception that the warehouse space is only a single story and thus, the demolition of these structures would be fairly straightforward. One complication for demolishing these buildings would be related to the railroad (UPRR). Because the buildings are adjacent to UPRR’s tracks, demolition would need to be coordinated

with the railroad and would likely require a railroad flagger be present during demolition.

2.4.2 Bridge Deck Demolition

Bridge demolition would be employed for the deck work (superstructure) and parts or the entire substructure, depending on the alternative.

- For all alternatives, the bridge deck, including bascule spans would be removed. For the Retrofit alternative, the bascule spans may be reused or replaced. Deck demolition, when over land, would be accomplished by placing an excavator on the deck of the bridge and using a processing attachment to break the deck into small pieces, dropping onto the surfaces below. When surfaces need to be protected (such as City streets), sand or other protective measures would be placed along the area to be protected prior to demolishing the deck. Over water, the contractor would stage barges under the deck areas to be demolished. When the deck is broken into pieces, the pieces would fall onto the barges. Once demolition is completed, the barges would be offloaded, and the material recycled or disposed of properly. Close to banks where barges cannot reach all the way to land, the contractor may use fabric, road plates, or other materials that would act as a ramp to divert broken concrete pieces to the barge or to land, such that no concrete debris falls into the water.

2.4.3 Bridge Demolition over I-5, I-84 Ramps, and UPRR

Regardless of alternative, the existing bridge spans over I-5, I-84 ramps, and UPRR would be replaced with new superstructure and substructure. Demolishing the existing bridge would need to be done in several stages, in order to safely demolish the bridge and work around traffic operations for the freeways and UPRR.

In order to demolish the bridge superstructure over I-5 and I-84 safely, freeway weekend closures would be necessary. The Project team envisions that a contractor would use a processing approach to the bridge deck demolition, meaning that the contractor would break the superstructure concrete into small pieces onto the surfaces below. This approach would require pre-planning and extensive coordination with ODOT for appropriate closure windows.

The contractor's demolition approach would likely be approximately as follows for these spans:

- Place sand on highway for protection of existing structures and break Burnside bridge deck and sidewalk, then roadway stringers into small pieces onto the highway bridge deck below using an excavator.
- Chip away concrete encasement on main steel girders and floor beams. Cut and lift off floor beams, then main girders using a crane sitting atop the Burnside bridge deck adjacent span.

For a more detailed sequence of operations, see Appendix C.

See Sections 2.4.4 and 2.4.5 for substructure demolition.

For demolition over the railroad tracks, the contractor would need to coordinate carefully with UPRR. Due to the frequency of trains, the Project team anticipates that the

contractor would not be able to secure extended windows for demolition. As such, the work would need to take place around UPRR's operations. This would likely mean the contractor would need to sawcut and lift off the deck in larger pieces with a crane or excavator. This method of demolition is slower but does not result in falling concrete pieces that need to be cleaned up. Depending on the size of crane or excavator, pieces could be cut into manageable sizes (typically between 6 feet and 12 feet long by 12 feet to 20 feet wide). Once the deck and roadway stringers have been cut and lifted off, the procedure for floor beam and girder removal would likely be the same as used for the spans over I-5 and I-84 ramps.

2.4.4 Remaining Bridge Demolition (Retrofit)

Several parts of the existing bridge would be demolished as part of the retrofit design. Features that would need to be demolished include the deck, removal of the bascule spans, a portion of the east truss, and portions of substructure that would be replaced by new spans. Additionally, a portion of the harbor wall would need to be removed to accommodate Pier 1 construction.

Deck Demolition: The deck would be demolished in a similar fashion to the deck over I-5 and I-84. Local City streets, Burnside Skatepark, Portland Saturday Market, the portion of Tom McCall Waterfront Park under the bridge, and any accessible points to the bridge would need to be closed during demolition. Where the bridge crosses TriMet's light rail tracks, MAX operation would need to be temporarily shut down and the catenary cables would need to be protected or removed during deck removal.

Bascule Span Demolition: The Project team understands that the USCG will not allow extended duration closures of the navigational channel. As such, the assumptions herein are based on allowable closures in the range of several days to a week or two (although there remains potential for the USCG to relax these requirements in the future). Based on this, rehabilitating the bascule spans cannot be performed in place. Instead, a short-term closure of the channel would be needed to lock the counterweights in place, and then lift off each bascule span onto a barge. Due to its size, this lift would require special jacking equipment to lift off and support the span. Once on a barge, the bascule span would be hauled to an offsite yard and rehabilitated. The deck would be removed, the existing steel rehabilitated and/or strengthened where required, and a new deck installed. See Section 2.8 for additional details.

Truss Demolition: As part of the plan for the Retrofit, the existing Pier 4 would be removed and a new Pier 4 constructed further west. Moving the pier west would result in establishing a new bearing point on the truss and would require removing the eastern portion of the truss that extends beyond the new Pier 4 location. To remove the portion of truss, a barge would need to be positioned under the work area to accept the truss. From then, a couple options could be employed to remove the truss:

1. The most likely method of truss removal would be cutting and lowering the truss in pieces. This would be done using a cutting torch or lance and severing pieces from the truss (temporarily held by a crane). When each piece is cut, it would be lowered to the barge and the process repeated. After all pieces were lowered, the barge would take them to a scrap yard to be recycled.

2. An alternative method would be to cut and lower the truss portion as one larger piece. To do this, larger equipment would need to be mobilized to hoist and lower the truss. Some type of jacking system would likely be needed on the barge that would rise into place and push up on the portion of truss until the weight was shifted onto the barge. Then, the truss would be severed, and the large piece of truss would be barged to a scrap yard to be recycled.

Substructure Demolition: The following substructure units would need to be removed completely or partially as part of the project:

- Full demolition: Pier 4, Bents 21, 22, and 24
- Partial demolition: Bents 25, 26, and 27

For Pier 4, a cofferdam would likely be needed around the pier foundation in order to remove the pier in the dry. Dry demolition would be accomplished by using large excavators mounted on barges to hammer and process pier concrete into smaller pieces. Once the pier demolition was underway, it is likely that a smaller excavator would be lowered into the cofferdam to break up concrete and help loadout. Instead of demolishing the pier within a cofferdam, if found acceptable by the USCG and environmental agencies, a wire saw could be used to saw the pier into pieces. With this method, the pier would be sawn into manageable blocks. The blocks would be lifted by a crane onto a barge and shipped off to be broken into smaller pieces and recycled. For either of these two methods used, it is expected that the USCG would require the existing substructure to be removed to 3 feet below grade (below riverbed).

Bents 21 and 22 are within extremely close proximity to I-5. The Project team expects that these bents would be removed with the superstructure during weekend closures. The bent columns are concrete encased steel and would need to be removed by cutting and lifting the pieces out. To do this, a crane would need to be stationed on the adjacent span. The concrete encasement would be chipped away exposing the steel to be cut. The crane would grab hold of individual pieces or, if the crane were large enough, would lift the entire column as a unit. The bottom of the column to be lifted would be cut and the piece would be lifted out, loaded onto a truck, removed from the site, and recycled.

The remaining bents on land would be removed with conventional equipment. As with the bents near I-5, these bents are concrete encased steel and would be removed in similar fashion. In lieu of a crane being stationed on the deck, the pieces would be lifted by a crane or excavator located on the access road or City streets below.

Harbor Wall Demolition: Demolition of portions of the harbor wall to accommodate Pier 1 foundation widening would be a risky operation. The sidewalk behind the harbor wall would need to be partially removed and the area shored to allow excavation/harbor wall removal. Once the area is shored and an isolation cofferdam is installed on the riverside of the harbor wall, the portion of harbor wall to be removed could be sawcut to sever it from the remainder of the harbor wall to remain. Once the portion of harbor wall has been cut from the remainder, the contractor could then use an excavator with shears and processing tools to break the concrete into small pieces, and then excavate that material from the cofferdam. Alternatively, the contractor could continue to use a sawcutter to cut the wall into manageable pieces and remove with a crane or large excavator.

After the harbor wall removal has been completed, the contractor would need to attempt to pull the wood piling under the harbor wall. If the piling does not pull, or break during pulling, the remainder of the pile would need to be cut off a minimum of three feet below grade.

2.4.5 Remaining Bridge Demolition (Replacement Alternatives)

Demolishing the various elements for the Replacement Alternatives would be very similar in nature to that described above for the Retrofit for the land piers. The means and methods and general approach would be practically identical. The largest difference between the Retrofit and Replacement Alternatives is the amount to be removed. Where the Retrofit removes limited bents, the Replacement Alternatives would demolish the entire existing structure. Where bents do not conflict with future work, those bents would be demolished to two feet below grade. Where new features conflict with the existing bents, the bents would be removed in either their entirety, or the contractor would need to install the new piers through the existing bents.

The primary difference between the Retrofit demolition and Replacement Alternatives demolition is that the Replacement Alternatives with river piers in the same location as existing piers require complete demolition of the river piers above foundation level, while the Retrofit would not. See below for details when new river pier locations are shifted away from the existing piers.

Main River Pier Demolition: Where the new river piers would be built on top of the existing piers, the Project team anticipates that the demolition of the river piers would need to take place within cofferdams. Once the contractor has the cofferdams in place (see Section 2.5 for more detail), demolition could commence on the upper piers. The contractor would begin demolition on anything that could be processed into smaller pieces within the main pier walls. Once the cofferdam was dewatered, the contractor would begin main pier demolition using large excavators with processing tools to break the walls into smaller pieces. The excavator(s) would likely be mounted on barges with smaller equipment lowered into the cofferdam to assist loading and break up concrete. As demolition progressed, concrete rubble would be loaded out either by clam bucket with a crane, or by using excavators with large buckets to load concrete rubble onto barges to be barged offsite and recycled.

The main piers would need to be removed in their entirety down to the seal pour elevation.

For the Replacement Alternatives, it is feasible that the new pier locations are shifted away from the existing river piers. If this were done, demolition of the existing piers would be performed without a cofferdam. The contractor would likely use mechanical demolition processes for above-water sections of the pier and process material into the existing pier box. Once the contractor reached water level, the remaining portion of the pier would be wire sawn into manageable pieces and lifted onto barges to be transported off site and disposed of properly. The existing piers would need to be removed to a minimum of three feet below the river mudline.

Beyond the potential cost savings of not having to install and remove a cofferdam, the Project schedule would be enhanced since demolition could be performed concurrently with drilled shaft installation for the new piers. The critical interaction between existing

pier demolition and new pier construction would be ensuring that both activities had ample access to the area away from the active navigation channel.

Advancement of Replacement Long-span Alternative (Narrowed):

As part of the refined design details, the river foundations have been modified to perched foundations in the approximate location of the existing piers. In order to accommodate the new piers, the existing piers would need to be demolished at least to the limits of the new piers. At this point, it is anticipated that cofferdams would not be utilized for new pier construction. As such, pier demolition would most likely take place utilizing wire saws underwater that would cut the pier into manageable pieces as is described above.

At the existing Pier 1, the pier will be removed to approximately the depth of the adjacent seawall foundations. This would allow the open the zone behind the existing Pier 1 to be flushed with water from the Willamette River. A cover over the pit would be constructed.

2.5 Cofferdam and Seal Construction

The assumed cofferdams for the EQRB Project would need to encapsulate both the proposed pier locations and the existing piers, resulting in large and deep cofferdams to facilitate demolition of existing structures and new construction. Further, the cofferdams would need to be driven within close proximity to existing pier foundations, producing significant risk of encountering differing site conditions associated with larger than known foundations, old cofferdams left in place, and/or other manmade “features” that could conflict with the construction.

Regardless of bridge alternative, it is assumed that standard installation techniques would be used to install (and remove) cofferdams using barge mounted equipment (cranes) for access. This work (installation and removal) would need to take place during the in-water work window (IWWW). The installation would be accomplished by first installing a sheet pile driving template. This is done by installing the top bracing ring (large W-beam on its side that will act as a brace for the sheet piles). Once the ring/template is installed, the contractor would install sheet piles using a vibratory hammer to advance the sheets past the bottom of the pier seal. For EQRB, the bottom of seal elevation is estimated at EI -72.5 (NAVD 88), meaning that the sheet pile length would be approximately 100 feet long. If a vibratory hammer cannot advance the sheet pile the entire way, a diesel impact hammer can be used to drive the sheet pile further. If cobbles are encountered, it is likely that the sheet pile would need to be driven through the cobbles but could meet refusal. Should refusal occur or a large boulder be encountered, the contractor would need to excavate inside the cofferdam to expose the boulder/cobble and then remove it underwater to allow cofferdam installation to continue.

Although the basic cofferdam installation methods would be similar, regardless of bridge alternative, the cofferdam type would vary for each alternative, as detailed in the following subsections.

Construction of the seal would generally take place in a similar fashion for each of the various bridge alternatives, but there would be differences in construction approach for each alternative. The basic construction of the seal begins with excavating the existing material from the river. Contaminated soils are expected from the riverbed elevation to approximately 20 feet below riverbed. Any contaminated soil excavated would need to be

disposed of properly at a certified landfill. For cofferdams as large as these, the contractor would likely use a barge mounted crane with a large clam bucket (assuming the work bridge(s) are not installed yet) to remove material from the cofferdam and place the material in a barge to be shipped off site and disposed of. The clamming would need to occur underwater to avoid inducing pressure on the unbraced cofferdam.

Once the cofferdam is excavated to the bottom of seal elevation, the contractor could either proceed with drilled shaft installation (see Section 2.6 for details) or would pour the concrete seal next. The seal would need to be tremie poured underwater.

Once the seal has cured for a few days, the contractor would begin to dewater the cofferdam. As the dewatering commences, the contractor would install bracing as the water level is dropped. Water would be drained until the contractor reaches the “next” bracing point, at which time, the dewatering would stop, the bracing would be installed, and the dewatering would continue. This process would be repeated until the contractor reaches the top of seal.

When the seal is exposed, the contractor would need to clean the top of the seal of latent material, uneven surfaces, and any ridges that may protrude into the new footing.

2.5.1 Main River Piers (Retrofit)

For the Retrofit alternative, the cofferdams need to be driven outside the drip line of the existing structure to avoid overhead conflicts between the bridge and the sheet piles with vibratory hammer and crane boom/hook atop the sheet pile. To accomplish this, part of the sidewalk near the piers would need to be removed to allow the sheet piles to be driven close to the edge of the existing pier wall(s) to tie the sheet piles and existing pier walls together to make a watertight seal.

The cofferdam would require several bracing rings to keep it stable. Additionally, due to the size of the cofferdams, internal braces would be required. The internal braces would need to be spaced to miss drilled shafts and depending on the location of the brace(s) relative to the top of footing elevation, it may be necessary to encase the lower brace(s) in the footing.

2.5.2 Main River Piers (Replacement Alternatives)

The details below assume the new river piers would be constructed in approximately the same location as the existing river piers. If the new river pier locations were shifted, this section would not apply.

For the Replacement Alternatives, the existing pier would need to be demolished before the new pier can be built since the location of the new river piers overlap the existing. However, the existing pier could not be demolished until a cofferdam is built around the existing pier. Further complicating matters, the new pier footprint is much larger than the existing pier footprint, requiring an offset cofferdam that would encompass the old and new foundations for demolition and new construction.

The bridge superstructure, including bascule span and land connection truss would need to be removed prior to the cofferdam being constructed. Once the superstructure is removed, the cofferdam could be driven around the entire perimeter of the new footing that also encloses the existing pier within the cofferdam. Because the existing pier is still

in place, there would be a u-shaped area around the existing footing and seal that would need to be excavated and prepared for a new seal to be poured. The top of new seal course elevation nearly matches the top of the existing seal.

After the seal is poured, the contractor would dewater the cofferdam and install bracing rings in a similar fashion to that described in Section 2.5.1. The major difference for dewatering the cofferdam for this scenario is that bracing rings would need to brace off/from the existing pier walls. Later, as the pier is demolished, the bracing would need to be sequentially reset/replaced as demolition continues. For the assumed demolition sequence, see Section 2.4.5. The bracing would most likely conflict with constructing the new pier footing and stem walls. The contractor would need to either encase the bracing in the new footings or block out wall pours around the bracing. Later, once the pier work is complete and the cofferdam is flooded, the bracing through the stem walls could be removed and the walls patched. This work would need to take place sequentially, as the water level is raised. To do this, the contractor would need to pump water into the cofferdam until the water level is close to the bottom of a brace. The brace would then be removed, the stem wall patched and cured, and then cofferdam flooding could continue until the next brace. This process would continue until all braces were removed and the water is at the same elevation as the river.

Advancement of the Replacement Long-span Alternative (Narrowed):

It is not anticipated that the Project would utilize cofferdams for the Replacement Long-span Alternative (Narrowed). Instead, the Project anticipates utilizing perched foundations over top of the existing footings. The existing footings would be demolished to three feet below mudline prior to constructing the new perched foundations.

2.5.3 Pier 1 (Retrofit)

The existing Pier 1 is constructed under the existing bridge truss, adjacent to the City's harbor wall, and also has City sewage pipes running along and adjacent to it. These conditions pose challenges for constructing a cofferdam for this pier:

- **Headroom:** For the Retrofit, the existing trusses would remain in place, posing a significant challenge for installing sheet pile. Due to low headroom, it is not practical to assume that a crane with vibratory hammer could fit under the existing truss to drive sheet piling. As such, an alternative means of installing sheet pile or other cofferdam material would need to be developed during design to create a dam to keep out water. Examples of alternative cofferdams are:
 - **Bolted connection:** In lieu of driving sheets, the sheets are threaded together and bolted to the foundation using structural angles or similar type connections.
 - **Bio-bag or sandbag wall:** For shallower conditions (the Willamette River is fairly shallow in the vicinity of Pier 1), a large bio-bag or sandbag wall could be placed in front of the area to be dewatered and act as a dike.
- **Harbor Wall:** The harbor wall is an old structure, built on wooden piles. As with any old structure built in water, it is likely that the cofferdams and/or formwork used to construct the original wall were left in place, in part or in whole. As such, unknown

manmade objects may impact anything that is built within close proximity to the harbor wall.

- It is unknown how vulnerable the harbor wall may be to vibration. Since the harbor wall is founded on wooden piles, the wall may experience settlement if vibratory installation and retrieval methods are used for cofferdam sheets. As such, an alternative to driven piles for creating a cofferdam is suggested.
- Existing Sewer Pipes: The City owns and operates two known sewage pipes that run from the pump station (just south of the bridge) along the Pier 1 wall to the north, and then turn east across the Willamette River on the north side of the bridge. Any work involving cofferdam installation would conflict with the existing sewage pipes near the north side of the pier. In order to avoid the conflict, a couple of mitigation measures could be employed:
 - The sewage pipes could be temporarily relocated during construction. The most likely place to run the sewage pipes would be along Tom McCall Waterfront Park. Performing this work would require dewatering the tie-in, cleaning out and disposing of the existing piping, and installing temporary piping that would bypass the Pier 1 work area. At the end of construction, the temporary pipe would be replaced by permanent pipe in the original or accepted alternative locations, and the connection point would again need to be connected to attach the new pipe. This operation would be expensive and risky for several reasons, including having to dewater and connect to an existing (old) system and risking damage to the existing pipe, having to clean/pump out the effluent within a dewatered area in the river, the pipe's proximity to the harbor wall, and risk of temporary pipe vandalism.
 - If an alternative system to sheet piling is used (such as sandbags, bio-bag, or similar), it is feasible that the existing pipes could be left in place for dewatering to commence. Leaving the existing pipes in place for this operation may not preclude having to remove them for other operations on the bridge (such as jet-grouting, drilled shaft installation, or other items of work that involve vibration or ground displacement).

2.5.4 Bent 7 (Replacement Alternatives)

For the Short-span Alternative and the Couch Extension, Bent 7 would be relocated further to the west away from Pier 1, or in the case of the Long-span Alternative, eliminated in its entirety. If this were done, the need for a cofferdam would be minimized or eliminated completely. The exception to this is the need to contain ground improvement grout from entering the river. This would be accomplished by either driving sheet piling (or similar) measures within Tom McCall Waterfront Park or placing a more traditional cofferdam in the water to ensure no grout migration.

Advancement of the Replacement Long-span Alternative (Narrowed):

For the Replacement Long-span Alternative (Narrowed), an additional Bent (Bent 5) would be placed in Tom McCall Waterfront Park west of Pier 1. It is not anticipated that this pier would require a cofferdam.

2.5.5 Bent 10 (Short-span Alternative and Couch Extension)

For the Short-span Alternative and Couch Extension, Bent 10 has a shaft cap that would need to be placed near the bottom of the river, necessitating a cofferdam. Whereas the cofferdams for Piers 1, 2, and 4 have been described above to be quite difficult due to extenuating circumstances, the cofferdam required for Bent 10 would be quite straightforward in relative terms and the most like a traditional cofferdam. Ground improvements would be required adjacent to Bent 10, which would necessitate installing an oversized cofferdam to contain the ground improvement work. In order to minimize the seal to allow dewatering, an interior cofferdam wall could be installed between the location of the ground improvements and the location of the Bent 10 drilled shafts/substructure.

The general cofferdam construction would be similar to that mentioned above, but would be accomplished in a more traditional order, when incorporating drilled shafts. The likely sequence of installation would be to:

- Vibrate/drive a frame/ring that would be used as the cofferdam template as well as a pressure brace
- Vibrate/drive sheet piles around the frame
- Install interior cofferdam wall between ground improvements & shaft/shaft cap location
- Install ground improvements
- Excavate (dredge) inside cofferdam on side of drilled shafts until the elevation of soils was roughly at finished grade
- Install drilled shafts
- Install cofferdam seal on side of drilled shafts
- Dewater cofferdam on side of drilled shafts and install remainder of substructure

2.6 Drilled Shafts

The drilled shaft construction for the river piers would require careful planning and execution. Multiple rows of 12-foot-diameter shafts are expected at the main piers for all bridge alternatives. This would require the contractor having to build access on top of the cofferdams in order to reach the shaft locations. For a detailed drilled shaft sequence inside cofferdams, see Appendix D. For a detailed drilled shaft sequence in open water, see Appendix E.

The general shaft installation procedure would be fairly similar for all alternatives. Significant differences will be discussed below within each alternative. In general, however, the Project team envisions one of two ways to install the shafts:

1. Conventionally augered shafts: With this method, a temporary casing is vibrated/driven as far as practical into the ground. Typically, a casing slightly larger than the shaft size is inserted into the ground first and a second casing matching the diameter of the shaft is inserted inside the oversized casing. This method of telescoping casing allows contractors to install casing twice as deep as just installing

one casing. Once the casing cannot be vibrated or driven any further, drilling fluids such as bentonite slurry is used to stabilize the hole below where the casing can be driven. A drill with an auger is used to excavate soil and drill to the rock layer. Once the rock layer is reached (or if a boulder/harder material is encountered along the way), a core barrel is used to core through the boulder/rock.

For this method, typical equipment includes a drill, a support crane (or two, depending on rebar cage length), a spin-off box or barge for excavated material, and a slurry mixer/pump. Depending on contractor preference, conventional drilling could be performed with a barge-mounted drill.

2. Oscillated Casing method: This method utilizes a large oscillating machine that rotates a temporary casing back and forth, pushing it into the ground as it oscillates. The casing is typically inserted to the tip elevation of the shaft, thus eliminating the need for slurry. As the casing is advanced, a crane is used to remove material using a clam bucket. During concrete placement, the casing is extracted and removed in sections, unless specified that the casing or a portion of it remains as permanent.

Typical equipment for this method includes an oscillator, a crane for clamming, a support crane for the rebar cage, and a compressor to power the oscillator). Drilling with an oscillator requires a work bridge with significant lateral bracing to resist the oscillator's torque.

For either method, once the hole is drilled, the contractor would insert the rebar cage using the support crane, and then concrete would be placed using the tremie method (typically using a concrete pump). During the pour as the concrete is filled into the drilled shaft, the temporary casing would be raised and picked out of the hole.

Drilled shaft construction, especially over water, requires careful planning around containment of drilling spoils and slurry (if used). Further, with large shafts such as the ones on this project, it would be very important for the contractor to adequately brace the work bridge (if used) laterally to resist the large torques induced by the oscillator.

2.6.1 Main River Piers (Retrofit)

For the main piers, there would be 9 drilled shafts on either side of the existing pier, totaling 18 shafts at each pier. To avoid impacts to the navigation channel during construction, it is assumed that the shafts would only be accessed from the "non-channel" side. This means that the shafts closest to the navigational channel would need to be accessed from a temporary platform built over the cofferdam. This platform would act as an extension of the work bridge. As the shafts are constructed, the temporary platform could be removed or "peeled" back until all shafts are constructed.

If the Retrofit shafts were constructed with a conventional drilling method, it is feasible that the shafts could be installed using a barge mounted drill before the cofferdam is in place, which would preclude needing a temporary platform. This would require that all shafts be installed during the in-water work window, or at least isolated from the river to allow construction outside the in-water work window.

For the Retrofit, the shafts would be placed outside the drip-line of the existing deck, meaning that the shafts can be installed relatively early in the schedule. It is currently assumed that the contractor would install shafts after the seal is poured and the

cofferdam is dewatered. In this scenario, the contractor would have to drill shafts through the existing seal. This would take additional time, however, would allow for shaft installation outside of the in-water work window once the cofferdam is dewatered. For more detail, see Appendix D.

2.6.2 Main River Piers (Replacement Alternatives) Within Cofferdams

Each replacement main river pier would contain 18 drilled shafts, 12 feet in diameter. Similar to the Retrofit, the contractor would need to build a temporary access platform from the work bridge to access the shafts nearest to the navigation channel. The platform would be partially removed as the contractor completes shafts from the channel moving towards the riverbank.

The drilled shafts for the main river piers of the Replacement Alternatives could not be drilled until the existing piers are demolished. In order to demolish the piers completely, the cofferdams would need to be dewatered. This means that the cofferdams would need seal pours, which in turn means that the drilled shafts would need to be cored through the seal. See Appendix D for a more detailed description of the drilled shaft sequence. It is likely that an oversized casing would be cored through the seal and then the cofferdam filled with water for the actual shaft installation, followed by dewatering of the cofferdam a second time to construct the remainder of the pier. It is feasible that a contractor would want to install oversized casings prior to pouring the new seal around the existing pier.

It is possible that a contractor will want to demolish a portion of the existing piers above water and drill shafts prior to installing a cofferdam. If this were done, the contractor could devise a plan to use a barge-mounted drill and drill through the existing pier floor to install shafts within the existing foundation footprint. Then, once complete with those shafts, continue to install the remaining shafts outside the existing pier footprint. After all shafts were installed, the contractor would continue with cofferdam installation and later, demolition of the remainder of the pier after the cofferdam was dewatered. For this plan to work well, the contractor would need to check to ensure the shaft locations did not conflict with the existing pier walls or that the installed shafts did not cut off access for demolition.

If pier protection is required, it could be accomplished by drilling several additional drilled shafts along the main channel side of the river piers or adding a fender system. These would likely be installed at the same time the pier shafts are being installed in order to utilize the same work platform and also to keep out of the main navigation channel.

2.6.3 Main River Piers (Replacement Alternatives) In Open Water

If the new river pier locations were shifted away from the existing piers, the drilled shafts could be installed in a more conventional manner primarily by not having to core through the existing foundations. This would mitigate a lot of schedule and cost risk. With this approach, a cofferdam would not be needed, and the shafts would be installed in the open water. The drilled shaft casing would provide containment during shaft excavation and concrete placement.

The contractor would likely build a work bridge over the “entire” pier that encompassed the area of the drilled shafts. This would allow the contractor to install shaft casings, shaft reinforcing cages, and pour concrete from the work bridge. This scheme would be very

similar to the platform required over a cofferdam but would be a traditional work bridge instead of a post-up platform that would be required for a cofferdam.

The time required to install drilled shafts in the open water would likely go beyond the standard in-water work window for the Willamette River. If this option was selected, it would be advantageous to install shafts in a longer in-water work window (if granted) without affecting the overall schedule.

If pier protection is required, it could be accomplished by drilling several additional drilled shafts along the main channel side of the river piers or adding a fender system. These would likely be installed at the same time the pier shafts are being installed in order to utilize the same work platform and also to keep out of the main navigation channel. For a detailed sequence of drilled shaft installation, see Appendix E.

Advancement of the Replacement Long-span Alternative (Narrowed):

The Project team performed a preliminary analysis weighing out the risk of drilling shafts through existing foundations to the added cost of building piers to the outsides of the existing piers. Since the bridge would be narrowed, the additional costs of installing foundations to the outside of the existing piers coupled with a need to “bridge” the existing piers to transfer loads to the outside became cost prohibitive as compared with the risk to drill through the existing foundations.

As currently planned, the Project would not utilize cofferdams and instead install drilled shaft foundations in open water through the existing foundations. For the bascule options, a single foundation would be placed over the same footprint as the existing pier, resulting in several shafts being installed through the existing footing. The bascule options’ drilled shafts would be installed through the existing foundation in a similar manner to that described above except that an oversized hole would need to be drilled through the existing foundation at each shaft location. The oversized hole would separate the new foundation’s shafts from the existing foundation.

For the lift options, the foundations are split (one foundation under each tower leg). For this scenario, the drilled shafts would be installed just north and south of the existing pier to avoid having to drill through the existing footings.

2.6.4 Abutment 1 (Retrofit)

Based on the current plans, the existing span configuration would be preserved. This would create a conflict with maintaining access to the Portland Rescue Mission (PRM) entrance on Burnside, which will be discussed later in this report. The construction enhancements to Abutment 1 will entail conventional methods to expose footings and construct enlargements, accessed from Burnside Street and from the University of Oregon classroom location.

2.6.5 Abutment 1 (Replacement Alternatives)

For the Replacement Alternatives, the team envisions moving Abutment 1 and eliminating the first span. Doing this would accomplish two major things:

1. In order to maintain access to PRM through their existing entrance, a temporary “platform” would need to be available. The current sidewalk is actually elevated and

is part of the bridge structure. Moving the abutment east would place the entryway to PRM on grade and allow for the contractor to construct the abutment fill while still maintaining access to PRM through their existing entryway.

2. Shifting the abutment east would eliminate one span, saving cost and allowing for easier construction adjacent to PRM.

Prior to demolishing the existing span 1, an infill wall would be built between the PRM building columns to enclose the PRM building. This wall would be formed between the columns and poured to the top/fascia beam using pressurized concrete pumping techniques to ensure the pour went all the way to the top. Once the wall was built, the building would be isolated from the bridge and future work could take place relatively independently, as long as access is maintained.

The sequence of operations for eliminating the span and constructing the fill while maintaining full access is addressed elsewhere in the report.

The abutment would be likely constructed using drilled shafts with a perched footing and a mechanically stabilized earth (MSE) wall to retain abutment fill. The abutment shafts would be constructed from the Skidmore Fountain MAX Station, while the MSE wall would be constructed from Skidmore Fountain heading west.

2.6.6 Pier 1 (Retrofit)

Similar to the main river piers for the Retrofit, the shafts at Pier 1 would be drilled to either side of the existing bridge. Although the shaft work would be very similar to that for the main piers, the difficulty associated with this pier relates to installing a cofferdam under the existing bridge, removing a portion of the harbor wall, removing a large area of sidewalk to make room for the retrofit footing, shoring the area, and temporarily relocating the City's sewage pipes that run along Pier 1.

Installing the shafts themselves would likely take place from land. This would require building a temporary platform over the cofferdam and accessing it via Tom McCall Waterfront Park. Due to the large equipment that would need to be located adjacent to the shafts, Portland Saturday Market would need to be shut down for an extended period. Additionally, the bicycle and pedestrian path under the bridge would need to be temporarily relocated away from Pier 1.

2.6.7 Bent 7 (Short-span Alternative and Couch Extension)

As currently designed, Pier 1 would remain in place, and a new bent would be constructed west of Pier 1. With this scheme, no shafts would be necessary at Pier 1.

At Bent 7, a single line of shafts would be constructed. The shafts would be built on land using conventional methods described above.

2.6.8 Bent 6 (Long-span Alternative)

Bent 7 would be eliminated entirely. If this were the case, the long-span (as shown, a tied arch) would terminate at Bent 6 (see Appendix F and *EQRB Bridge Replacement Technical Report* (Multnomah County 2021a) for more detail). This bent would encompass a double-row of 10-foot diameter drilled shafts constructed on land. Due to

the western shafts' location, the outside lane of SW Naito Parkway northbound would need to be closed during shaft (and footing) construction.

Advancement of the Replacement Long-span Alternative (Narrowed):

As a cost saving measure, the Project team has added the pier back into Tom McCall Waterfront Park. Due to other design progression, the west approach has reduced the number of bents such that Bent 6 as described in the *EQRB Construction Approach Technical Report* (Multnomah County 2021b) is now named Bent 5 for the Replacement Long-span Alternative (Narrowed). The installation of drilled shafts for this bent would be similar to Bent 7 described in the Short-span Alternative (see Section 2.6.7).

2.6.9 Bent 9 (Long-span Alternative)

Similar to the elimination of Bent 7 on the west approach as described in Section 2.6.8, if a Long-span Alternative was chosen for the east approach, Bents 10, 11, and 13 included with the Short-span Alternative would be eliminated (see *EQRB Bridge Replacement Technical Report* (Multnomah County 2021a) for more detail). For the other alternatives, Bent 10 shafts would be constructed inside a cofferdam or during in-water work windows, and Bent 11 would be constructed between the I-84 ramp and the UPRR railroad. Eliminating these two piers would mitigate substantial risk.

2.7 Pier Construction

Depending on the location of the new river piers for the Replacement Alternatives, or if the Retrofit Alternative is selected, the construction of the pier footings and towers could differ. For both the Retrofit and the Replacement Alternatives with piers in the same location as the existing piers, a large cofferdam will be constructed around the work. This will allow for piers to be built conventionally in the dry within cofferdams.

For Replacement Alternatives where the new pier locations are shifted away from the existing piers, a perched foundation would be constructed. Perched foundations, as the name implies, are placed above the river bottom and rest (or perch) on the drilled shafts. Perched foundations can be built without having to install traditional cofferdams, saving large excavations, large seal pours, and not having to place structure down to the river bottom.

The perched foundation needs to be lowered into place in the water to create a dry space to continue the remainder of the construction. There are two primary ways that perched foundations can be constructed:

- Method 1 involves constructing a modified floating cofferdam that would be lowered around the group of shafts. In order for the box to fit over the shafts, the floor would need to have a hole at each shaft location. These holes would later be sealed up. The box would be brought into location by either prebuilding and using float in methods or by building the box in place above water and jacking the box down into the water. This method would likely utilize cofferdam sheet piling anchored into a temporary floor. Once the box was lowered into the water, the space between the box floor holes and drilled shaft casings would be grouted and sealed using divers.

Then, the perched cofferdam would be dewatered, and the remainder of construction occur. The cofferdam sheets would later be cut off and removed.

- Method 2 involves utilizing precast flooring/sides to create the perched box. In this case, the floor of the box would be made up of multiple precast slab pieces that would be incrementally installed over the drilled shafts. Like method 1, the space between the shaft casings and holes would need to be grouted and sealed. Once all the precast sections were placed and post-tensioned together to form a singular unit, the box would be dewatered, and construction could commence in the dry.

Advancement of the Replacement Long-span Alternative (Narrowed):

Perched foundations are shown to be used for the refined Replacement Long-span Alternative (Narrowed). With these refinements, the piers would be installed using the same approximate means and methods as those described above. For the bascule options, the new piers would be constructed over top of the existing foundations in lieu of shifted outside the limits of the existing piers. For the lift options, the piers would be shifted north and south of the existing piers and installed just outside the limits of the existing piers.

Delta piers that utilize canted columns with a top tie-beam are being considered in lieu of vertical columns for the bascule options. This design would minimize hydraulic impacts, and potentially extend the bearing seats for girders beyond the limits of the foundations, shortening the span lengths slightly.

In order to construct canted columns, falsework would need to be built on top of the footings to temporarily support the rebar and concrete until the concrete was cured. The tie-beam could be post-tensioned, which (if necessary) would need to be designed to allow post-tensioning from the pier side away from the channels. Doing this would stay consistent with not blocking the navigation channel and would also allow for access from the work bridge.

For the cable-stay option, a large pier footing will be required within relatively close proximity to the UPRR railroad. In order to construct this pier footing, temporary shoring will likely be installed around the perimeter of the foundation limits prior to excavating for the footing.

2.8 Ground Improvements

Ground improvements are currently anticipated in the areas of the existing Pier 1, Pier 4, Bent 22, between Bents 24 and 25, and at Bent 26. The anticipated ground improvement method is jet grouting.

Access for jet grouting could be accomplished using the same general access as used for drilled shafts and other aspects of the project. The largest implications to jet grouting within close proximity to existing features relates to potential damage to structures on wood piling and causing settlement to adjacent structures.

To protect the existing bridge, jet grouting can be completed after the new foundations have been completed, reducing risk to the Burnside Bridge. However, there is still a risk that adjacent facilities could be damaged. Structures potentially vulnerable to settlement damage and/or foundation damage from jet grouting include the harbor wall, Ankeny

Pump Station, Eastbank Esplanade, I-5 mainline structures, I-84 ramps, UPRR, private property (if building left in place), and Rose City Transportation (if building left in place).

It is currently assumed that jet grouting would occur at Bent 7 for the Short-span Alternative and Couch Extension. Jet grouting would be performed within very close proximity to the existing harbor wall, the existing Pier 1, and the Ankeny Pump Station. These facilities would be vulnerable to damage and carry a risk of settling. The Project would carry a risk of costly repairs and schedule impacts if damages are found to existing structures and repairs are necessary before work could continue. Further, the Project would need to ensure that pressurized grout from the operation did not migrate into the river. During the final design phase, careful consideration would need to be given to performing isolation work and/or providing other means of protecting the existing structures from potential damage and ensuring that grout would not migrate into the river. If reasonable mitigation measures cannot be implemented, it is likely that portions of the harbor wall would need to be replaced, creating the need to relocate City of Portland sewer lines and install a cofferdam.

2.8.1 Long-span Alternative

If a long-span solution is chosen for both approaches, a large portion of the ground improvements could be eliminated. As currently shown in the concept plans (see *EQRB Bridge Replacement Technical Report* (Multnomah County 2021a), long-span approaches eliminate the need to perform ground improvements at existing Pier 1, Pier 4, Bent 22, and Bent 24. Ground improvements are likely still required at Bent 25, which would be the eastern terminus of the east long-span (tied arch as shown).

Advancement of the Replacement Long-span Alternative (Narrowed):

The current design assumes that ground improvements would be necessary for Bent 8 on the east side for the cable-stay option. For the tied arch option, ground improvements would not be required.

2.9 Superstructure Construction

Although the scopes of the alternatives vary, the general approach to work would be similar. The contractor would need to gain access to each span with large cranes to set girders, hoist form materials into place and form decks, pour decks, and then strip out the form materials to move to other parts of the project. This approach is fairly standard and would be accomplished using conventional equipment, tooling, and approaches to the work.

For the Long-span Alternative, the contractor would likely bring in structural steel via barge and as such, it is possible that the contractor could either use barge-mounted equipment to erect the long-span superstructure or a combination of work bridge accessed equipment and barge mounted equipment.

Along the approaches, the bridge would come within two feet of existing buildings. With virtually no space to work alongside the bridge, the contractor would need to have equipment placed at the nearest City street or opening. For erecting girders, trucks would need to pull in on the portion of structure in place (for alternatives with the temporary

bridge option) or in line with the bridge (for alternatives with no temporary bridge). Two cranes, one on each side of the span to be erected, would need to pick girders into place starting at the tightest point and working their way backwards. Thus, for an alternative with temporary bridge, the girder closest to the middle of the bridge would be set first, repeating the steps working towards the outside of the bridge.

For the bascule spans over the navigational channel, it is assumed that the channel could only be fully closed for short durations (i.e., a weekend or a week). With this, it is not practical to assume that the bascule spans could be poured in place. Instead, the bascule spans would need to be pre-built offsite and barged in as one piece (with the deck poured on the span or precast pieces installed after the span was in place). Large hydraulic jacks would be mounted on a barge or strand jacks mounted to the pier to allow the span to be lifted into place. Once the barge has been floated into place and anchored, the hydraulic jacks would raise the bascule span until the trunnion holes align with the bearings. The trunnions would need to be installed quickly before the tides change and the river elevation fluctuates.

Beyond the bascule spans, the contractor would need to coordinate carefully with ODOT and UPRR for setting girders over their respective infrastructure. Once girders are erected, the contractor would need to build false deck containment along the bottom flange of the girders. After this is in place, the contractor could progress with deck work in the same fashion as other spans and allow for full use of both facilities.

2.9.1 Span 1 Reconstruction (Retrofit)

Partial demolition and reconstruction of Span 1 for the Retrofit would be done very similarly to the remainder of the approach work. The primary difference is not in how the bridge work would occur, but rather in required temporary works to accommodate PRM ingress for its patrons. Based on the location of the existing entryway and the fact that the entry is located in Span 1 of the existing bridge, the entry point would need to be relocated during structural upgrade work.

In order to accommodate PRM's security and crowd control process, there would be two feasible options to maintain access to PRM's building:

1. Option 1 would be creating a structural opening through PRM's east wall that would enter the building inside the security checkpoint area. This would be accomplished by installing a header beam and cutting out the existing wall. A temporary staircase and elevator (for ADA) would need to be installed on the outside of the building to provide access from 1st Avenue (alongside Skidmore Fountain LRT Station) to the side of the building.
2. Option 2 would be utilizing the existing window within the secured area and converting it into a door. In order to maintain security, the existing partition wall would need to be demolished and new partition walls constructed around the window such that patrons were still entering the building through the existing security checkpoint. Like Option 1, this option would require constructing a temporary staircase and elevator on 1st Avenue for ingress.

2.9.2 Span 1 Elimination (Replacement Alternatives)

In order to maintain access through the existing PRM entryway, the existing span 1 (adjacent to PRM and encompassing the University of Oregon classroom) would be eliminated, and instead, the new abutment would be constructed just outside the limits of the Skidmore Fountain LRT station, approximately in line with the PRM building east wall. Eliminating the span has several advantages, with the primary advantage being that the work in front of PRM would be on grade (earthwork) in lieu of structure work. This will allow for the Project to maintain daily access using the existing entryway.

The sequence of construction would occur approximately as follows. For a full sequence, see Appendix K:

1. Construct infill walls between PRM and existing bridge
2. Mobilize rolling/moveable scaffold under the bridge (inside the university of Oregon classroom area). Scaffold should be capable of moving side to side as well as vertically.
3. Begin demolition of existing bridge. At the end of each shift, move scaffold into place such that PRM patrons can safely walk from the existing sidewalk on grade to the main entryway. Per PRM, the entryway can be shut down during the day between the hours of 9 am to 5 pm.
4. Install drilled shafts and columns (or blockouts for columns) from Skidmore Fountain Station while maintaining scaffolding for ingress to PRM.
5. Begin MSE wall construction starting at the abutment face and placing aggregate base/straps from the abutment back to the west. As work encroaches on the entry scaffold, the scaffold will be moved out of the way for the days' work and then placed back each day for PRM to use. This process would be repeated until the earthwork was brought up to final grade.
6. Construct a temporary access adjacent to the permanent sidewalk to allow patrons safe ingress while the permanent sidewalk is constructed.
7. At the actual entry (doorway) to PRM, high-early concrete would likely need to be placed to allow sidewalk placement that morning and be in use later that afternoon.

2.9.3 Burnside Skatepark Span (Replacement Alternatives)

For all Replacement Alternatives, the Burnside Skatepark will need to be spanned over with minimal impacts allowed to the skatepark. The girder erection process would largely depend on whether a temporary detour bridge was built as part of the project or not as this would affect how the contractor would bring in girders and where the cranes would pick the girders off trucks.

- For the temporary detour bridge option, the contractor would need to phase superstructure construction and would need to install pre-built girders on half the bridge per phase. A temporary bent would likely be required just east of the skatepark, or could be situated within the skatepark, to allow for shorter pieces to be erected. See Appendix I for a construction sequence.

- For the no temporary detour bridge option, the contractor would need to pre-build girders at least long enough to span over the skatepark. A temporary bent would likely be required just east of the skatepark but could be situated within the skatepark to allow for shorter pieces to be erected. See Appendix J for a construction sequence.

2.9.4 Long-span Alternative

For the Long-span Alternative, the contractor would likely need to build the superstructure using temporary supports until the structure was self-supporting. In the case of a tied arch structure, temporary stays or false work would need to be employed during piece erection. After all the pieces were erected and the arch tie connected, the structure would be self-supporting and the temporary stays/false work could be removed. For more detail, see Appendix F.

An option that exists only for the Long-span Alternative is the possibility to leave the existing Burnside deck in place and use it as a temporary work access and protection platform. Once the new structure was assembled and self-supporting, the existing bridge could be demolished. Proceeding in this manner would significantly reduce impacts to the I-5 mainline, I-84 ramp, UPRR tracks, and potentially other parts of the structure.

Advancement of the Replacement Long-span Alternative (Narrowed):

The current design assumes that either a cable-stay or tied arch would be selected over I-5, I-84 ramps, and UPRR railroad. For both options, it is anticipated that a cantilevered construction approach would be used for the superstructure.

For the tied arch option, temporary support structures would likely be used to construct the arch over the highway and railroad. The contractor would use a combination of steel beams and cables to temporarily support the arch as it is built over the highway. Once the arch girders were all connected together, the temporary supports would be removed, and the arch deck constructed.

For the cable-stay option, the contractor would either build the spans using a balanced cantilever method (starting from the Bent 8 tower and working outward with equal weighted sections being erected either side of the tower to maintain balance) or would construct the back span first (from the tower towards the east) using falsework to support the girders and deck. Once the back span was in place, the contractor would likely construct the girders and deck pieces sequentially in a progressive approach over the highway. As each section of girders and cables were added, pre-cast deck pieces would be placed on the added section of girders and then equipment advanced to the leading edge of the newly placed deck section. This process would repeat until the span was completed.

2.10 Water Treatment

Any water that falls onto the bridge will need to be captured, treated, and then released appropriately. Depending on the alternative, this will likely be handled slightly differently.

For the Retrofit, the deck will be replaced in-kind, and existing catch basins will be utilized where possible. It is anticipated that any water captured will be captured and discharged through the existing water treatment system.

For the Replacement Alternatives, treatment vaults will likely be added at each side of the river to capture runoff water and then discharge into either the river, or a City of Portland sewer. Depending on the location of the treatment vaults, piping may need to be installed under TriMet tracks and Naito Parkway on the west side, and UPRR tracks on the east side. When design progresses, a suitable location for treatment vaults should be selected that result in the shortest possible discharge pipe lengths. This will avoid risk of damage to other infrastructure and reduce cost by decreasing pipe lengths and minimizing work.

2.11 Construction Impacts and Mitigation

Regardless of mitigation strategies implemented, there would still be some impacts to the public and stakeholders as a result of construction. The following categories encompass likely impacts that would affect the public users of the bridge and various stakeholders within close proximity to the bridge. This report provides a general description of potential construction impacts. Additional details relative to individual resource impacts can be found within the accompanying technical reports.

2.11.1 Noise

The scope of this Project and the need for large machinery would result in the contractor mobilizing equipment that generates a large amount of noise. Several examples that are expected to generate the most noise are listed below with related activities/scopes of work. See the *EQRB Noise and Vibration Technical Report* (Multnomah County 2021g) for additional details:

- Pile installation: pile hammer, crane, vibratory hammer
- Drilled shaft installation assuming an oscillated method: oscillator, air compressor, crane with clam bucket
- Jet grouting: crane with jet grouting equipment, air compressor
- Earthwork/paving: Roller compactors
- Demolition: Excavator with hammer, processing attachment/tools, jackhammers, crane

Work would be accomplished during the daytime hours. However, nighttime and weekend work would be required when working around I-5, I-84, and other roadways that have restrictions on when work can be performed. The contractor should anticipate applying for noise variances for work that could not be performed during daytime hours.

2.11.2 Vibration

The following equipment would likely cause a lot of vibration during the Project. At a minimum, when these pieces of equipment are operating, the contractor should maintain vibration-monitoring equipment to ensure no adjacent properties are affected. See the

EQRB Noise and Vibration Technical Report (Multnomah County 2021g) for additional details:

- Pile driving hammer and vibratory hammer used for driving and extracting piles and cofferdam sheets
- Oscillator for installing and extracting drilled shaft casings (when vibrator is activated)
- Roller compactors for earthwork and paving operations

In areas where vibration may cause damage to adjacent structures, the contractor may need to pre-bore pile holes, thus mitigating the need for pile hammers. Additionally, vibratory techniques of installing drilled shafts could be limited or avoided when close to vulnerable structures. If it is determined that vibratory techniques for installation must be limited or avoided, the Project Specifications should explicitly list the restrictions.

2.11.3 Temporary Right-of-Way Impacts/Temporary Construction Easements

Section 2.1 describes the necessary construction access needs and likely impacts to stakeholders, adjacent properties, and areas of likely impact. See the *EQRB Right-Of-Way Technical Report* (Multnomah County 2021i) for additional ROW details.

2.11.4 Stakeholder Facilities

Several stakeholders would be affected by the project during construction. Major stakeholder facilities include the Portland Parks and Recreation's Eastbank Esplanade and Tom McCall Waterfront Park, Portland Saturday Market, Burnside Skatepark, as well as several businesses and residences adjacent to the bridge.

Further, several transportation related stakeholder facilities would be impacted by the Project, namely ODOT I-5 mainline and I-84 ramps, UPRR tracks, Willamette River (river users), TriMet's bus and MAX operations, as well as vehicles, bicycles, and pedestrians traversing Burnside Bridge. The following sections detail expected construction impacts to the various stakeholder facilities. For additional details and potential mitigations, see the individual technical report focused on each facility.

Eastbank Esplanade: The Eastbank Esplanade travels directly beneath the east fixed truss of the Burnside Bridge on floating structure and continues north towards Lloyd Boulevard. Where the esplanade crosses under the bridge, there are several construction activities that would impact the esplanade. Based on the construction that needs to occur, primarily the ramps connecting the Eastbank Esplanade with Burnside Bridge, it is likely that the Eastbank Esplanade will be relocated for the duration of the project. Temporary relocation of the Eastbank Esplanade would likely be accomplished in the following manner:

Eastbank Esplanade sections in the river are essentially floating docks that are held in place by piling and are likely interconnected with bolts or the like. To move the Eastbank Esplanade sections out of the way, the following steps will need to be taken: first, the bolts between the section remaining in place and the sections to be removed will need to be cut or pulled. Once the bolts are removed, piling would need to be extracted while a tug held the Eastbank Esplanade sections in place. Once the piling is pulled, the tug

would move the sections of esplanade out of the way and place them slightly upstream or downstream as not to impact the remaining construction work. Piling that is extracted would be re-driven in a temporary location close to the remaining Eastbank Esplanade to hold the sections in place for the duration of construction. Once construction impacting the Eastbank Esplanade was completed, the sections would be returned to their original location and the piling re-driven and bolts reconnected. Any materials that were damaged during the initial removal or while temporarily storing the Eastbank Esplanade sections would be replaced like-in-kind.

For all Replacement Alternatives, the Eastbank Esplanade between the southern landing and approximately the Kevin Duckworth Memorial Dock would need to be relocated. There is a section of Eastbank Esplanade towards the south that is founded on permanent pile, which would need to be demolished and rebuilt at the end of the project. The relocation/demolition is necessary to allow for contractor's equipment access to construct the assumed pedestrian/bicycle ramps.

See the *EQRB Parks and Recreation Technical Report* (Multnomah County 2021h) and *EQRB Draft Section 4f Analysis* (Multnomah County 2021e) for additional details:

- In order to construct and deconstruct the east work bridge, the Eastbank Esplanade would need to be disconnected and temporarily moved out of the way to allow barge equipment to enter the space between the existing Eastbank Esplanade alignment and the east bank.
- Bent 10 (or the new Pier 4 in the Retrofit) is within very close proximity to the Eastbank Esplanade. In order to build the pier (shafts, columns, and cap), the Eastbank Esplanade would need to be temporarily relocated or shut down to allow for equipment on barges to access the work. If the Long-span Alternative was selected, this impact would no longer exist.
- Ground improvements are needed for pier construction directly below the Eastbank Esplanade. The Eastbank Esplanade would likely need to be temporarily relocated or shut down to allow for barge-mounted equipment to perform the work safely. If the Long-span Alternative was selected, this impact would no longer exist.
- For the Retrofit, the east truss would be cut back to the new Pier 4. During truss demolition, the Eastbank Esplanade would need to be temporarily relocated or shut down due to safety implications.
- For the Replacement Alternatives, the east truss would be removed in its entirety. The Eastbank Esplanade would need to be temporarily moved from its location or closed to public access for this operation.
- For all alternatives with the exception of the Long-span Alternative, during girder erection over I-5, it is expected that the girders would need to be erected from the river. To do this, the Eastbank Esplanade would need to be shut down and temporarily relocated to allow barge access close to the east bank.
- For the Long-span Alternative, a temporary tower would likely be erected adjacent to the Eastbank Esplanade. During erection of the arch pieces and deck, the Eastbank

Esplanade would need to be shut down and temporarily relocated to allow barge access close to the east bank.

For all replacement options, ramps connecting the Esplanade to Burnside Bridge are assumed. Ramps would be connected to Burnside Bridge's westbound and eastbound sidewalks and tied into the existing Esplanade alignment near the southern landing/connection point. In order to construct the ramps, the entire Esplanade section between the truss connecting to southern landing and approximately the Kevin Duckworth Memorial Dock would need to be relocated/demolished to allow for equipment access. As currently envisioned, the Eastbank Esplanade would need to be taken out of service while work bridge was installed for equipment access. Multiple options for this ramp connection are being evaluated.

Portland Saturday Market: Portland Saturday Market operates directly beneath the west approach, within Tom McCall Waterfront Park. During construction, it would not be safe or practical for Portland Saturday Market to continue to occupy the area. Complete relocation of Portland Saturday Market to another location would be the safest and best option for a contractor. This would allow the contractor to perform necessary work that would otherwise require extensive phasing to accomplish.

See the *EQRB Parks and Recreation Technical Report* (Multnomah County 2021h) for additional details. Items of work that would directly impact Portland Saturday Market are:

- Existing substructure demolition (Replacement Alternatives) or rehabilitation (Retrofit)
- Installation and removal of shoring for Pier 1 work (Retrofit)
- Pier 1 shaft and shaft cap installation (Retrofit)
- Existing superstructure demolition (Replacement Alternatives)
- Deck reconstruction (Retrofit)
- Substructure installation for new bents (Replacement Alternatives)
- Jet grouting/ground improvements (all alternatives except the Long-span Alternative)
- Girder erection (Replacement Alternatives)
- Superstructure construction (all alternatives)
- Work bridge installation and daily access to/from work bridge (all alternatives)
- Material storage and laydown (all alternatives)

Burnside Skatepark: The skatepark is situated directly beneath the bridge on the east side. For the Retrofit alternative, the skatepark will need to be evacuated and demolished during construction for the pier strengthening that needs to occur. For the Replacement Alternatives, the skatepark can remain relatively unaffected during construction since the work occurring would be over the skatepark, however intermittent skatepark closures will still be required for overhead work.

For any alternative that includes a temporary bridge, the tie-in location of the temporary bridge would be within very close proximity to the skatepark and the alignment of the temporary bridge is directly over the skatepark. For liability reasons, it is likely that the

southern fifteen to twenty feet of skatepark would need to be closed for the duration of the Project to ensure that the joint between existing bridge and temporary bridge did not allow any debris to fall below, which could negatively affect skateboarding. If conventional, shorter spans were utilized for the temporary bridge, the skatepark would be impacted by construction to install, maintain, and remove the temporary pier. As an alternate, a longer span should be studied during design to determine if the skatepark could be spanned over without additional impacts. See Appendix I and the *EQRB Parks and Recreation Technical Report* (Multnomah County 2021h) for additional details.

The following list of activities would directly impact the skatepark:

- Deck demolition (Retrofit)
- Complete structure demolition while leaving existing Bent 25 in place (Replacement Alternatives)
- Installation of longitudinal struts (Retrofit)
- Girder erection on east approach (Replacement Alternatives)
- Superstructure construction on east approach (all alternatives)
- If a conventional, shorter span temporary bridge is used, a temporary pier would be constructed within the skatepark (all alternatives that include a temporary bridge)

Business Access: Several businesses operate within very close proximity to the bridge. Further, several residences have recently been constructed at the east bridgehead at NE 3rd Avenue and Couch Street. Depending on the alternative selected, several businesses would be impacted permanently or temporarily. For additional details, see the *EQRB Right-of-Way Technical Report* (Multnomah County 2021i). Temporary impacts from day-to-day construction activities would be in the form of equipment staging for work and multiple short-term road closures to allow for substructure work and girder erection. When City streets are closed to traffic, detour routes and/or flagging would need to be provided to redirect the public. Continual outreach to neighborhood stakeholders would be needed throughout the project to provide sufficient notice of detours, closures, and other impacts to local residents and businesses. During the design phase, the specifications will need to explicitly identify allowable closure times, closure windows, and other restrictions. Placing timing restrictions on areas the contractor can occupy would reduce the contractor's flexibility but would also mitigate impacts to local businesses by requiring the contractor to focus on limited areas of work and complete the entire scope of work rather than spread out its crews over a larger area.

Although not the only business affected by the Project, the Portland Rescue Mission is referenced specifically in this report due to the unusual nature of the bridge work's impact on the PRM. Due to the nature of PRM's business, ingress must be maintained at all times, except between 9:00 am and 5:00 pm. The existing entryway is adjacent to Span 1 of the existing bridge, meaning that if the existing bridge were demolished and replaced by conventional methods, the entryway could not remain open. If the Retrofit Alternative is selected, the entryway will need to be closed and a new entryway installed along the east wall of the building. If a replacement alternative is selected, the new abutment will be relocated ahead of the entryway, thus converting the access to be on

grade. Doing this will allow for the entryway to be maintained using a moveable scaffold or the like while an MSE wall fill is constructed in front of PRM's entryway. See Appendix K for a sequence of construction in front of PRM. See the *EQRB Economic Impacts Technical Report* (Multnomah County 2021f) for additional details.

I-5 Mainline and I-84 Ramps: As part of the Project, irrespective of which alternative is selected, the existing structure over I-5 mainline and I-84 ramps would be removed and replaced. The demolition, girder erection, and false deck installation/removal activities would require lane/full closures. Typically, highway closures are only feasible at night for limited hours or on weekends. In order to complete work efficiently and with minimal closures, it would be best if the contractor were granted full weekend closures of the freeway and ramps for demolition activities. Girder erection (including bolt tightening) could be performed over several nights or in one weekend closure. Installation and removal of false deck containment could take place under single lane closures if necessary.

If the existing bridge deck was left in place to be used as a temporary false deck for the Long-span Alternative, the I-5 mainline and I-84 ramps could be kept operational even when much of the work is performed overhead. For safety reasons, it would be expected that when upper arch rib sections were lifted into place, the freeway would be shut down. Additional closures, subject to the construction method and exact bridge type selected, could also be required. The closures could feasibly be done using overnight closures in lieu of weekend closures. Ultimately, when the existing bridge was demolished, the freeway would need to be shut down. See the *EQRB Transportation Technical Report* (Multnomah County 2021j) for additional details.

UPRR Tracks: The contractor would need temporary access across the railroad tracks to connect the east side of the east approach to the river and the piers between the railroad and highway. Although having a crossing would be beneficial to the contractor in not having to go out on public roads to access the project, the railroad crossing adds a safety concern for the railroad when their tracks become accessible by anyone other than railroad employees. The railroad may require a flagger since the rail line is used several times daily. UPRR would also be impacted by construction work over and adjacent to the tracks including deck demolition, existing column and foundation demolition, new girder erection, and false deck installation/removal. See the *EQRB Transportation Technical Report* (Multnomah County 2021j) for additional details.

River Users: There are several commercial river users that navigate the river regularly and numerous recreational vessels that are on the river primarily in the summer months. Although the Project team has developed ways to largely mitigate affecting river traffic, there are certain times when impacts to river traffic will be unavoidable. The existing bascule span demolition and new span construction could not be performed without impacting the navigation channel. As soon as demolition begins on the bascule span, the counterweight needs to be locked in place to avoid an unbalanced condition. In order to reduce impacts to river traffic, the contractor would need to lift off the existing bascule span in one piece. Performing this operation could take a few days to complete beyond what would be necessary to shore up the counterweight. As such, there would be a limited period of approximately a week where the navigation channel would be closed. A similar procedure would be needed when the rehabilitated span (Retrofit) or new span (Replacement Alternatives) is erected.

For all alternatives, it is likely that the contractor will need a “no wake” zone through the Project Area. This is done for safety of the workers who are using marine equipment to access the bridge. Although river users will still be able to traverse through the project, the vessels will need to be slowed down as not to create a wake.

For all alternatives, it is likely that the contractor will request exclusion zones around the work bridges and other “sensitive” areas that may not be safe for the general public. Although the exclusion zones are not expected to impact most river users, some users such as kayaks, standup paddleboards, and jet skis, etc. will need to use the main channel to move through the Project Area. See the *EQRB Transportation Technical Report* (Multnomah County 2021j) for additional details.

TriMet Operations: TriMet has bus operations on and around Burnside Bridge. During construction, if no temporary bridge is constructed or a temporary bridge accommodating bicycles and pedestrians only is selected, the bridge would be closed to all vehicular traffic. This would require TriMet to redirect its bus service to adjacent bridges during construction. If a temporary bridge is constructed for all modes as part of the Project, bus service can be maintained for the majority of the work. However, even with a temporary bridge, there would be intermittent closures of the bridge for tie-ins that would need to occur near the beginning of the schedule, in the midst of work to switch traffic from the south side of the approaches to the north side of the approaches, and near the end of work when traffic is switched to the new or rehabilitated structure. These intermittent closures would be in the range of one week each. See the *EQRB Transportation Technical Report* (Multnomah County 2021j) for additional details.

During construction of the west approach, TriMet’s MAX operations would be affected around Skidmore Fountain:

- For the Retrofit, the deck will need to be removed, which would require a closure of TriMet’s station and LRT movements. Additionally, the catenary system would need to be shut down and the lines protected or removed and reinstalled. Further, foundation widening work is shown to extend under the existing tracks, meaning that the tracks will need to be removed and reinstalled or replaced with new. Since the tracks will be removed for foundation enhancement, a bus bridge will need to be utilized. After the foundations are widened, the tracks can be reinstalled. However, due to the proximity of the existing piers to the tracks and more importantly catenary wires, the system will need to be shut down and a bus bridge utilized for column and cap enhancements.
- For the Replacement Alternatives, TriMet’s LRT operations would need to be shut down to allow for superstructure and substructure demolition. A temporary catenary system would need to be set up to keep LRT operational after the superstructure was demolished, but before the new slab girders were erected. The shafts, columns, and caps for the new bridge could be installed during operation since the substructure elements are outside of the 10 feet minimum distance from the OCS system.
- For any alternative using a temporary bridge, TriMet’s operations would be impacted at least twice (once for each phase and dependent on allowable length of shut down and how much work could be completed). The reason for this is that if traffic were maintained across the approach, only half the bridge could be demolished and rebuilt

at a time. Thus, a bus bridge or other accommodation would need to be implemented for each half of the bridgework.

Bridge Users: The impact to bridge users depends largely on whether or not a temporary bridge is constructed as part of the Project. If a temporary bridge is constructed, it would not be as wide as the existing bridge, meaning that the number of vehicular lanes would be reduced. Additionally, during traffic switches onto the temporary bridge, between north/south phases of the approaches, and near the end of the project, there would be approximate one week-long closures to complete tie-in work on the bridge.

If no temporary bridge were constructed, bridge users would need to find another bridge to cross. There are several options, with the nearest bridges being the Steel Bridge to the north, and the Morrison Bridge to the south. See the *EQRB Transportation Technical Report* (Multnomah County 2021j) for additional details.

2.12 Restrictions/Limitations Affecting Construction

There would be several restrictions placed on the contractor for when and how work can be accomplished. The contractor would need to plan work accordingly to account for the various permit conditions, moratoriums, and limitations that would affect work. Current known restrictions on work are as follows:

I-5 Mainline and I-84 Ramps: Work over the freeways would generally be limited to night work during the week and pre-determined, limited weekends. It would be imperative to coordinate during design with ODOT to determine which weekends would be available for a complete closure of the freeways. These should be scheduled to limit conflicts with Moda Center events as well as other events in the City, such as the Portland Rose Festival, Cinco de Mayo, Oregon Brewers Festival, and Waterfront Blues Fest).

Specific to the tied arch option, if the existing bridge deck was left in place temporarily to act as a false deck for the Long-span Alternative, the bulk of the work could be performed without impacting the freeway and could therefore be performed unimpeded. For safety reasons, it would be expected that when large steel sections were lifted into place, the freeway would be shut down. This could feasibly be done using overnight closures in lieu of weekend closures. Ultimately, when the existing bridge was demolished, the freeway would need to be shut down, and thus being performed during weekend or night closures. Additional closures, subject to the construction method and exact bridge type selected, could also be required but is unknown at this time.

UPRR Tracks: Work over the railroad would be similar in nature to work over the freeway in that limited work windows will be available. However, the railroad would not necessarily limit work to weekends or nights. Instead, the railroad would likely demand that the contractor performs work around the railroad's schedule; in other words, work must stop when trains are approaching. The contractor would need to be in a position to stop work and let the train through. As such, the contractor's work would be less efficient with the expectation that it would have to pause work several times a day when working within close proximity to the tracks.

The railroad may require that no work is performed between October and the end of the year as that is the busy time for the railroad. Conversations with the railroad have not yet

begun, thus this assumption has not been incorporated into the schedule. Because the approach work is not on the critical path of the project, this is not expected to drive the Project's schedule. If a temporary bridge is constructed and the second half of the new bridge/retrofitted bridge is not built until the end of the project (i.e., after traffic is moved to the north side of the reconstructed/new bridge), a railroad moratorium could affect the overall Project schedule.

In-Water Work: The EQRB Project would need to adhere to environmental regulations, in part requiring work below ordinary high water to be completed between July 10 and October 15 for vibratory or pile driving operations. Once isolated from the river, additional operations could be performed within dewatered cofferdams; however, in-water work restrictions require extensive planning and resource allocation from the contractor to ensure that the Project can complete the required in-water work within the window.

If cofferdams are not utilized for the main river piers, the drilled shafts could be installed within temporary casings in open water reducing overall impacts to the river. If this were done, it would be advantageous to be able to install drilled shafts in an extended in-water work window to enhance the project schedule.

Sewage Lines and Ankeny Pump Station: Sewage lines from the pump station cross the Willamette River to the east bank. The location of these lines would need to be identified and labeled on the plans. When the contractor is working with barges in the area, it would be important to avoid anchoring the barges close to the sewage line to avoid risk of damaging the sewage line. A "no spud zone" would need to be established such that the contractor does not accidentally drive an anchoring spud through the sewage line in the river.

The sewage lines and associated Ankeny Pump Station have to remain operational throughout the project. Any temporary works to relocate piping would need to be done utilizing a temporary workaround to pump sewage. Further, any work occurring on the project would need to be done in a manner as not to negatively impact the sewage pumping operation.

City of Portland Holiday Moratorium: Each year, the City imposes a moratorium during the holiday season with the expectation that all traffic lanes are open and shoppers are not impeded by construction. Due to the EQRB Project being a multi-year project, an exemption from the moratorium would need to be obtained to allow the Project to continue construction year-round. The contractor would have the opportunity to plan work to minimize further impacts to traffic (such as avoiding major traffic shifts, keeping equipment clear of City streets when feasible, and the like).

Rose Festival Moratorium: Each year, the City imposes a moratorium during the Rose Festival with the expectation that all traffic lanes are open. Due to the EQRB Project being a multi-year project, an exemption from the moratorium would need to be obtained to allow the Project to continue construction year-round. The contractor would have the opportunity to plan work to minimize further impacts to traffic (such as avoiding major traffic shifts, keeping equipment clear of City streets when feasible, and the like).

Fleet Week occurs along with the Rose Festival. This results in several large ships docking within close proximity to the Burnside Bridge. Not only would it be necessary to accommodate the ships through the project by ensuring that the navigation channel is open, but further, the contractor may need to provide access to the ships docked at the

harbor wall. The contractor should also not plan major harbor wall construction work or bascule replacement/removal work during the Portland Rose Festival.

The Grand Floral Parade is part of the Portland Rose Festival and crosses the Burnside Bridge. If a temporary bridge is incorporated into the Project, it is feasible that the parade could be accommodated. If, however, the bridge was closed to all traffic, the parade would need to detour to another bridge.

Other Projects: There are several projects within the region that will potentially be constructed during the Project timeline, including the I-5 Rose Quarter Improvement Project, which is a major project adjacent to the Burnside Bridge site. Other major projects that could potentially occur include ODOT's I-205: I-5 – OR 213 Project, ODOT's OR 217: Auxiliary Lanes Project, and ODOT's Interstate Bridge Replacement Program.

Additionally, other currently unknown projects may be performed during the Project timeline. With more competition for resources from other projects, several impacts could be realized, including labor, material, and equipment shortages, and lack of subcontractor interest, all of which could negatively affect project cost and schedule.

2.13 Value Engineering Opportunities

For the NEPA phase, several assumptions have been made in the design, as documented in this report and other documents in arriving at a constructible solution, given the constraints associated with the various aspects of the Project. Several constraints would add complexity (and ultimately cost) to the work, which, if alleviated, would allow for a less risky approach to work, and a less costly Project. Below are several ideas that could be explored further during a Value Engineering session to determine whether feasible to develop further:

1. For the Retrofit alternative, review whether to replace the bascule spans in lieu of retrofitting. This is not expected to result in a significant cost change.
2. Review whether to explore asking the USCG to allow partial navigation channel clearance for longer periods, allowing for a more conventional approach to bascule span deconstruction/re-construction.
3. Review alternatives to ground improvements to isolate piers and/or revise span lengths to avoid placing piers within geotechnically-sensitive areas.
4. Similar to #3, review potential long-span superstructure bridge options such as a tied arch, cable-stayed, or similar that would allow for spanning over UPRR, I-5, and geotechnically-sensitive areas with relatively shallow superstructure depth (Idea incorporated into the Replacement Long-span Alternative (Narrowed)).
5. Review options to isolate superstructure (including bascule or lift spans) from substructure (isolation bearings, hydraulics, or similar) to avoid/mitigate large substructure requirements.
6. For bascule options, review potential to construct shafts outboard of the existing bridge to allow for constructing the majority, if not all of the deep foundation work, prior to having to take the existing bridge out of service. Constructing shafts outside of the existing foundation footprint would also mitigate large risks of drilling through the existing foundations.

7. Similar to #6, review potential to install a “delta pier” in lieu of a more traditional pier box. Using a delta pier would allow the drilled shafts to be installed away from the existing piers, but still maintain a feasible bascule span length (Idea incorporated into the Replacement Long-span Alternative (Narrowed)).
8. For lift bridge options, review potential to construct deep foundations outside of the limits of the existing foundations. Doing this would mitigate large risks of drilling through the existing foundations (Idea incorporated into the Replacement Long-span Alternative (Narrowed)).
9. Review options to shift a temporary bridge for all modes during the project to a portion of the structure that is built for potential schedule savings.
10. Review potential to use a lower elevation bridge with a lift bridge or removable section for navigation if a temporary bridge accommodating bicycles and pedestrians only was used. As part of this, alternative landing spots on the east and west sides would need to be reviewed (for instance, the Tom McCall Waterfront Park on the west side and the Eastbank Esplanade on the east side).
11. Evaluate means and methods of construction, particularly related to accelerated construction of the main (movable) piers and steel erection (tied arch, float-in or launching portions).
12. For the long-span construction sequence, evaluate the movable bridge construction methods to accelerate the overall completion date; specifically, the shaft construction without cofferdam and/or outside IWWW, precast pier walls, some amount of perched construction that seems viable given final built configuration of the movable pier foundations.
13. Consider utilizing the existing truss spans for a portion of the temporary bridge.
14. In terms of specifically accelerating the long-span construction path, consider:
 - a. Float-in of a west tied arch span (possibly combined with launching)
 - b. Float-in of a west tied arch and stick-build an east tied arch.
 - c. Modify the construction sequence to have the critical path go through the west tied arch instead of the east tied arch; switch the construction sequence of pier demo/new bent construction for movable span piers.
 - d. Utilize full-depth precast deck panels in lieu of cast-in-place deck that are very compatible with tied arches.
 - e. Avoid pier wall by using stick erection of arches from towers.
 - f. For float-in or stick construction, use precast or large diameter concrete-filled steel tube columns at bearing locations to expedite setting arches. Pier walls (in-fill) could be constructed around columns.
 - g. Extend concrete-filled steel tube directly from shafts could be used at the tied arch’s two bearing locations, possibly decoupling arch erection from most of the new bent construction.

2.14 Early Work Packages

The County is currently contemplating administering the EQRB Project as a CM/GC Project. With this contracting model, the contractor will be brought on early in the design process to provide input into the design and perform several other functions. An advantage to the CM/GC model is that early work packages can be designed and constructed while the bulk of the project is still being designed. This allows for the overall project schedule to be shortened in duration.

Within the EQRB Project, there will be numerous opportunities to advance certain aspects of the design towards early work packages. Ideally, an early work package would help advance the critical path (i.e.: shorten the overall project duration), help mitigate risk and inflation impacts, and be completely severable such that if the County does not reach agreement on a guaranteed maximum price for the work, the overall contract can be cancelled, but the early work can complete without consequence to the remainder of work. Several potential early work packages are listed below for consideration:

1. Utility relocation
 - a. For example, for alternatives that require relocating the City's sewer lines along the harbor wall, this work could be performed as early work.
2. Demolition packages
 - a. Several buildings will likely be demolished as part of the project. These parcels can be demolished early to clear the sites while design progresses.
3. Portland Rescue Mission (PRM) infill walls
 - a. The existing bridge and PRM are built somewhat integrally in that PRM's south building edge is not separated from the bridge and once the existing bridge is (partially or fully) removed, PRM's building would be open. In order to create a separation and enclose the PRM building, infill walls would be placed between the PRM building columns. The infill walls could be an early work package to ensure that the building envelope was completed, after which time, the bridge could be demolished.
4. Project office co-located space
 - a. Of the buildings to be demolished, a portion of the American Medical Response (AMR) building could potentially be used as a co-located office space for either the design phase, the construction phase, or both.
 - b. Regardless of whether the AMR building is chosen as an office, a potential early work package could be securing an office space and performing necessary tenant improvements to ready the office for the design phase.
5. Temporary detour bridge
 - a. If incorporated into the project, a temporary detour bridge could be built while design progresses on the replacement bridge.
6. Dredging

- a. Dredging, rip rap removal, and potential obstruction removal such as the old swing bridge foundation or unknown items could be removed as early work. This would mitigate long term potential schedule delay risk of other in-water work items. As part of this work, the existing pier debris dolphins (on the south side of the existing piers) would be removed at the same time.
7. River foundations
 - a. If a design is progressed that moves foundation elements outside of the existing foundations to the south & north (outboard of the existing bridge), the shafts/deep foundations could be packaged, and work started while the design is completed on the remainder of the bridge. Feasibility of this package would be dependent on contractor means and methods for installation for severability reasons (i.e.: if using a cofferdam, it would not be recommended, but if using a sunk cofferdam method or shaft installation in open water, this early work package could save substantial time).
 8. UPRR temporary crossing
 - a. Unless the cost of the temporary UPRR crossing is dependent upon in-place duration, it would be advantageous to install the crossing early while design work is occurring.
 9. Temporary electrical service
 - a. If a temporary bridge is utilized, it will be necessary to deliver power to the bridge in order to operate the lift span. This electrical service could be delivered to the site prior to being required for the temporary bridge.
 10. Early material procurement
 - a. For example, structural steel and/or machinery design could be advanced, and the materials procured through early work packages.
 11. Work bridges
 - a. Installing work bridges ahead of the main work would enhance the project schedule, however, could be problematic from a severability standpoint.

3 Construction Schedule

A preliminary construction schedule has been generated for the three alternatives, all with and without the inclusion of a temporary bridge. The following sections will describe the assumed sequencing of the work. When a contractor is chosen for the work, that contractor may have a preferred sequence that differs from that shown here based on equipment, resource availability, or preferred means and methods.

For all three alternatives, it is assumed that building demolition would likely occur in an early work package or be completed in conjunction with other set up work, so it would not drive the Project schedule.

For all three alternatives, the addition of a temporary bridge would add a year of construction on each end of the Project. The first IWWW is taken up by constructing in-water piles for the temporary bridge. After the piles are in, the bridge superstructure

must be put in place and tied in to the east and west approaches before traffic can be shifted off the existing bridge and the “primary work” begun. The reverse is true at the completion of work. Once the permanent work is complete, traffic would be shifted onto the permanent bridge and the temporary bridge superstructure would be removed. During the following IWWW, piles would be removed from the river.

For scheduling purposes, the assumed notice to proceed date for the construction phase would be in March 2024.

3.1 General Phasing (Retrofit)

The Retrofit Alternative would take approximately 5 years to construct assuming a temporary bridge is incorporated into the Project, and approximately 3.5 years to construct assuming no temporary bridge. The following is a general sequence of events by year. For more detailed schedules, see Appendix G.

- **Enhanced Retrofit with Temporary Bridge**
 - Year 1 (2024)
 - Install piles for temporary bridge during first IWWW
 - Install temporary bridge superstructure
 - Begin work bridge installation (complete west work bridge)
 - Perform substructure retrofit on west approach spans
 - Year 2 (2025)
 - Switch traffic to temporary bridge (March 2025)
 - Complete work bridge installation
 - Remove bascule leaves
 - Install cofferdams for Piers 1 and 2
 - Complete substructure and foundation retrofit on west approach spans
 - Remove and replace north side of west approach deck
 - Begin shaft installation at Pier 1 and Pier 2
 - Perform substructure and foundation retrofit on east approach spans
 - Year 3 (2026)
 - Install Pier 3 cofferdam
 - Reinstall bascule leaves
 - Ground Improvements approaches
 - Remove and replace north side of east approach deck
 - Complete Pier 1 and Pier 2 substructure retrofits
 - Begin shaft installation at Pier 3
 - Year 4 (2027)

- Complete Pier 3 substructure retrofits
- Install Pier 4 drilled shafts
- Demolish and replace spans over I-5, I-84 ramps, and UPRR
- Install main spans ground Improvements
- Pour replacement deck in main spans from west approach to west bascule span
- Year 5 (2028)
 - Pour replacement deck in main spans from east approach to east bascule span
 - Switch traffic to retrofitted bridge (August 2028)
 - Remove and begin replacement of south side of east and west approach decks
 - Remove temporary bridge
- Year 6 (2029)
 - Complete replacement of south side of east and west approaches
 - Complete Project (May 2029)
- **Retrofit with No Temporary Bridge**
 - Year 1 (2024)
 - Install cofferdams for Pier 1 and Pier 2
 - Install west work bridge
 - Perform substructure retrofit on west approach spans
 - Begin shaft installation at Pier 1 and Pier 2
 - Year 2 (2025)
 - Complete work bridge installation
 - Install Pier 3 cofferdam
 - Complete substructure retrofit on west approach spans
 - Close bridge to traffic (September 2025)
 - Remove and begin replacement of west approach deck
 - Begin substructure retrofit on east approach spans
 - Complete Pier 1 and Pier 2 substructure retrofits
 - Begin shaft installation at Pier 3
 - Year 3 (2026)
 - Install ground Improvements
 - Complete replacement of west approach deck

- Complete Pier 3 substructure retrofits
- Demolish and replace spans over I-5, I-84 ramps, and UPRR
- Pour replacement deck in main spans from west approach to west bascule span
- Complete substructure retrofit on east approach spans
- Remove and replace east approach deck
- Year 4 (2027)
 - Pour replacement deck in main spans from east approach to east bascule span
 - Open retrofitted bridge to traffic (August 2027. Total closure: 2 years)
 - Complete Project (September 2027)

3.2 General Phasing (Short-span Alternative)

The Short-span Alternative would take approximately 6.5 years to construct assuming a temporary bridge is incorporated into the Project, and approximately 4.5 years to construct assuming no temporary bridge. The following is a general sequence of events by year. For detailed schedules, see Appendix G.

- **Short-span Alternative with Temporary Bridge**
 - Year 1 (2024)
 - Install piles for temporary bridge during first IWWW
 - Install temporary bridge superstructure
 - Begin work bridge installation
 - Year 2 (2025)
 - Switch traffic to temporary bridge (March 2025)
 - Complete West work bridge
 - Remove bascule spans and trusses
 - Continue work bridge installation
 - Install cofferdams for Bents 8 and 9
 - Complete substructure on northwest approach spans
 - Demolish Piers 1, 2, and 4
 - Complete substructure on northeast approach spans
 - Install main spans and north approaches ground Improvements
 - Year 3 (2026)
 - Complete work bridge installation
 - Erect north half of east and west approach girders and pour decks

- Demolish Pier 3
- Install shafts at Bent 8 and begin shafts at Bent 9
- Year 4 (2027)
 - Complete Bent 8 substructure
 - Float in and install west bascule span
 - Complete shaft installation and begin constructing Bent 9
 - Pour decks from west approach to west bascule span
- Year 5 (2028)
 - Complete substructure for east and west approaches
 - Complete decks for east and west approaches
 - Construct Bent 10
 - Float in and install east bascule span
- Year 6 (2029)
 - Pour deck from east approach to east bascule span
 - Switch traffic to new bridge (July 2029)
 - Demolish existing and begin new construction of south approaches.
 - Remove temporary bridge
- Year 7 (2030)
 - Install south approaches ground improvements
 - Complete construction of south approaches
 - Complete Project (June 2030)
- **Short-span Alternative with No Temporary Bridge**
 - Year 1 (2024)
 - Install west work bridge
 - Demolish bascule spans and trusses
 - Install Bent 8 and Bent 9 cofferdams
 - Close bridge to traffic (May 2024)
 - Demolish east and west approaches and begin substructure
 - Demolish Pier 2
 - Year 2 (2025)
 - Complete work bridges
 - Complete Bent 7
 - Demolish Pier 3

- Install Bent 8 shafts
- Complete Bent 8
- Complete east and west approach substructure
- Install ground improvements
- Year 3 (2026)
 - Place new east and west approach decks
 - Float in and install west bascule span
 - Install Bent 9 and Bent 10 shafts
 - Complete Bent 9 and Bent 10
 - Pour west approach to west bascule span
- Year 4 (2027)
 - Pour east approach to east bascule span
 - Float in and install east bascule span
- Year 5 (2028)
 - Open new bridge to traffic (March 2028. Total closure: 4 years)
 - Remove work bridges
 - Complete Project (August 2028)

3.3 General Phasing (Long-span Alternative)

The Long-span Alternative would take approximately 6.5 years to construct assuming a temporary bridge is incorporated into the Project, and approximately 4.5 years to construct assuming no temporary bridge. The following is a general sequence of events by year. For detailed schedules, see Appendix G.

- **Long-span Alternative with Temporary Bridge (Note: tied arch bridge type assumed; overall cable-stayed construction duration expected to be similar)**
 - Year 1 (2024)
 - Install piles for temporary bridge during first IWVV
 - Install temporary bridge superstructure
 - Begin work bridge installation
 - Begin structural steel procurement
 - Year 2 (2025)
 - Switch traffic to temporary bridge (February 2025)
 - Complete West work bridge
 - Remove bascule spans and trusses
 - Install ground improvements at Bent 9

- Install Bent 6 and 9 drilled shafts
- Continue work bridge installation
- Install cofferdams for Bents 7 and 8 (assumed pier replacement in approximately the same location as the existing piers)
- Complete substructure on northwest approach spans
- Demolish Piers 1, 2, and 4
- Complete substructure on northeast approach spans
- Year 3 (2026)
 - Complete work bridge installation
 - Erect north half of east and west approach girders and pour decks
 - Demolish Pier 3
 - Install shafts at Bent 7 and begin shafts at Bent 8
 - Complete Bents 6 and 9
- Year 4 (2027)
 - Complete Bent 7 substructure
 - Erect west long-span
 - Float in and install west bascule span
 - Complete shaft installation and begin constructing Bent 8
 - Pour decks from west approach to west bascule span
- Year 5 (2028)
 - Complete substructure for east and west approaches
 - Complete Bent 8 Substructure
 - Erect east long-span
 - Float in and install east bascule span
- Year 6 (2029)
 - Pour deck from east approach to east bascule span
 - Switch traffic to new bridge (June 2029)
 - Demolish existing and begin new construction of south half of approach spans
 - Remove temporary bridge
- Year 7 (2030)
 - Complete construction of south half of approach spans
 - Complete Project (August 2030)

- **Long-span Alternative with No Temporary Bridge (Note: tied arch bridge type assumed; overall cable-stayed construction duration expected to be similar)**
 - Year 1 (2024)
 - Install west work bridge
 - Demolish bascule spans and trusses
 - Install Bent 7 and Bent 8 cofferdams (assumed pier replacement in approximately the same location as the existing piers)
 - Close bridge to traffic (May 2024)
 - Demolish east and west approaches and begin substructure
 - Demolish Pier 2
 - Begin procuring long-span structural steel
 - Year 2 (2025)
 - Complete work bridges
 - Complete Bent 6
 - Demolish Pier 3
 - Install Bent 7 shafts
 - Complete Bent 7
 - Complete east and west approach substructure
 - Install ground improvements
 - Year 3 (2026)
 - Erect west long-span
 - Place new east and west approach decks
 - Float in and install west bascule span
 - Install Bent 8
 - Complete Bent 9
 - Pour west approach to west bascule span
 - Year 4 (2027)
 - Erect east long-span
 - Pour east approach to east bascule span
 - Float in and install east bascule span
 - Year 5 (2028)
 - Open new bridge to traffic (August 2028. Total closure: 4 years)
 - Remove work bridges
 - Complete Project (October 2028)

Advancement of the Replacement Long-span Alternative (Narrowed):

The Replacement Long-span Alternative (Narrowed) considers four option combinations consisting of a tied arch bridge, cable stay bridge, lift span, and bascule span. The combinations of these options do not differ substantially from the Draft EIS Long-span Alternative, except that it is assumed that construction will begin 12 months later (beginning construction March 2025 instead of March 2024). Each version of the Replacement Long-span Alternative (Narrowed) schedule has been included with Appendix G.

3.4 General Phasing (Couch Extension)

The Couch Extension would take approximately 6.5 years to construct assuming a temporary bridge is incorporated into the Project, and approximately 4.5 years to construct assuming no temporary bridge. The following is a general sequence of events by year. For detailed schedules, see Appendix G.

- **Couch Extension with Temporary Bridge**
 - Year 1 (2024)
 - Install piles for temporary bridge during first IWVW
 - Install temporary bridge superstructure
 - Begin work bridge installation (complete west work bridge)
 - Year 2 (2025)
 - Switch traffic to temporary bridge (March 2025)
 - Continue work bridge installation
 - Remove bascule spans and trusses
 - Install cofferdams for Bents 8 and 9
 - Complete substructure on northwest approach spans
 - Begin substructure on Couch Couplet
 - Demolish Piers 1, 2, and 4
 - Complete substructure on northeast approach spans
 - Install main spans and north approaches ground Improvements
 - Year 3 (2026)
 - Complete work bridge installation
 - Erect north half of east and west approach girders and pour decks
 - Complete substructure on Couch Couplet
 - Demolish Pier 3
 - Install shafts at Bent 8 and begin shafts at Bent 9
 - Year 4 (2027)

- Shift east and west approach traffic to north side
- Complete substructure for east and west approaches
- Complete Bent 8 substructure
- Float in and install west bascule span
- Complete shaft installation and begin constructing Bent 9
- Pour decks from west approach to west bascule span
- Year 5 (2028)
 - Complete decks for east and west approaches
 - Construct Bent 10
 - Float in and install east bascule span
 - Construct Couch Couplet Superstructure
 - Pour deck from west approach to west bascule span
- Year 6 (2029)
 - Pour deck from east approach to east bascule span
 - Switch traffic to new bridge (August 2029)
 - Demolish existing and begin new construction of south approach spans
 - Install south approaches ground Improvements
 - Remove temporary bridge
- Year 7 (2030)
 - Complete south half of approach spans
 - Complete Project (October 2030)
- **Couch Extension with No Temporary Bridge**
 - Year 1 (2024)
 - Install west work bridge
 - Demolish bascule spans and trusses
 - Install Bent 8 and Bent 9 cofferdams
 - Close bridge to traffic (May 2024)
 - Demolish east and west approaches and begin substructure
 - Begin Couch Couplet substructure
 - Demolish Pier 2
 - Year 2 (2025)
 - Complete work bridges
 - Complete Bent 7

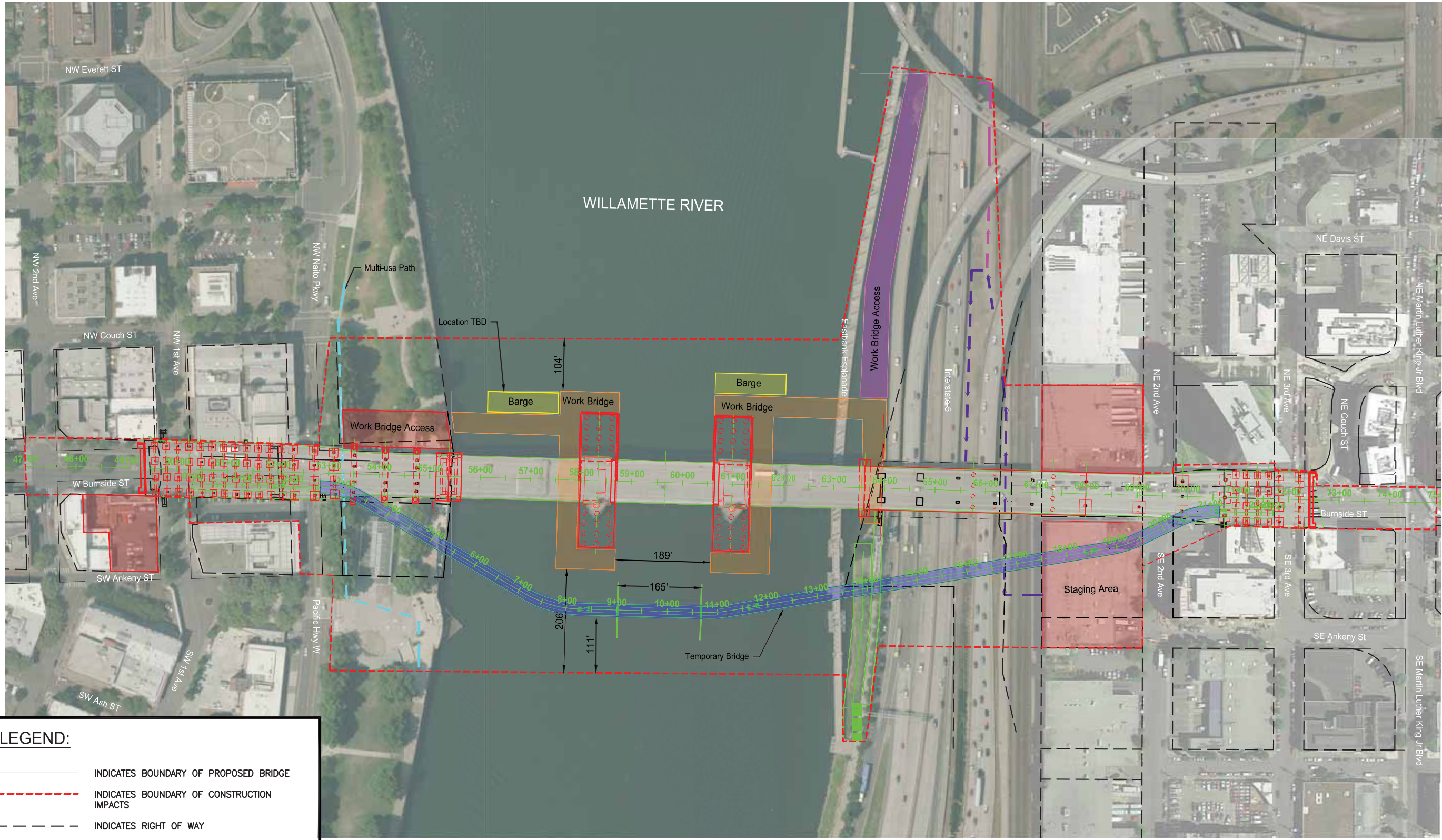
- Demolish Pier 3
- Install Bent 8 shafts
- Complete Bent 8
- Complete east and west approach substructure
- Complete Couch Couplet substructure
- Install ground Improvements
- Year 3 (2026)
 - Erect new east and west approach girders and place decks
 - Float in and install west bascule span
 - Place Couch Couplet deck
 - Install Bent 9 and Bent 10 shafts
 - Complete Bent 9 and Bent 10
 - Pour west approach to west bascule span
- Year 4 (2027)
 - Pour east approach to east bascule span
 - Float in and install east bascule span
- Year 5 (2028)
 - Open new bridge to traffic (March 2028. Total closure: 4 years)
 - Remove work bridges
 - Complete Project (August 2028)

4 References

Multnomah County

- 2021a EQRB Bridge Replacement Technical Report. <https://multco.us/earthquake-ready-burnside-bridge/project-library>.
- 2021b EQRB Construction Approach Technical Report. <https://multco.us/earthquake-ready-burnside-bridge/project-library>.
- 2021c EQRB Description of Alternatives Report. <https://multco.us/earthquake-ready-burnside-bridge/project-library>.
- 2021d EQRB Draft Environmental Impact Statement. <https://multco.us/earthquake-ready-burnside-bridge/project-library>.
- 2021e EQRB Draft Section 4(f) Analysis. Attachment M to the EQRB Draft Environmental Impact Statement. <https://multco.us/earthquake-ready-burnside-bridge/project-library>.
- 2021f EQRB Economic Impacts Technical Report. <https://multco.us/earthquake-ready-burnside-bridge/project-library>.
- 2021g EQRB Noise and Vibration Technical Report. <https://multco.us/earthquake-ready-burnside-bridge/project-library>.
- 2021h EQRB Parks and Recreation Technical Report. <https://multco.us/earthquake-ready-burnside-bridge/project-library>.
- 2021i EQRB Right-of-Way Technical Report. <https://multco.us/earthquake-ready-burnside-bridge/project-library>.
- 2021j EQRB Transportation Technical Report. <https://multco.us/earthquake-ready-burnside-bridge/project-library>.
- 2022a EQRB Supplemental Draft Environmental Impact Statement. <https://multco.us/earthquake-ready-burnside-bridge/project-library>.

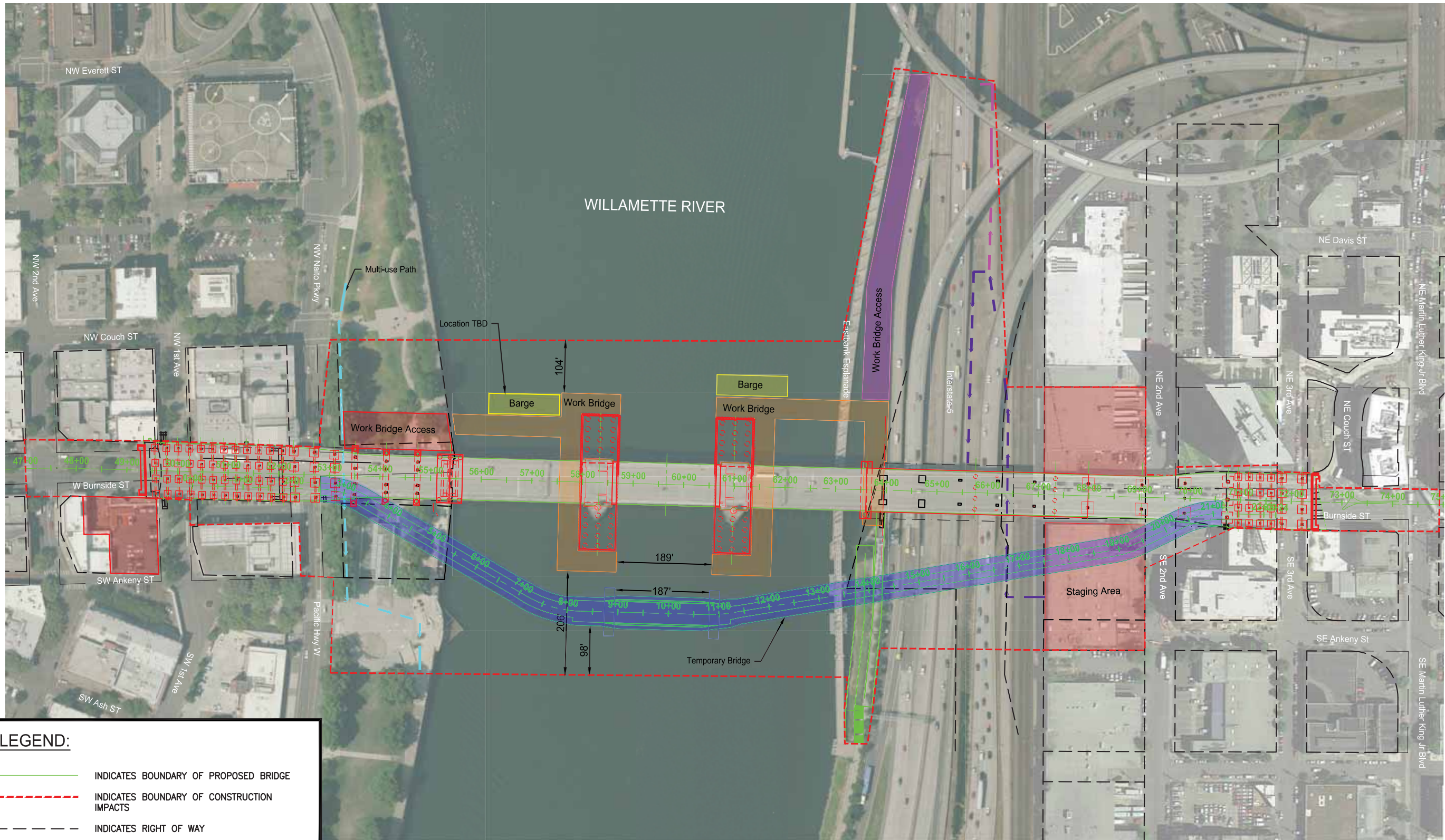
Appendix A. Access Plan and Temporary Bridge Layout



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- INDICATES BOUNDARY OF PROPOSED BRIDGE
- INDICATES BOUNDARY OF CONSTRUCTION IMPACTS
- INDICATES RIGHT OF WAY
- INDICATES PROPOSED MULTI-USE PATH
- INDICATES PROPOSED CONSTRUCTION ACCESS
- INDICATES OPTIONAL CONSTRUCTION ACCESS

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DRAFTER: _____		COUNTY ENGINEER	
CHECKED BY: _____		DATE: _____	
NO. DATE:		PROJECT NO.: Proj No	
REVISIONS		Earthquake Ready Burnside Bridge	
Sheet No. A-1		Access Plan and Temporary Bridge Layout	
		Enhanced Retrofit (w/ Temporary Bike/Ped Bridge)	



LEGEND:

- INDICATES BOUNDARY OF PROPOSED BRIDGE
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- - - INDICATES RIGHT OF WAY
- INDICATES PROPOSED MULTI-USE PATH
- INDICATES PROPOSED CONSTRUCTION ACCESS
- INDICATES OPTIONAL CONSTRUCTION ACCESS

Earthquake Ready Burnside Bridge
 Access Plan and Temporary Bridge Layout
 Enhanced Retrofit
 MULTNOMAH COUNTY

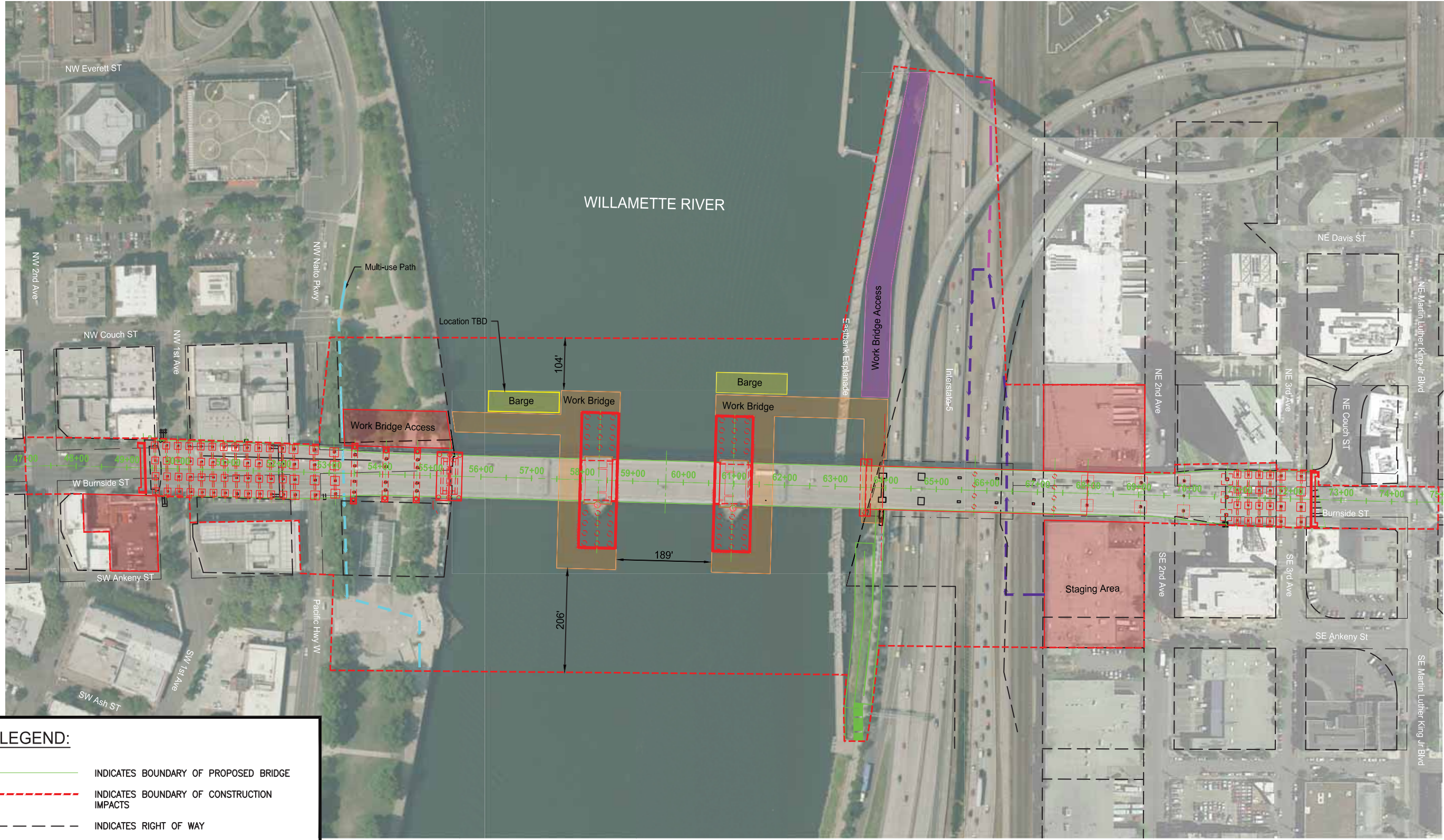
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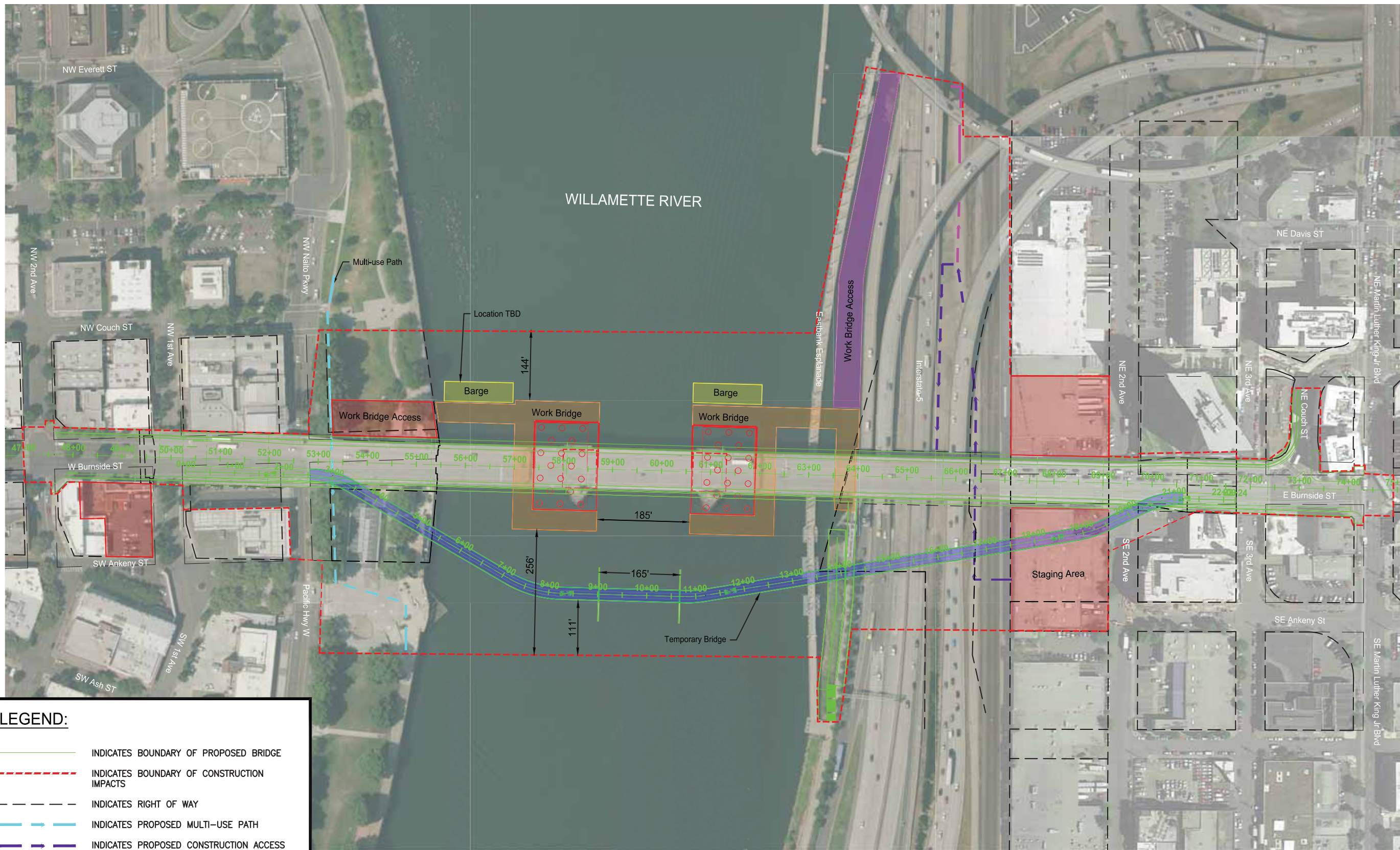
PROJECT NO.: PROJ NO



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- INDICATES PROPOSED MULTI-USE PATH
- INDICATES PROPOSED CONSTRUCTION ACCESS
- INDICATES OPTIONAL CONSTRUCTION ACCESS

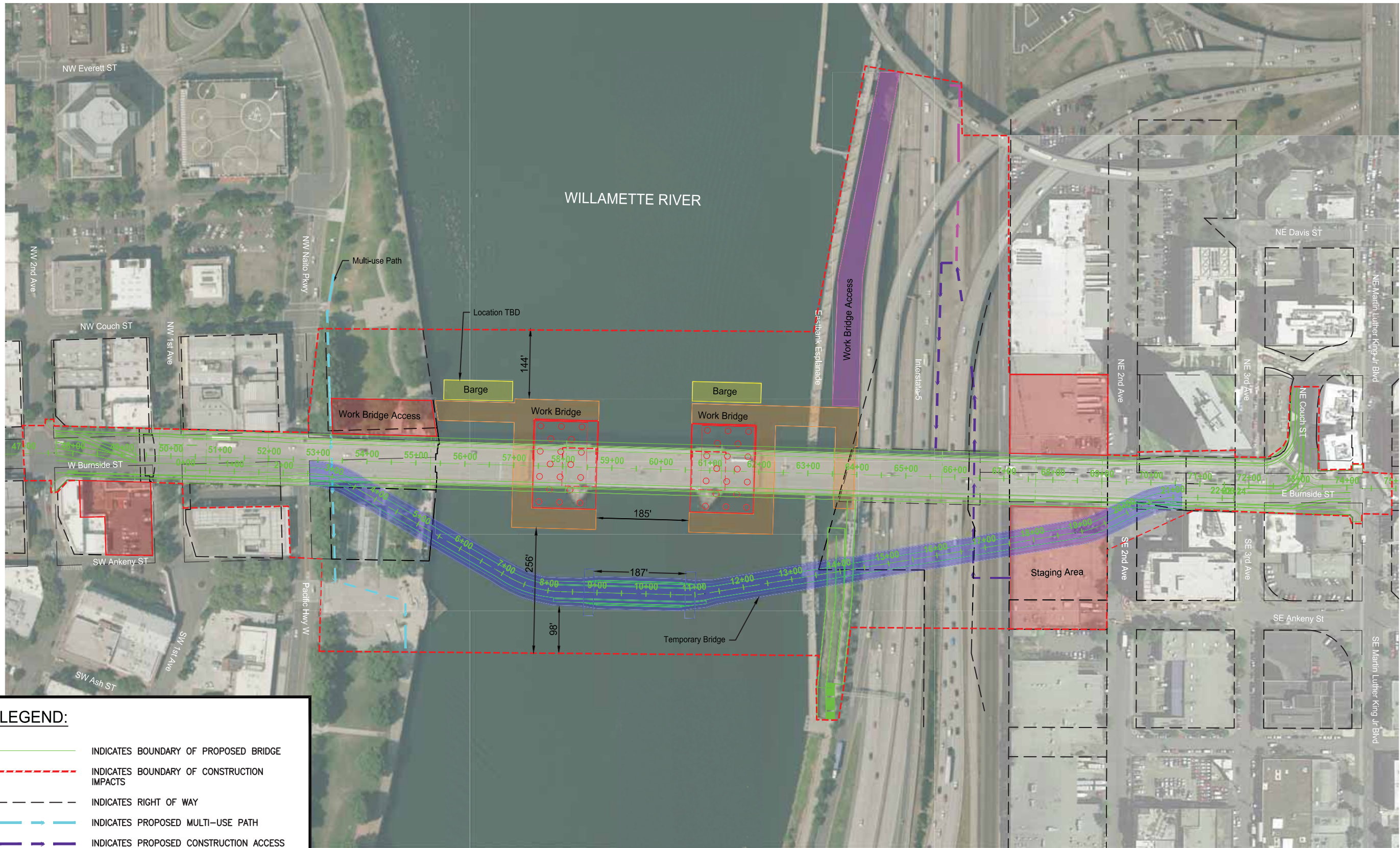
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- - - INDICATES BOUNDARY OF CONSTRUCTION IMPACTS
- - - INDICATES RIGHT OF WAY
- INDICATES PROPOSED MULTI-USE PATH
- INDICATES PROPOSED CONSTRUCTION ACCESS
- INDICATES OPTIONAL CONSTRUCTION ACCESS

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REVISIONS		Earthquake Ready Burnside Bridge Access Plan and Temporary Bridge Layout Replacement Movable Bridge on Existing Alignment (w/ TemporaryBike/Ped Bridge)	
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- - - INDICATES BOUNDARY OF CONSTRUCTION IMPACTS
- - - INDICATES RIGHT OF WAY
- INDICATES PROPOSED MULTI-USE PATH
- INDICATES PROPOSED CONSTRUCTION ACCESS
- INDICATES OPTIONAL CONSTRUCTION ACCESS

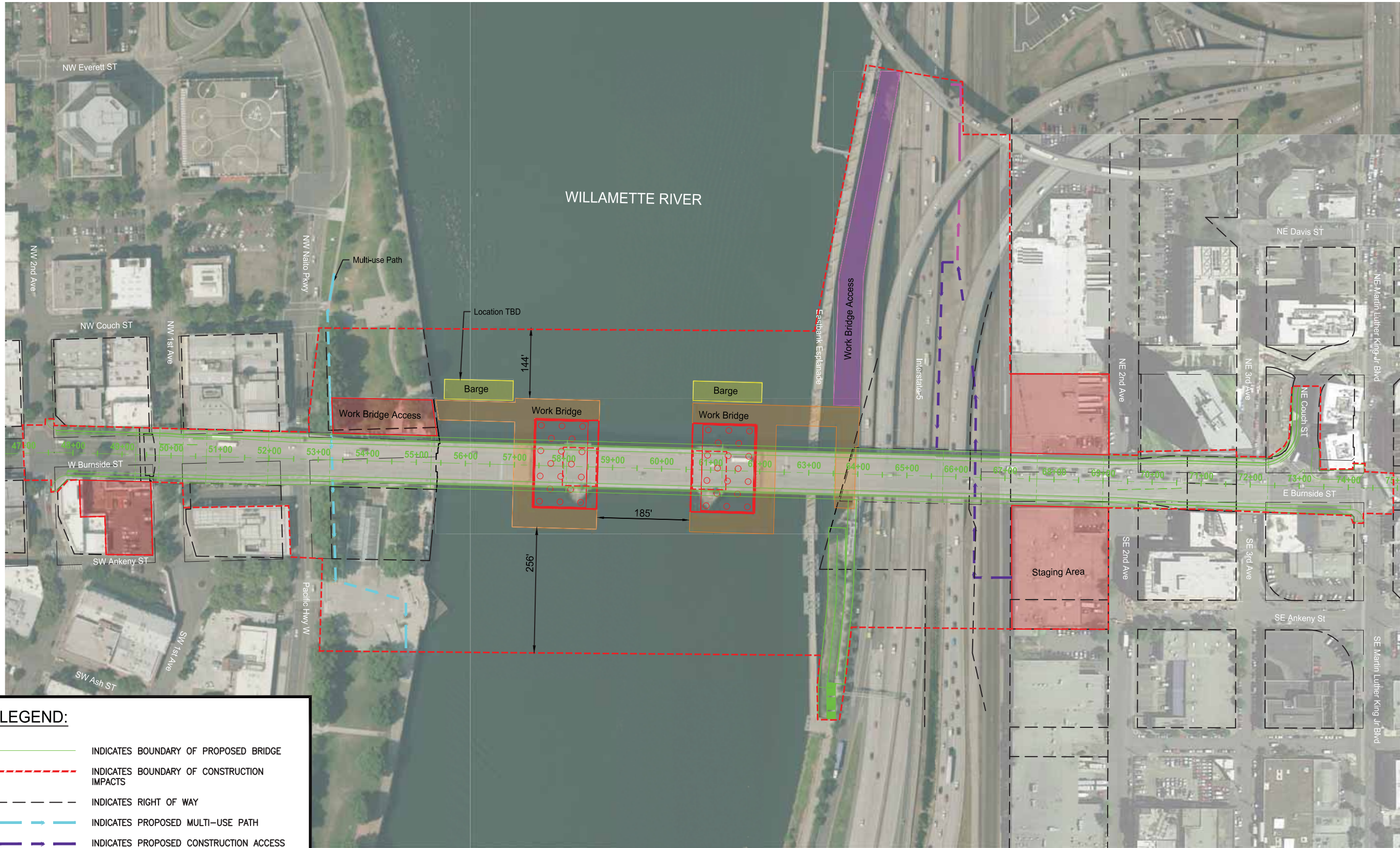
Earthquake Ready Burnside Bridge
 Access Plan and Temporary Bridge Layout
 Replacement Movable Bridge on Existing Alignment
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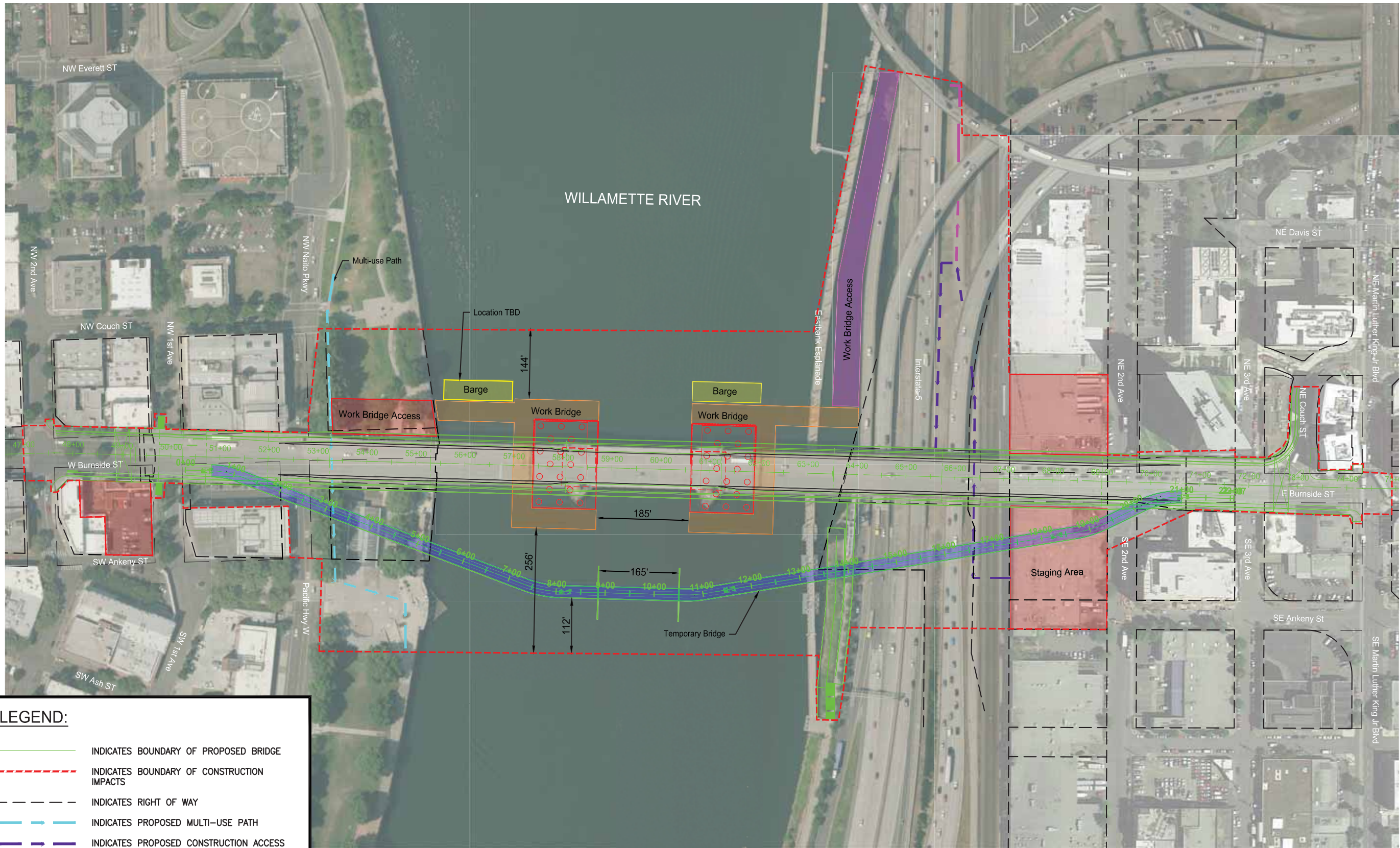
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	INDICATES RIGHT OF WAY
	INDICATES PROPOSED MULTI-USE PATH
	INDICATES PROPOSED CONSTRUCTION ACCESS
	INDICATES OPTIONAL CONSTRUCTION ACCESS

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NO. DATE:		Access Plan Layout	
REVISIONS		Replacement Movable Bridge on Existing Alignment	
Sheet No.		A-6	



LEGEND:

- INDICATES BOUNDARY OF PROPOSED BRIDGE
- - - INDICATES BOUNDARY OF CONSTRUCTION IMPACTS
- - - INDICATES RIGHT OF WAY
- INDICATES PROPOSED MULTI-USE PATH
- INDICATES PROPOSED CONSTRUCTION ACCESS
- INDICATES OPTIONAL CONSTRUCTION ACCESS

Earthquake Ready Burnside Bridge
 Access Plan and Temporary Bridge Layout
 Replacement Movable Bridge with Long Span Approaches
 on Existing Alignment (w/Temporary Bike/Ped Bridge)
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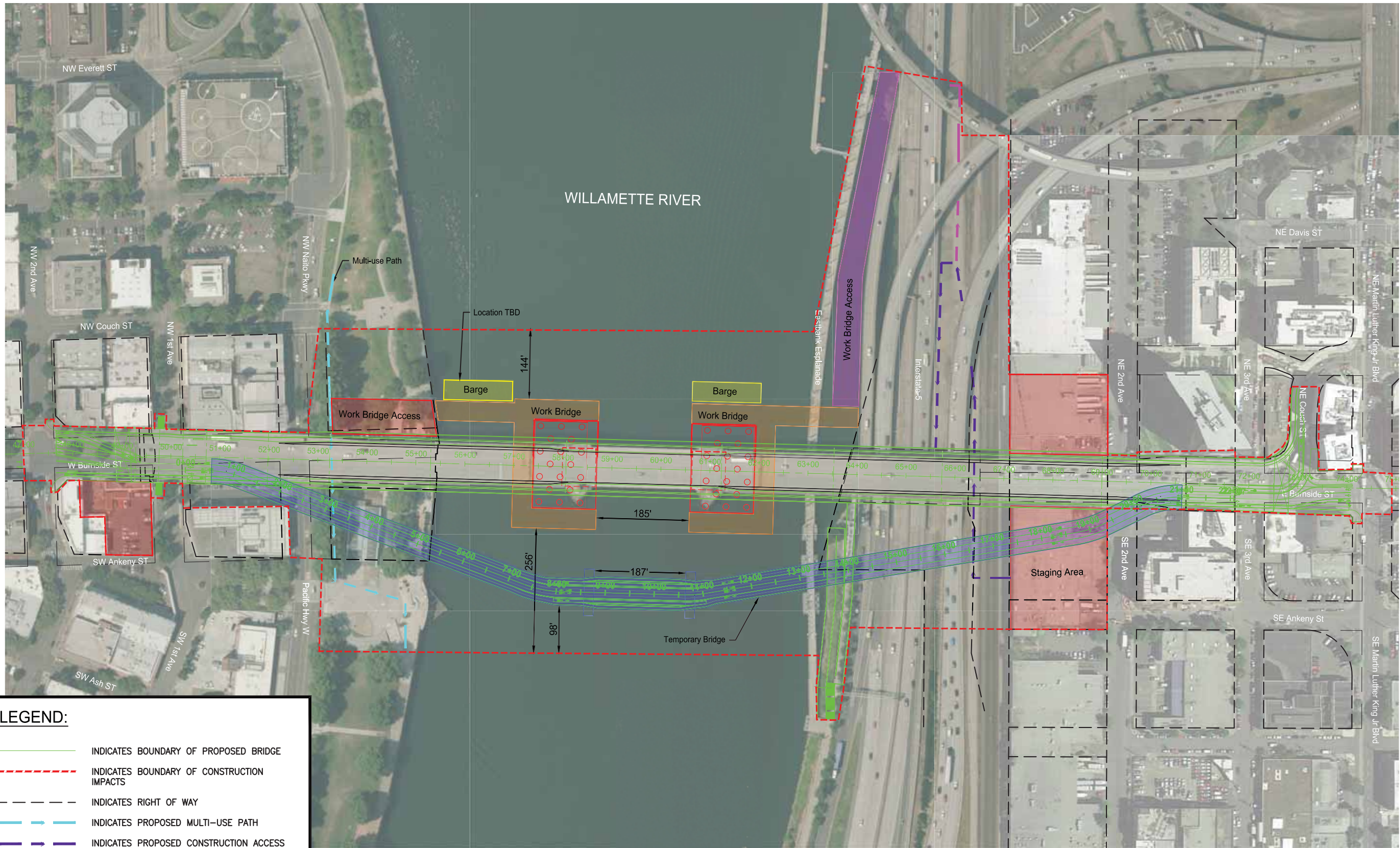
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- - - INDICATES BOUNDARY OF CONSTRUCTION IMPACTS
- - - INDICATES RIGHT OF WAY
- INDICATES PROPOSED MULTI-USE PATH
- INDICATES PROPOSED CONSTRUCTION ACCESS
- INDICATES OPTIONAL CONSTRUCTION ACCESS

REVISIONS

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Sheet No.

A-8

MULTNOMAH COUNTY

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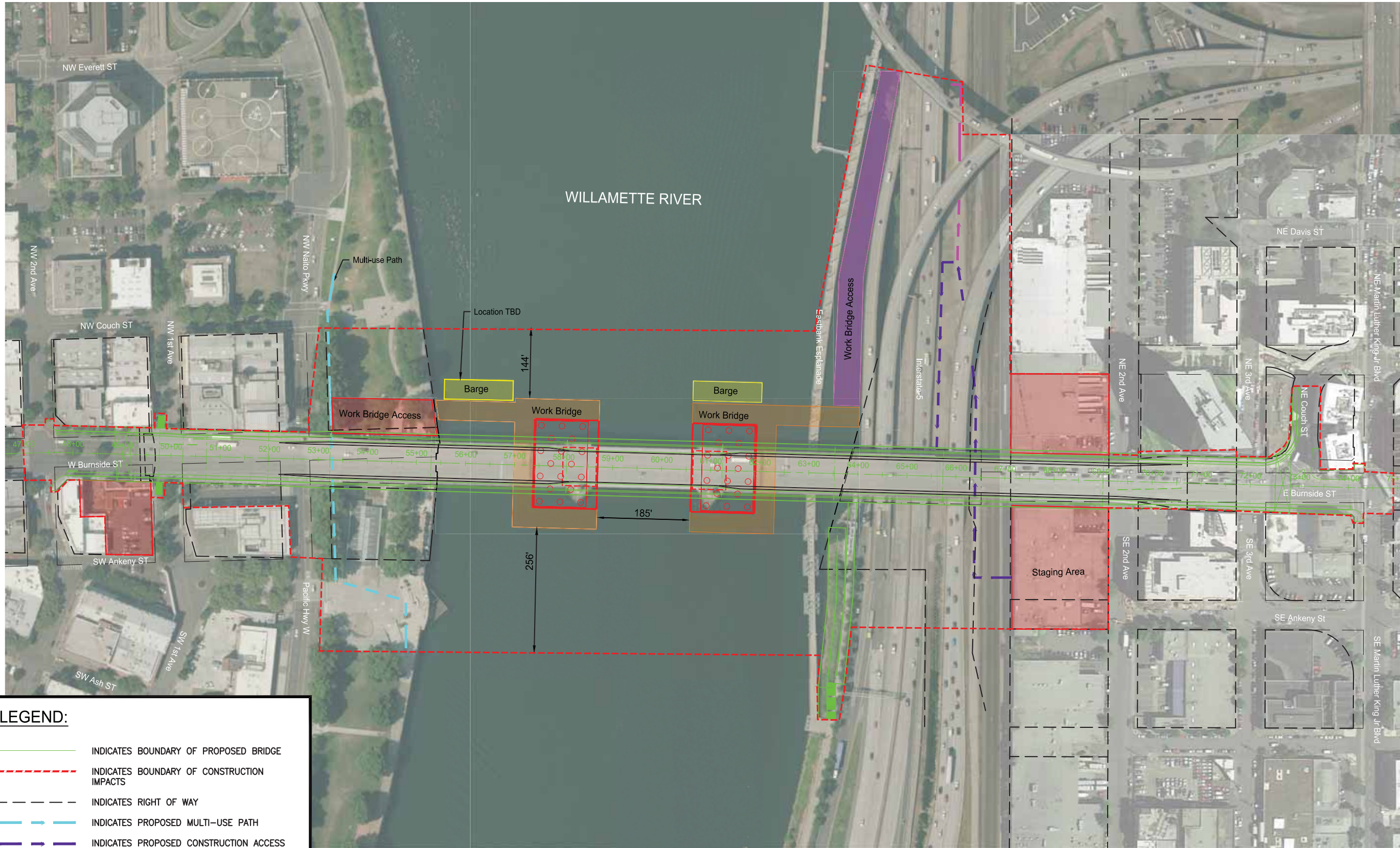
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COUNTY ENGINEER

*Earthquake Ready Burnside Bridge
Access Plan and Temporary Bridge Layout
Replacement Movable Bridge with Long Span
Approaches on Existing Alignment*
MULTNOMAH COUNTY

DATE: **Date**

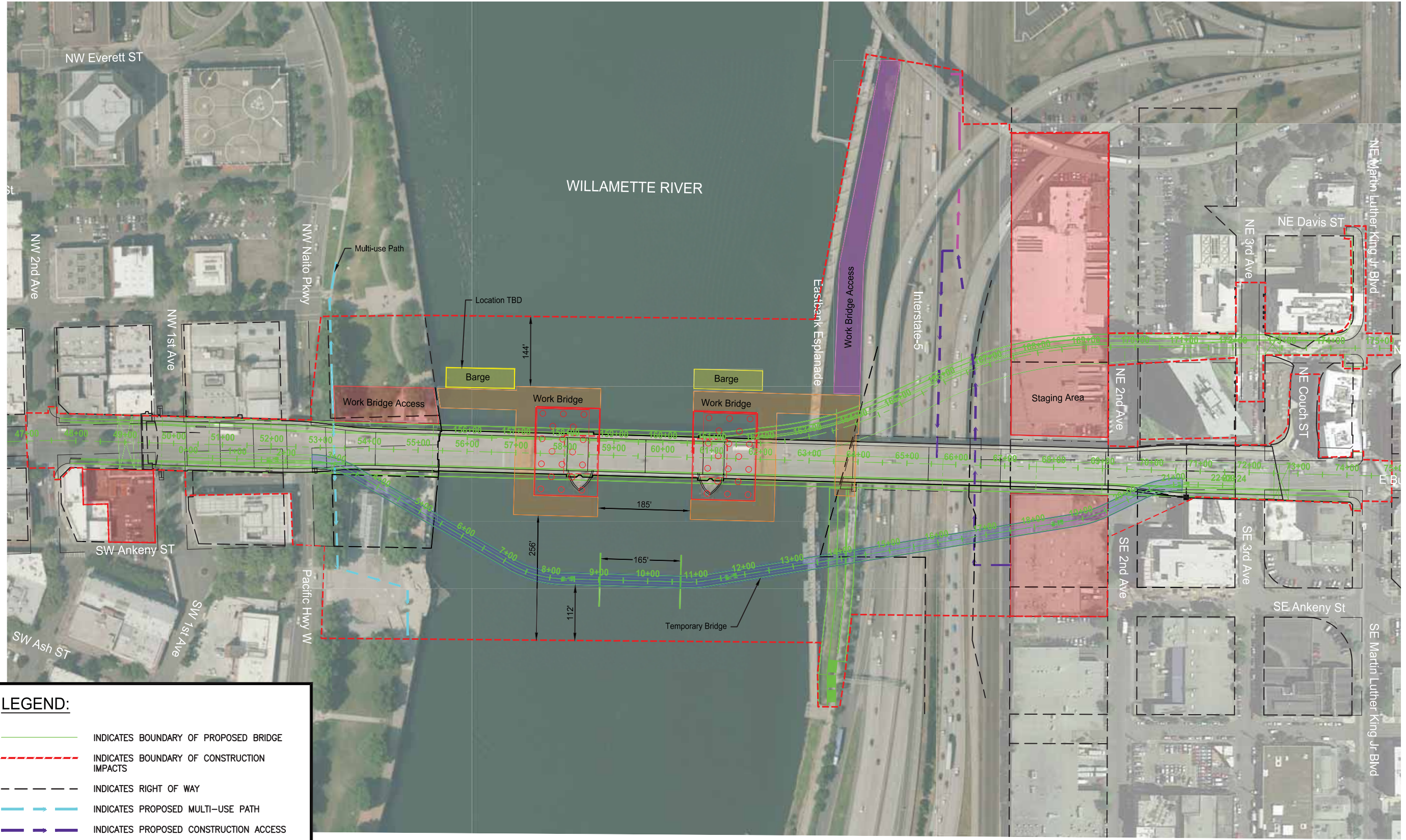
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- - - INDICATES RIGHT OF WAY
- INDICATES PROPOSED MULTI-USE PATH
- INDICATES PROPOSED CONSTRUCTION ACCESS
- INDICATES OPTIONAL CONSTRUCTION ACCESS

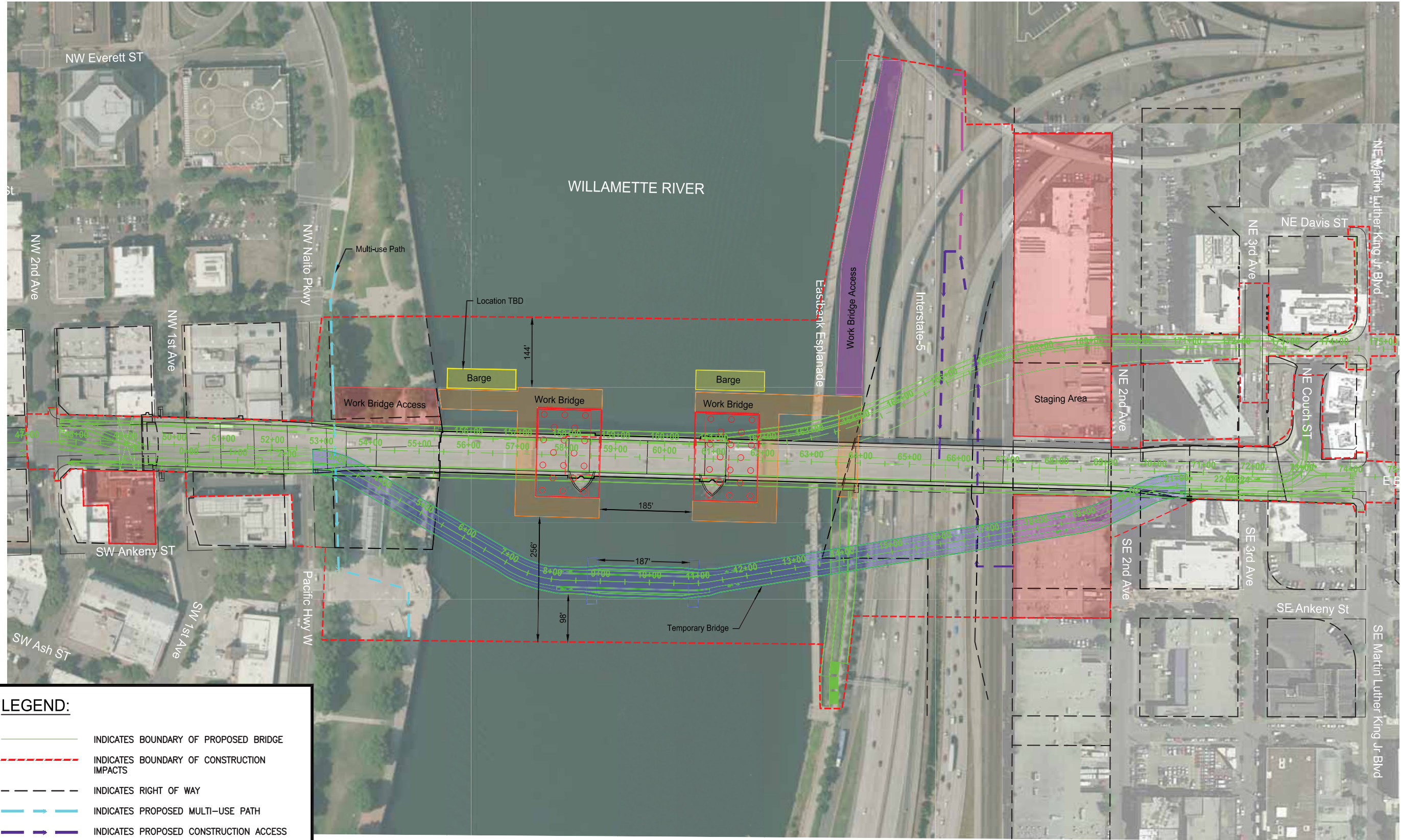
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REVISIONS		Earthquake Ready Burnside Bridge Access Plan Layout Replacement Movable Bridge with Long Span Approaches on Existing Alignment MULTNOMAH COUNTY	
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- INDICATES BOUNDARY OF PROPOSED BRIDGE
- - - INDICATES BOUNDARY OF CONSTRUCTION IMPACTS
- - - INDICATES RIGHT OF WAY
- INDICATES PROPOSED MULTI-USE PATH
- INDICATES PROPOSED CONSTRUCTION ACCESS
- INDICATES OPTIONAL CONSTRUCTION ACCESS

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REVISIONS		Earthquake Ready Burnside Bridge Access Plan and Temporary Bridge Layout Replacement Movable Bridge w/ Couch Connection (w/ Temporary Bike/Pad Bridge)	
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Sheet No. A-10			




LEGEND:

- INDICATES BOUNDARY OF PROPOSED BRIDGE
- - - INDICATES BOUNDARY OF CONSTRUCTION IMPACTS
- - - INDICATES RIGHT OF WAY
- INDICATES PROPOSED MULTI-USE PATH
- INDICATES PROPOSED CONSTRUCTION ACCESS
- INDICATES OPTIONAL CONSTRUCTION ACCESS

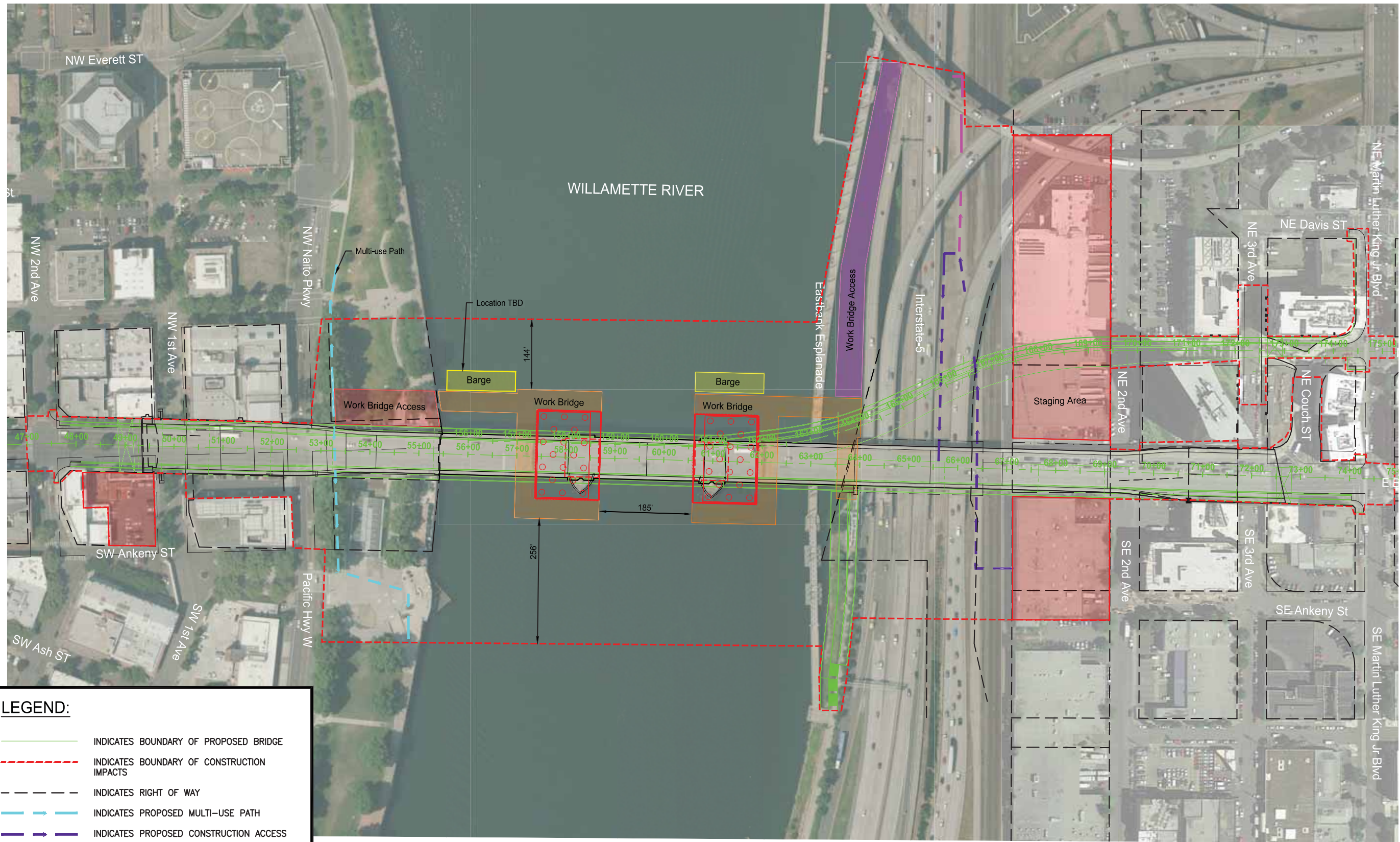
Earthquake Ready Burnside Bridge
 Access Plan and Temporary Bridge Layout
 Replacement Movable Bridge w/ Couch Connection

MULTNOMAH COUNTY
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- - - INDICATES BOUNDARY OF CONSTRUCTION IMPACTS
- - - INDICATES RIGHT OF WAY
- INDICATES PROPOSED MULTI-USE PATH
- INDICATES PROPOSED CONSTRUCTION ACCESS
- INDICATES OPTIONAL CONSTRUCTION ACCESS

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Sheet No.		PROJECT NO.: Proj No	
A-12		PROJECT NO.: Proj No	

Earthquake Ready Burnside Bridge

Access Plan Layout
Replacement Movable Bridge w/ Couch Connection

MULTNOMAH COUNTY

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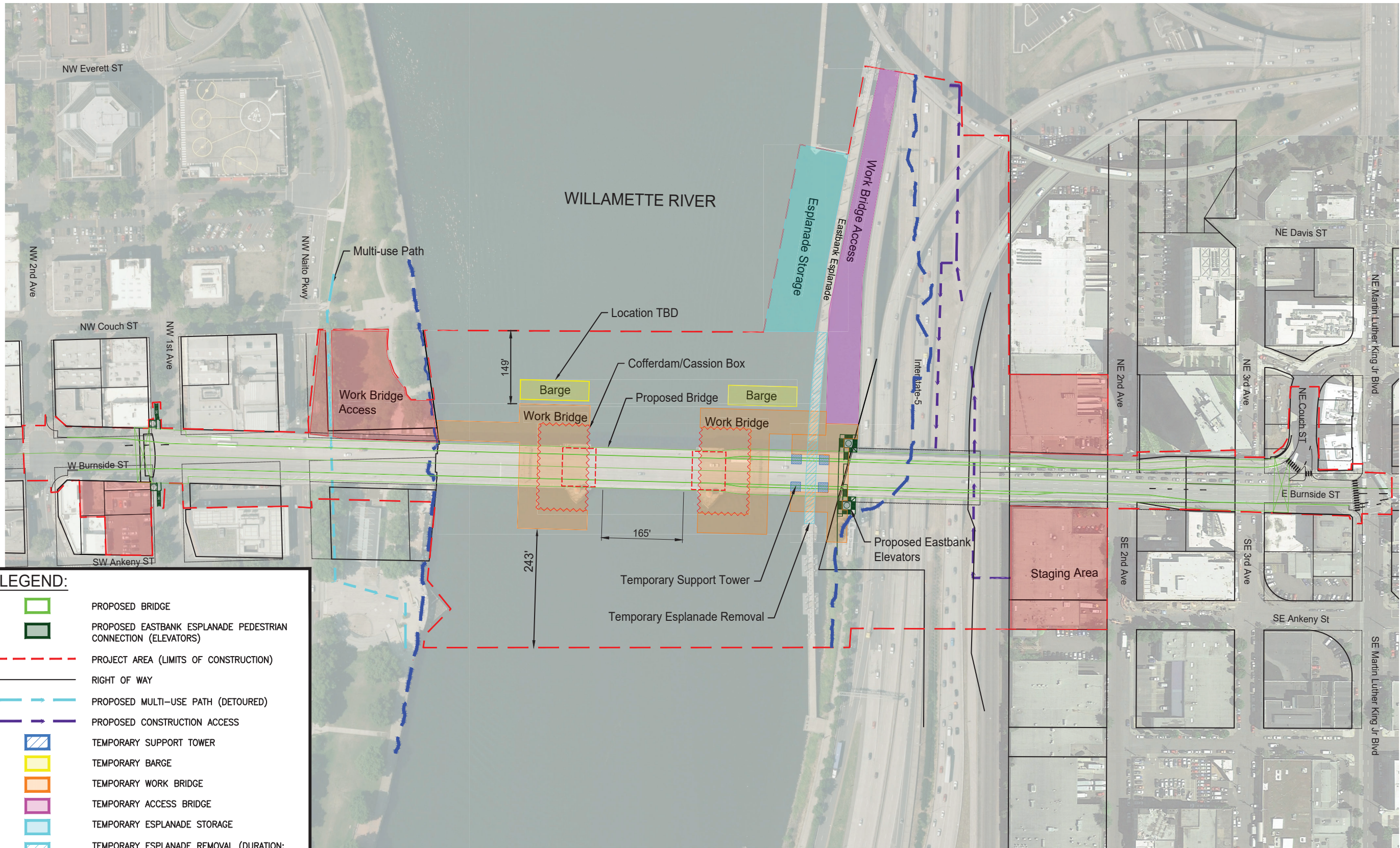
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A-12




LEGEND:

	PROPOSED BRIDGE
	PROPOSED EASTBANK ESPLANADE PEDESTRIAN CONNECTION (ELEVATORS)
	PROJECT AREA (LIMITS OF CONSTRUCTION)
	RIGHT OF WAY
	PROPOSED MULTI-USE PATH (DETOURED)
	PROPOSED CONSTRUCTION ACCESS
	TEMPORARY SUPPORT TOWER
	TEMPORARY BARGE
	TEMPORARY WORK BRIDGE
	TEMPORARY ACCESS BRIDGE
	TEMPORARY ESPLANADE STORAGE
	TEMPORARY ESPLANADE REMOVAL (DURATION: INTERMITTENT)
	TEMPORARY CONSTRUCTION STAGING/ACCESS
	TEMPORARY COFFERDAM/CASSION BOX
	OHW EL. 20.1' (NAV88)

Earthquake Ready Burnside Bridge
 Access Plan and Temporary Bridge Layout
 Traditional Bascule NE and SE Ped. Conn.
 MULTNOMAH COUNTY
 DATE: 11/2020 PROJECT NO.: Proj No

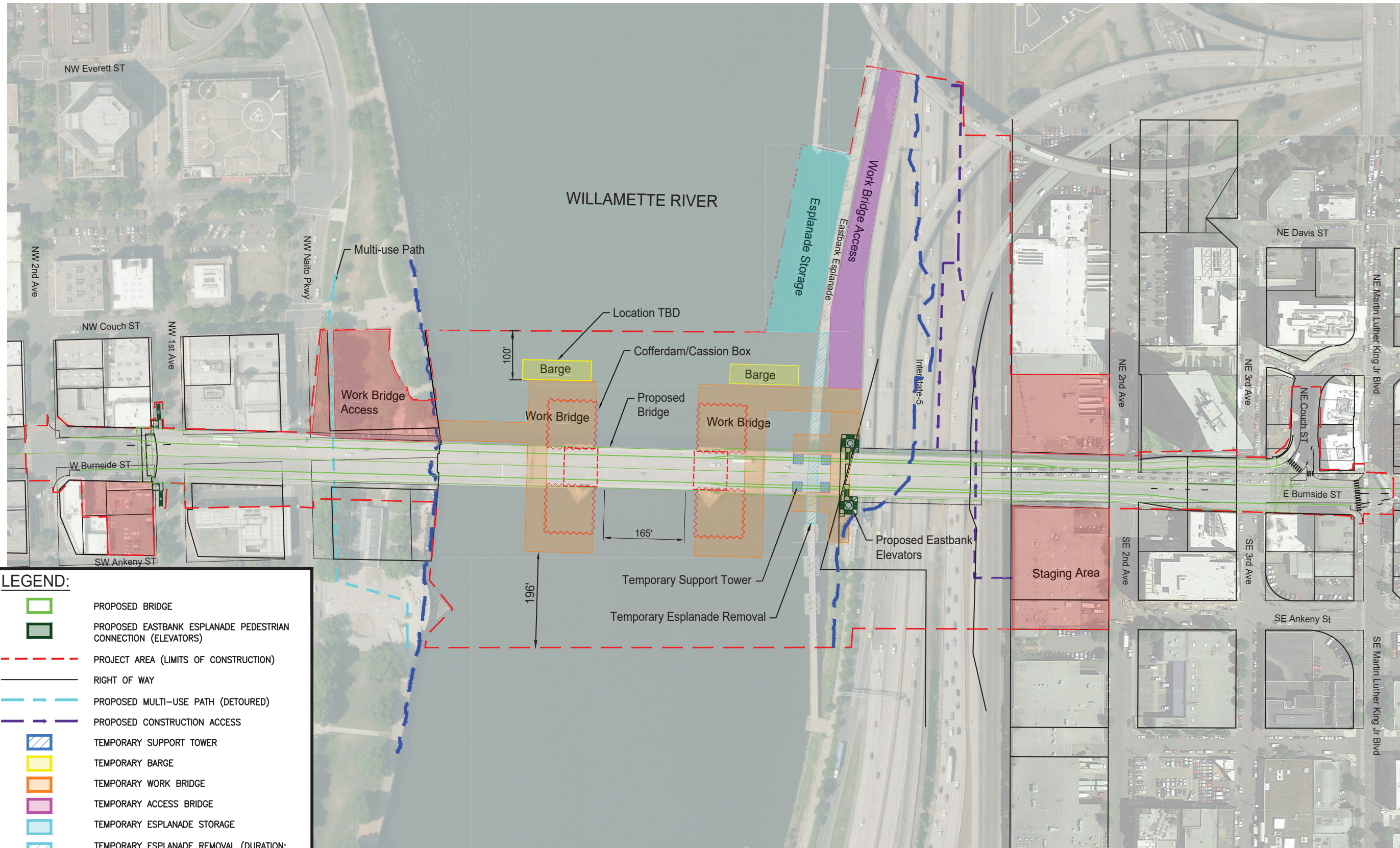
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LEGEND:

	PROPOSED BRIDGE
	PROPOSED EASTBANK ESPLANADE PEDESTRIAN CONNECTION (ELEVATORS)
	PROJECT AREA (LIMITS OF CONSTRUCTION)
	RIGHT OF WAY
	PROPOSED MULTI-USE PATH (DETOURED)
	PROPOSED CONSTRUCTION ACCESS
	TEMPORARY SUPPORT TOWER
	TEMPORARY BARGE
	TEMPORARY WORK BRIDGE
	TEMPORARY ACCESS BRIDGE
	TEMPORARY ESPLANADE STORAGE
	TEMPORARY ESPLANADE REMOVAL (DURATION: INTERMITTENT)
	TEMPORARY CONSTRUCTION STAGING/ACCESS
	TEMPORARY COFFERDAM/CASSION BOX
	OHW EL. 20.1' (NAV88)

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MULTNOMAH COUNTY Earthquake Ready Burnside Bridge Access Plan and Temporary Bridge Layout Traditional Bascule NE and SE Ped. Conn.		MULTNOMAH COUNTY PROJECT NO.: Proj No									
DATE: 11/2020											

Appendix B. Potential Offsite Storage Yards



Site Map



Imagery ©2019 Google, Map data ©2019 Google 200 ft

USACE Portland Terminal 2



Imagery ©2019 Google, Map data ©2019 500 ft

Willamette Staging Option



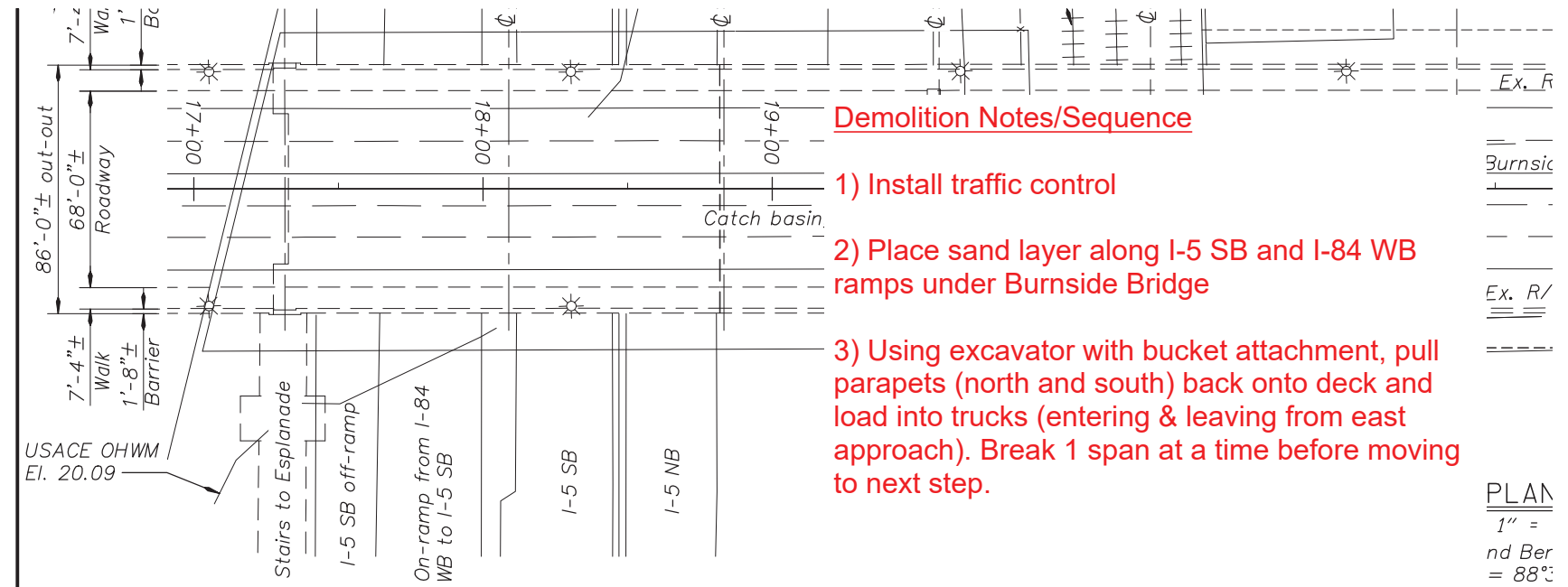
Imagery ©2019 Google, Map data ©2019 Google 200 ft

Willamette Staging Option Near Job



Old Ross Island Sand & Gravel Yard

Appendix C. Demolition Sequence over I-5 Mainline, I-84 Ramps, and UPRR

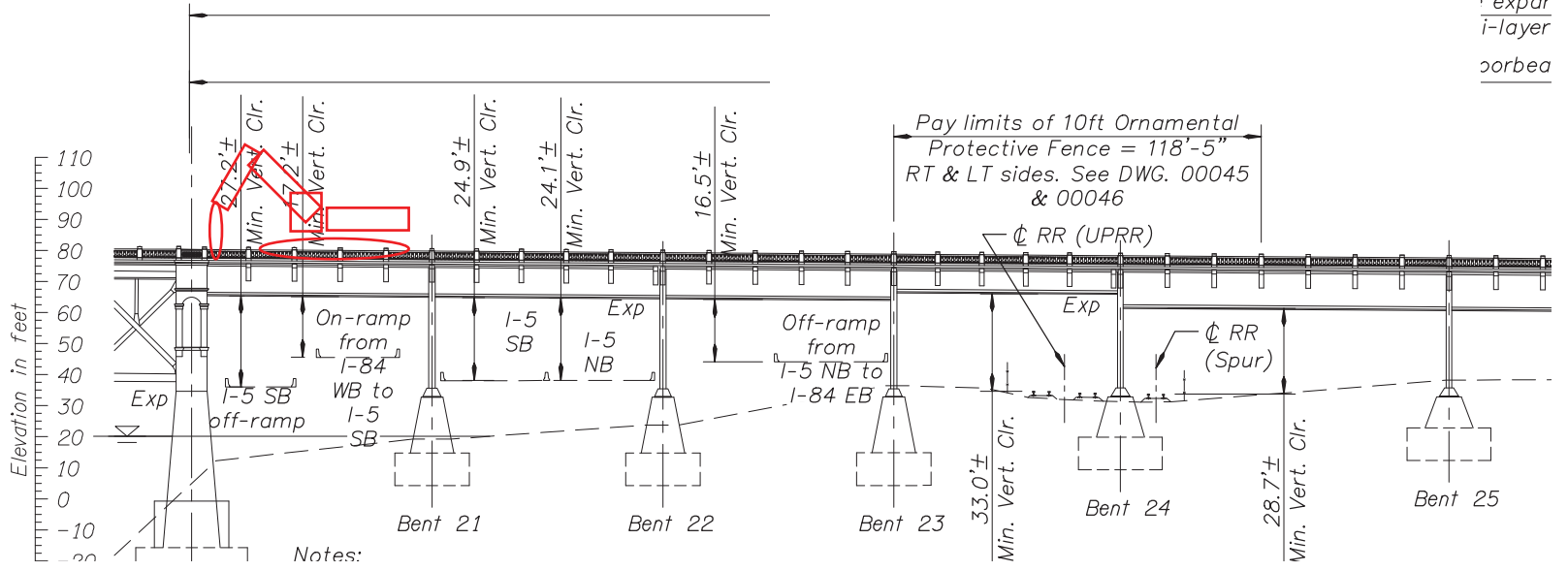


Demolition Notes/Sequence

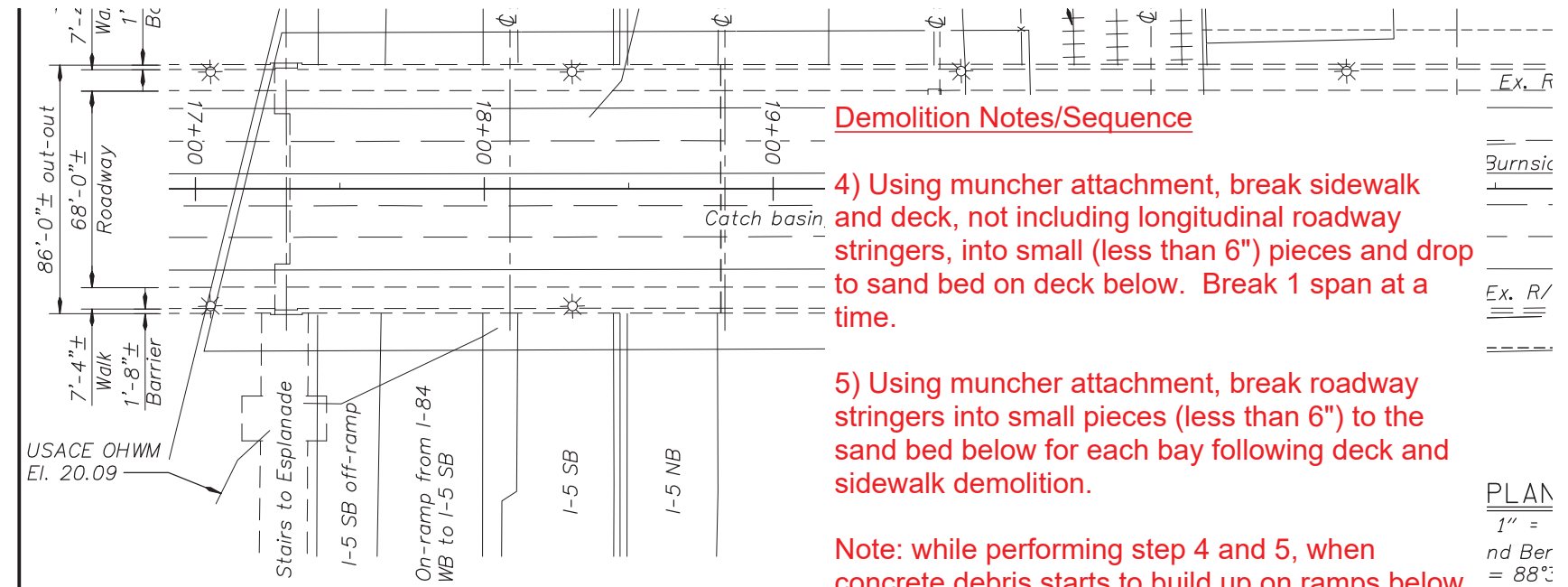
- 1) Install traffic control
- 2) Place sand layer along I-5 SB and I-84 WB ramps under Burnside Bridge
- 3) Using excavator with bucket attachment, pull parapets (north and south) back onto deck and load into trucks (entering & leaving from east approach). Break 1 span at a time before moving to next step.

PLAN
 1" =
 nd Ber
 = 88°
 : expar
 i-layer
 corbea

W_Burnside.dwg X_Survey_Burnside.dwg



Notes:



Demolition Notes/Sequence

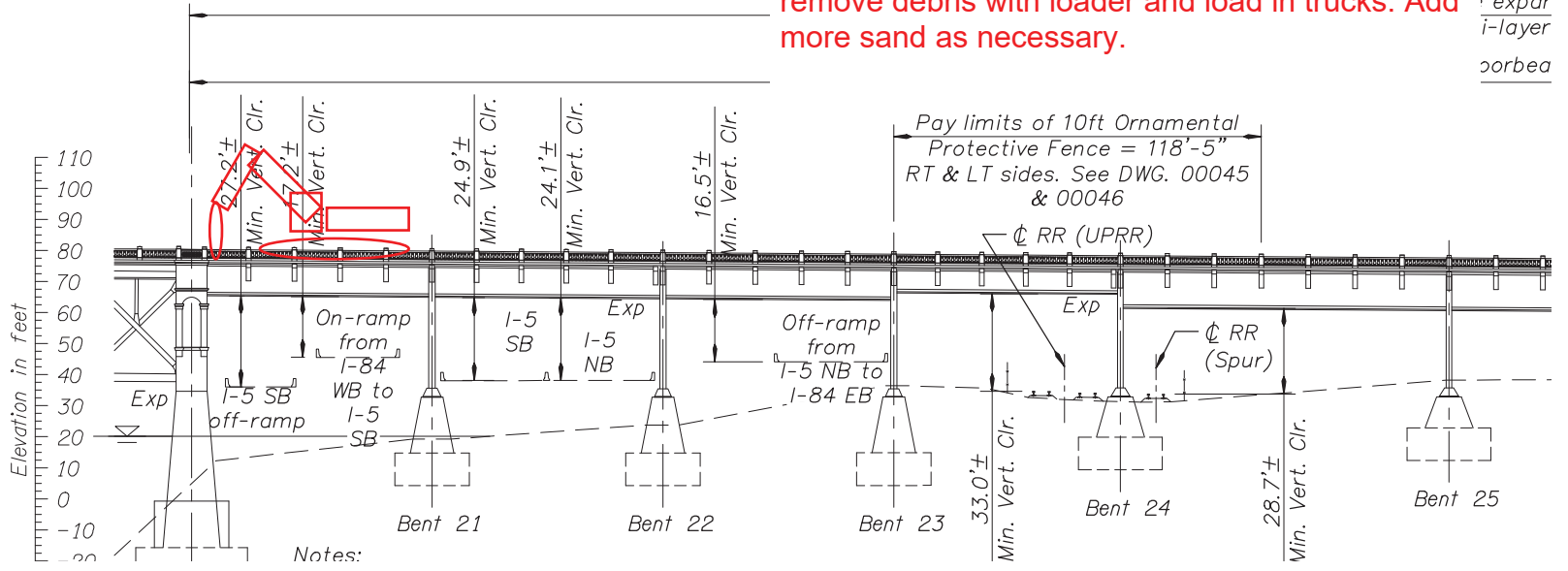
4) Using muncher attachment, break sidewalk and deck, not including longitudinal roadway stringers, into small (less than 6") pieces and drop to sand bed on deck below. Break 1 span at a time.

5) Using muncher attachment, break roadway stringers into small pieces (less than 6") to the sand bed below for each bay following deck and sidewalk demolition.

Note: while performing step 4 and 5, when concrete debris starts to build up on ramps below, remove debris with loader and load in trucks. Add more sand as necessary.

PLAN
 1" =
 nd Ber
 = 88°
 : expar
 i-layer
 corbea

W_Burnside.dwg X_Survey_Burnside.dwg



Notes:

Demolition Notes/Sequence

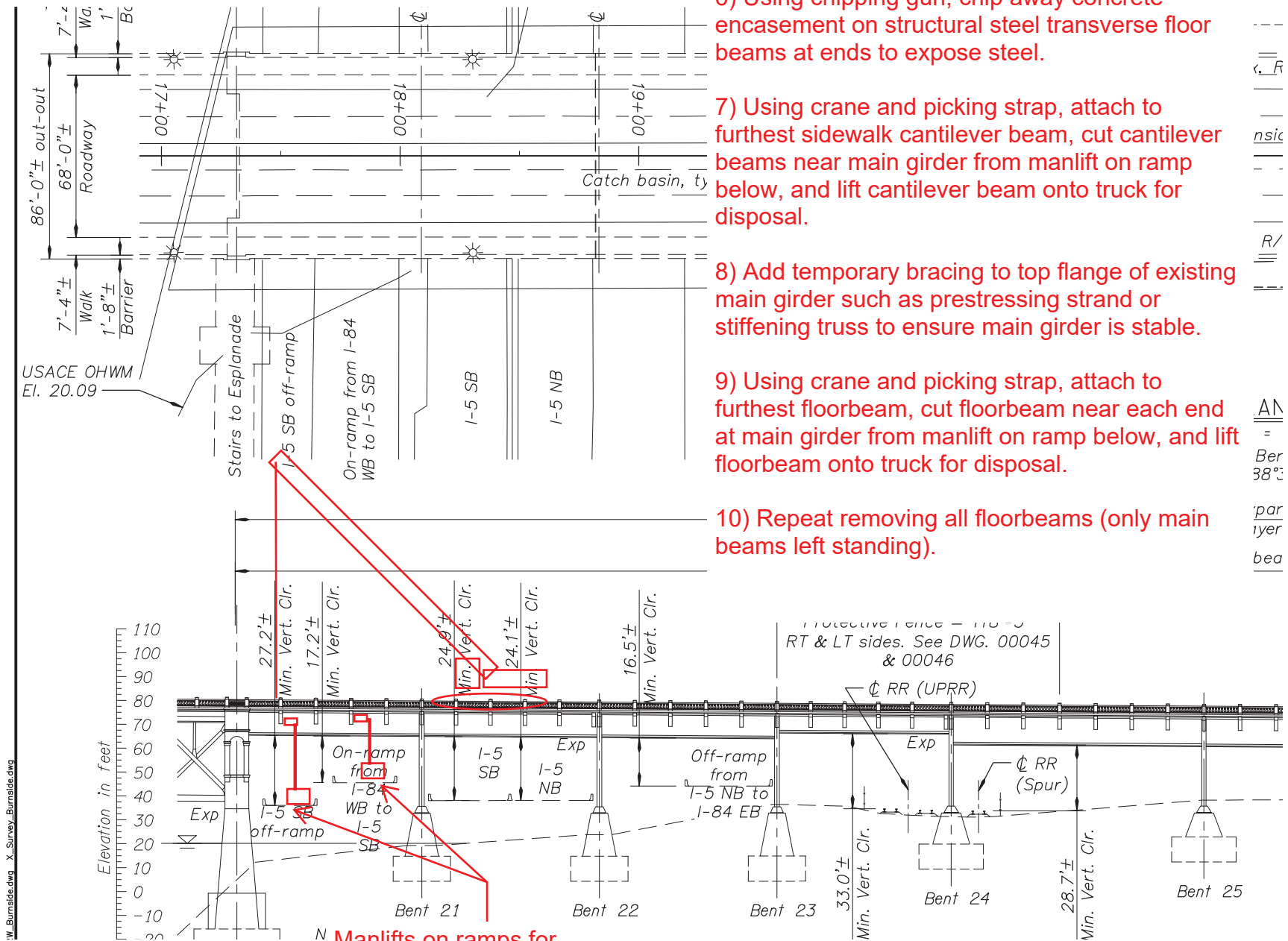
6) Using chipping gun, chip away concrete encasement on structural steel transverse floor beams at ends to expose steel.

7) Using crane and picking strap, attach to furthest sidewalk cantilever beam, cut cantilever beams near main girder from manlift on ramp below, and lift cantilever beam onto truck for disposal.

8) Add temporary bracing to top flange of existing main girder such as prestressing strand or stiffening truss to ensure main girder is stable.

9) Using crane and picking strap, attach to furthest floorbeam, cut floorbeam near each end at main girder from manlift on ramp below, and lift floorbeam onto truck for disposal.

10) Repeat removing all floorbeams (only main beams left standing).

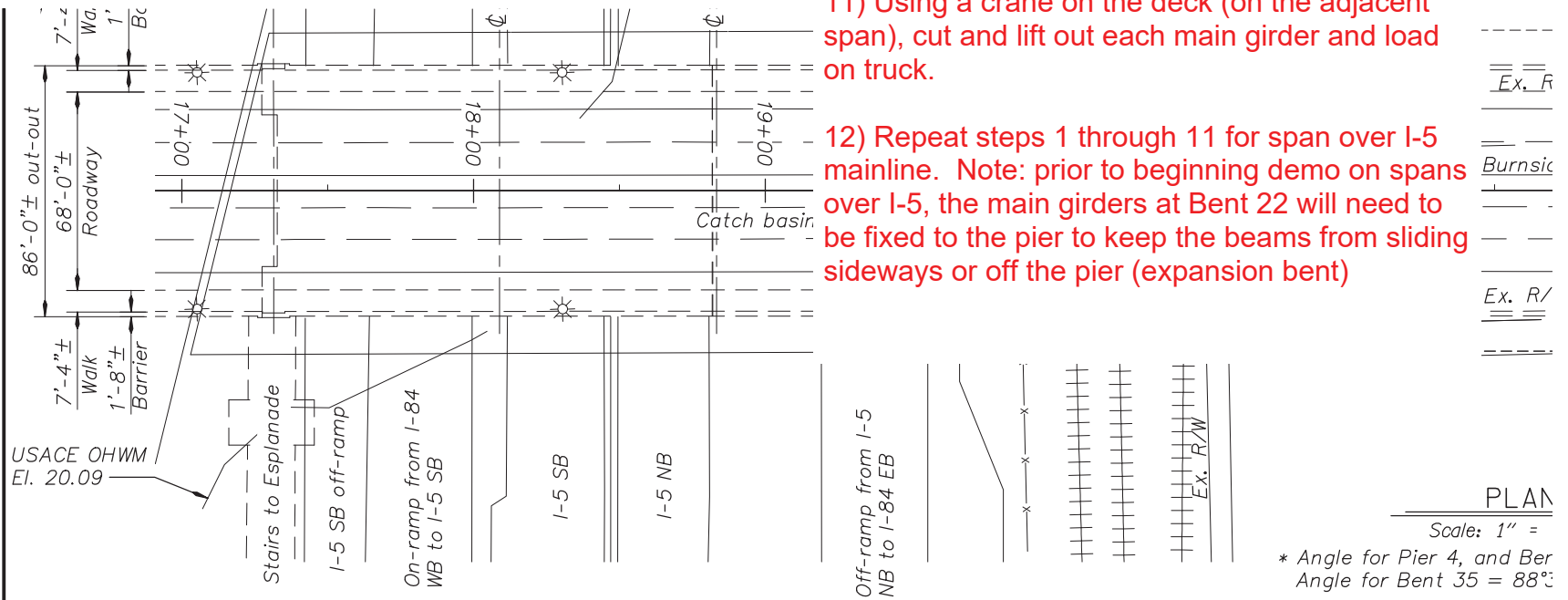


Manlifts on ramps for chipping & burning girders (will be on mainline and I-84 ramp during Span 21 & 22 removal)

Demolition Notes/Sequence

11) Using a crane on the deck (on the adjacent span), cut and lift out each main girder and load on truck.

12) Repeat steps 1 through 11 for span over I-5 mainline. Note: prior to beginning demo on spans over I-5, the main girders at Bent 22 will need to be fixed to the pier to keep the beams from sliding sideways or off the pier (expansion bent)

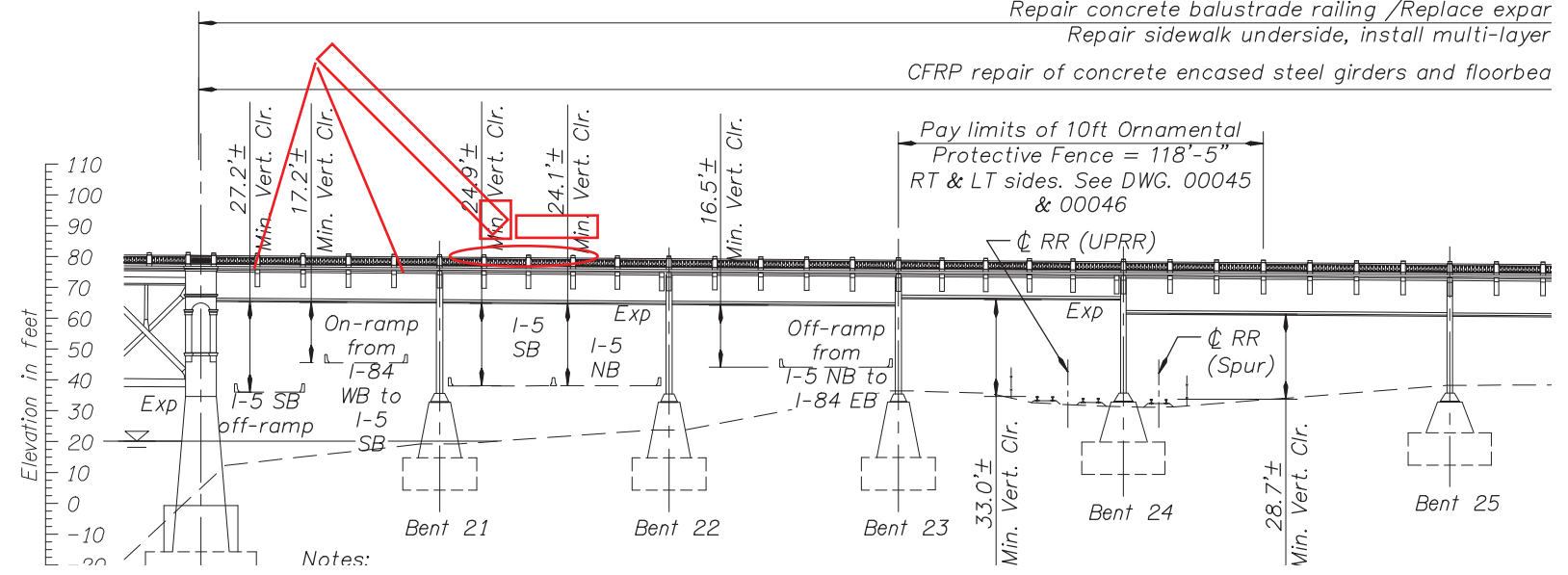


PLAN

Scale: 1" =

* Angle for Pier 4, and Ber
Angle for Bent 35 = 88°

Repair concrete balustrade railing /Replace expar
Repair sidewalk underside, install multi-layer
CFRP repair of concrete encased steel girders and floorbea



Notes:

W_Burnside.dwg X_Survey_Burnside.dwg

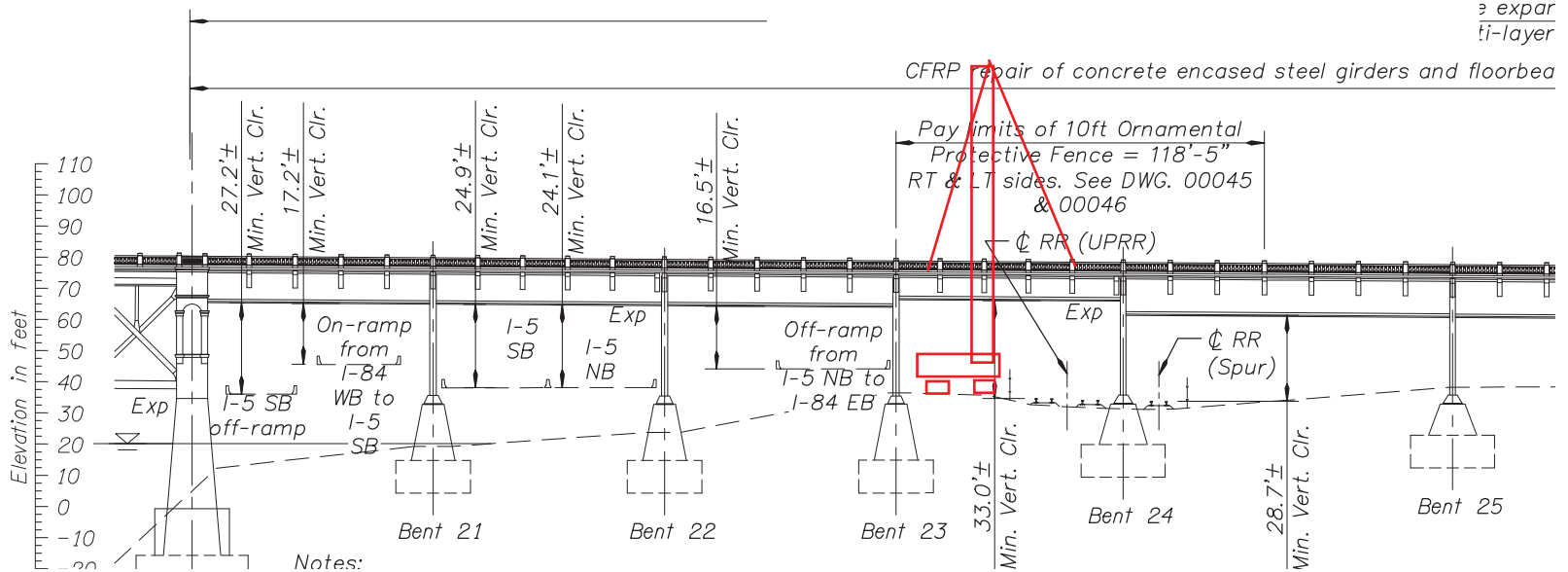
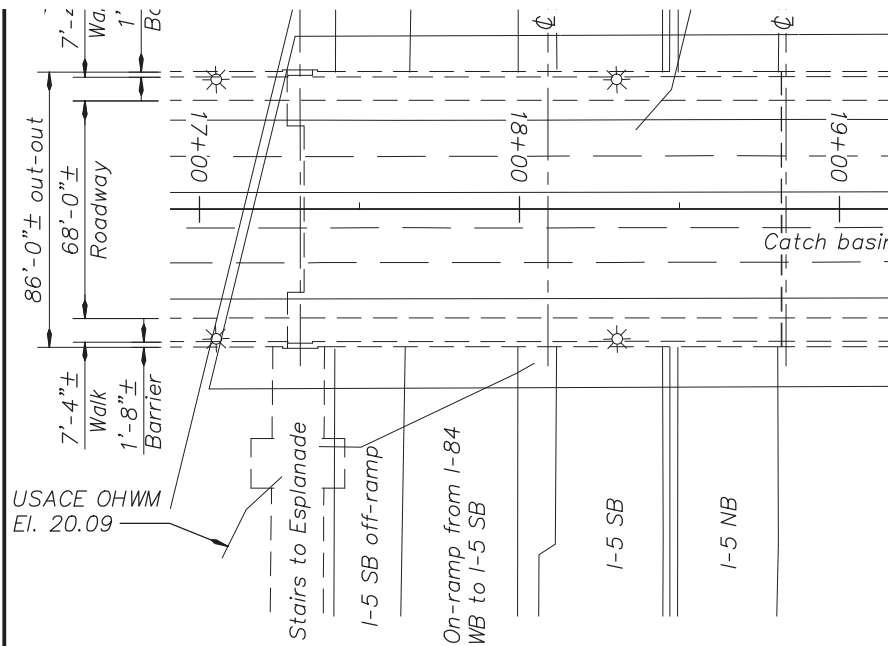
Demolition Notes/Sequence

13) Option 1: Repeat steps 1 through 12 for span over UPRR with a few exceptions:

- a) Closure(s) will depend on coordination with UPRR
- b) In lieu of using sand for protection, place crane mats/timbers/the like over the tracks for track protection during demolition.

Note: prior to beginning demo on spans over I-5, the main girders at Bent 22 will need to be fixed to the pier to keep the beams from sliding sideways or off the pier (expansion bent)

14) Option 2: Sawcut and remove parapet, sidewalk, and deck in pieces using a crane sitting just north of Span 23. Then, once concrete is removed, remove steel using crane in same sequence as steps 6 through 12.



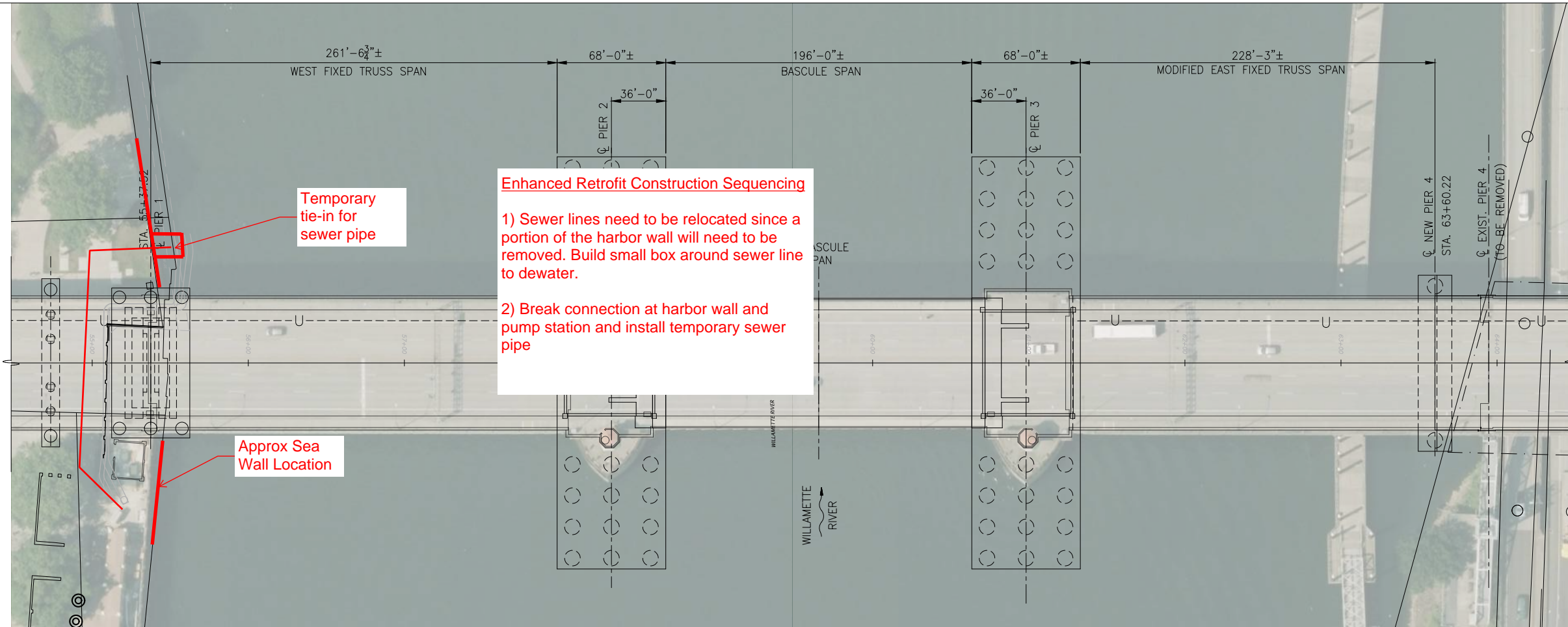
 Ex. R

 Burnside

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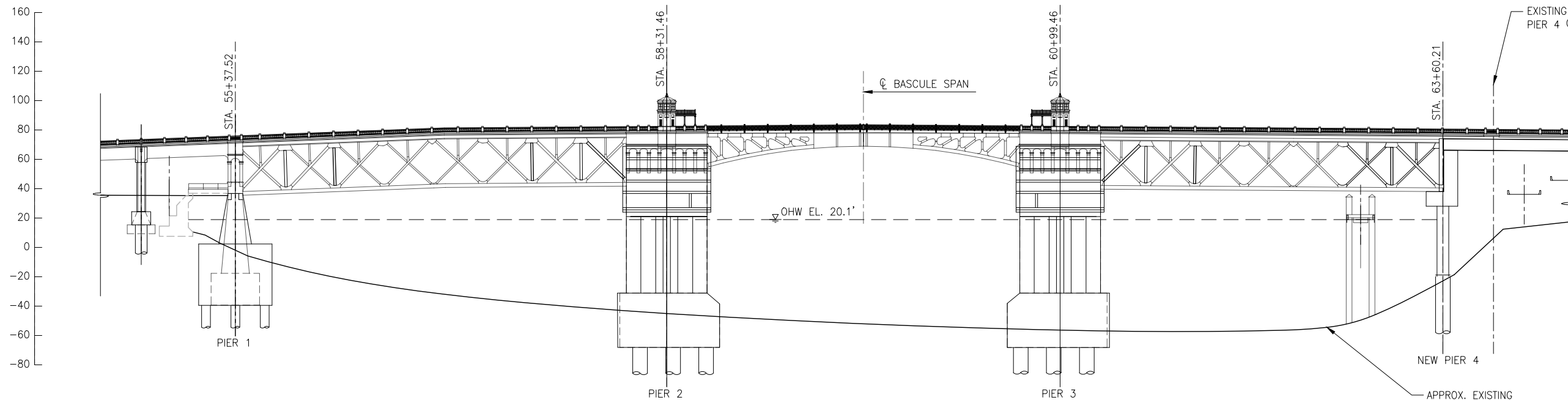
 PLAN
 1" =
 and Ber
 = 88°
 ? expar
 ti-layer

Appendix D. Cofferdam and Drilled Shaft Installation Sequence



PLAN

SCALE: 1" = 40'



ELEVATION

SCALE: 1" = 40'

LEGEND

	EXISTING
	RETROFIT

NOTES
1. BASCULE LEAVES RETROFIT NOT SHOWN FOR CLARITY

CONCEPTUAL PLANS
FEBRUARY 2020

EARTHQUAKE READY BURNSIDE BRIDGE
ENHANCED RETROFIT OF EXISTING CONDITION
SUBSTRUCTURE RETROFIT LAYOUT
RIVER SPANS

MULTNOMAH COUNTY
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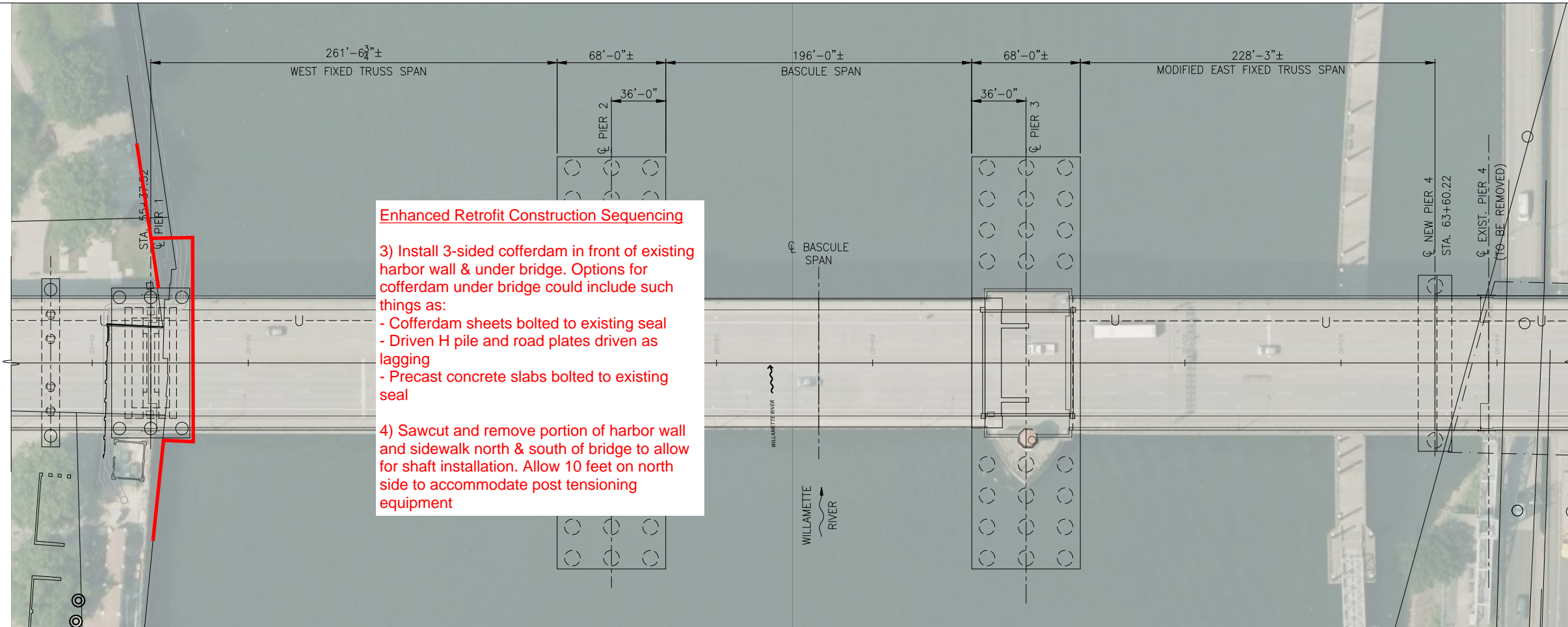
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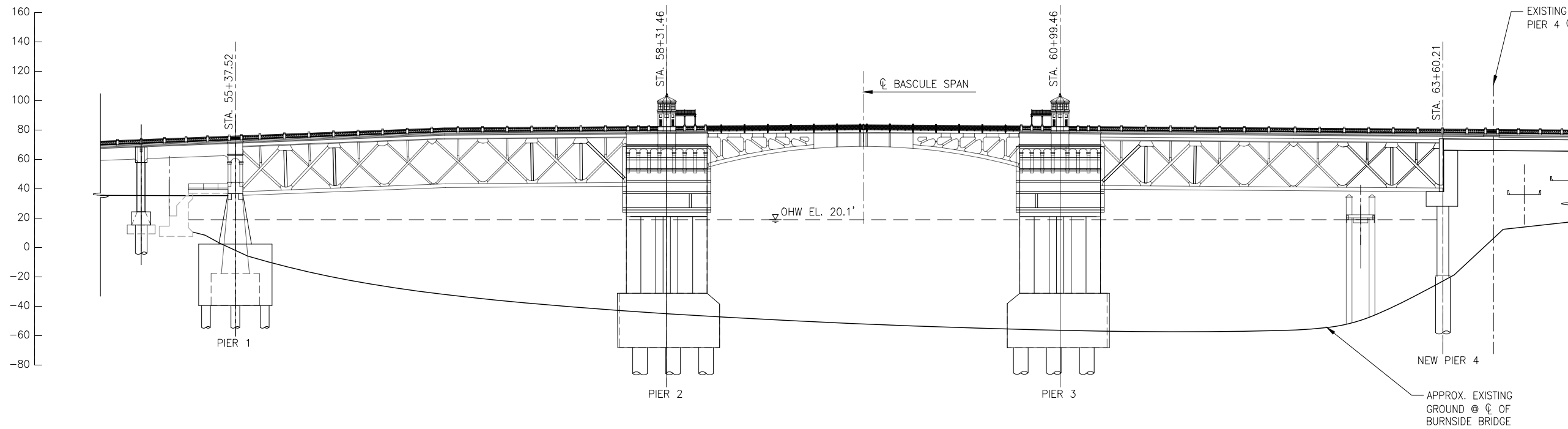
Enhanced Retrofit Construction Sequencing

3) Install 3-sided cofferdam in front of existing harbor wall & under bridge. Options for cofferdam under bridge could include such things as:

- Cofferdam sheets bolted to existing seal
- Driven H pile and road plates driven as lagging
- Precast concrete slabs bolted to existing seal

4) Sawcut and remove portion of harbor wall and sidewalk north & south of bridge to allow for shaft installation. Allow 10 feet on north side to accommodate post tensioning equipment

PLAN
SCALE: 1" = 40'



LEGEND

— EXISTING

— RETROFIT

NOTES

1. BASCULE LEAVES RETROFIT NOT SHOWN FOR CLARITY

ELEVATION
SCALE: 1" = 40'

CONCEPTUAL PLANS
FEBRUARY 2020

EARTHQUAKE READY BURNSIDE BRIDGE
ENHANCED RETROFIT OF EXISTING CONDITION
SUBSTRUCTURE RETROFIT LAYOUT
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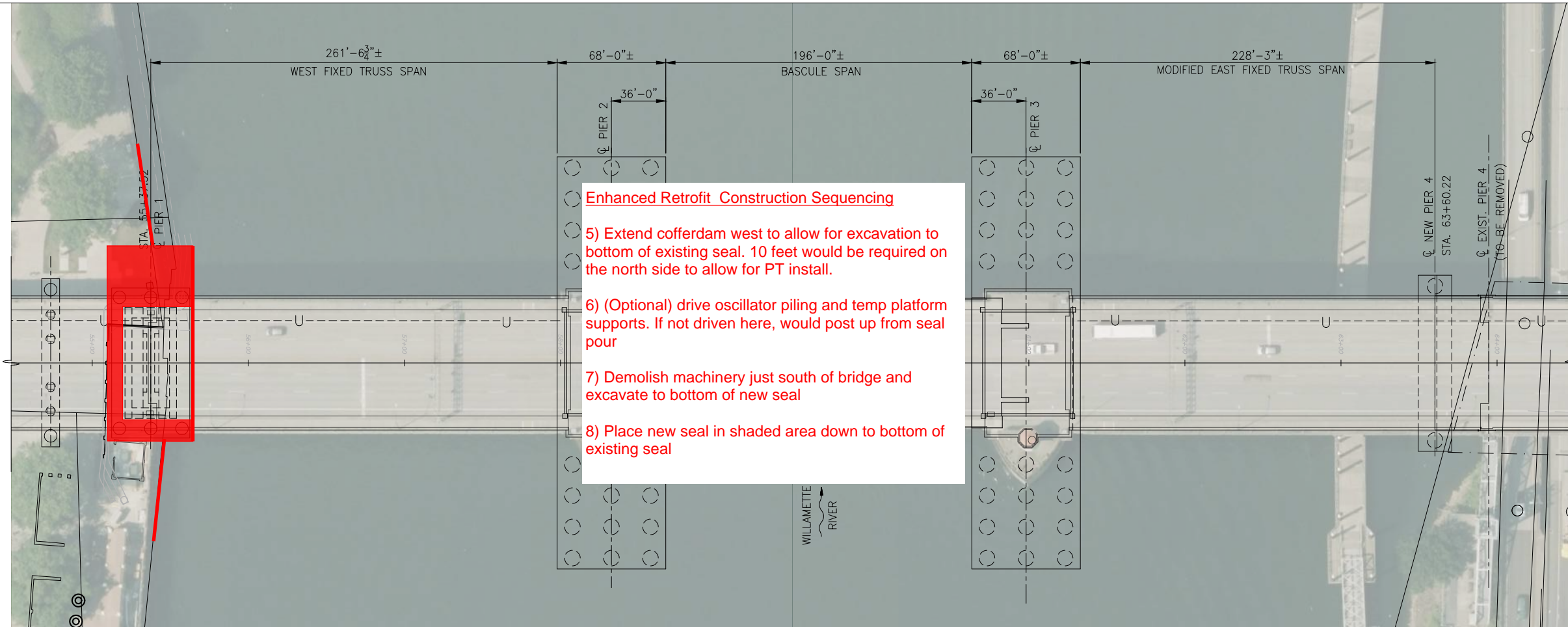
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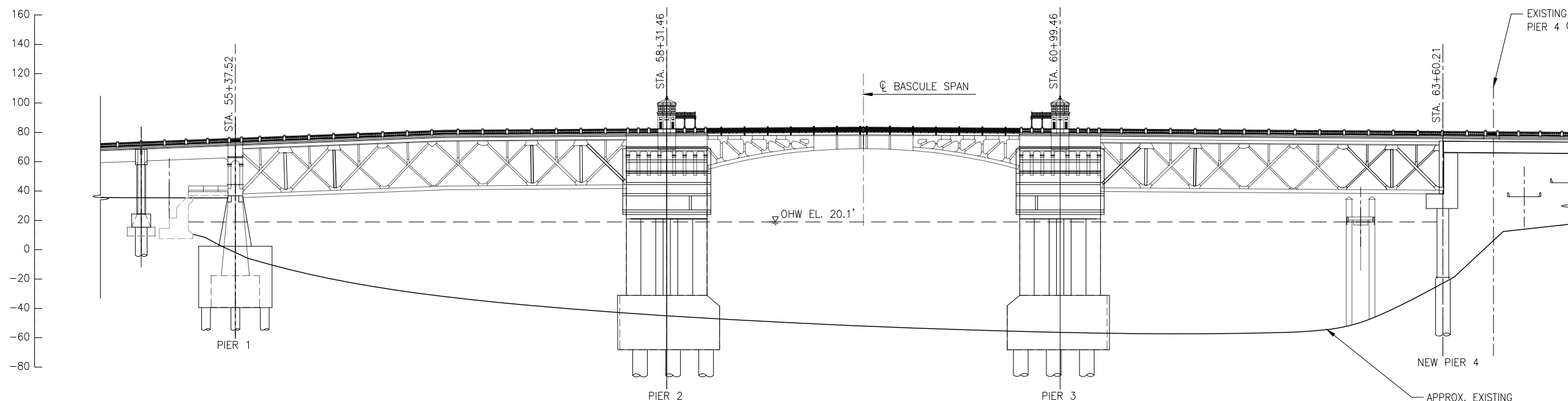
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Enhanced Retrofit Construction Sequencing

- 5) Extend cofferdam west to allow for excavation to bottom of existing seal. 10 feet would be required on the north side to allow for PT install.
- 6) (Optional) drive oscillator piling and temp platform supports. If not driven here, would post up from seal pour
- 7) Demolish machinery just south of bridge and excavate to bottom of new seal
- 8) Place new seal in shaded area down to bottom of existing seal

PLAN
SCALE: 1" = 40'



LEGEND

— EXISTING

— RETROFIT

NOTES

1. BASCULE LEAVES RETROFIT NOT SHOWN FOR CLARITY

ELEVATION
SCALE: 1" = 40'

CONCEPTUAL PLANS
FEBRUARY 2020

EARTHQUAKE READY BURNSIDE BRIDGE
ENHANCED RETROFIT OF EXISTING CONDITION
SUBSTRUCTURE RETROFIT LAYOUT
RIVER SPANS

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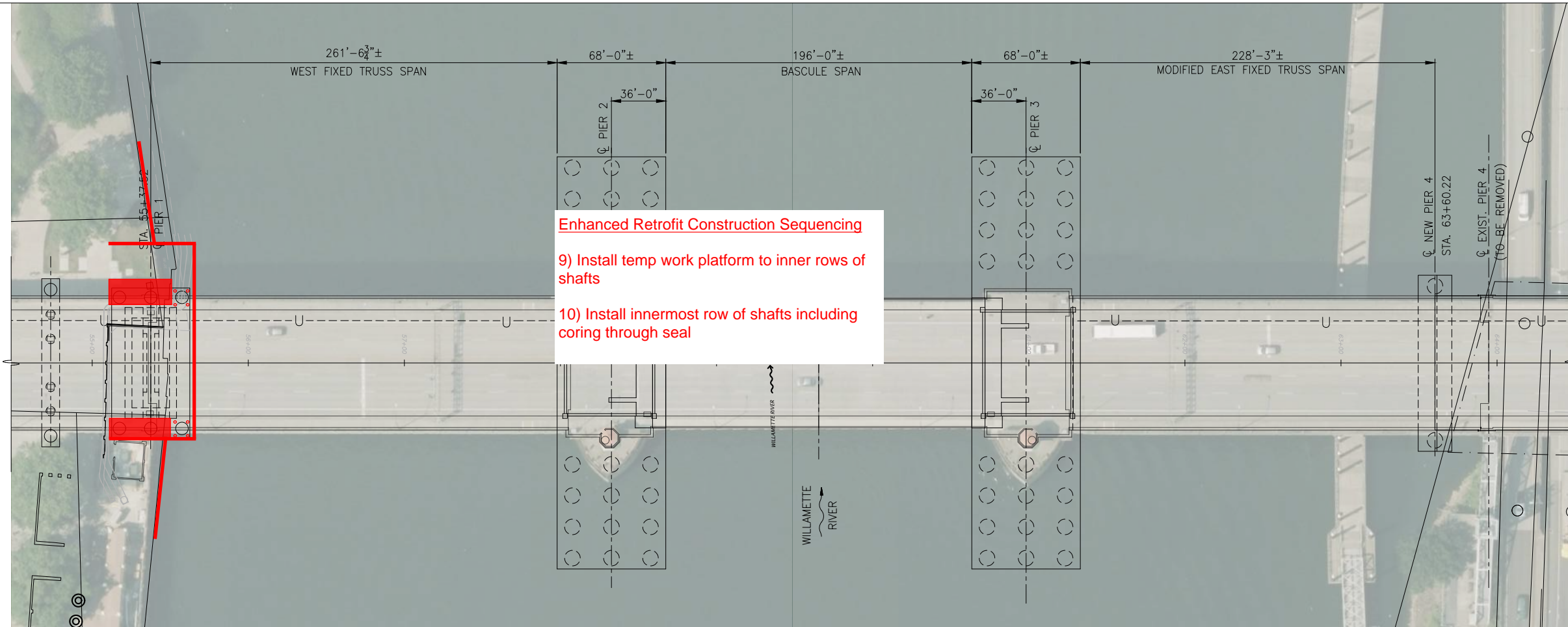
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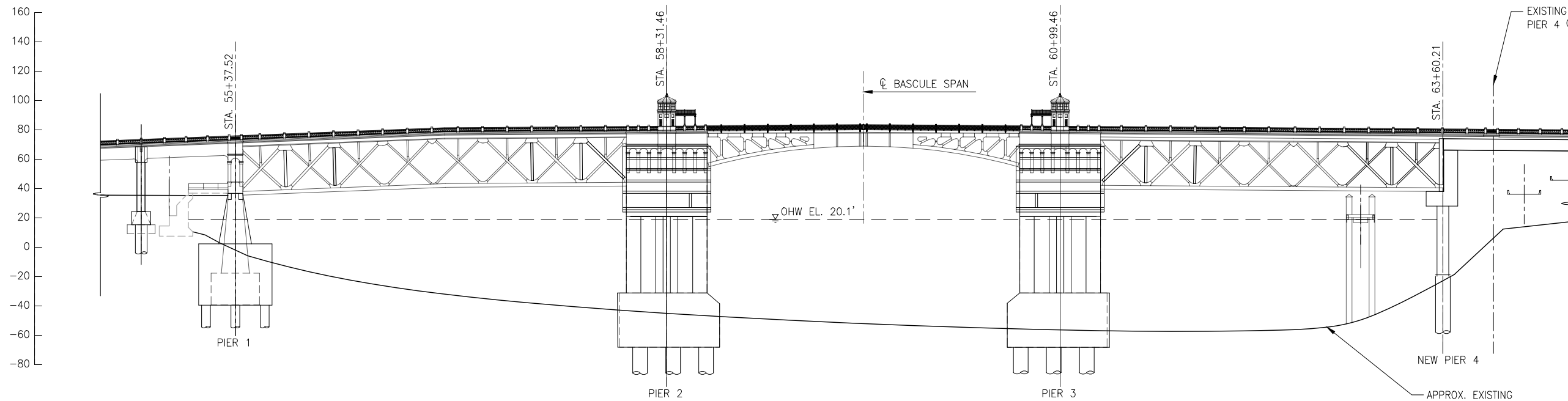
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Enhanced Retrofit Construction Sequencing

9) Install temp work platform to inner rows of shafts

10) Install innermost row of shafts including coring through seal



LEGEND

	EXISTING
	RETROFIT

NOTES
1. BASCULE LEAVES RETROFIT NOT SHOWN FOR CLARITY

CONCEPTUAL PLANS
FEBRUARY 2020

EARTHQUAKE READY BURNSIDE BRIDGE
ENHANCED RETROFIT OF EXISTING CONDITION
SUBSTRUCTURE RETROFIT LAYOUT
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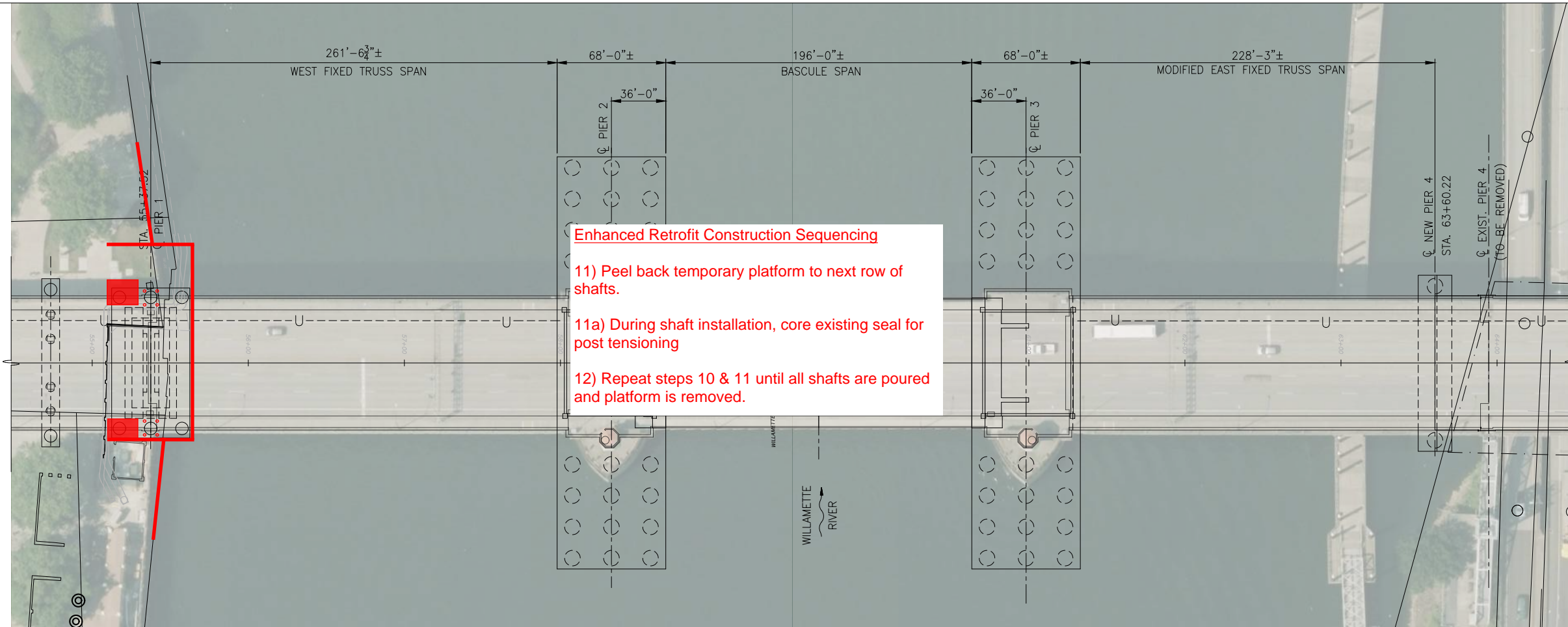
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Enhanced Retrofit Construction Sequencing

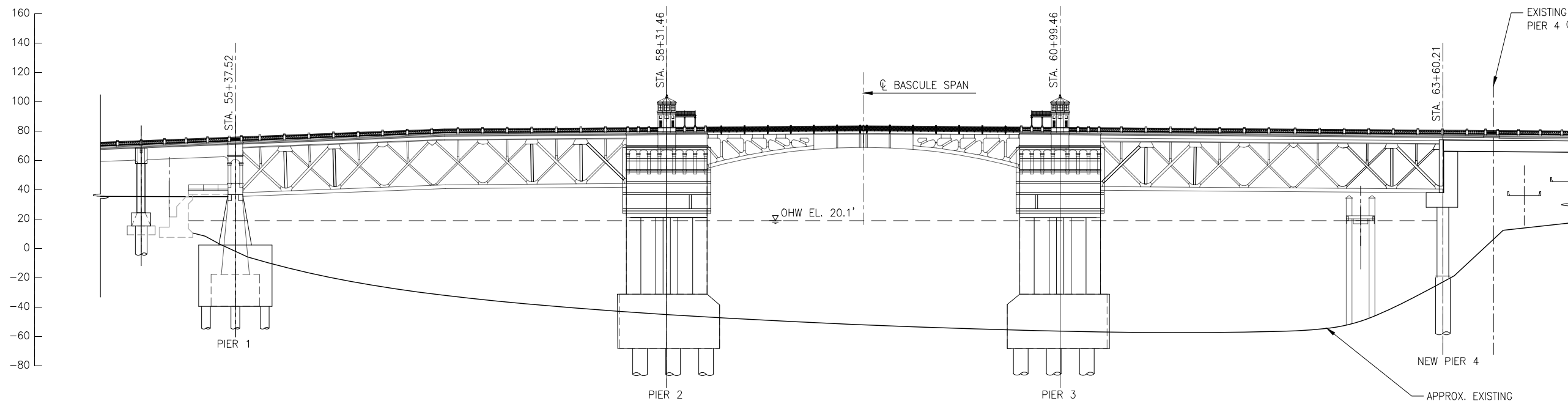
11) Peel back temporary platform to next row of shafts.

11a) During shaft installation, core existing seal for post tensioning

12) Repeat steps 10 & 11 until all shafts are poured and platform is removed.

PLAN

SCALE: 1" = 40'



ELEVATION

SCALE: 1" = 40'

LEGEND

	EXISTING
	RETROFIT

NOTES

1. BASCULE LEAVES RETROFIT NOT SHOWN FOR CLARITY

CONCEPTUAL PLANS
FEBRUARY 2020

EARTHQUAKE READY BURNSIDE BRIDGE
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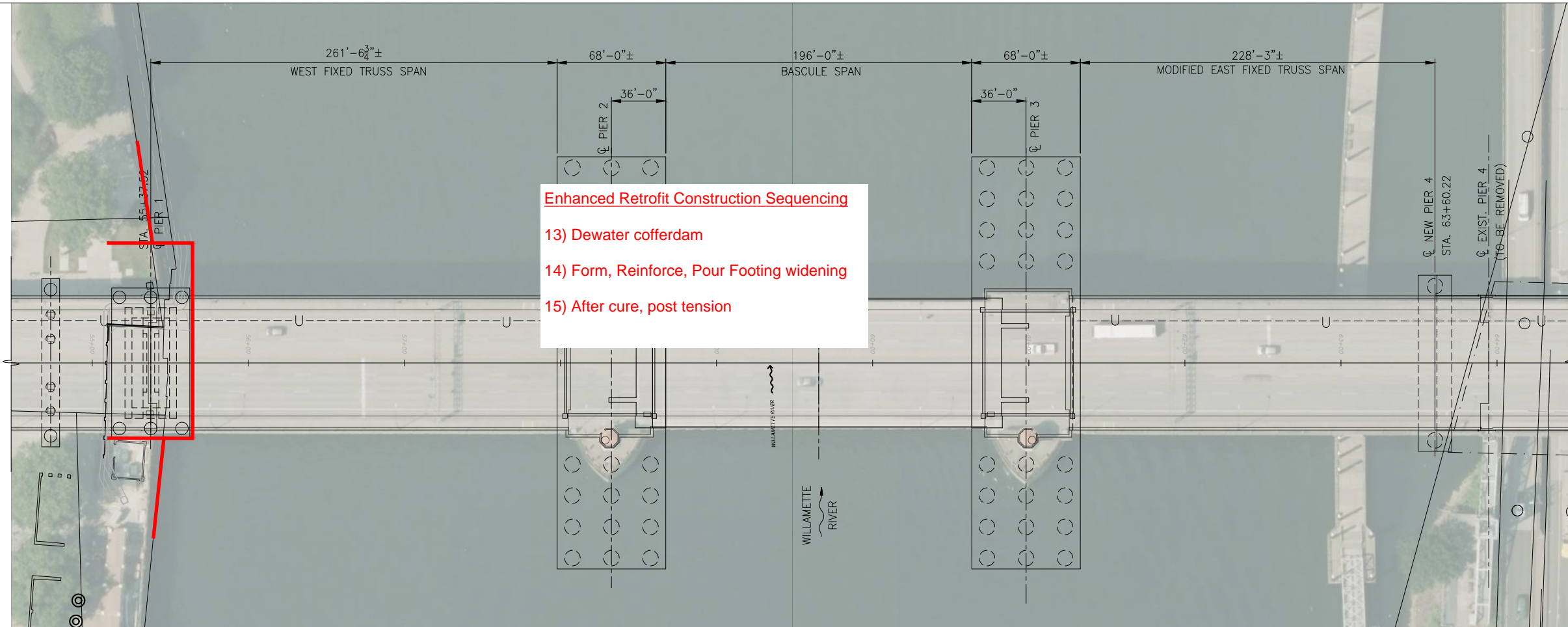
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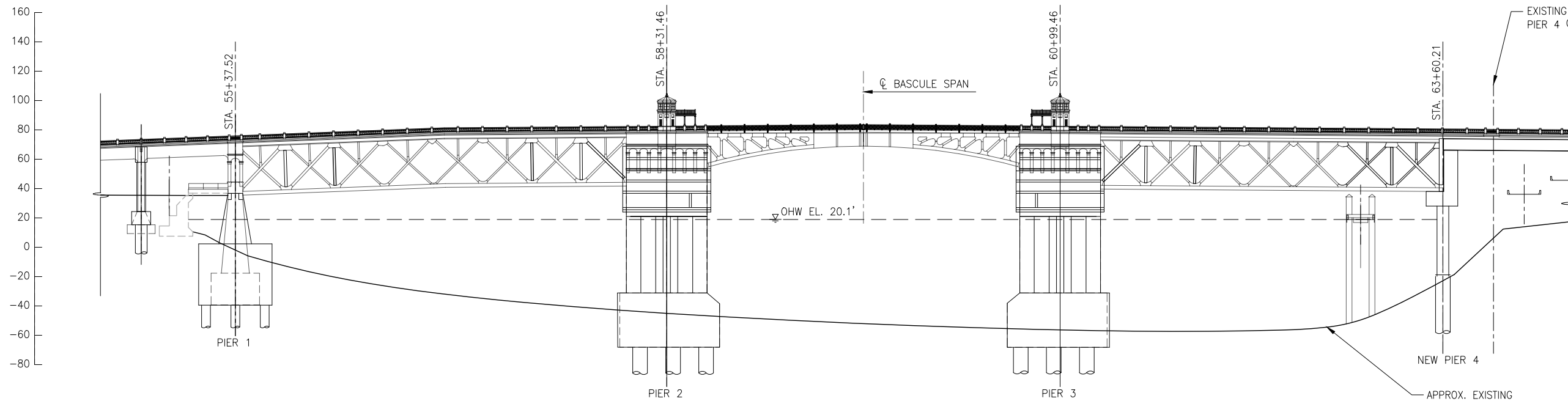


Enhanced Retrofit Construction Sequencing

- 13) Dewater cofferdam
- 14) Form, Reinforce, Pour Footing widening
- 15) After cure, post tension

PLAN

SCALE: 1" = 40'



ELEVATION

SCALE: 1" = 40'

LEGEND

- EXISTING
- RETROFIT

NOTES

1. BASCULE LEAVES RETROFIT NOT SHOWN FOR CLARITY

CONCEPTUAL PLANS
FEBRUARY 2020

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SUBSTRUCTURE RETROFIT LAYOUT
RIVER SPANS

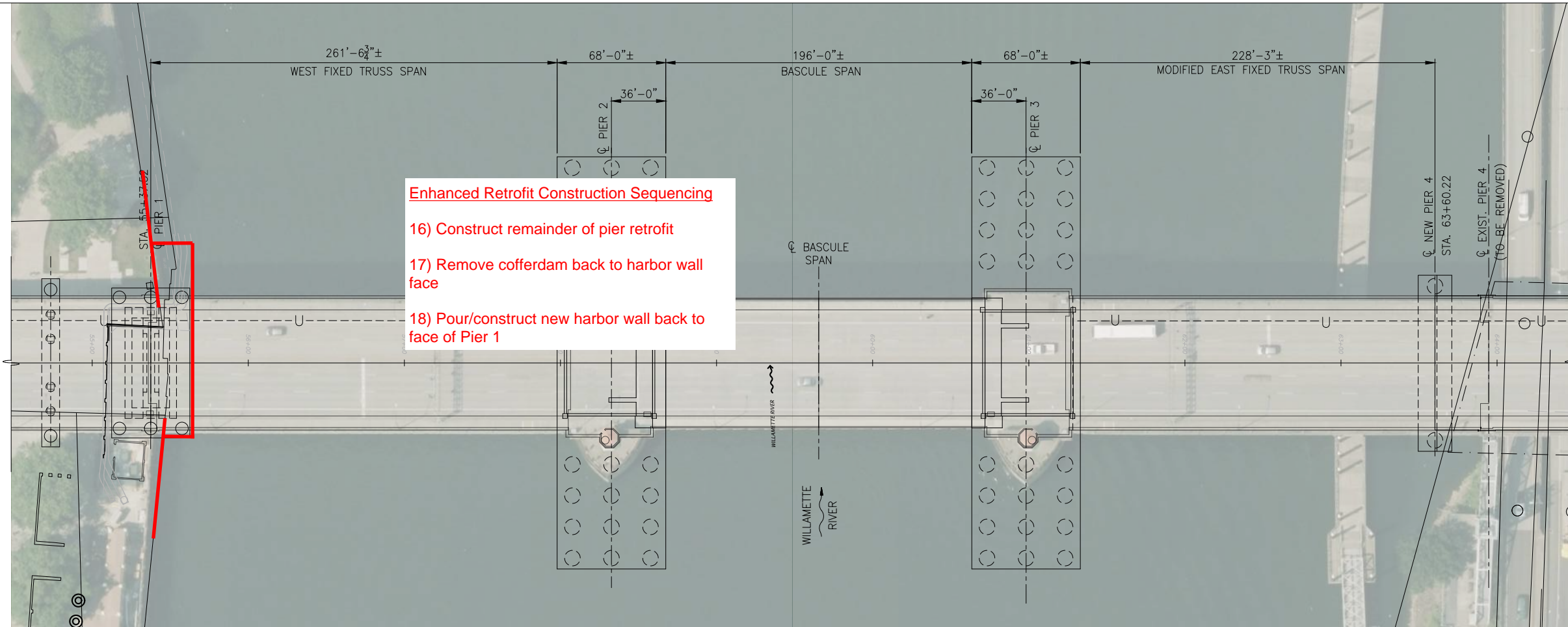
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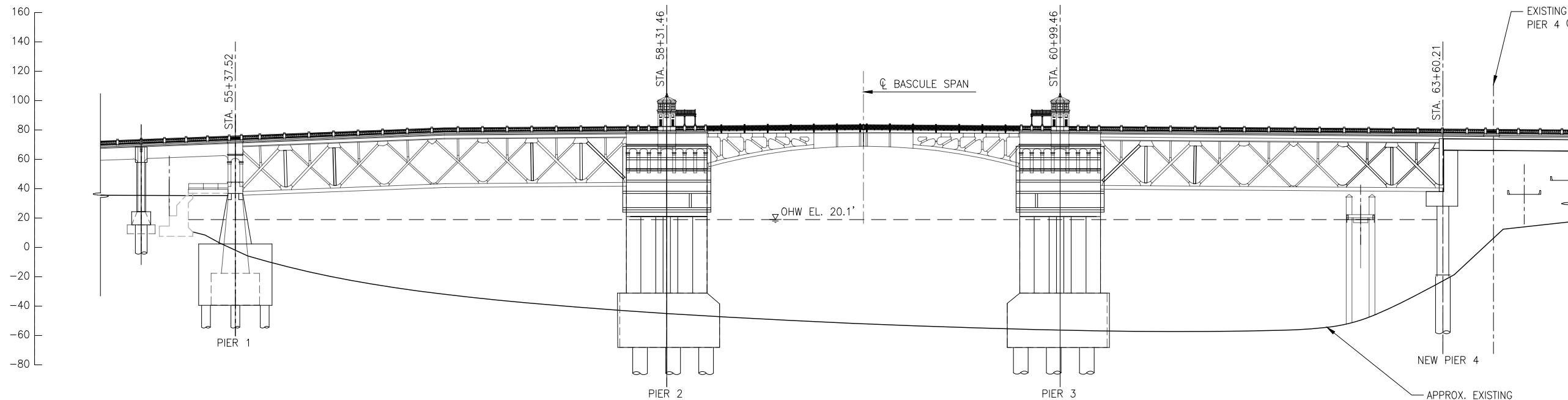


Enhanced Retrofit Construction Sequencing

- 16) Construct remainder of pier retrofit
- 17) Remove cofferdam back to harbor wall face
- 18) Pour/construct new harbor wall back to face of Pier 1

PLAN

SCALE: 1" = 40'



LEGEND

- EXISTING
- RETROFIT

NOTES

- 1. BASCULE LEAVES RETROFIT NOT SHOWN FOR CLARITY

ELEVATION

SCALE: 1" = 40'

**CONCEPTUAL PLANS
FEBRUARY 2020**

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ENHANCED RETROFIT OF EXISTING CONDITION
SUBSTRUCTURE RETROFIT LAYOUT
RIVER SPANS

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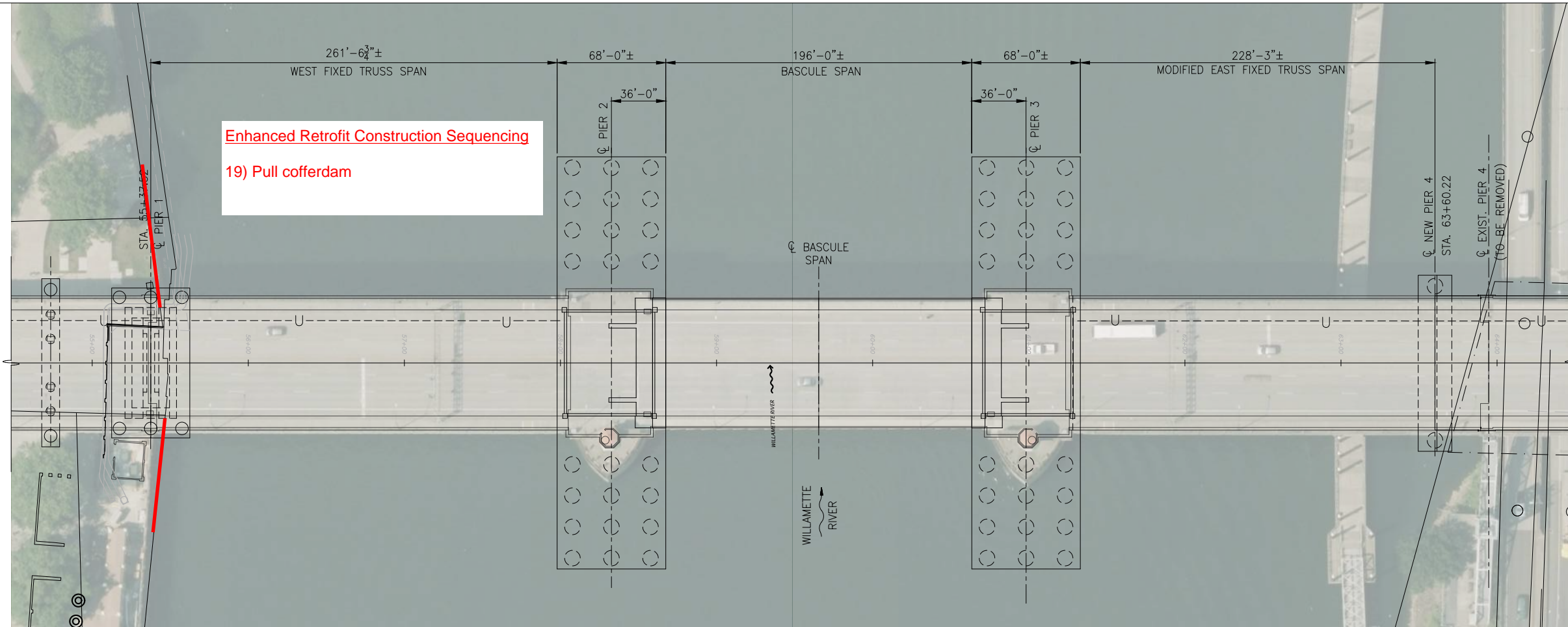
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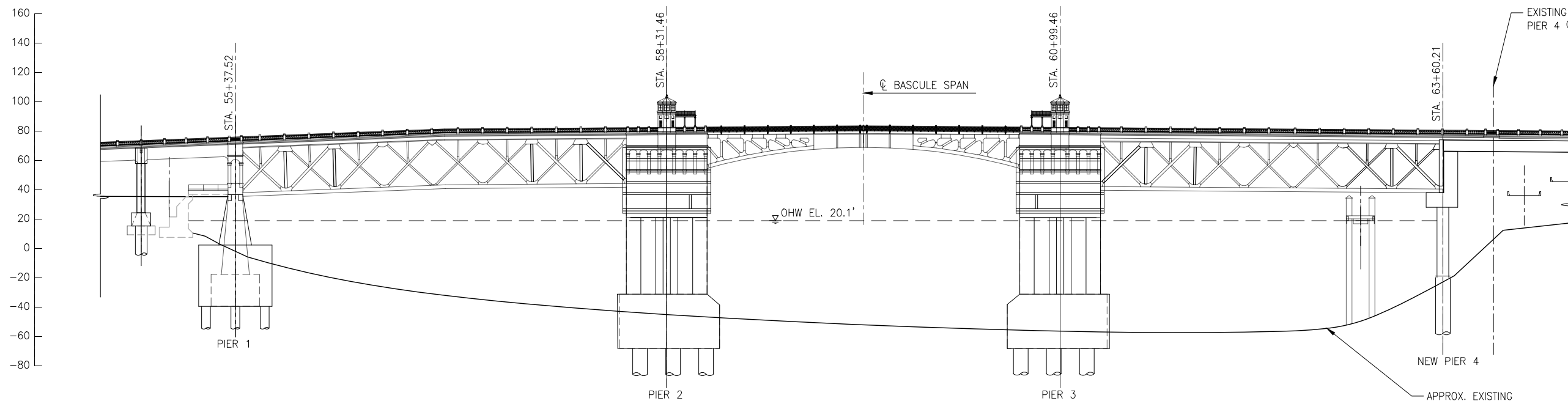
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PLAN

SCALE: 1" = 40'



ELEVATION

SCALE: 1" = 40'

LEGEND

	EXISTING
	RETROFIT

NOTES
1. BASCULE LEAVES RETROFIT NOT SHOWN FOR CLARITY

CONCEPTUAL PLANS
FEBRUARY 2020

EARTHQUAKE READY BURNSIDE BRIDGE
ENHANCED RETROFIT OF EXISTING CONDITION
SUBSTRUCTURE RETROFIT LAYOUT
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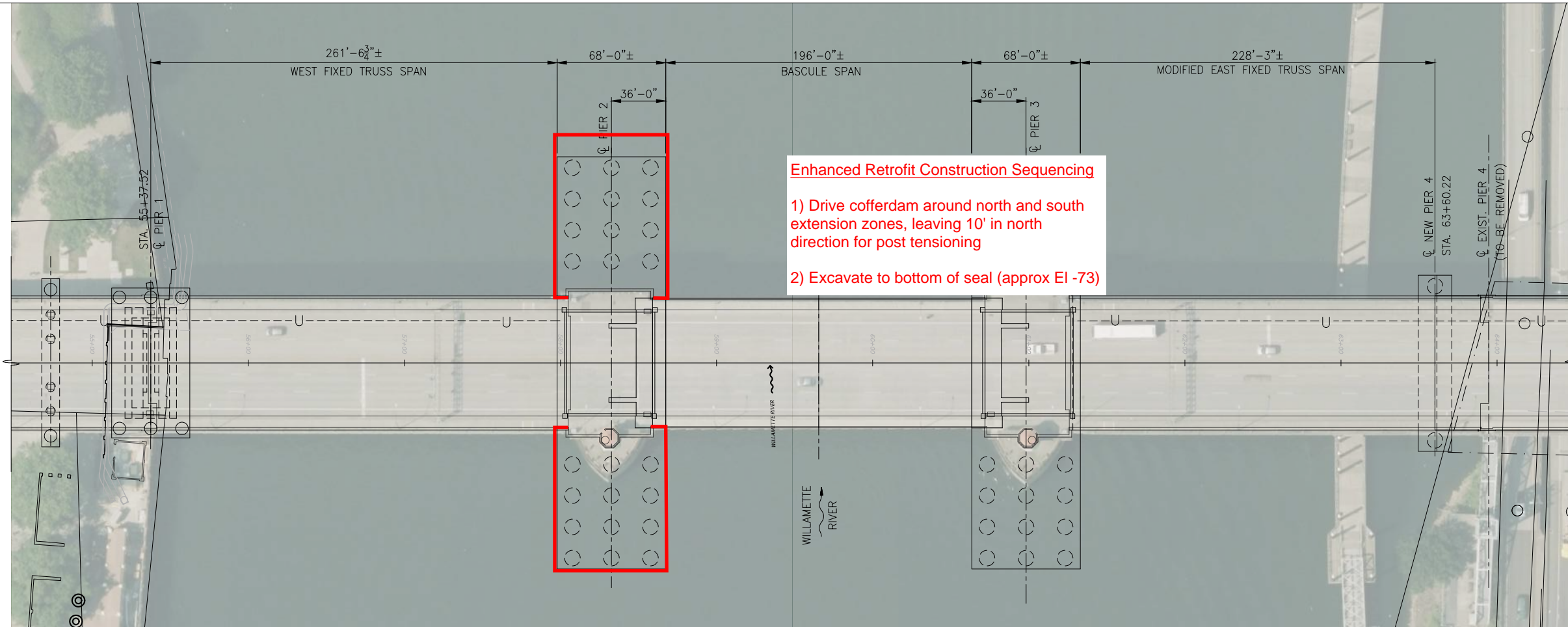
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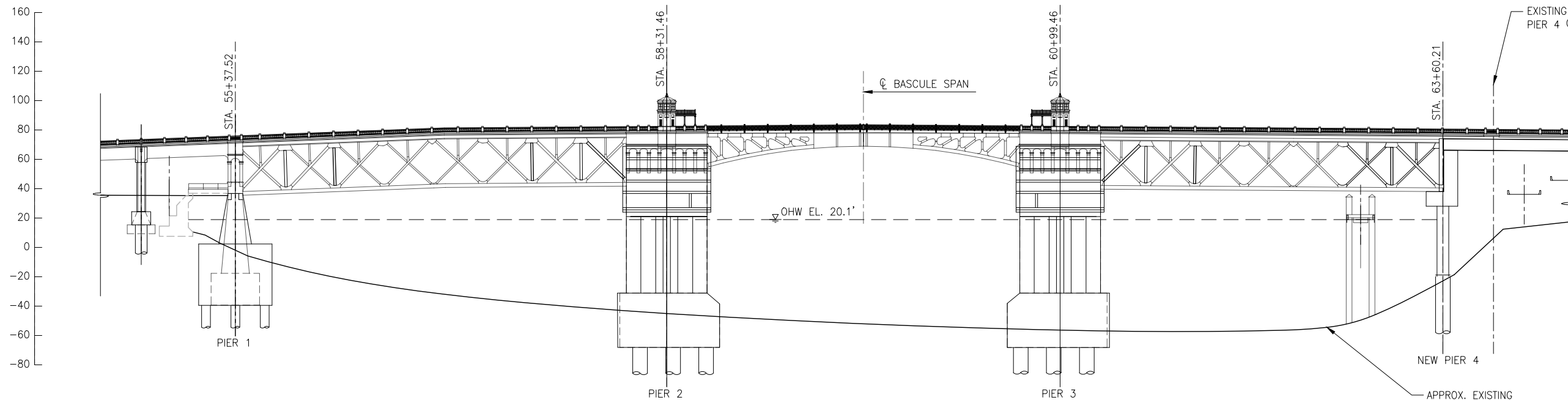
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PLAN

SCALE: 1" = 40'



LEGEND

— EXISTING

— RETROFIT

NOTES

1. BASCULE LEAVES RETROFIT NOT SHOWN FOR CLARITY

ELEVATION

SCALE: 1" = 40'

**CONCEPTUAL PLANS
FEBRUARY 2020**

EARTHQUAKE READY BURNSIDE BRIDGE
ENHANCED RETROFIT OF EXISTING CONDITION
SUBSTRUCTURE RETROFIT LAYOUT
RIVER SPANS

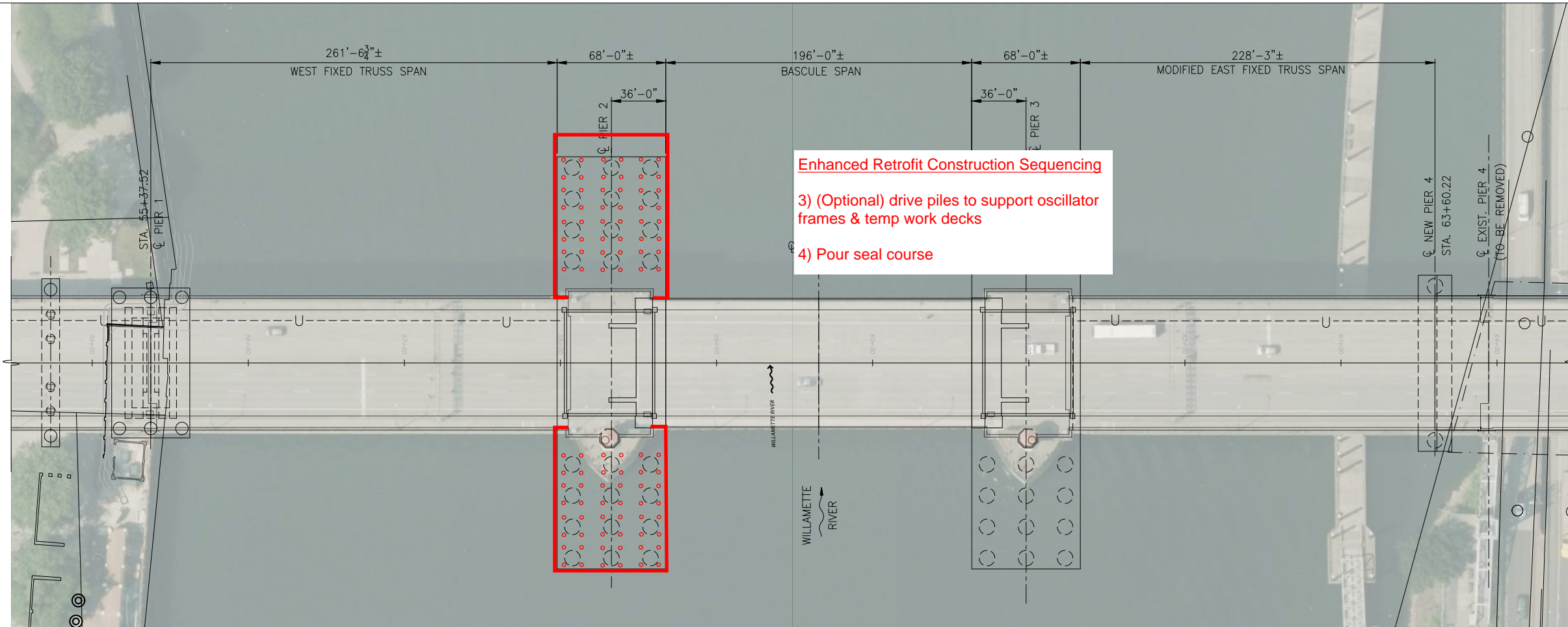
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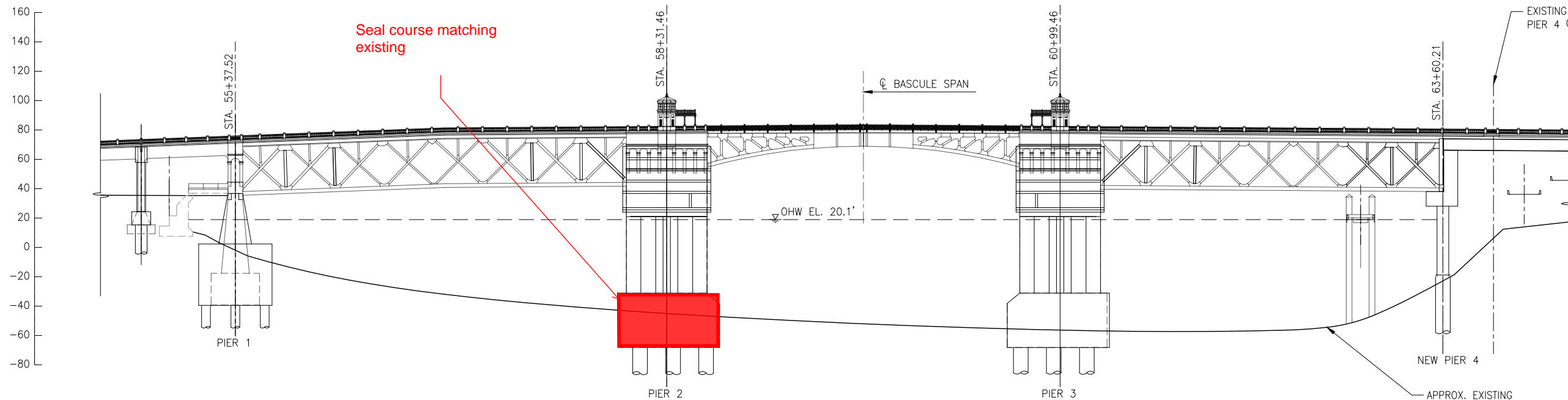
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PLAN

SCALE: 1" = 40'



ELEVATION

SCALE: 1" = 40'

LEGEND

	EXISTING
	RETROFIT

NOTES
1. BASCULE LEAVES RETROFIT NOT SHOWN FOR CLARITY

CONCEPTUAL PLANS
FEBRUARY 2020

EARTHQUAKE READY BURNSIDE BRIDGE
ENHANCED RETROFIT OF EXISTING CONDITION
SUBSTRUCTURE RETROFIT LAYOUT
RIVER SPANS

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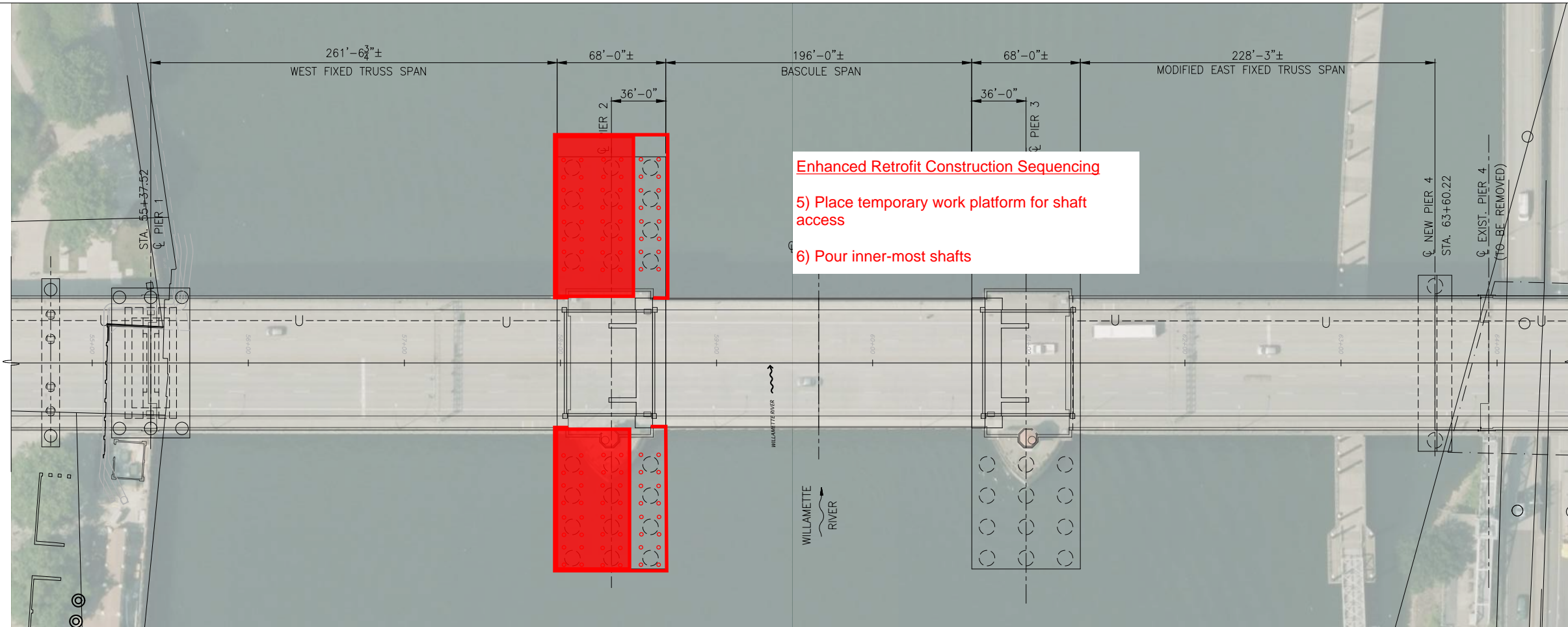
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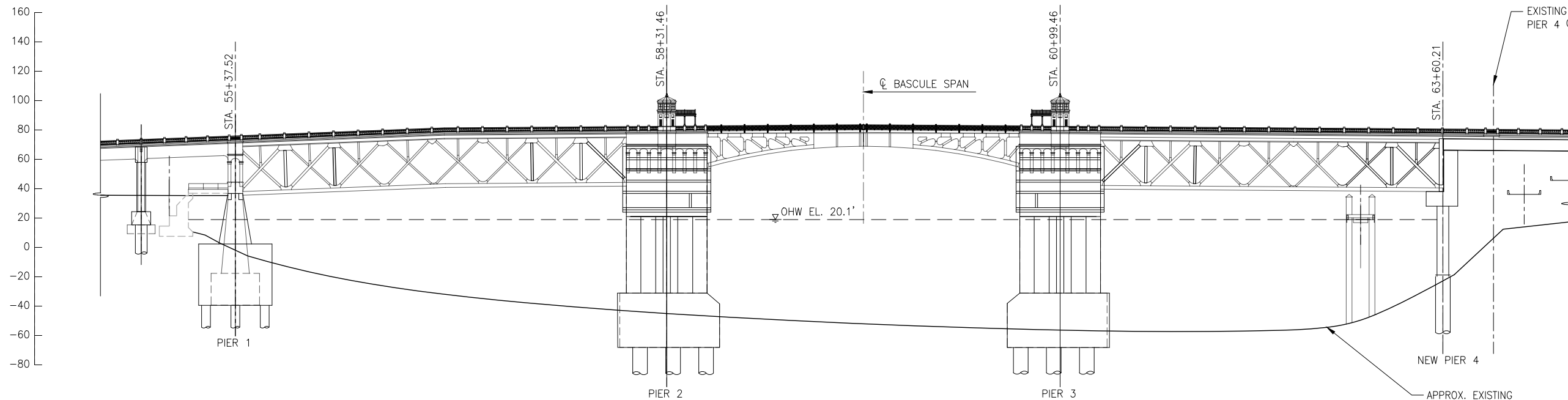
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Sheet No. **D-10**



PLAN

SCALE: 1" = 40'



ELEVATION

SCALE: 1" = 40'

LEGEND

	EXISTING
	RETROFIT

NOTES
1. BASCULE LEAVES RETROFIT NOT SHOWN FOR CLARITY

CONCEPTUAL PLANS
FEBRUARY 2020

EARTHQUAKE READY BURNSIDE BRIDGE
ENHANCED RETROFIT OF EXISTING CONDITION
SUBSTRUCTURE RETROFIT LAYOUT
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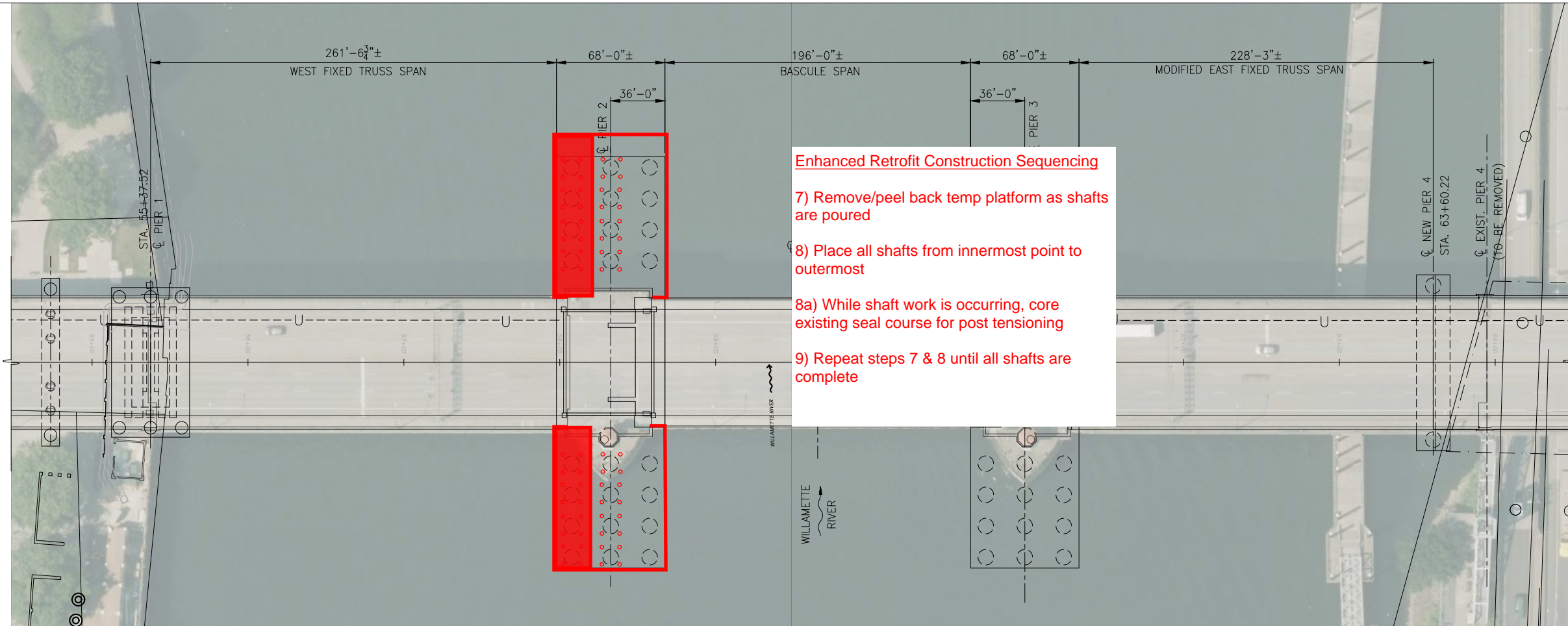
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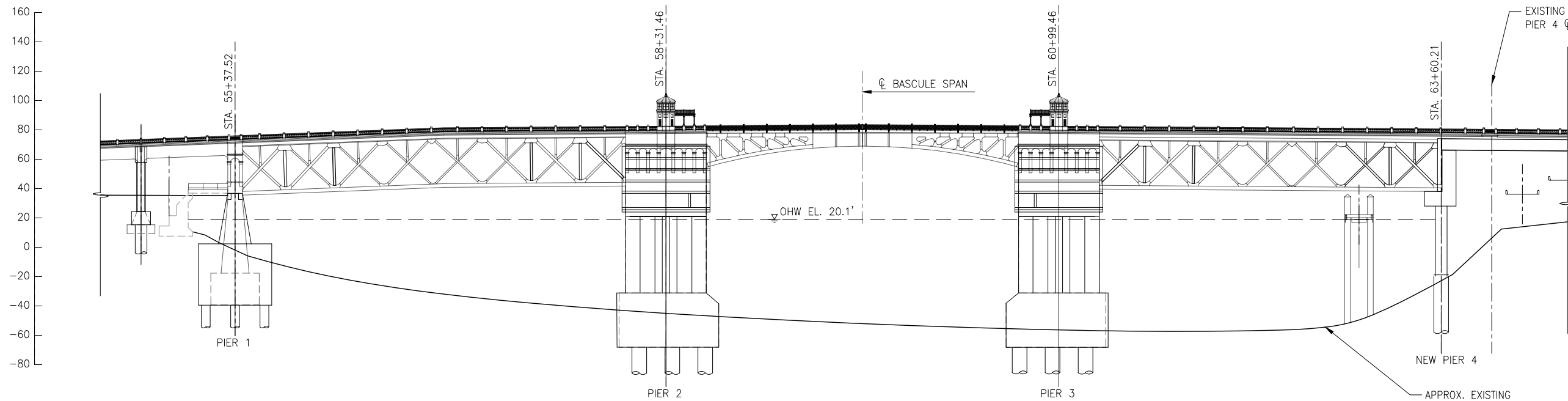


Enhanced Retrofit Construction Sequencing

- 7) Remove/peel back temp platform as shafts are poured
- 8) Place all shafts from innermost point to outermost
- 8a) While shaft work is occurring, core existing seal course for post tensioning
- 9) Repeat steps 7 & 8 until all shafts are complete

PLAN

SCALE: 1" = 40'



LEGEND

— EXISTING

— RETROFIT

NOTES

1. BASCULE LEAVES RETROFIT NOT SHOWN FOR CLARITY

ELEVATION

SCALE: 1" = 40'

CONCEPTUAL PLANS
FEBRUARY 2020

EARTHQUAKE READY BURNSIDE BRIDGE
ENHANCED RETROFIT OF EXISTING CONDITION
SUBSTRUCTURE RETROFIT LAYOUT
RIVER SPANS

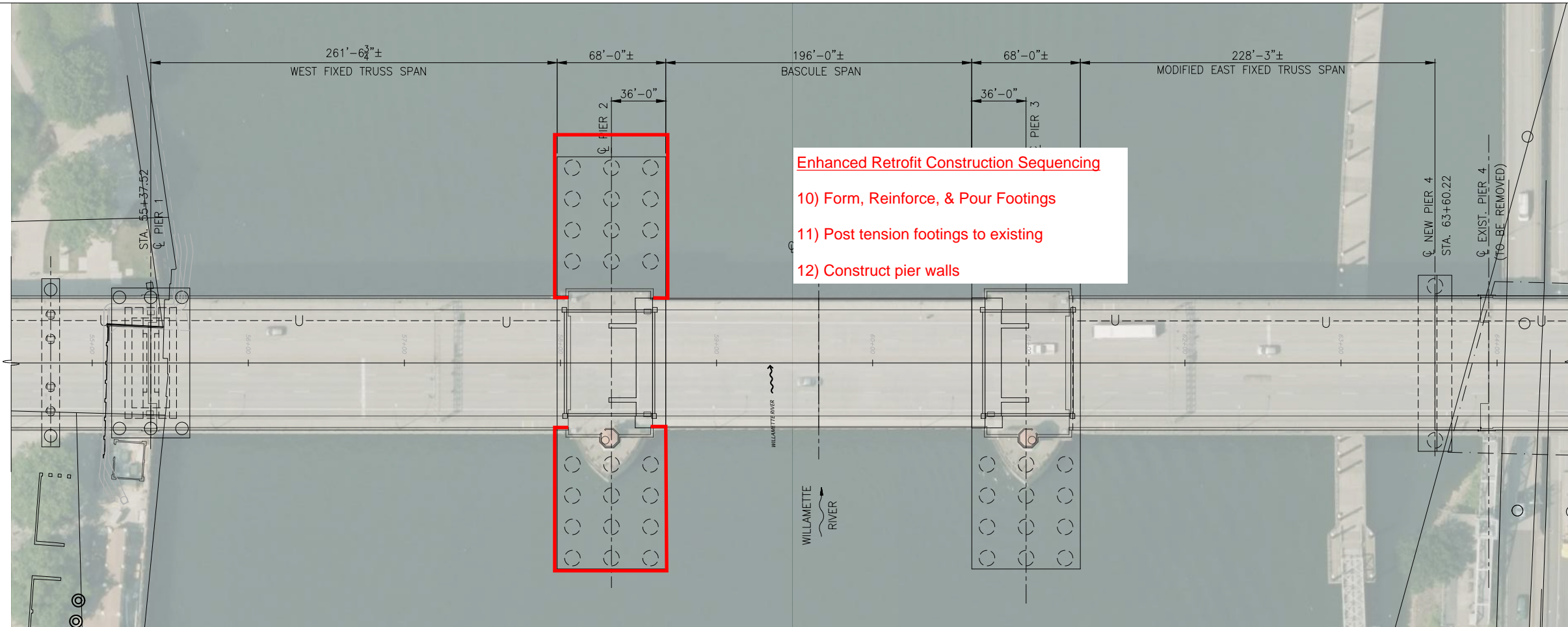
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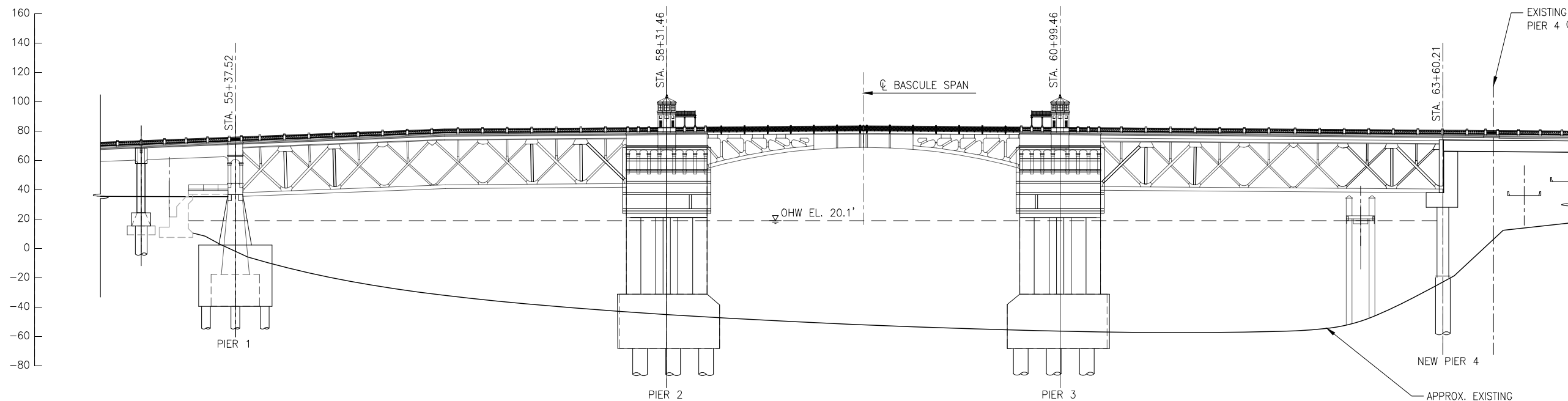
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PLAN

SCALE: 1" = 40'



ELEVATION

SCALE: 1" = 40'

LEGEND

	EXISTING
	RETROFIT

NOTES
1. BASCULE LEAVES RETROFIT NOT SHOWN FOR CLARITY

CONCEPTUAL PLANS
FEBRUARY 2020

EARTHQUAKE READY BURNSIDE BRIDGE
ENHANCED RETROFIT OF EXISTING CONDITION
SUBSTRUCTURE RETROFIT LAYOUT
RIVER SPANS

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TRANSPORTATION DIVISION
1620 S.E. 190th AVE. PORTLAND, ORE. 97233-5999

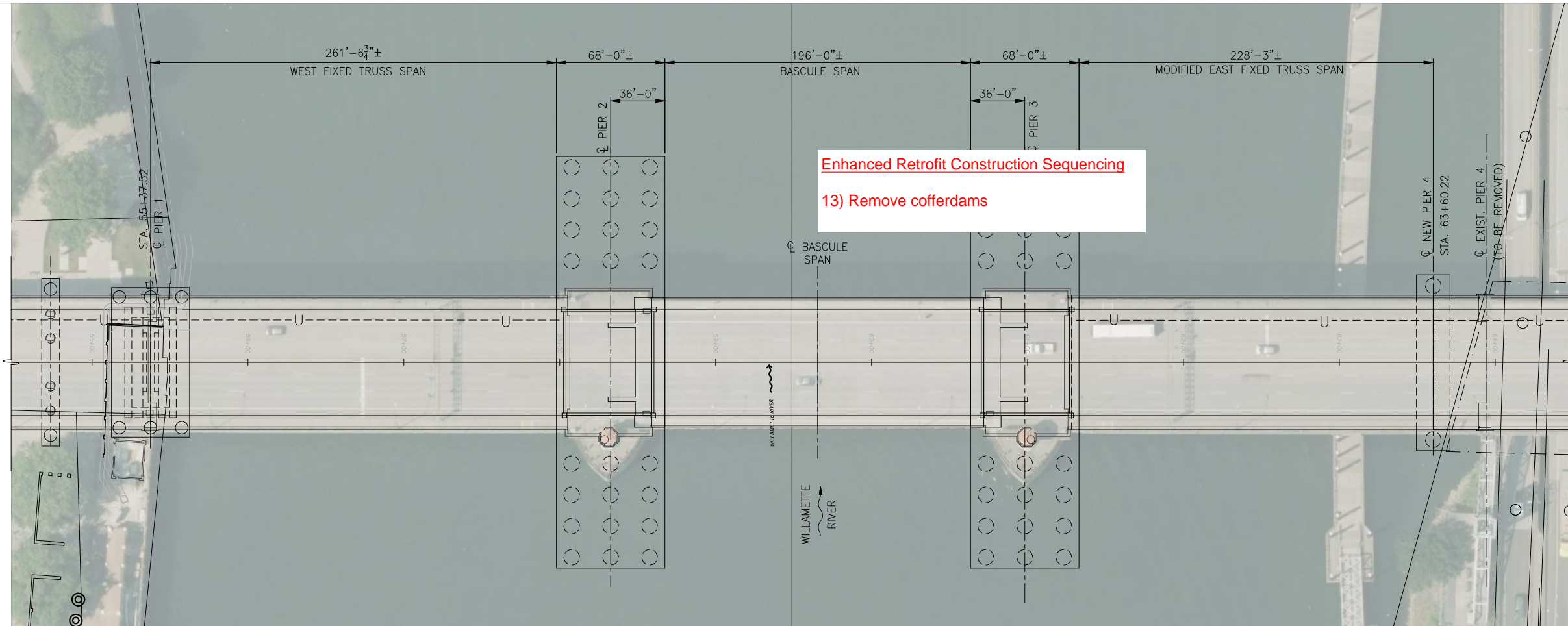
IAN B. CANNON P.E. COUNTY ENGINEER

DESIGNED BY: BJS
DRAFTED BY: CRK
CHECKED BY: YY

REVISIONS

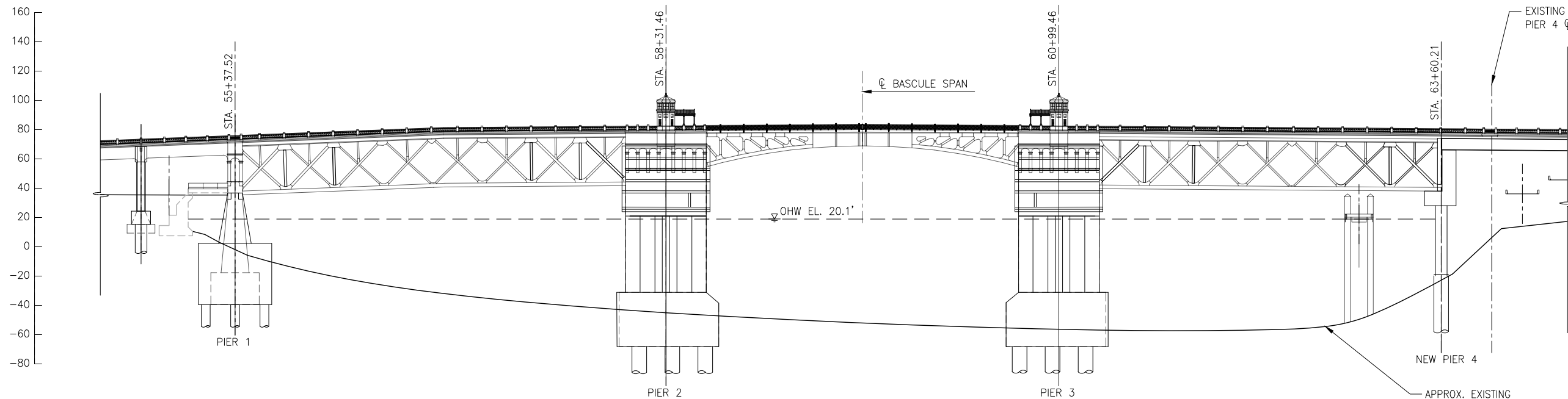
NO.	DATE	DESCRIPTION

Sheet No. **D-13**



PLAN

SCALE: 1" = 40'



ELEVATION

SCALE: 1" = 40'

LEGEND

	EXISTING
	RETROFIT

NOTES
1. BASCULE LEAVES RETROFIT NOT SHOWN FOR CLARITY

CONCEPTUAL PLANS
FEBRUARY 2020

EARTHQUAKE READY BURNSIDE BRIDGE
ENHANCED RETROFIT OF EXISTING CONDITION
SUBSTRUCTURE RETROFIT LAYOUT
RIVER SPANS

MULTNOMAH COUNTY
DEPARTMENT OF COMMUNITY SERVICES
TRANSPORTATION DIVISION
1620 S.E. 190th AVE. PORTLAND, ORE. 97233-5999

IAN B. CANNON P.E. COUNTY ENGINEER

DESIGNED BY: BJS
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REVISIONS

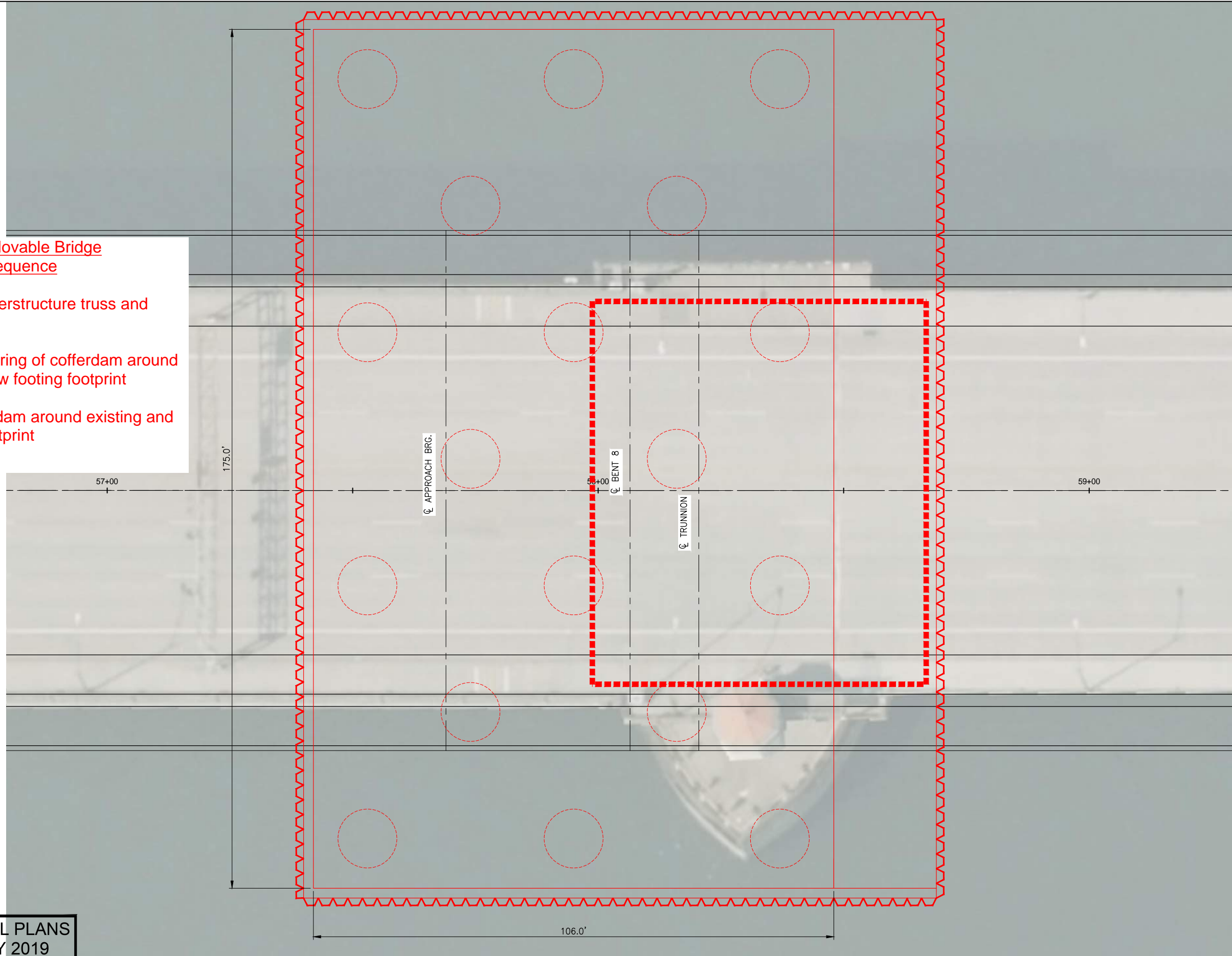
NO.	DATE	DESCRIPTION

Sheet No. **D-14**




**Replacement Movable Bridge
Construction Sequence**

- 1) Remove superstructure truss and bascule spans
- 2) Install upper ring of cofferdam around existing and new footing footprint
- 3) Install cofferdam around existing and new footing footprint



**CONCEPTUAL PLANS
FEBRUARY 2019**

*Earthquake Ready Burnside Bridge
Replacement Movable Bridge*
MULTNOMAH COUNTY
DATE: *Date* PROJECT NO.: *Proj No*

MULTNOMAH COUNTY
DEPARTMENT OF COMMUNITY SERVICES
TRANSPORTATION DIVISION
1620 S.E. 190th AVE. PORTLAND, ORE. 97233-5989

IAN B. CANNON P.E. COUNTY ENGINEER

DESIGNED BY: _____
DRAFTED BY: _____
CHECKED BY: _____

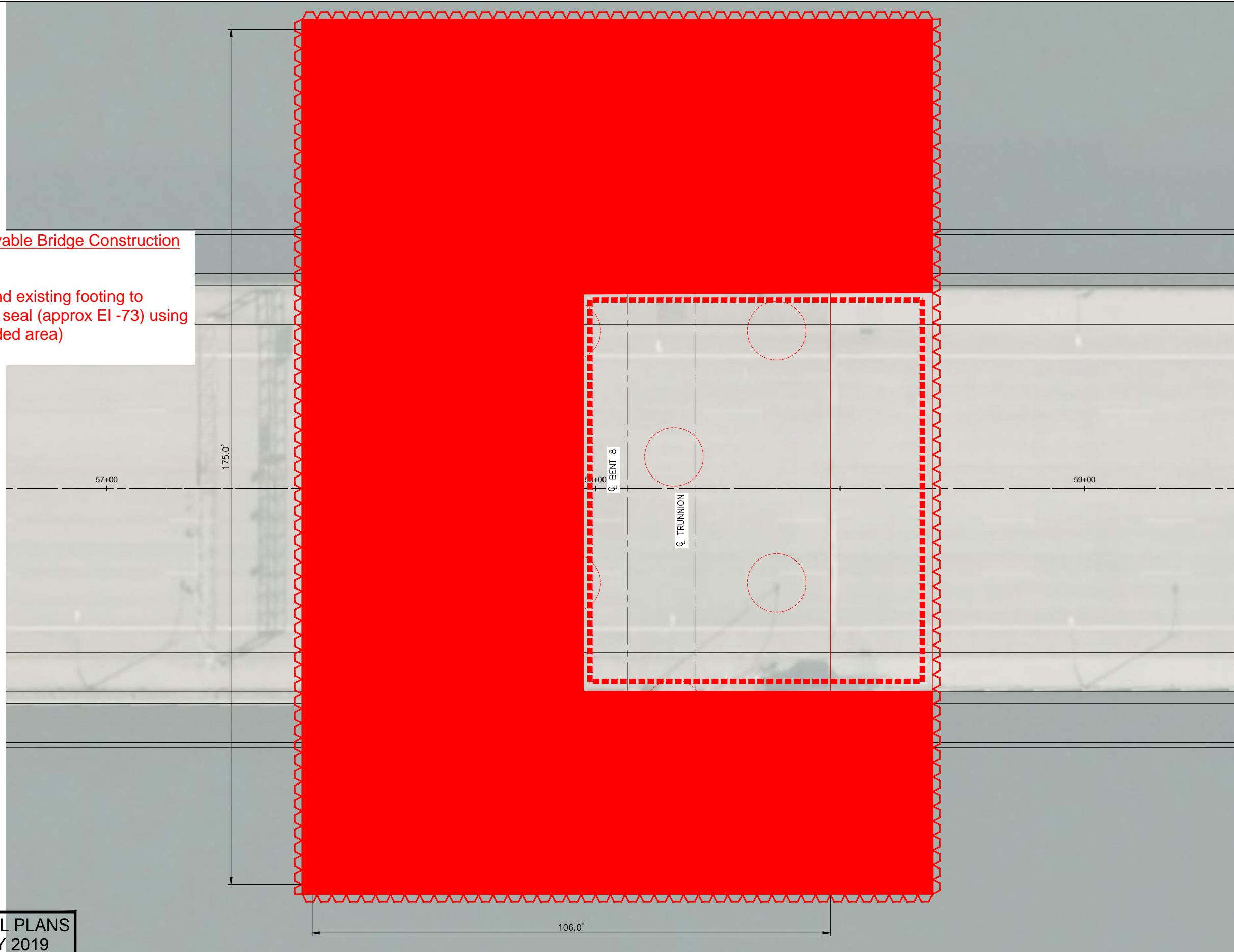
REVISIONS	
NO	DATE

Sheet No.
D-15



Replacement Movable Bridge Construction Sequence

4) Excavate around existing footing to bottom of existing seal (approx EI -73) using clam bucket (shaded area)



CONCEPTUAL PLANS
FEBRUARY 2019

Earthquake Ready Burnside Bridge
 Replacement Movable Bridge
 MULTNOMAH COUNTY
 DATE: *Date* PROJECT NO.: *Proj No*

MULTNOMAH COUNTY
 DEPARTMENT OF COMMUNITY SERVICES
 TRANSPORTATION DIVISION
 1620 S.E. 190th AVE. PORTLAND, ORE. 97233-5989

IAN B. CANNON P.E. COUNTY ENGINEER

REVISIONS	
NO. DATE:	
DESIGNED BY:	
DRAFTED BY:	
CHECKED BY:	

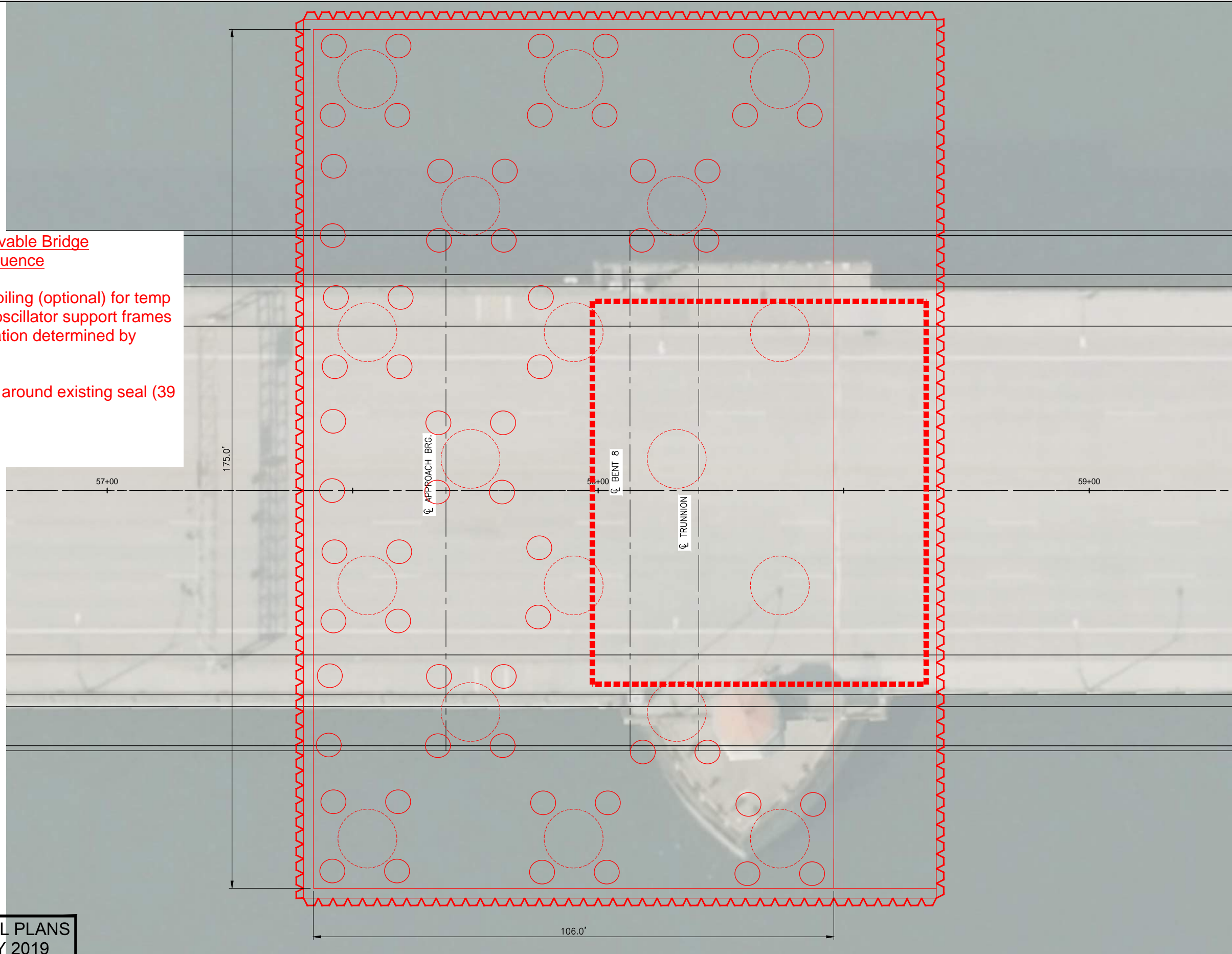
Sheet No.
D-16



**Replacement Movable Bridge
Construction Sequence**

5) Drive support piling (optional) for temp shaft platform & oscillator support frames (number and location determined by contractor)

6) Pour new seal around existing seal (39 feet thick)



**CONCEPTUAL PLANS
FEBRUARY 2019**

Earthquake Ready Burnside Bridge
Replacement Movable Bridge

MULTNOMAH COUNTY

DATE: *Date* PROJECT NO.: *Proj No*

MULTNOMAH COUNTY

DEPARTMENT OF COMMUNITY SERVICES
TRANSPORTATION DIVISION
1620 S.E. 190th AVE. PORTLAND, ORE. 97233-5989



IAN B. CANNON P.E.

COUNTY ENGINEER

DESIGNED BY:

DRAFTED BY:

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REVISIONS

NO. DATE:

Sheet No.

D-17

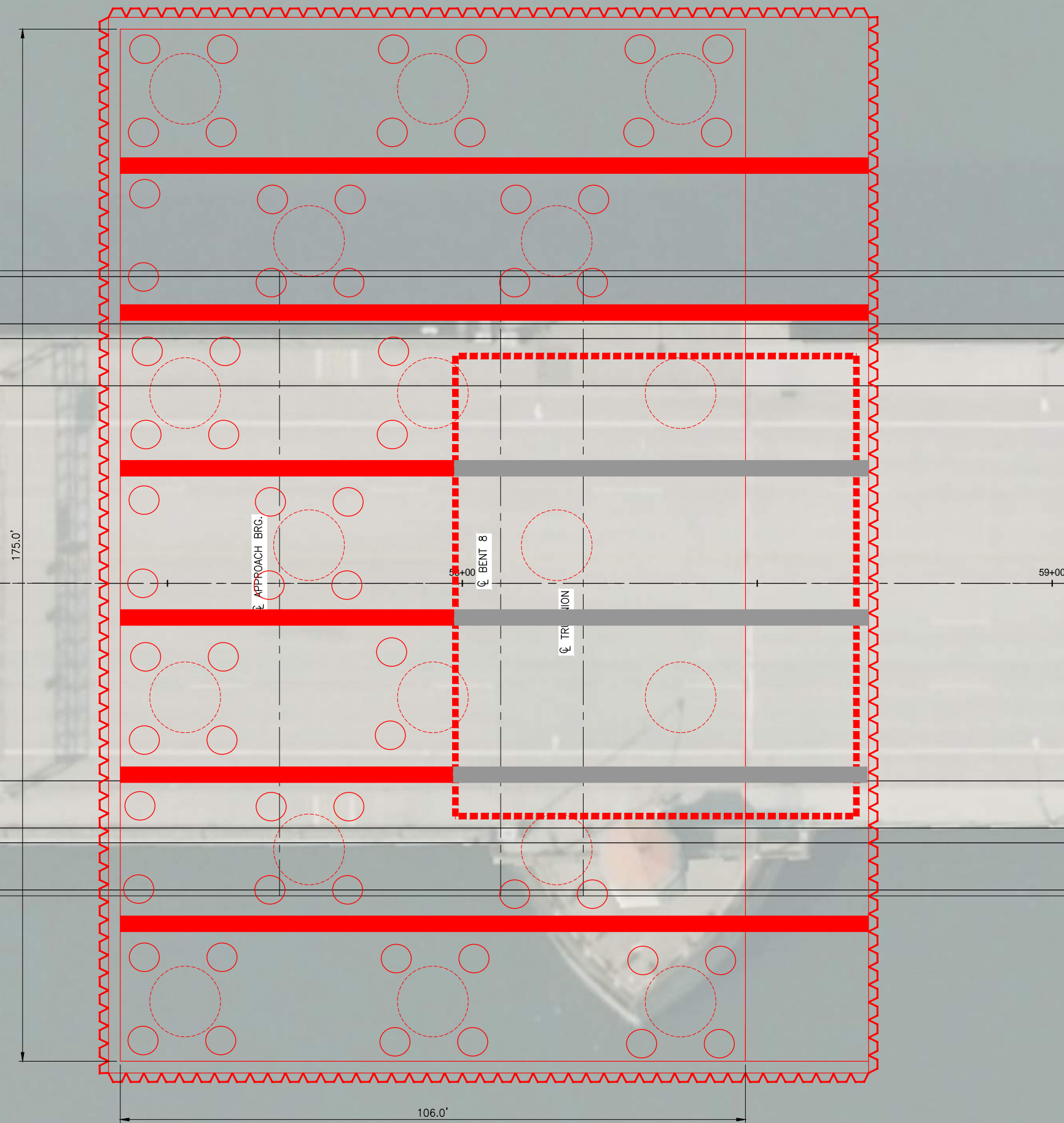


**Replacement Movable Bridge
Construction Sequence**

7) Install progressively lower cofferdam rings and bracing to existing stem wall as applicable, and dewater cofferdam


8) Demolish existing pier and footing

8a) As existing pier is demolished, bracing will need to be replaced by long braces that extend across cofferdam



**CONCEPTUAL PLANS
FEBRUARY 2019**

*Earthquake Ready Burnside Bridge
Replacement Movable Bridge*
MULTNOMAH COUNTY
DATE: *Date* PROJECT NO.: *Proj No*

MULTNOMAH COUNTY
DEPARTMENT OF COMMUNITY SERVICES
TRANSPORTATION DIVISION
1620 S.E. 190th AVE. PORTLAND, ORE. 97233-5989

IAN B. CANNON P.E. COUNTY ENGINEER

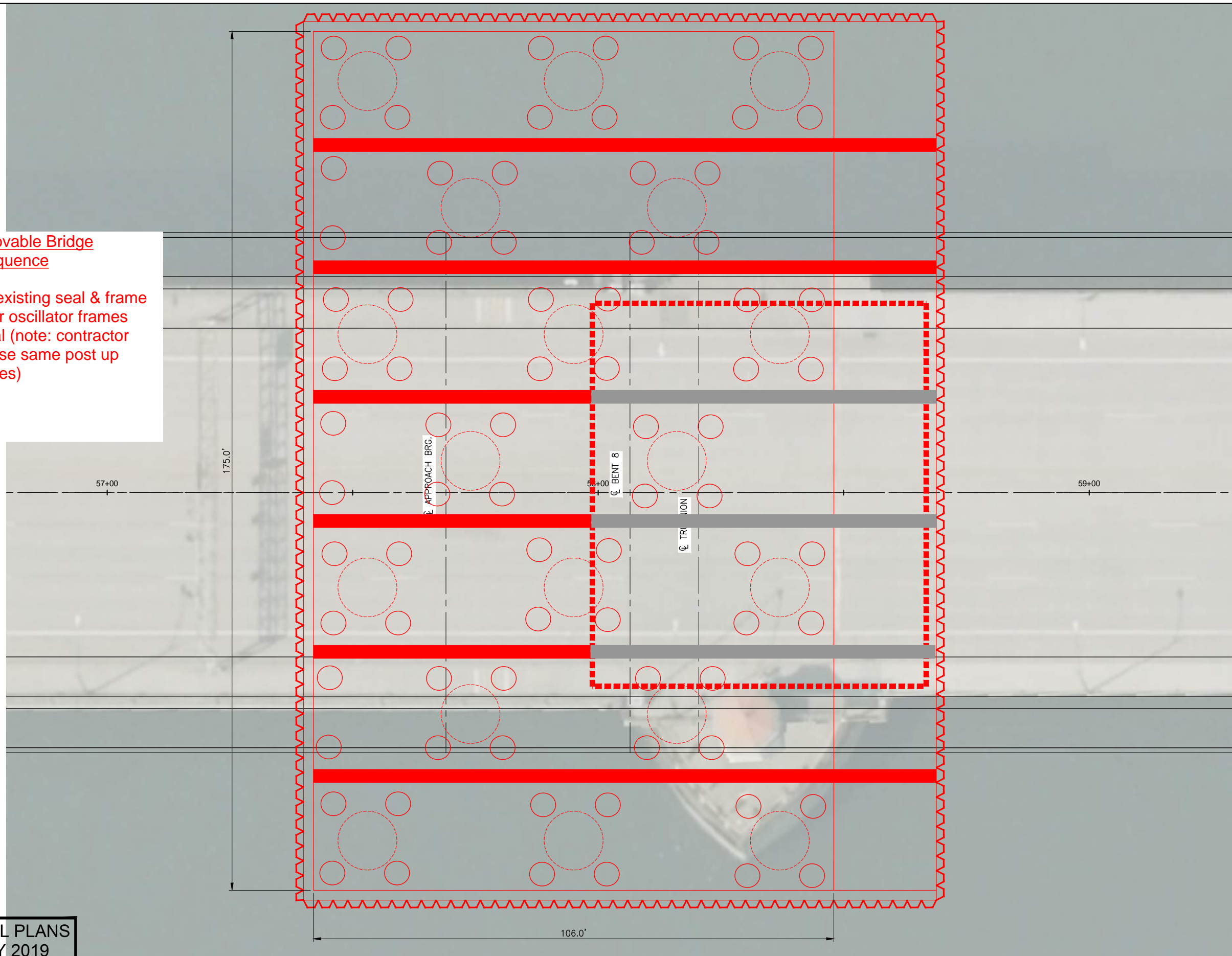
NO	DATE	DESIGNED BY:	DRAFTED BY:	CHECKED BY:

Sheet No.
D-18



**Replacement Movable Bridge
Construction Sequence**

9) Post up from existing seal & frame in/brace posts for oscillator frames over existing seal (note: contractor may choose to use same post up method for all piles)



**CONCEPTUAL PLANS
FEBRUARY 2019**

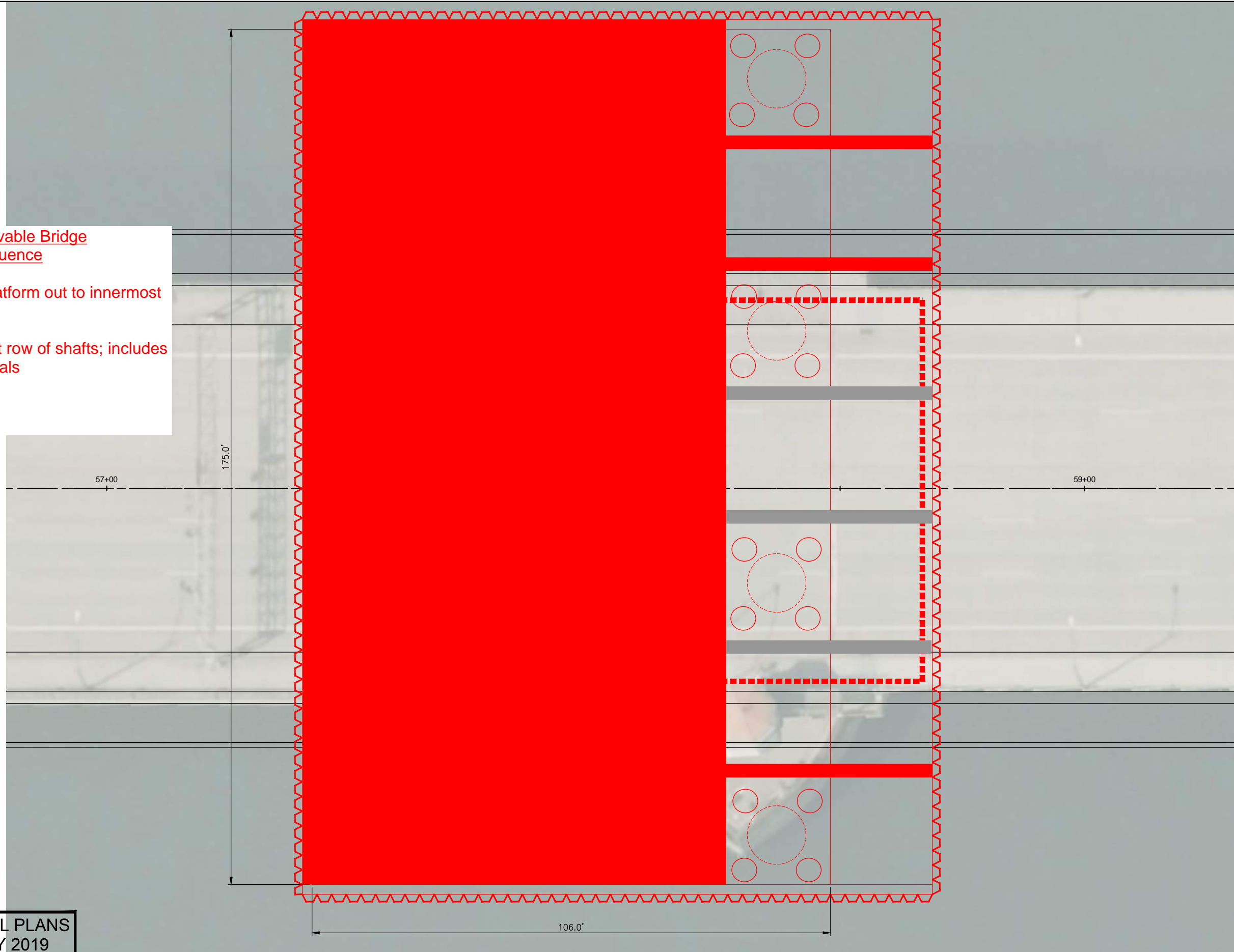
Earthquake Ready Burnside Bridge	
Replacement Movable Bridge	
MULTNOMAH COUNTY	
DATE: _____	Date
PROJECT NO.: Proj No	
MULTNOMAH COUNTY DEPARTMENT OF COMMUNITY SERVICES TRANSPORTATION DIVISION 1620 S.E. 190th AVE. PORTLAND, ORE. 97233-5989	
IAN B. CANNON P.E. COUNTY ENGINEER	
DESIGNED BY:	
DRAFTED BY:	
CHECKED BY:	
NO. DATE:	
REVISIONS	
Sheet No. D-19	



Replacement Movable Bridge
Construction Sequence

10) Build work platform out to innermost shafts

11) Construct first row of shafts; includes coring through seals



CONCEPTUAL PLANS
FEBRUARY 2019

Earthquake Ready Burnside Bridge

Replacement Movable Bridge

MULTNOMAH COUNTY

DATE: _____ Date PROJECT NO.: _____ Proj No

MULTNOMAH COUNTY

DEPARTMENT OF COMMUNITY SERVICES
TRANSPORTATION DIVISION
1620 S.E. 190th AVE. PORTLAND, ORE. 97233-5989



IAN B. CANNON P.E.

COUNTY ENGINEER

DESIGNED BY:

DRAFTED BY:

CHECKED BY:

REVISIONS

NO. DATE:

Sheet No.

D-20

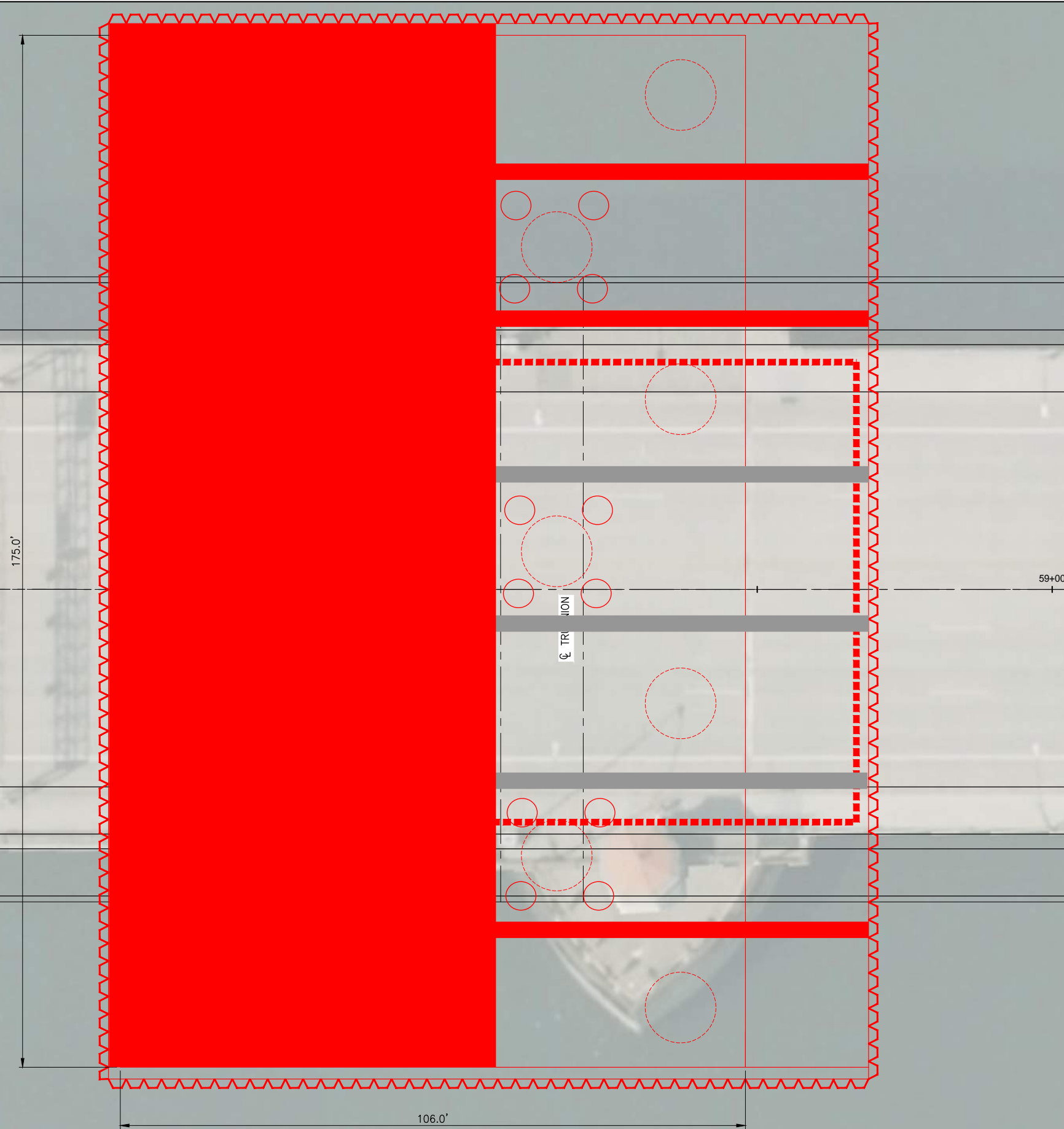


Replacement Movable Bridge
Construction Sequence


12) Peel back work deck and drill next row
of shafts

13) Remove innermost oscillator frame
piles

14) Repeat steps 12 & 13 until all pier
shafts are complete



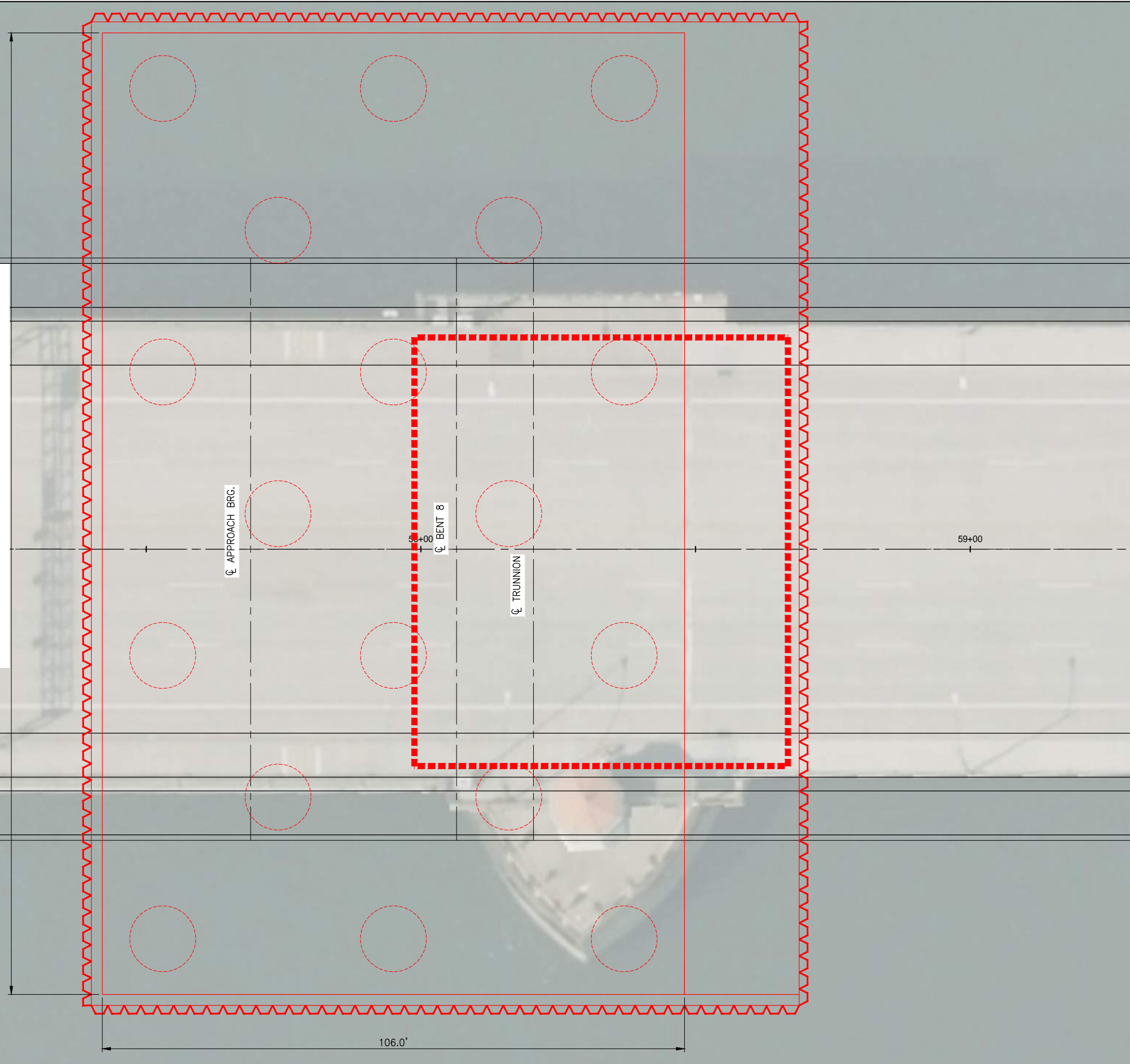
CONCEPTUAL PLANS
FEBRUARY 2019

Earthquake Ready Burnside Bridge	
Replacement Movable Bridge	
MULTNOMAH COUNTY	
DATE: _____	Date
PROJECT NO.: Proj No	
 MULTNOMAH COUNTY DEPARTMENT OF COMMUNITY SERVICES TRANSPORTATION DIVISION 1620 S.E. 190th AVE. PORTLAND, ORE. 97233-5989	
DESIGNED BY: _____	COUNTY ENGINEER
DRAFTED BY: _____	IAN B. CANNON P.E.
CHECKED BY: _____	
NO. DATE:	
Sheet No.	D-21



Replacement Movable Bridge Construction Sequence

- 15) Form, reinforce, & pour shaft cap (footing). Note that cofferdam bracing will be encapsulated in pour. Will be cut out later after cofferdam is flooded
- 16) Form, reinforce, & pour pier walls. Note that cofferdam bracing will be encapsulated in pour. Will be cut out later after cofferdam is flooded
- 17) Flood cofferdam and remove/cut off bracing and patch
- 18) Remove cofferdam



CONCEPTUAL PLANS
FEBRUARY 2019

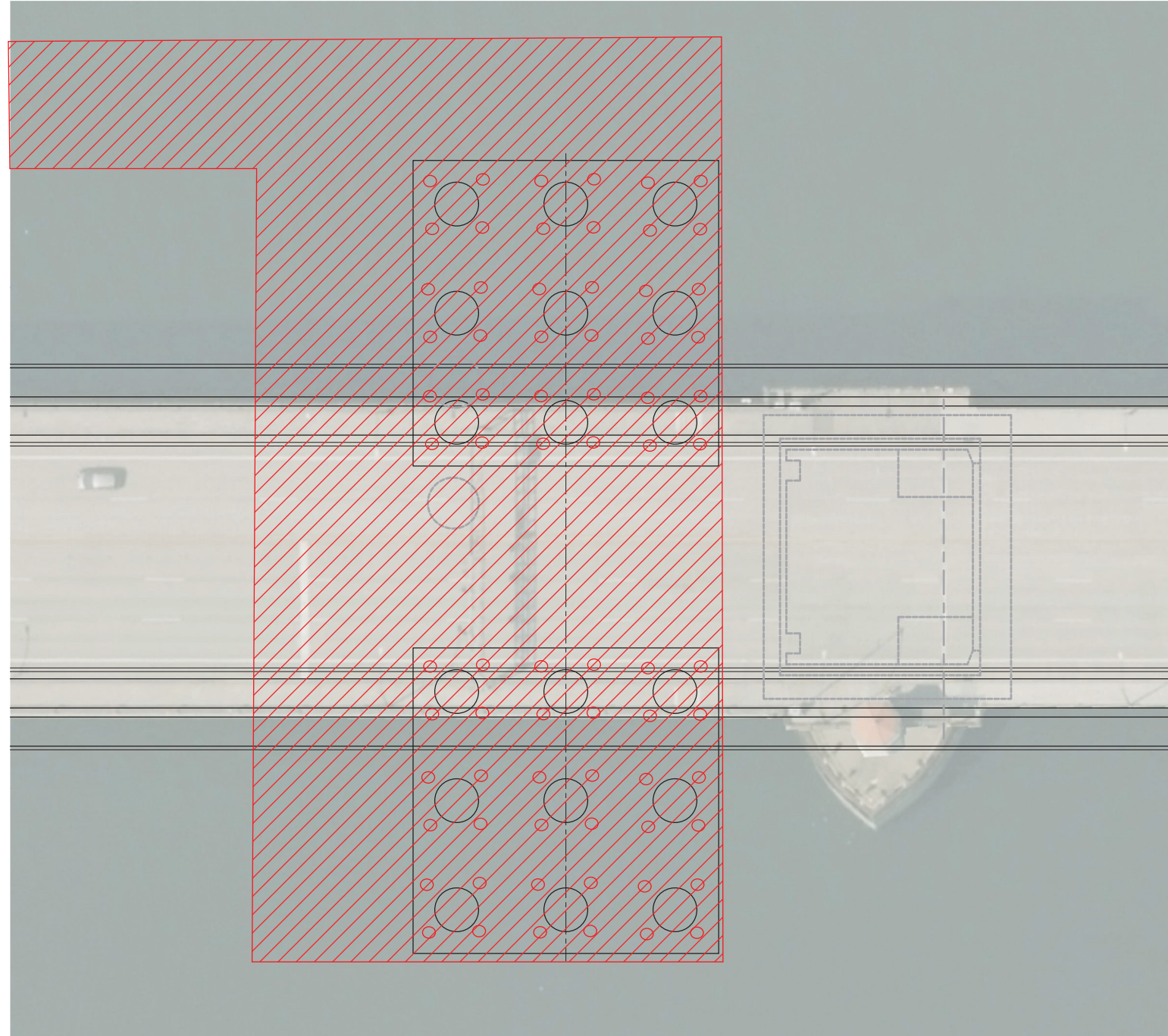
Earthquake Ready Burnside Bridge Replacement Movable Bridge	
MULTNOMAH COUNTY PROJECT NO.: Proj No	
DATE: Date	
MULTNOMAH COUNTY DEPARTMENT OF COMMUNITY SERVICES TRANSPORTATION DIVISION 1620 S.E. 190th AVE. PORTLAND, ORE. 97233-5989	
IAN B. CANNON P.E. COUNTY ENGINEER	
DESIGNED BY: DRAFTED BY: CHECKED BY:	REVISIONS NO. DATE:
Sheet No. D-22	

Appendix E. Drilled Shaft Installation Sequence In Open Water

Open Water Shaft Construction Sequence

1) Work bridge would be built (west side shown) alongside pier locations and extending over pier locations to access shafts (hatched area).

During pile installation for work bridge, additional oscillator frame piles around each shaft would be installed (assuming oscillated shafts)



BENT 5 PLAN - MOVEABLE LIFT - BASCULE DELTA

SCALE: 1" = 10'-0"

CONCEPTUAL PLANS
SEPTEMBER 2020

Earthquake Ready Burnside Bridge

Sheet Title

MULTNOMAH COUNTY

DATE: January 2021 PROJECT NO.: ---

MULTNOMAH COUNTY
DEPARTMENT OF COMMUNITY SERVICES
TRANSPORTATION DIVISION
1620 S.E. 190th AVE. PORTLAND, ORE. 97233-5999



IAN B. CANNON P.E.

COUNTY ENGINEER

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CHECKED BY: XXX

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NO.	DATE:

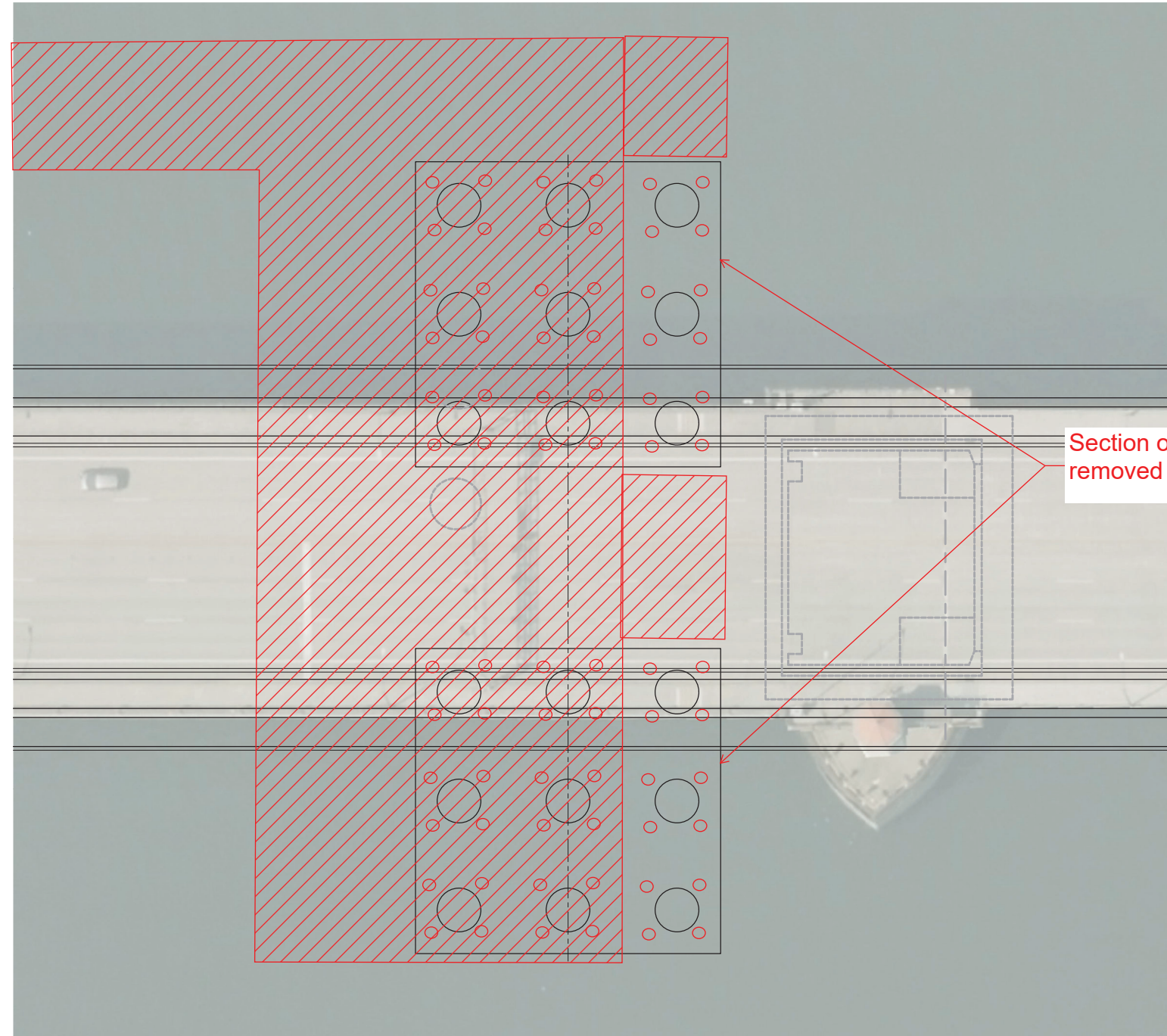
Sheet No.

7

Open Water Shaft Construction Sequence

2) As each shaft is drilled, the work bridge will be "peeled back" to expose the shaft location. Start closest to the navigation channel and work back to the "main" work bridge

3) Install casings and shafts one shaft at a time



Section of work bridge removed to access shafts

BENT 5 PLAN - MOVEABLE LIFT - BASCULE DELTA

SCALE: 1" = 10'-0"

CONCEPTUAL PLANS
SEPTEMBER 2020

Earthquake Ready Burnside Bridge

Sheet Title

MULTNOMAH COUNTY

DATE: January 2022 PROJECT NO.: ---

MULTNOMAH COUNTY
DEPARTMENT OF COMMUNITY SERVICES
TRANSPORTATION DIVISION
1620 S.E. 190th AVE. PORTLAND, ORE. 97233-5999



IAN B. CANNON P.E.
COUNTY ENGINEER

DESIGNED BY: XXX
DRAFTED BY: XXX
CHECKED BY: XXX

REVISIONS

NO	DATE

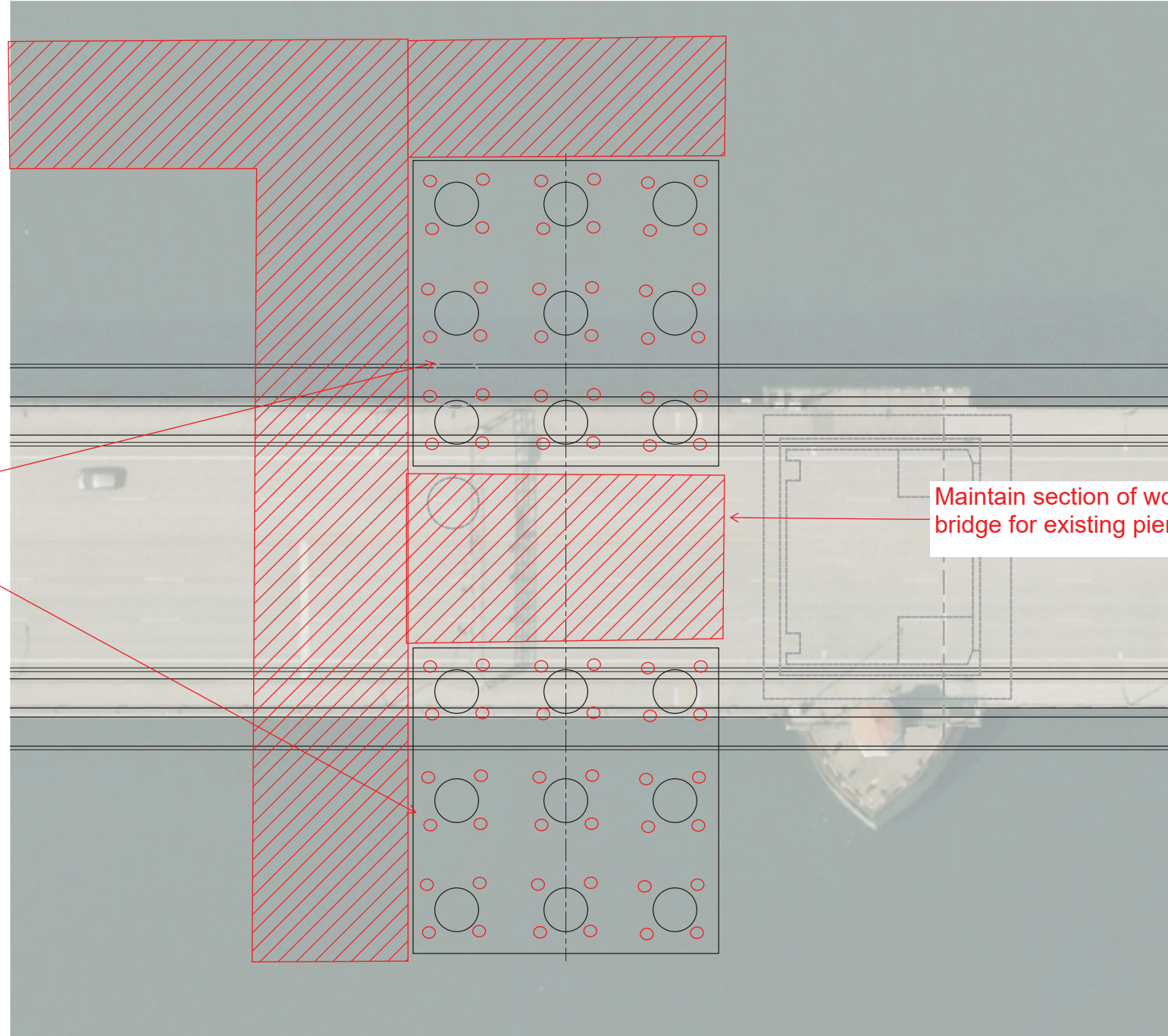
Sheet No.

Open Water Shaft Construction Sequence

4) Repeat steps 2 & 3 until shafts are complete

Section of work bridge removed to access shafts

Maintain section of work bridge for existing pier demo



BENT 5 PLAN - MOVEABLE LIFT - BASCULE DELTA

SCALE: 1" = 10'-0"

CONCEPTUAL PLANS
SEPTEMBER 2020



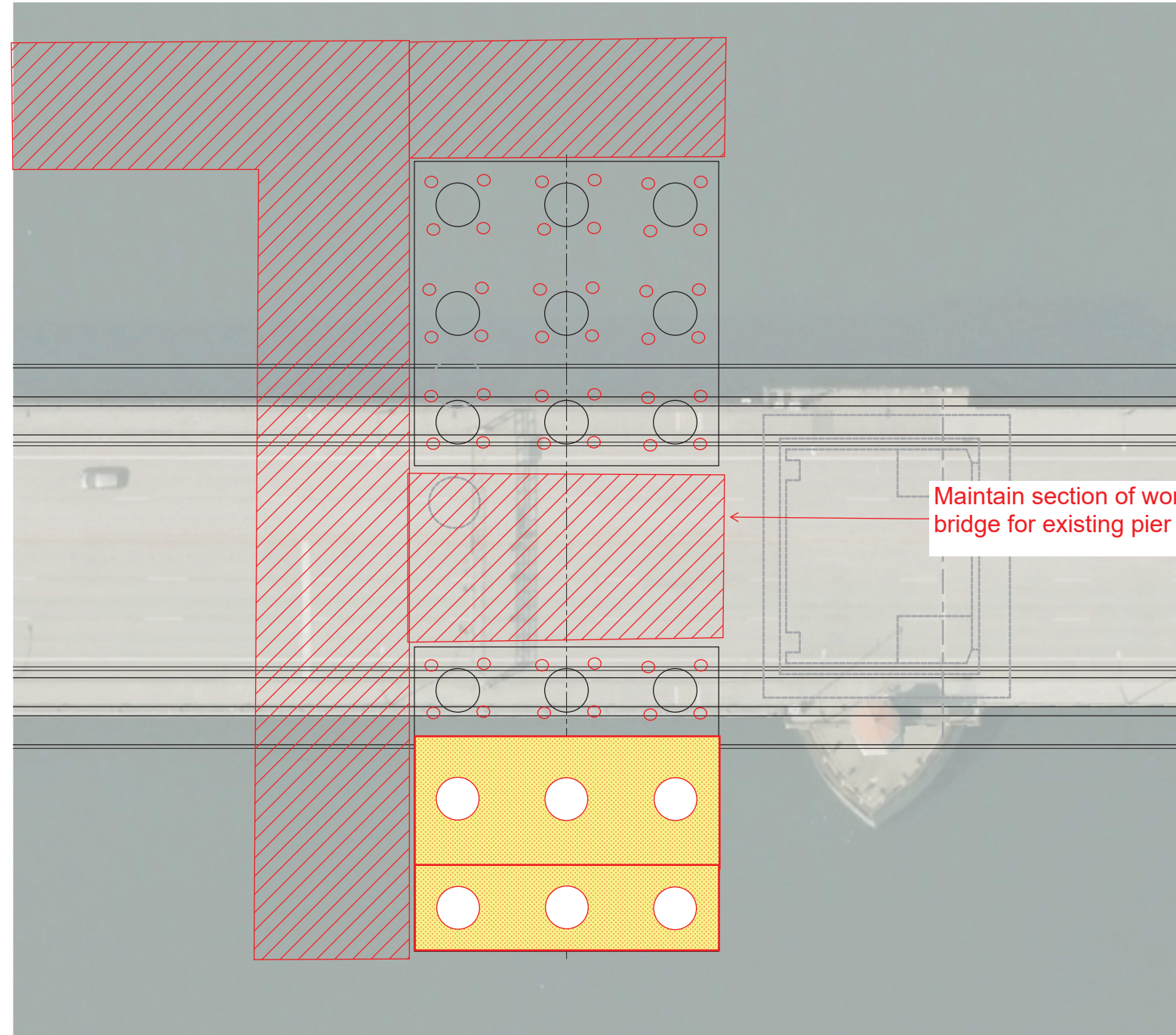
DESIGNED BY: XXX
DRAFTED BY: XXX
CHECKED BY: XXX

REVISIONS

NO	DATE	DESCRIPTION

Open Water Shaft Construction Sequence

- 5) Cut down oscillator pile supports and use as falsework support for perched footing (or weld/bolt on falsework tabs to use as perched footing supports)
- 6) Install sections of precast slabs with wall sections over shafts
- 7) Repeat step 6 until all precast slabs are in place



BENT 5 PLAN - MOVEABLE LIFT - BASCULE DELTA
SCALE: 1" = 10'-0"

CONCEPTUAL PLANS
SEPTEMBER 2020

Earthquake Ready Burnside Bridge

Sheet Title

MULTNOMAH COUNTY

DATE: January 2022 PROJECT NO.: ---

MULTNOMAH COUNTY
DEPARTMENT OF COMMUNITY SERVICES
TRANSPORTATION DIVISION
1620 S.E. 190th AVE. PORTLAND, ORE. 97233-5999



IAN B. CANNON P.E. COUNTY ENGINEER

DESIGNED BY: XXX
DRAFTED BY: XXX
CHECKED BY: XXX

NO	DATE	REVISIONS

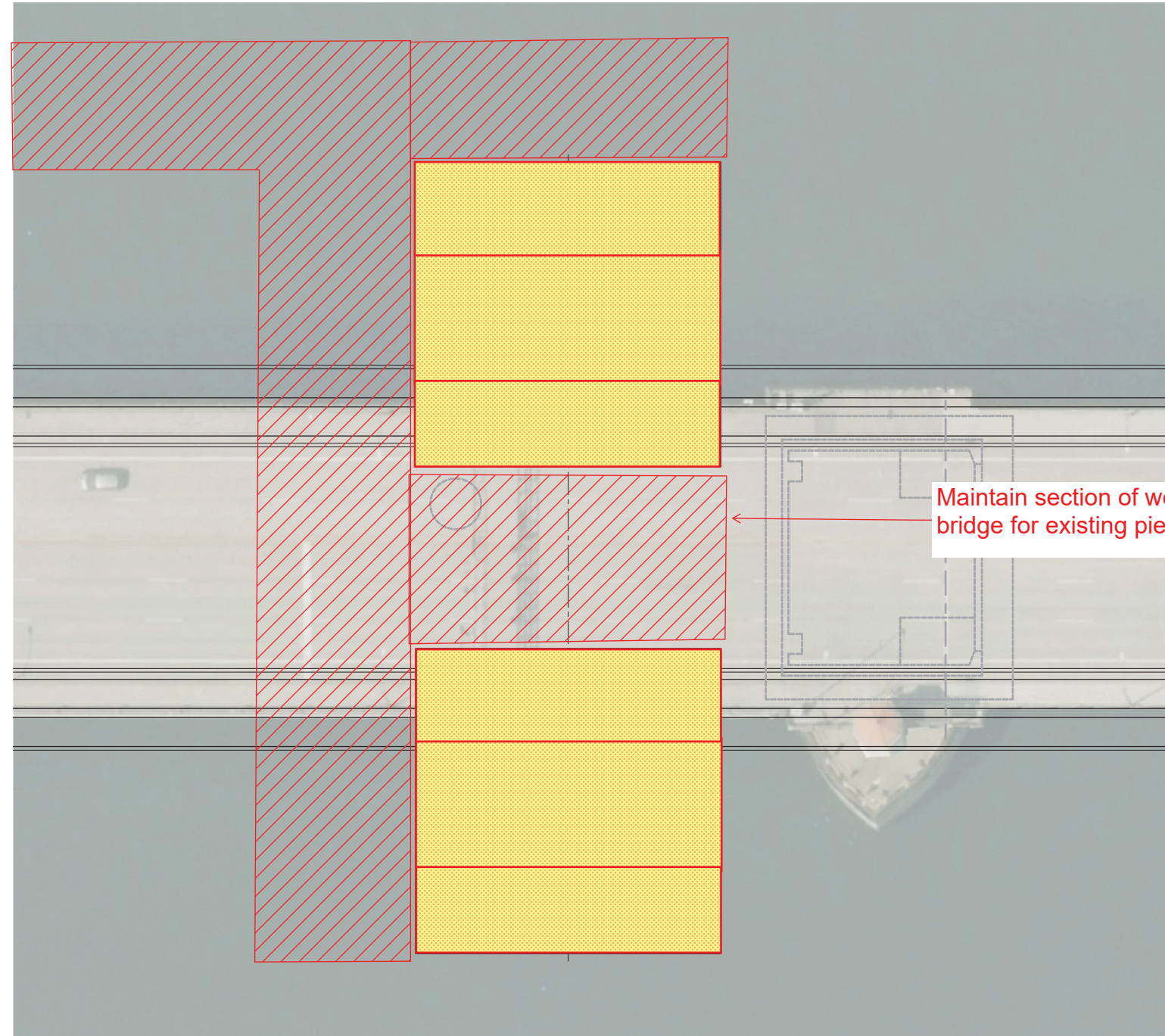
Sheet No. 7

Open Water Shaft Construction Sequence

8) After all precast sections are in place, connect slabs together using interlocks, tension rods, and/or post tensioning

9) Grout annulus between shaft casings and precast slabs

10) Dewater inside footing areas and begin pier footing construction



BENT 5 PLAN - MOVEABLE LIFT - BASCULE DELTA

SCALE: 1" = 10'-0"

CONCEPTUAL PLANS
SEPTEMBER 2020

Earthquake Ready Burnside Bridge

Sheet Title

MULTNOMAH COUNTY

DATE: January 2021 PROJECT NO.: ---

MULTNOMAH COUNTY
DEPARTMENT OF COMMUNITY SERVICES
TRANSPORTATION DIVISION
1620 S.E. 190th AVE. PORTLAND, ORE. 97233-5999



IAN B. CANNON P.E.
COUNTY ENGINEER

DESIGNED BY: XXX
DRAFTED BY: XXX
CHECKED BY: XXX

REVISIONS

NO	DATE	DESCRIPTION

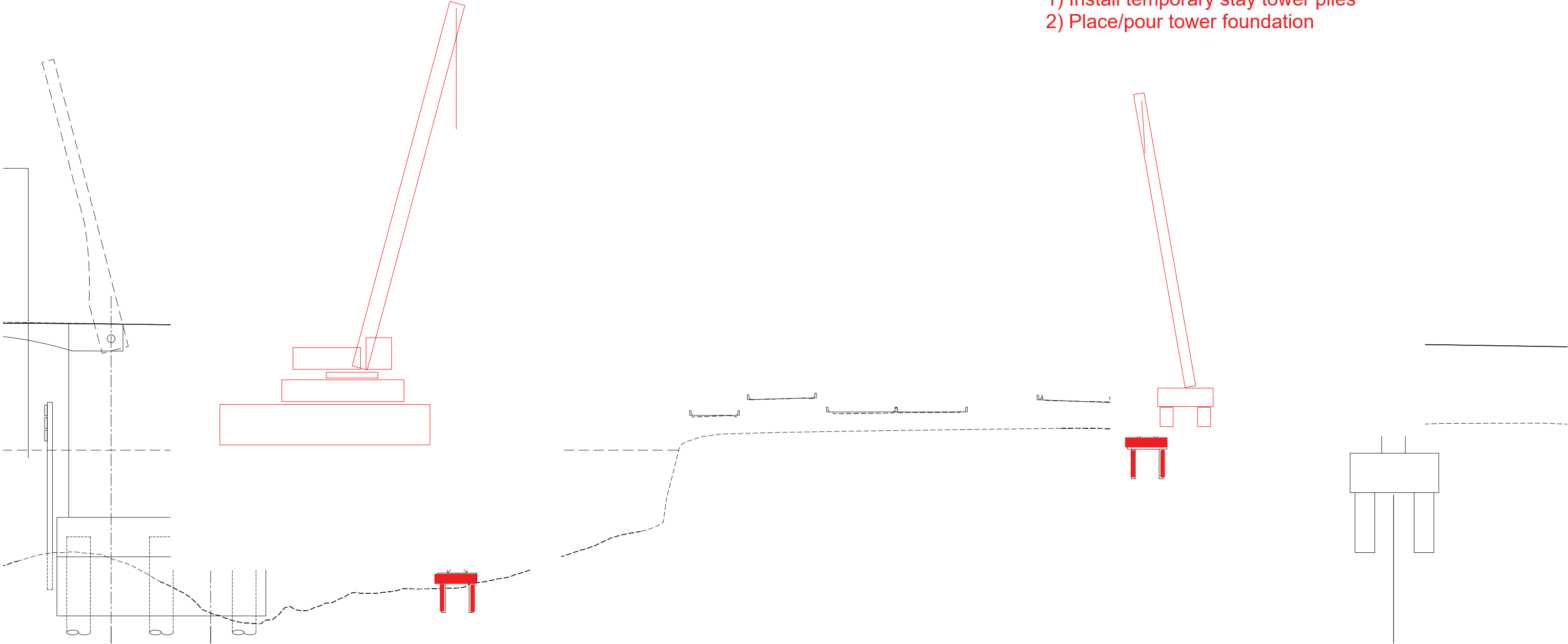
Sheet No.

7

Appendix F. Long-span Approach Erection

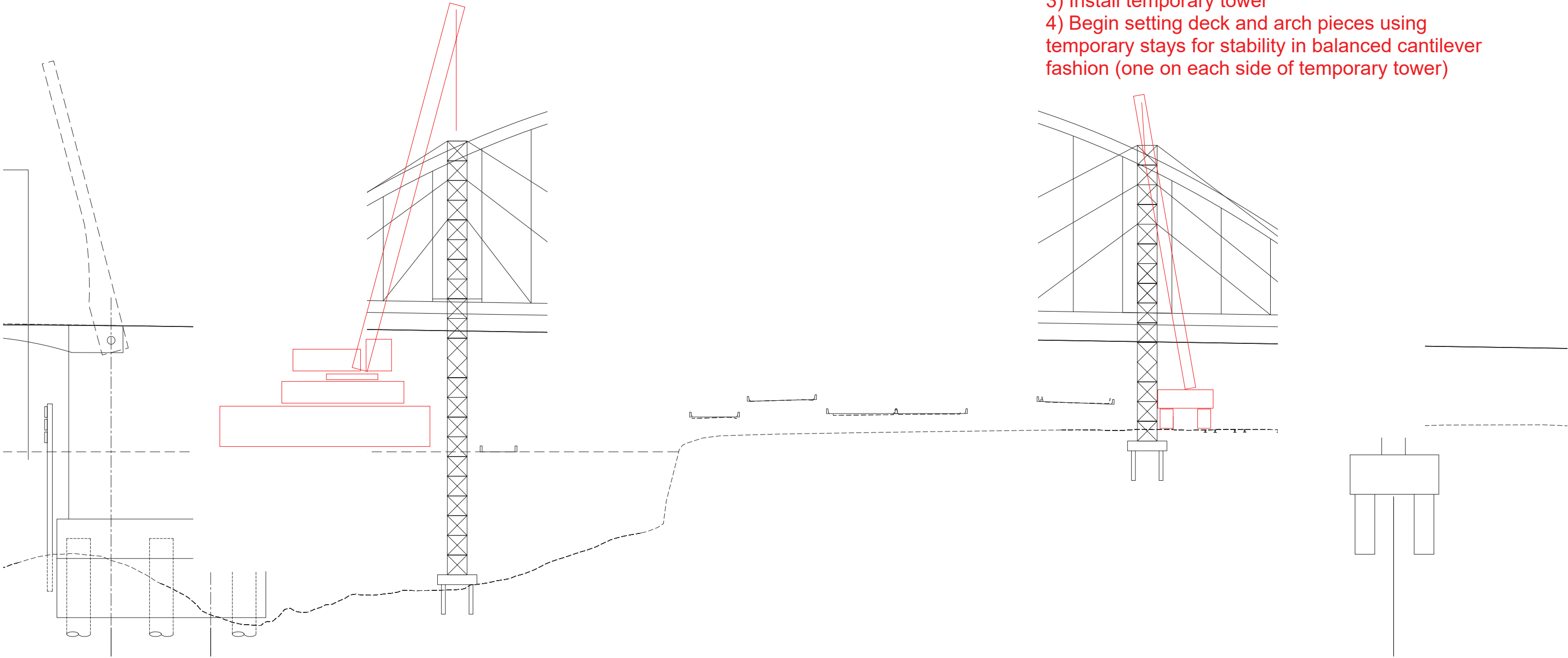
Long Span Approach Sequence
(Note: East side shown. West side similar)

- 1) Install temporary stay tower piles
- 2) Place/pour tower foundation



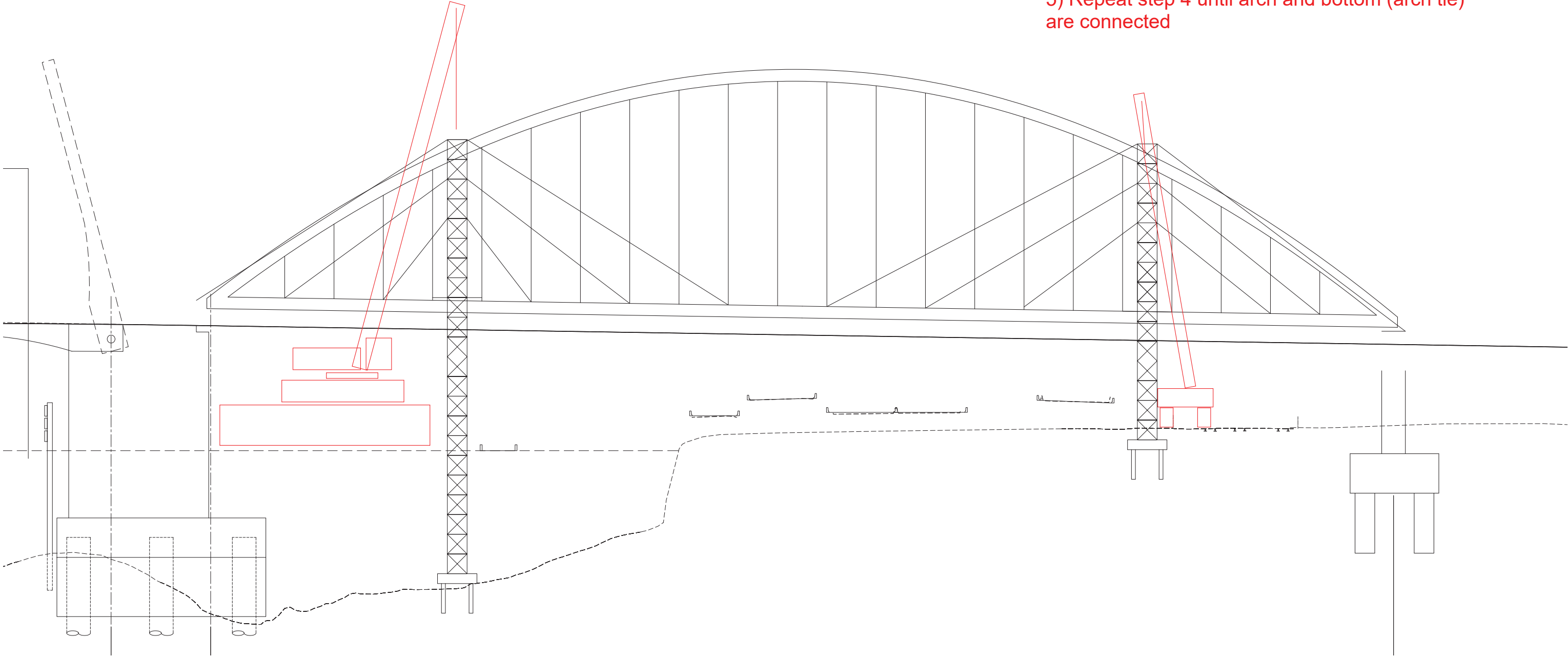
Long Span Approach Sequence
(Note: East side shown. West side similar)

- 3) Install temporary tower
- 4) Begin setting deck and arch pieces using temporary stays for stability in balanced cantilever fashion (one on each side of temporary tower)



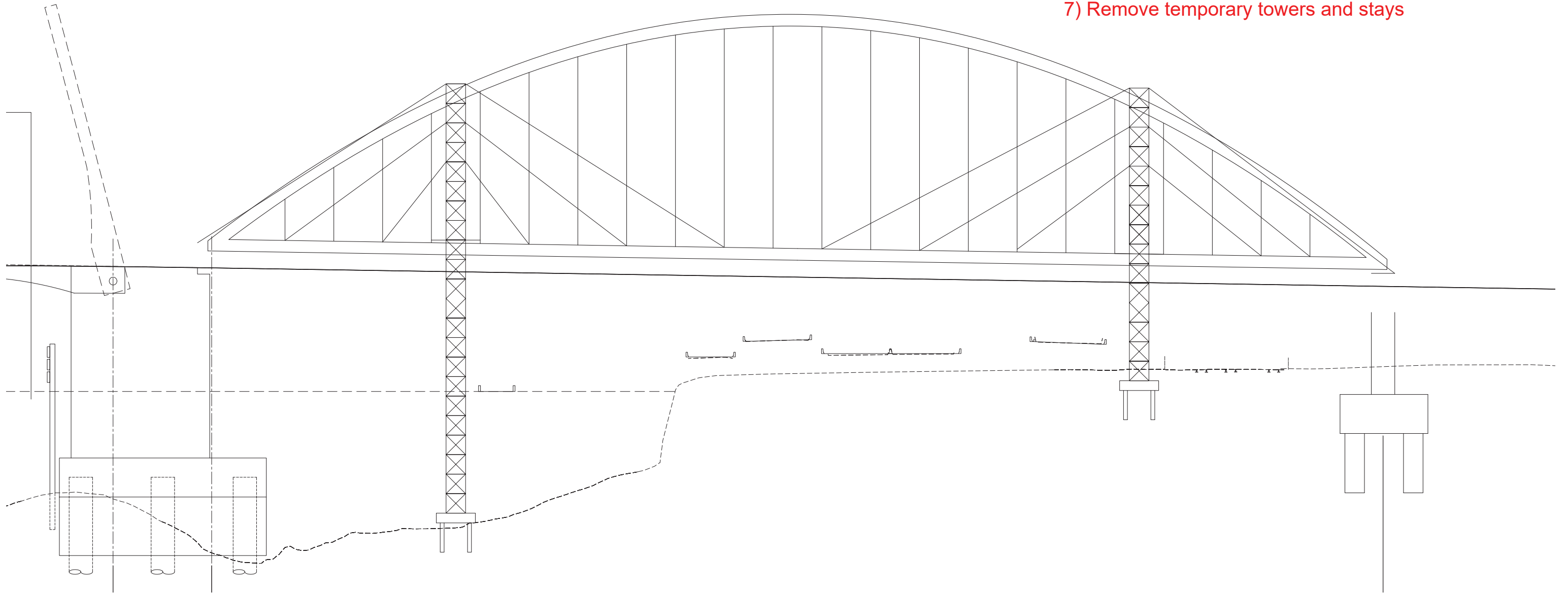
Long Span Approach Sequence
(Note: East side shown. West side similar)

5) Repeat step 4 until arch and bottom (arch tie)
are connected



Long Span Approach Sequence
(Note: East side shown. West side similar)

- 5) Once piers are complete (assumed river piers), install jacks at arch ends on piers
- 6) Release temporary towers and jack arch down onto piers
- 7) Remove temporary towers and stays



Appendix G. Project Schedules

APPENDIX G-1

Enhanced Retrofit Schedule with Temporary Bridge

Activity ID	Activity Name	Original Duration	% Complete	Total Float	Start	Finish	Predecessors	Successors	2024												2025												2026												2027												2028												2029																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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A1000	Notice To Proceed	0	0%	4	04-Mar-24			A1050	Notice To Proceed																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1010	Move Traffic To Detour Structure	0	0%	49	26-Mar-25		A1150	A1590, A2000	Move Traffic To Detour Structure																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1020	Shift Traffic to North Half (for South Approaches Work)	10	0%	0	22-Aug-28	05-Sep-28	A1390, A2200, ,	A2210, A2860	Shift Traffic to North Half (for S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1030	Open Retrofitted Bridge North Half to Traffic	7	0%	0	11-Aug-28	21-Aug-28	A1990	A2390, A1020	Open/Retrofitted Bridge North H																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1035	South Approaches Complete	0	0%	0					S																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1040	Project Completion	0	0%	0					P																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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A1050	Early Submittals	80	0%	4	04-Mar-24	24-Jun-24	A1000	A1060, A1070, A	20-Aug-24, Procurement																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1060	Procure Work Bridge Piling	30	0%	13	25-Jun-24	06-Aug-24	A1050	A1160, A1180	Early Submittals																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1070	Procure Work Bridge Superstructure	40	0%	159	25-Jun-24	20-Aug-24	A1050	A1170, A1190	Procure Work Bridge Piling																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1080	Procure Detour Bridge Materials	30	0%	4	25-Jun-24	06-Aug-24	A1050	A1120	Procure Work Bridge Superstructure																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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A1090	Mobilize to Site	10	0%	4	25-Jun-24	09-Jul-24	A1050	A1100	Mobilize to Site																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1100	Install Site Access/Erosion Control	20	0%	4	10-Jul-24	06-Aug-24	A1090	A1110, A1120, A	Install Site Access/Erosion Control																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1110	Railroad Crossing (East Side)	20	0%	428	07-Aug-24	04-Sep-24	A1100	A1190	Railroad Crossing (East Side)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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A1115	Demo Buildings For Detour Bridge	40	0%	49	07-Aug-24	02-Oct-24	A1100	A1130	Demo Buildings For Detour Bridge																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1120	Install In-Water Piles (Assumed 200 piles) For Detour	50	0%	5	07-Aug-24	04-Oct-24	A1100, A1080	A1140	Install In-Water Piles (Assumed 200 piles) For Detour																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1130	Install Modular Detour Bridge	110	0%	49	03-Oct-24	11-Mar-25	A1115	A1150	Install Modular Detour Bridge																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1140	Install Movable Span	60	0%	97	07-Oct-24	02-Jan-25	A1120	A1150	Install Movable Span																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1150	Testing & Switch Over Traffic to Detour	10	0%	49	12-Mar-25	25-Mar-25	A1140, A1130	A1010	Testing & Switch Over Traffic to Detour																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A2390	Remove Detour Bridge Superstructure	45	0%	1	22-Aug-28	24-Oct-28	A1030	A2400, A2410	Remove Detour Bridge Superstructure																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A2400	Remove Detour Bridge In-Water Piling	20	0%	1	22-Aug-28	14-Sep-28	A2390	A1040, A2450	Remove Detour Bridge In-Wa																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A2410	Remove On Land Piling	20	0%	120	25-Oct-28	21-Nov-28	A2390	A1040	Remove On Land Piling																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
Work Bridges									1060																																																																																																																																																0%																																																																																																																																																1																																																																																																																																																07-Aug-24																																																																																																																																																10-Oct-28																																																																																																																																															
A1160	Install West Work Bridge Pile to Pier 2	40	0%	15	07-Aug-24	23-Sep-24	A1100, A1060	A1170, A1200, A	Install West Work Bridge Pile to Pier 2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1170	Install West Work Bridge Superstructure to Pier 2	40	0%	136	24-Sep-24	18-Nov-24	A1160, A1070	A1590	Install West Work Bridge Superstructure to Pier 2																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1180	Install East Work Bridge Pile to Pier 3	50	0%	43	24-Sep-24	19-Aug-25	A1060, A1160	A1190, A1210	Install East Work Bridge Pile to Pier 3																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1190	Install East Work Bridge Superstructure To Pier 3	100	0%	85	20-Aug-25	13-Jan-26	A1180, A1070, ,	A1595	Install East Work Bridge Superstructure To Pier 3																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A2420	Remove West Work Bridge Superstructure	30	0%	214	01-Oct-27	11-Nov-27	A1910	A2430	Remove West Work Bridge Superstructure																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A2430	Remove West Work Bridge Piling	20	0%	45	27-Jul-28	18-Aug-28	A2420, A2470	A1040	Remove West Work Bridge Piling																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A2440	Remove East Work Bridge Superstructure	40	0%	4	14-Jul-28	08-Sep-28	A1980	A2450	Remove East Work Bridge Su																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A2450	Remove East Work Bridge Piling	22	0%	1	14-Sep-28	10-Oct-28	A2440, A2400	A1040	Remove East Work Bridge																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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A1195	Install Pier 1 Cofferdam (Incl Rings)	40	0%	18	10-Jul-25	25-Aug-25	A1620	A1225, A1680, A	Install Pier 1 Cofferdam (Incl Rings)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1200	Install Pier 2 Cofferdams (N & S of Ex Pier)	20	0%	18	26-Aug-25	19-Sep-25	A1620, A1160, ,	A1205	Install Pier 2 Cofferdams (N & S of Ex Pier)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1205	Install Pier 2 Coffe Rings & Dewater	20	0%	39	22-Sep-25	17-Oct-25	A1200	A1700, A1225	Install Pier 2 Coffe Rings & Dewater																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1210	Install Pier 3 Cofferdam (N & S of Ex Pier)	20	0%	0	10-Jul-26	01-Aug-26	A1630, A1180	A1215	Install Pier 3 Cofferdam (N & S of Ex Pier)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1215	Install Pier 3 Coffe Rings & Dewater	20	0%	0	03-Aug-26	28-Aug-26	A1210	A1235, A1760, A	Install Pier 3 Coffe Rings & Dewater																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1225	Install Cofferdam for Ex Pier 4 Removal	20	0%	17	29-Aug-26	21-Sep-26	A2000, A1195, ,	A1670	Install Cofferdam for Ex Pier 4 Removal																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1235	Remove Cofferdam for Ex Pier 4 Removal	15	0%	84	10-Jul-27	27-Jul-27	A1670, A1215	A1040, A2455	Remove Cofferdam for Ex Pier 4 Removal																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A2455	Remove Pier 1 Cofferdam	10	0%	84	28-Jul-27	07-Aug-27	A1235, A1685	A2460	Remove Pier 1 Cofferdam																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A2460	Remove Pier 2 Cofferdam	15	0%	84	09-Aug-27	25-Aug-27	A1720, A2455	A2470	Remove Pier 2 Cofferdam																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A2470	Remove Pier 3 Cofferdam	15	0%	45	10-Jul-28	26-Jul-28	A1780, A2460	A2430	Remove Pier 3 Cofferdam																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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Underdeck									407																																																																																																																																																0%																																																																																																																																																397																																																																																																																																																07-Aug-24																																																																																																																																																16-Mar-26																																																																																																																																															
Bents 1 - 16									290																																																																																																																																																0%																																																																																																																																																484																																																																																																																																																07-Aug-24																																																																																																																																																26-Sep-25																																																																																																																																															
A1230	Prep & Face Bent 1	40	0%	484	07-Aug-24	02-Oct-24	A1100	A1240	Prep & Face Bent 1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1240	Excavate, FRP Bent 2 Footing Retrofit	15	0%	484	03-Oct-24	23-Oct-24	A1230	A1250, A1260	Excavate, FRP Bent 2 Footing Retrofit																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1250	FRP Bent 2 Cap Retrofit	10	0%	569	24-Oct-24	06-Nov-24	A1240	A1280	FRP Bent 2 Cap Retrofit																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1260	Excavate, FRP Bent 3 Footing Retrofit	15	0%	484	24-Oct-24	13-Nov-24	A1240	A1280, A1300	Excavate, FRP Bent 3 Footing Retrofit																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1280	FRP Bent 3 Cap Retrofit	10	0%	564	14-Nov-24	27-Nov-24	A1260, A1250	A1320	FRP Bent 3 Cap Retrofit																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
A1300	Excavate, FRP Bent 4 Footing Retrofit	15	0%	484	14-Nov-24	06-Dec-24	A1260	A1320, A1340	Excavate, FRP Bent 4 Footing Retrofit																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															

█ Actual Work
 █ Critical Remaining Work
 ▼ Summary
█ Remaining Work
 ◆ Milestone

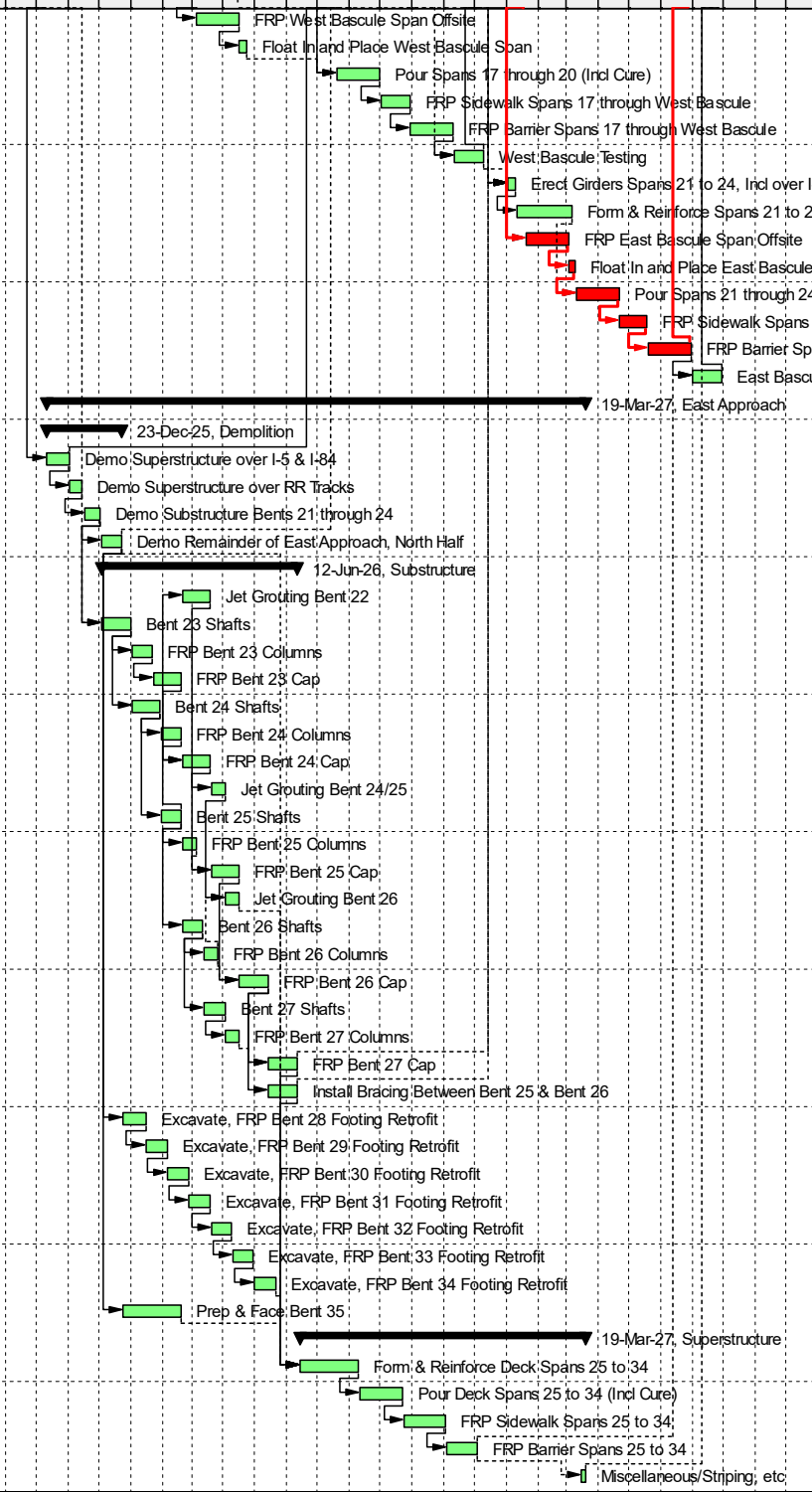
APPENDIX G-2

Enhanced Retrofit Schedule

NO Temporary Bridge

Activity ID	Activity Name	Original Duration	% Complete	Total Float	Start	Finish	Predecessors	Successors	2024							2025							2026							2027													
									M	A	M	J	Jul	A	S	Oct	N	D	Jan	F	M	A	M	J	Jul	A	S	Oct	N	D	Jan	F	M	Apr	M	J	Jul	A	S	Oct	N	D	Jan
EQRB NEPA Retrofit (No Detour Bridge)									910 0% 0 04-Mar-24 30-Sep-27																																		
General/Milestones									910 0% 0 04-Mar-24 30-Sep-27																																		
A1000	Notice To Proceed	0	0%	0	04-Mar-24	30-Sep-27		A1050	Notice To Proceed																																		
A1020	Close Bridge to Traffic	10	0%	86	29-Sep-25	10-Oct-25	A2730, A2850	A1360, A2000, A	Close Bridge to Traffic																																		
A1030	Open Retrofitted Bridge to Traffic	7	0%	0	30-Jul-27	09-Aug-27*	A1990, A2480, .		Open Ret																																		
A1040	Project Completion	0	0%	0	30-Sep-27*	30-Sep-27*	A2470, A2430, .		Pr																																		
Procurement									120 0% 207 04-Mar-24 20-Aug-24																																		
A1050	Early Submittals	80	0%	0	04-Jun-24	24-Jun-24	A1000	A1060, A1070, A	20-Aug-24, Procurement																																		
A1060	Procure Work Bridge Piling	30	0%	13	25-Jun-24	06-Aug-24	A1050	A1160, A1180	Early Submittals																																		
A1070	Procure Work Bridge Superstructure	40	0%	207	25-Jun-24	20-Aug-24	A1050	A1170, A1190	Procure Work Bridge Piling																																		
Construction									830 0% 0 25-Jun-24 30-Sep-27																																		
A1090	Mobilize to Site	10	0%	0	25-Jun-24	09-Jul-24	A1050	A1100	Mobilize to Site																																		
A1100	Install Site Access/Erosion Control	20	0%	0	10-Jul-24	06-Aug-24	A1090	A1110, A1160, A	Install Site Access/Erosion Control																																		
A1110	Railroad Crossing (East Side)	20	0%	501	07-Aug-24	04-Sep-24	A1100	A1190	Railroad Crossing (East Side)																																		
Temporary Works									800 0% 0 07-Aug-24 30-Sep-27																																		
Work Bridges									800 0% 0 07-Aug-24 30-Sep-27																																		
A1160	Install West Work Bridge Pile to Pier 2	40	0%	15	07-Aug-24	23-Sep-24	A1100, A1060	A1170, A1180	Install West Work Bridge Pile to Pier 2																																		
A1170	Install West Work Bridge Superstructure to Pier 2	40	0%	184	24-Sep-24	18-Nov-24	A1160, A1070	A1590, A1180	Install West Work Bridge Superstructure to Pier 2																																		
A1180	Install East Work Bridge Pile to Pier 3	50	0%	28	10-Jul-25	05-Sep-25	A1060, A1160, .	A1190	Install East Work Bridge Pile to Pier 3																																		
A1190	Install East Work Bridge Superstructure To Pier 3	100	0%	146	08-Sep-25	29-Jan-26	A1180, A1070, .	A1595	Install East Work Bridge Superstructure To Pier 3																																		
A2420	Remove West Work Bridge Superstructure	30	0%	126	11-Dec-26	25-Jan-27	A1910	A2430	Remove West Work Bridge Superstruct																																		
A2430	Remove West Work Bridge Piling	20	0%	7	15-Jul-27	06-Aug-27	A2420, A1235	A1040, A2455	Remove West Work Bridge Superstruct																																		
A2440	Remove East Work Bridge Superstructure	40	0%	0	01-Jul-27	26-Aug-27	A1980	A2450	Remove																																		
A2450	Remove East Work Bridge Piling	30	0%	0	27-Aug-27	30-Sep-27	A2440	A1040	Remove																																		
Cofferdams									794 0% 6 07-Aug-24 22-Sep-27																																		
A1195	Install Pier 1 Cofferdam (Incl Rings)	40	0%	6	16-Aug-25	03-Oct-25	A1215	A1225, A1680	Install Pier 1 Cofferdam (Incl Rings)																																		
A1200	Install Pier 2 Cofferdams (N & S of Ex Pier)	20	0%	0	07-Aug-24	29-Aug-24	A1100	A1205, A1210	Install Pier 2 Cofferdams (N & S of Ex Pier)																																		
A1205	Install Pier 2 Cofferdams Rings & Dewater	20	0%	0	30-Aug-24	27-Sep-24	A1200	A1700, A1210	Install Pier 2 Cofferdams Rings & Dewater																																		
A1210	Install Pier 3 Cofferdam (N & S of Ex Pier)	20	0%	0	28-Sep-24	19-Jul-25	A1200, A1205	A1215	Install Pier 3 Cofferdam (N & S of Ex Pier)																																		
A1215	Install Pier 3 Cofferdams Rings & Dewater	20	0%	0	21-Jul-25	15-Aug-25	A1210	A1235, A1760, A	Install Pier 3 Cofferdams Rings & Dewater																																		
A1225	Install Cofferdam for Ex Pier 4 Removal	20	0%	7	10-Jul-26	01-Aug-26	A2000, A1195	A1670	Install Cofferdam for Ex Pier 4 Removal																																		
A1235	Remove Cofferdam for Ex Pier 4 Removal	15	0%	7	29-Sep-26	14-Jul-27	A1670, A1215	A1040, A2455, A	Remove Coff																																		
A2455	Remove Pier 1 Cofferdam	10	0%	7	07-Aug-27	18-Aug-27	A1235, A1685, .	A2460	Remove																																		
A2460	Remove Pier 2 Cofferdam	15	0%	7	19-Aug-27	04-Sep-27	A1720, A2455	A2470	Remove																																		
A2470	Remove Pier 3 Cofferdam	15	0%	7	06-Sep-27	22-Sep-27	A1780, A2460	A1040	Remove																																		
Retrofit Bridge									756 0% 0 07-Aug-24 29-Jul-27																																		
West Approach									435 0% 321 07-Aug-24 23-Apr-26																																		
Underdeck									290 0% 211 07-Aug-24 26-Sep-25																																		
Bents 1 - 16									290 0% 86 07-Aug-24 26-Sep-25																																		
A1230	Prep & Face Bent 1	40	0%	86	07-Aug-24	02-Oct-24	A1100	A1240	Prep & Face Bent 1																																		
A1240	Excavate, FRP Bent 2 Footing Retrofit	15	0%	86	03-Oct-24	23-Oct-24	A1230	A1250, A1260	Excavate, FRP Bent 2 Footing Retrofit																																		
A1250	FRP Bent 2 Cap Retrofit	10	0%	171	24-Oct-24	06-Nov-24	A1240	A1280	FRP Bent 2 Cap Retrofit																																		
A1260	Excavate, FRP Bent 3 Footing Retrofit	15	0%	86	24-Oct-24	13-Nov-24	A1240	A1280, A1300	Excavate, FRP Bent 3 Footing Retrofit																																		
A1280	FRP Bent 3 Cap Retrofit	10	0%	166	14-Nov-24	27-Nov-24	A1260, A1250	A1320	FRP Bent 3 Cap Retrofit																																		
A1300	Excavate, FRP Bent 4 Footing Retrofit	15	0%	86	14-Nov-24	06-Dec-24	A1260	A1320, A1340	Excavate, FRP Bent 4 Footing Retrofit																																		
A1320	FRP Bent 4 Cap Retrofit	10	0%	161	09-Dec-24	20-Dec-24	A1300, A1280	A1400	FRP Bent 4 Cap Retrofit																																		
A1340	Excavate, FRP Bent 5 Footing Retrofit	15	0%	86	09-Dec-24	30-Dec-24	A1300	A1400, A2520	Excavate, FRP Bent 5 Footing Retrofit																																		
A1400	FRP Bent 5 Cap Retrofit	10	0%	156	31-Dec-24	14-Jan-25	A1320, A1340	A2530	FRP Bent 5 Cap Retrofit																																		
A2520	Excavate, FRP Bent 6 Footing Retrofit	15	0%	86	31-Dec-24	21-Jan-25	A1340	A2530, A2540	Excavate, FRP Bent 6 Footing Retrofit																																		
A2530	FRP Bent 6 Cap Retrofit	10	0%	151	22-Jan-25	04-Feb-25	A2520, A1400	A2550	FRP Bent 6 Cap Retrofit																																		
A2540	Excavate, FRP Bent 7 Footing Retrofit	15	0%	86	22-Jan-25	11-Feb-25	A2520	A2550, A2560	Excavate, FRP Bent 7 Footing Retrofit																																		
A2550	FRP Bent 7 Cap Retrofit	10	0%	146	12-Feb-25	25-Feb-25	A2540, A2530	A2570	FRP Bent 7 Cap Retrofit																																		
A2560	Excavate, FRP Bent 8 Footing Retrofit	15	0%	86	12-Feb-25	04-Mar-25	A2540	A2570, A2580	Excavate, FRP Bent 8 Footing Retrofit																																		
A2570	FRP Bent 8 Cap Retrofit	10	0%	141	05-Mar-25	18-Mar-25	A2560, A2550	A2590	FRP Bent 8 Cap Retrofit																																		
A2580	Excavate, FRP Bent 9 Footing Retrofit	15	0%	86	05-Mar-25	25-Mar-25	A2560	A2590, A2600	Excavate, FRP Bent 9 Footing Retrofit																																		
A2590	FRP Bent 9 Cap Retrofit	10	0%	136	26-Mar-25	08-Apr-25	A2570, A2580	A2610	FRP Bent 9 Cap Retrofit																																		
A2600	Excavate, FRP Bent 10 Footing Retrofit	15	0%	86	26-Mar-25	15-Apr-25	A2580	A2610, A2620	Excavate, FRP Bent 10 Footing Retrofit																																		

Activity ID	Activity Name	Original Duration	% Complete	Total Float	Start	Finish	Predecessors	Successors	2024												2025												2026												2027																																																																																																																																																											
									M	A	M	J	Jul	A	S	Oct	N	D	Jan	F	M	A	M	J	Jul	A	S	Oct	N	D	Jan	F	M	Apr	M	J	Jul	A	S	Oct	N	D	Jan	F	M	A	M	Jun	Jul	A	S	Oct																																																																																																																																																				
A1860	FRP West Bascule Span Offsite	30	0%	86	06-Mar-26	16-Apr-26	A1730	A1870																																																																																																																																																																																																
A1870	Float In and Place West Bascule Span	5	0%	86	17-Apr-26	23-Apr-26	A1860	A1880																																																																																																																																																																																																
A1880	Pour Spans 17 through 20 (Incl Cure)	30	0%	26	21-Jul-26	31-Aug-26	A1870, A1850	A1890																																																																																																																																																																																																
A1890	FRP Sidewalk Spans 17 through West Bascule	20	0%	26	01-Sep-26	29-Sep-26	A1880	A1900																																																																																																																																																																																																
A1900	FRP Barrier Spans 17 through West Bascule	30	0%	26	30-Sep-26	10-Nov-26	A1890	A1910																																																																																																																																																																																																
A1910	West Bascule Testing	20	0%	26	11-Nov-26	10-Dec-26	A1900, A1390	A1940, A2420																																																																																																																																																																																																
A1920	Erect Girders Spans 21 to 24, Incl over I-5, I-84, & RRR	4	0%	0	02-Jan-27	10-Jan-27	A1830, A1675, .	A1930																																																																																																																																																																																																
A1930	Form & Reinforce Spans 21 to 24	40	0%	2	11-Jan-27	05-Mar-27	A1920	A1960																																																																																																																																																																																																
A1940	FRP East Bascule Span Offsite	30	0%	0	20-Jan-27	02-Mar-27	A1910, A1790	A1950																																																																																																																																																																																																
A1950	Float In and Place East Bascule Span	5	0%	0	03-Mar-27	09-Mar-27	A1940	A1960																																																																																																																																																																																																
A1960	Pour Spans 21 through 24 (Incl Cure)	30	0%	0	10-Mar-27	20-Apr-27	A1950, A1930	A1970																																																																																																																																																																																																
A1970	FRP Sidewalk Spans 24 through East Bascule	20	0%	0	21-Apr-27	18-May-27	A1960	A1980																																																																																																																																																																																																
A1980	FRP Barrier Spans 24 through East Bascule	30	0%	0	19-May-27	30-Jun-27	A1970	A1990, A2440																																																																																																																																																																																																
A1990	East Bascule Testing	20	0%	0	01-Jul-27	29-Jul-27	A1980, A2200	A1030																																																																																																																																																																																																
East Approach		364	0%	92	11-Oct-25	19-Mar-27																																																																																																																																																																																																		
Demolition		50	0%	160	11-Oct-25	23-Dec-25																																																																																																																																																																																																		
A2000	Demo Superstructure over I-5 & I-84	8	0%	56	11-Oct-25	02-Nov-25	A1020	A2010, A1225																																																																																																																																																																																																
A2010	Demo Superstructure over RR Tracks	10	0%	139	03-Nov-25	14-Nov-25	A2000	A2020																																																																																																																																																																																																
A2020	Demo Substructure Bents 21 through 24	10	0%	139	17-Nov-25	02-Dec-25	A2010	A2500, A2030																																																																																																																																																																																																
A2030	Demo Remainder of East Approach, North Half	15	0%	160	03-Dec-25	23-Dec-25	A2020	A1670, A2170, A																																																																																																																																																																																																
Substructure		135	0%	146	03-Dec-25	12-Jun-26																																																																																																																																																																																																		
A2495	Jet Grouting Bent 22	20	0%	186	20-Feb-26	19-Mar-26	A2960	A2955																																																																																																																																																																																																
A2500	Bent 23 Shafts	20	0%	139	03-Dec-25	31-Dec-25	A2820, A2020	A2910, A2930																																																																																																																																																																																																
A2910	FRP Bent 23 Columns	15	0%	139	02-Jan-26	22-Jan-26	A2500	A2920																																																																																																																																																																																																
A2920	FRP Bent 23 Cap	20	0%	139	23-Jan-26	19-Feb-26	A2910	A2950																																																																																																																																																																																																
A2930	Bent 24 Shafts	20	0%	139	02-Jan-26	29-Jan-26	A2500	A2940, A2960																																																																																																																																																																																																
A2940	FRP Bent 24 Columns	15	0%	139	30-Jan-26	19-Feb-26	A2930	A2950																																																																																																																																																																																																
A2950	FRP Bent 24 Cap	20	0%	139	20-Feb-26	19-Mar-26	A2940, A2920	A2980																																																																																																																																																																																																
A2955	Jet Grouting Bent 24/25	10	0%	186	20-Mar-26	02-Apr-26	A2495	A2985																																																																																																																																																																																																
A2960	Bent 25 Shafts	15	0%	149	30-Jan-26	19-Feb-26	A2930	A2970, A2990, A																																																																																																																																																																																																
A2970	FRP Bent 25 Columns	10	0%	149	20-Feb-26	05-Mar-26	A2960	A2980																																																																																																																																																																																																
A2980	FRP Bent 25 Cap	20	0%	139	20-Mar-26	16-Apr-26	A2970, A2950	A3010																																																																																																																																																																																																
A2985	Jet Grouting Bent 26	10	0%	186	03-Apr-26	16-Apr-26	A2955, A3000	A2170																																																																																																																																																																																																
A2990	Bent 26 Shafts	15	0%	154	20-Feb-26	12-Mar-26	A2960	A3000, A3020																																																																																																																																																																																																
A3000	FRP Bent 26 Columns	10	0%	154	13-Mar-26	26-Mar-26	A2990	A3010, A2985																																																																																																																																																																																																
A3010	FRP Bent 26 Cap	20	0%	139	17-Apr-26	14-May-26	A3000, A2980	A3040, A3050																																																																																																																																																																																																
A3020	Bent 27 Shafts	15	0%	159	13-Mar-26	02-Apr-26	A2990	A3030																																																																																																																																																																																																
A3030	FRP Bent 27 Columns	10	0%	159	03-Apr-26	16-Apr-26	A3020	A3040																																																																																																																																																																																																
A3040	FRP Bent 27 Cap	20	0%	139	15-May-26	12-Jun-26	A3030, A3010	A1920, A2170																																																																																																																																																																																																
A3050	Install Bracing Between Bent 25 & Bent 26	20	0%	139	15-May-26	12-Jun-26	A3010	A1920, A2170																																																																																																																																																																																																
A3060	Excavate, FRP Bent 28 Footing Retrofit	15	0%	161	24-Dec-25	15-Jan-26	A2030	A3070																																																																																																																																																																																																
A3070	Excavate, FRP Bent 29 Footing Retrofit	15	0%	161	16-Jan-26	05-Feb-26	A3060	A3080																																																																																																																																																																																																
A3080	Excavate, FRP Bent 30 Footing Retrofit	15	0%	161	06-Feb-26	26-Feb-26	A3070	A3090																																																																																																																																																																																																
A3090	Excavate, FRP Bent 31 Footing Retrofit	15	0%	161	27-Feb-26	19-Mar-26	A3080	A3100																																																																																																																																																																																																
A3100	Excavate, FRP Bent 32 Footing Retrofit	15	0%	161	20-Mar-26	09-Apr-26	A3090	A3110																																																																																																																																																																																																
A3110	Excavate, FRP Bent 33 Footing Retrofit	15	0%	161	10-Apr-26	30-Apr-26	A3100	A3120																																																																																																																																																																																																
A3120	Excavate, FRP Bent 34 Footing Retrofit	15	0%	161	01-May-26	21-May-26	A3110	A2170																																																																																																																																																																																																
A3130	Prep & Face Bent 35	40	0%	226	24-Dec-25	19-Feb-26	A2030	A2170																																																																																																																																																																																																
Superstructure		194	0%	92	15-Jun-26	19-Mar-27																																																																																																																																																																																																		
A2170	Form & Reinforce Deck Spans 25 to 34	40	0%	146	15-Jun-26	10-Aug-26	A3040, A3050, .	A2180																																																																																																																																																																																																
A2180	Pour Deck Spans 25 to 34 (Incl Cure)	30	0%	146	11-Aug-26	22-Sep-26	A2170	A2190																																																																																																																																																																																																
A2190	FRP Sidewalk Spans 25 to 34	30	0%	146	23-Sep-26	03-Nov-26	A2180	A2200																																																																																																																																																																																																
A2200	FRP Barrier Spans 25 to 34	20	0%	146	04-Nov-26	03-Dec-26	A2190	A1990, A2490																																																																																																																																																																																																
A2490	Miscellaneous/Striping, etc	5	0%	92	15-Mar-27*	19-Mar-27	A2200	A1030																																																																																																																																																																																																



█ Actual Work
 █ Critical Remaining Work
 Summary
█ Remaining Work
 ◆ Milestone

APPENDIX G-3

Replacement In-Kind Schedule
with Conventional Approaches
with Temporary Bridge

Activity ID	Activity Name	Original Duration	% Complete	Total Float	Start	Finish	Predecessors	Successors	2024												2025												2026												2027												2028												2029												2030																																																																							
									M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D																																																														
EQRB NEPA Replacement In-Kind (With Detour Bridge)									1602 0% 105 04-Mar-24 11-Jun-30																																																																																																																																															
General/Milestones									1602 0% 0 04-Mar-24 11-Jun-30																																																																																																																																															
A1000	Notice To Proceed	0	0%	8	04-Mar-24			A1050	Notice To Proceed																																																																																																																																															
A1010	Move Traffic To Detour Structure	0	0%	63	26-Feb-25		A1150	A1220, A1590, A	Move Traffic To Detour Structure																																																																																																																																															
A1020	Switch Traffic To North Half	10	0%	0	07-Mar-29	20-Mar-29	A1030	A1410, A2210	Switch Traffic To North Half																																																																																																																																															
A1030	Main Bridge Complete	7	0%	0	26-Feb-29	06-Mar-29*	A1990	A2390, A1020	Main Bridge Complete																																																																																																																																															
A1035	South Approaches Complete	0	0%	0				A1040																																																																																																																																																
A1040	Project Completion	0	0%	0																																																																																																																																																				
Procurement									100 0% 245 04-Mar-24 23-Jul-24																																																																																																																																															
A1050	Early Submittals	60	0%	8	04-Mar-24	24-May-24	A1000	A1060, A1070, A	23-Jul-24, Procurement																																																																																																																																															
A1060	Procure Work Bridge Piling	30	0%	50	28-May-24	09-Jul-24	A1050	A1160, A1180	Early Submittals																																																																																																																																															
A1070	Procure Work Bridge Superstructure	40	0%	245	28-May-24	23-Jul-24	A1050	A1170, A1190	Procure Work Bridge Piling																																																																																																																																															
A1080	Procure Detour Bridge Materials	30	0%	8	28-May-24	09-Jul-24	A1050	A1120	Procure Work Bridge Superstructure																																																																																																																																															
Construction									1542 0% 105 28-May-24 11-Jun-30																																																																																																																																															
A1090	Mobilize to Site	10	0%	8	28-May-24	10-Jun-24	A1050	A1100	Mobilize to Site																																																																																																																																															
A1100	Install Site Access/Erosion Control	20	0%	8	11-Jun-24	09-Jul-24	A1090	A1110, A1120, A	Install Site Access/Erosion Control																																																																																																																																															
A1110	Railroad Crossing (East Side)	20	0%	462	10-Jul-24	06-Aug-24	A1100	A1190	Railroad Crossing (East Side)																																																																																																																																															
Temporary Works									1313 0% 199 10-Jul-24 05-Sep-29																																																																																																																																															
Detour Bridge									1288 0% 224 10-Jul-24 01-Aug-29																																																																																																																																															
A1115	Demo Buildings For Detour Bridge	40	0%	63	10-Jul-24	04-Sep-24	A1100	A1130	Demo Buildings For Detour Bridge																																																																																																																																															
A1120	Install In-Water Piles (Assumed 200 piles) For Detour	50	0%	10	10-Jul-24	06-Sep-24	A1100, A1080	A1140, A1160	Install In-Water Piles (Assumed 200 piles) For Detour																																																																																																																																															
A1130	Install Modular Detour Bridge	110	0%	63	05-Sep-24	11-Feb-25	A1115	A1150	Install Modular Detour Bridge																																																																																																																																															
A1140	Install Movable Span	60	0%	111	09-Sep-24	03-Dec-24	A1120	A1150	Install Movable Span																																																																																																																																															
A1150	Testing & Switch Over Traffic to Detour	10	0%	63	12-Feb-25	25-Feb-25	A1140, A1130	A1010	Testing & Switch Over Traffic to Detour																																																																																																																																															
A2390	Remove Detour Bridge Superstructure	45	0%	69	07-Mar-29	08-May-29	A1030	A2400, A2410	Remove Detour Bridge Superstructure																																																																																																																																															
A2400	Remove Detour Bridge In-Water Piling	20	0%	30	10-Jul-29	01-Aug-29	A2390	A1040, A2450	Remove Detour Bridge In-Water Piling																																																																																																																																															
A2410	Remove On Land Piling	20	0%	265	09-May-29	05-Jun-29	A2390	A1040	Remove On Land Piling																																																																																																																																															
Work Bridges									1271 0% 25 07-Sep-24 05-Sep-29																																																																																																																																															
A1160	Install West Work Bridge Pile to Pier 8	20	0%	10	07-Sep-24	30-Sep-24	A1100, A1060, A	A1170, A1180	Install West Work Bridge Pile to Pier 8																																																																																																																																															
A1170	Install West Work Bridge Superstructure to Pier 8	30	0%	197	01-Oct-24	11-Nov-24	A1160, A1070	A1665, A1660	Install West Work Bridge Superstructure to Pier 8																																																																																																																																															
A1180	Install East Work Bridge Pile to Pier 9	40	0%	27	01-Oct-24	14-Aug-25	A1060, A1160	A1190, A2415	Install East Work Bridge Pile to Pier 9																																																																																																																																															
A1190	Install East Work Bridge Superstructure To Pier 9	100	0%	102	15-Aug-25	08-Jan-26	A1180, A1070, A	A2416	Install East Work Bridge Superstructure To Pier 9																																																																																																																																															
A1660	Install West Work Bridge Piling Around Pier 8	20	0%	37	10-Jul-25	01-Aug-25	A1620, A1600, A	A1665, A2415	Install West Work Bridge Piling Around Pier 8																																																																																																																																															
A1665	Install West Work Bridge Superstructure Around Pier 8	20	0%	31	04-Aug-25	29-Aug-25	A1660, A1170	A1640	Install West Work Bridge Superstructure Around Pier 8																																																																																																																																															
A2415	Install East Work Bridge Piling Around Pier 9	20	0%	27	15-Aug-25	09-Sep-25	A1610, A1630, A	A2416	Install East Work Bridge Piling Around Pier 9																																																																																																																																															
A2416	Install East Work Bridge Superstructure Around Pier 9	20	0%	102	09-Jan-26	05-Feb-26	A2415, A1190	A1650, A1235	Install East Work Bridge Superstructure Around Pier 9																																																																																																																																															
A2417	Remove West Work Bridge From Navigation Channel	10	0%	151	28-Jul-27	10-Aug-27	A2460	A1870	Remove West Work Bridge From Navigation Channel																																																																																																																																															
A2418	Remove East Work Bridge From Navigation Channel	10	0%	32	27-Jul-28	09-Aug-28	A2470	A1950	Remove East Work Bridge From Navigation Channel																																																																																																																																															
A2420	Remove West Work Bridge Superstructure	30	0%	254	09-Aug-28	20-Sep-28	A1910	A2430	Remove West Work Bridge Superstructure																																																																																																																																															
A2430	Remove West Work Bridge Piling	20	0%	77	21-Sep-28	12-Jul-29	A2420	A1040	Remove West Work Bridge Piling																																																																																																																																															
A2440	Remove East Work Bridge Superstructure	40	0%	118	29-Jan-29	23-Mar-29	A1980	A2450	Remove East Work Bridge Superstructure																																																																																																																																															
A2450	Remove East Work Bridge Piling	30	0%	30	02-Aug-29	05-Sep-29	A2440, A2400, A	A1040	Remove East Work Bridge Piling																																																																																																																																															
Cofferdams									774 0% 285 10-Jul-25 26-Jul-28																																																																																																																																															
A1195	Install Pier 7 Cofferdam (Incl Rings)	20	0%	18	02-Aug-25	25-Aug-25	A1220, A1620, A	A1635, A1225, A	Install Pier 7 Cofferdam (Incl Rings)																																																																																																																																															
A1200	Install Pier 8 Cofferdam	20	0%	14	10-Jul-25	01-Aug-25	A1600, A1620	A1205, A1195	Install Pier 8 Cofferdam																																																																																																																																															
A1205	Install Pier 8 Cofferdams & Dewater	40	0%	11	04-Aug-25	29-Sep-25	A1200	A1640, A1215	Install Pier 8 Cofferdams & Dewater																																																																																																																																															
A1210	Install Pier 9 Cofferdam	20	0%	18	26-Aug-25	19-Sep-25	A1610, A1630, A	A1215, A1225	Install Pier 9 Cofferdam																																																																																																																																															
A1215	Install Pier 9 Cofferdams & Dewater	40	0%	151	30-Sep-25	24-Nov-25	A1210, A1205	A1650, A1235	Install Pier 9 Cofferdams & Dewater																																																																																																																																															
A1225	Install Cofferdam for Ex Pier 4 Removal	18	0%	80	20-Sep-25	10-Oct-25	A1610, A2000, A	A1670, A2520	Install Cofferdam for Ex Pier 4 Removal																																																																																																																																															
A1235	Remove Cofferdam for Ex Pier 4 Removal	15	0%	134	10-Jul-26	27-Jul-26	A1670, A1215, A	A1040, A2455	Remove Cofferdam for Ex Pier 4 Removal																																																																																																																																															
A2455	Remove Pier 7 Cofferdam	10	0%	134	28-Jul-26	07-Aug-26	A1690, A1235	A1840, A1860	Remove Pier 7 Cofferdam																																																																																																																																															
A2460	Remove Pier 8 Cofferdam	15	0%	64	10-Jul-27	27-Jul-27	A1720	A1860, A2470, A	Remove Pier 8 Cofferdam																																																																																																																																															
A2470	Remove Pier 9 Cofferdam	15	0%	2	10-Jul-28	26-Jul-28	A1780, A2460	A1920, A1940, A	Remove Pier 9 Cofferdam																																																																																																																																															
A2520	Install Pier 10 Cofferdam (incl Rings)	20	0%	99	10-Jul-26	01-Aug-26	A1225	A1835	Install Pier 10 Cofferdam (incl Rings)																																																																																																																																															
A2530	Remove Pier 10 Cofferdam	10	0%	120	10-Jul-28	20-Jul-28	A1830	A2450	Remove Pier 10 Cofferdam																																																																																																																																															
New Bridge									1352 0% 105 26-Feb-25 11-Jun-30																																																																																																																																															
West Approach									1297 0% 160 26-Feb-25 26-Mar-30																																																																																																																																															

Activity ID	Activity Name	Original Duration	% Complete	Total Float	Start	Finish	Predecessors	Successors	2024												2025												2026												2027												2028												2029												2030																							
									M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D														
Phase 1									17-Aug-26, Phase 1																																																																																															
Demolition									25-Mar-25, Demolition																																																																																															
A1220	Demolish Existing N Half of Bridge	20	0%	116	26-Feb-25	25-Mar-25	A1010	A1635, A2030, A	Demolish Existing N Half of Bridge																																																																																															
Substructure									05-Mar-26, Substructure																																																																																															
A1230	Excavate & Shore Bent 1 & Retaining Wall	40	0%	490	26-Mar-25	20-May-25	A1220	A1240	Excavate & Shore Bent 1 & Retaining Wall																																																																																															
A1240	FRP Bent 1 & Retaining Wall	30	0%	490	21-May-25	02-Jul-25	A1230	A1250	FRP Bent 1 & Retaining Wall																																																																																															
A1250	Bent 2 Shafts	20	0%	490	03-Jul-25	31-Jul-25	A1240	A1260, A1270	Bent 2 Shafts																																																																																															
A1260	RFP Bent 2 Columns & Cap	30	0%	490	01-Aug-25	12-Sep-25	A1250	A1280	RFP Bent 2 Columns & Cap																																																																																															
A1270	Bent 3 Shafts	20	0%	500	01-Aug-25	28-Aug-25	A1250	A1290, A1280	Bent 3 Shafts																																																																																															
A1280	RFP Bent 3 Columns & Cap	30	0%	490	15-Sep-25	24-Oct-25	A1260, A1270	A1300	RFP Bent 3 Columns & Cap																																																																																															
A1290	Bent 4 Shafts	20	0%	510	29-Aug-25	26-Sep-25	A1270	A1310, A1300	Bent 4 Shafts																																																																																															
A1300	RFP Bent 4 Columns & Cap	30	0%	490	27-Oct-25	09-Dec-25	A1280, A1290	A1320	RFP Bent 4 Columns & Cap																																																																																															
A1310	Bent 5 Shafts	20	0%	520	29-Sep-25	24-Oct-25	A1290	A1330, A1320	Bent 5 Shafts																																																																																															
A1320	RFP Bent 5 Columns & Cap	30	0%	490	10-Dec-25	22-Jan-26	A1300, A1310	A1340	RFP Bent 5 Columns & Cap																																																																																															
A1330	Bent 6 Shafts	20	0%	530	27-Oct-25	21-Nov-25	A1310	A1340	Bent 6 Shafts																																																																																															
A1340	RFP Bent 6 Columns & Cap	30	0%	490	23-Jan-26	05-Mar-26	A1320, A1330	A1350	RFP Bent 6 Columns & Cap																																																																																															
Superstructure									17-Aug-26, Superstructure																																																																																															
A1350	Set Girders Spans 1 to 5 (Steel Girders included with F	10	0%	490	06-Mar-26	19-Mar-26	A1340	A1360	Set Girders Spans 1 to 5 (Steel Girders included with River Spans)																																																																																															
A1360	Form & Reinforce Spans 1 to Span 5	40	0%	490	20-Mar-26	14-May-26	A1350	A1370	Form & Reinforce Spans 1 to Span 5																																																																																															
A1370	Pour Spans 1 to 5 (Incl Cure)	30	0%	490	15-May-26	26-Jun-26	A1360	A1380	Pour Spans 1 to 5 (Incl Cure)																																																																																															
A1380	Pour Sidewalks Spans 1 to 5	15	0%	490	29-Jun-26	20-Jul-26	A1370	A1390	Pour Sidewalks Spans 1 to 5																																																																																															
A1390	Pour Barrier/Ped Rail Spans 1 to 5	15	0%	490	21-Jul-26	10-Aug-26	A1380	A1910, A2480	Pour Barrier/Ped Rail Spans 1 to 5																																																																																															
A2480	Miscellaneous/Striping, etc	5	0%	1082	11-Aug-26	17-Aug-26	A1390		Miscellaneous/Striping, etc																																																																																															
Phase 2									26-Mar-30																																																																																															
Demolition									17-Apr-29, Demolition																																																																																															
A1410	Demolish Existing S Half of Bridge	20	0%	0	21-Mar-29	17-Apr-29	A1020	A2210, A1420, A	Demolish Existing S Half of Bridge																																																																																															
Substructure									16-Oct-29, Substructure																																																																																															
A1420	Excavate & Shore Bent 1 & Retaining Wall	40	0%	115	18-Apr-29	12-Jun-29	A1410	A1430	Excavate & Shore Bent 1 & Retaining Wall																																																																																															
A1430	FRP Bent 1 & Retaining Wall	30	0%	115	13-Jun-29	24-Jul-29	A1420	A1540	FRP Bent 1 & Retaining Wall																																																																																															
A1440	Bent 2 Shafts	20	0%	55	18-Apr-29	15-May-29	A1410	A1450, A1460	Bent 2 Shafts																																																																																															
A1450	RFP Bent 2 Columns & Cap	30	0%	105	16-May-29	26-Jun-29	A1440	A1470	RFP Bent 2 Columns & Cap																																																																																															
A1460	Bent 3 Shafts	20	0%	55	16-May-29	12-Jun-29	A1440	A1480, A1470, A	Bent 3 Shafts																																																																																															
A1470	RFP Bent 3 Columns & Cap	30	0%	105	27-Jun-29	07-Aug-29	A1450, A1460	A1540	RFP Bent 3 Columns & Cap																																																																																															
A1480	Bent 4 Shafts	20	0%	65	13-Jun-29	10-Jul-29	A1460	A1490	Bent 4 Shafts																																																																																															
A1490	RFP Bent 4 Columns & Cap	30	0%	65	11-Jul-29	21-Aug-29	A1480	A1510	RFP Bent 4 Columns & Cap																																																																																															
A1500	Bent 5 Shafts	20	0%	55	13-Jun-29	10-Jul-29	A1460	A1520, A1510	Bent 5 Shafts																																																																																															
A1510	RFP Bent 5 Columns & Cap	30	0%	65	22-Aug-29	02-Oct-29	A1490, A1500	A1540	RFP Bent 5 Columns & Cap																																																																																															
A1520	Bent 6 Shafts	30	0%	55	11-Jul-29	21-Aug-29	A1500	A1530	Bent 6 Shafts																																																																																															
A1530	RFP Bent 6 Columns & Cap	40	0%	55	22-Aug-29	16-Oct-29	A1520	A1540	RFP Bent 6 Columns & Cap																																																																																															
Superstructure									26-Mar-30																																																																																															
A1540	Set Girders Spans 1 to 5 (Steel Girders included with F	10	0%	55	17-Oct-29	30-Oct-29	A1530, A1430, ,	A1550	Set Girders Spans 1 to 5 (Steel Girders included with River Spans)																																																																																															
A1550	Form & Reinforce Spans 1 to Span 5	40	0%	55	31-Oct-29	25-Dec-29	A1540	A1560	Form & Reinforce Spans 1 to Span 5																																																																																															
A1560	Pour Spans 1 to 5 (Incl Cure)	30	0%	55	26-Dec-29	05-Feb-30	A1550	A1570	Pour Spans 1 to 5 (Incl Cure)																																																																																															
A1570	Pour Sidewalks Spans 1 to 5	15	0%	55	06-Feb-30	26-Feb-30	A1560	A1580	Pour Sidewalks Spans 1 to 5																																																																																															
A1580	Pour Barrier/Ped Rail Spans 1 to 5	15	0%	55	27-Feb-30	19-Mar-30	A1570	A2500	Pour Barrier/Ped Rail Spans 1 to 5																																																																																															
A2500	Miscellaneous/Striping, etc	5	0%	55	20-Mar-30	26-Mar-30	A1580	A1035	Miscellaneous/Striping, etc																																																																																															
River Spans									23-Feb-29, River Spans																																																																																															
Demolition									29-May-26, Demolition																																																																																															
A1590	Shore West Counterweight For Span Demo	20	0%	63	26-Feb-25	25-Mar-25	A1010	A1620	Shore West Counterweight For Span Demo																																																																																															
A1595	Shore East Counterweight For Span Demo	20	0%	63	23-Apr-25	20-May-25	A1620	A1630	Shore East Counterweight For Span Demo																																																																																															
A1600	Demo West Truss Deck & Lower Truss	30	0%	76	26-Feb-25	08-Apr-25	A1010	A1610, A1640, A	Demo West Truss Deck & Lower Truss																																																																																															
A1610	Demo East Truss Deck & Lower Truss	30	0%	83	09-Apr-25	20-May-25	A1600	A1210, A2415, A	Demo East Truss Deck & Lower Truss																																																																																															
A1620	Demo West Bascule Span	20	0%	63	26-Mar-25	22-Apr-25	A1590	A1595, A1640, A	Demo West Bascule Span																																																																																															
A1630	Demo East Bascule Span	20	0%	63	21-May-25	18-Jun-25	A1595	A1650, A1210, A	Demo East Bascule Span																																																																																															
A1635	Demo Ex Pier 1	20	0%	98	26-Aug-25	19-Sep-25	A1220, A1195	A1670, A1680	Demo Ex Pier 1																																																																																															
A1640	Demo Ex Pier 2	80	0%	11	30-Sep-25	23-Jan-26	A1600, A1620, ,	A1650, A1700	Demo Ex Pier 2																																																																																															
A1650	Demo Ex Pier 3	80	0%	102	06-Feb-26	29-May-26	A1640, A1630, ,	A1760	Demo Ex Pier 3																																																																																															
A1670	Demo Ex Pier 4	60	0%	382	13-Oct-25	08-Jan-26	A1635, A2030, ,	A1820, A1235	Demo Ex Pier 4																																																																																															

█ Actual Work
 █ Critical Remaining Work
 ▼ Summary
█ Remaining Work
 ◆ Milestone

Activity ID	Activity Name	Original Duration	% Complete	Total Float	Start	Finish	Predecessors	Successors	2024												2025												2026												2027												2028												2029												2030											
									M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
Substructure		676	0%	59	22-Sep-25	18-May-28																																																																																						
Superstructure		494	0%	0	17-Mar-27	23-Feb-29																																																																																						
East Approach		1349	0%	105	01-Mar-25	11-Jun-30																																																																																						
Phase 1		604	0%	850	01-Mar-25	16-Jul-27																																																																																						
Demolition		47	0%	570	01-Mar-25	06-May-25																																																																																						
Substructure		417	0%	393	07-May-25	29-Dec-26																																																																																						

█ Actual Work
 █ Critical Remaining Work
 ▶ Summary
█ Remaining Work
 ◆ Milestone

APPENDIX G-4

Replacement In-Kind Schedule
with Conventional Approaches
NO Temporary Bridge

Activity ID	Activity Name	Original Duration	% Complete	Total Float	Start	Finish	Predecessors	Successors	2024												2025												2026												2027												2028																																																																																																																																																																																																																																																											
									M	A	M	J	Jul	A	S	O	N	D	J	F	M	A	M	J	Jul	A	S	O	N	D	J	F	M	A	M	J	Jul	A	S	O	N	D	J	F	M	A	M	J	Jul	A	S	O	N	D	J	F	M	A	M	J	Jul	A	S	O	N	D																																																																																																																																																																																																																																																		
EQRB NEPA Replacement In-Kind (No Detour Bridge)									1130																																																												0%																																																												1																																																												04-Mar-24																																																												14-Aug-28																																																											
General/Milestones									1130																																																												0%																																																												1																																																												04-Mar-24																																																												14-Aug-28																																																											
A1000	Notice To Proceed	0	0%	33	04-Mar-24			A1050, A1090	Notice To Proceed																																																																																																																																																																																																																																																																																																											
A1010	Close Bridge to Traffic	0	0%	41	13-May-24		A1110	A1220, A1590, A	Close Bridge to Traffic																																																																																																																																																																																																																																																																																																											
A1030	Open New Bridge to Traffic	7	0%	0	28-Feb-28	07-Mar-28*	A1990, A2480, ,		Open New Bridge to Traffic																																																																																																																																																																																																																																																																																																											
A1040	Project Completion	0	0%	1		14-Aug-28*	A2430, A2450, ,		Project Completion																																																																																																																																																																																																																																																																																																											
Procurement									100																																																												0%																																																												197																																																												04-Mar-24																																																												23-Jul-24																																																											
A1050	Early Submittals	60	0%	33	04-Mar-24	24-May-24	A1000	A1060, A1070	Early Submittals																																																																																																																																																																																																																																																																																																											
A1060	Procure Work Bridge Piling	30	0%	33	28-May-24	09-Jul-24	A1050	A1160, A1180	Procure Work Bridge Piling																																																																																																																																																																																																																																																																																																											
A1070	Procure Work Bridge Superstructure	40	0%	197	28-May-24	23-Jul-24	A1050	A1170, A1190	Procure Work Bridge Superstructure																																																																																																																																																																																																																																																																																																											
Construction									1130																																																												0%																																																												1																																																												04-Mar-24																																																												12-Aug-28																																																											
A1090	Mobilize to Site	10	0%	41	04-Mar-24	15-Mar-24	A1000	A1100	Mobilize to Site																																																																																																																																																																																																																																																																																																											
A1100	Install Site Access/Erosion Control	20	0%	41	18-Mar-24	12-Apr-24	A1090	A1110, A1160	Install Site Access/Erosion Control																																																																																																																																																																																																																																																																																																											
A1110	Railroad Crossing (East Side)	20	0%	41	15-Apr-24	10-May-24	A1100	A1190, A1010	Railroad Crossing (East Side)																																																																																																																																																																																																																																																																																																											
Temporary Works									1040																																																												0%																																																												1																																																												10-Jul-24																																																												12-Aug-28																																																											
Work Bridges									1040																																																												0%																																																												1																																																												10-Jul-24																																																												12-Aug-28																																																											
A1160	Install West Work Bridge Pile to Pier 8	20	0%	39	10-Jul-24	01-Aug-24	A1100, A1060	A1170, A1180, A	Install West Work Bridge Pile to Pier 8																																																																																																																																																																																																																																																																																																											
A1170	Install West Work Bridge Superstructure to Pier 8	30	0%	174	26-Aug-24	07-Oct-24	A1160, A1070, ,	A1665	Install West Work Bridge Superstructure to Pier 8																																																																																																																																																																																																																																																																																																											
A1180	Install East Work Bridge Pile to Pier 9	40	0%	39	26-Aug-24	10-Jul-25	A1060, A1160, ,	A1190, A2415	Install East Work Bridge Pile to Pier 9																																																																																																																																																																																																																																																																																																											
A1190	Install East Work Bridge Superstructure To Pier 9	100	0%	32	11-Jul-25	02-Dec-25	A1180, A1070, ,	A2416	Install East Work Bridge Superstructure To Pier 9																																																																																																																																																																																																																																																																																																											
A1660	Install West Work Bridge Piling Around Pier 8	20	0%	39	02-Aug-24	24-Aug-24	A1620, A1600, ,	A1665, A2415, A	Install West Work Bridge Piling Around Pier 8																																																																																																																																																																																																																																																																																																											
A1665	Install West Work Bridge Superstructure Around Pier 8	20	0%	174	08-Oct-24	04-Nov-24	A1660, A1170	A1700	Install West Work Bridge Superstructure Around Pier 8																																																																																																																																																																																																																																																																																																											
A2415	Install East Work Bridge Piling Around Pier 9	20	0%	57	11-Jul-25	02-Aug-25	A1610, A1630, ,	A2416	Install East Work Bridge Piling Around Pier 9																																																																																																																																																																																																																																																																																																											
A2416	Install East Work Bridge Superstructure Around Pier 9	20	0%	32	03-Dec-25	31-Dec-25	A2415, A1190	A1760	Install East Work Bridge Superstructure Around Pier 9																																																																																																																																																																																																																																																																																																											
A2417	Remove West Work Bridge From Navigation Channel	10	0%	152	28-Jul-26	10-Aug-26	A2460	A1870	Remove West Work Bridge From Navigation Channel																																																																																																																																																																																																																																																																																																											
A2418	Remove East Work Bridge From Navigation Channel	10	0%	25	09-Aug-27	20-Aug-27	A2470, A2510	A1950	Remove East Work Bridge From Navigation Channel																																																																																																																																																																																																																																																																																																											
A2420	Remove West Work Bridge Superstructure	30	0%	226	21-Jul-27	31-Aug-27	A1910	A2430	Remove West Work Bridge Superstructure																																																																																																																																																																																																																																																																																																											
A2430	Remove West Work Bridge Piling	20	0%	45	01-Sep-27	23-Sep-27	A2420	A1040	Remove West Work Bridge Piling																																																																																																																																																																																																																																																																																																											
A2440	Remove East Work Bridge Superstructure	40	0%	74	31-Jan-28	24-Mar-28	A1980	A2450	Remove East Work Bridge Superstructure																																																																																																																																																																																																																																																																																																											
A2450	Remove East Work Bridge Piling	30	0%	1	10-Jul-28	12-Aug-28	A2440	A1040	Remove East Work Bridge Piling																																																																																																																																																																																																																																																																																																											
Cofferdams									782																																																												0%																																																												25																																																												10-Jul-24																																																												07-Aug-27																																																											
A1195	Install Pier 7 Cofferdam (Incl Rings)	20	0%	87	14-Aug-24	06-Sep-24	A1220, A1620, ,	A1635, A1225	Install Pier 7 Cofferdam (Incl Rings)																																																																																																																																																																																																																																																																																																											
A1200	Install Pier 8 Cofferdam	30	0%	49	10-Jul-24	13-Aug-24	A1600, A1620	A1205, A1195	Install Pier 8 Cofferdam																																																																																																																																																																																																																																																																																																											
A1205	Install Pier 8 Cofferd Rings & Dewater	40	0%	112	14-Aug-24	09-Oct-24	A1200	A1640	Install Pier 8 Cofferd Rings & Dewater																																																																																																																																																																																																																																																																																																											
A1210	Install Pier 9 Cofferdam	31	0%	40	05-Sep-24	10-Oct-24	A1610, A1630	A1215, A1225	Install Pier 9 Cofferdam																																																																																																																																																																																																																																																																																																											
A1215	Install Pier 9 Cofferd Rings & Dewater	40	0%	221	11-Oct-24	09-Dec-24	A1210	A1650, A1235	Install Pier 9 Cofferd Rings & Dewater																																																																																																																																																																																																																																																																																																											
A1216	Install Pier 10 Cofferdam (incl Rings)	20	0%	78	02-Aug-25	25-Aug-25	A1225	A1835	Install Pier 10 Cofferdam (incl Rings)																																																																																																																																																																																																																																																																																																											
A1225	Install Cofferdam for Ex Pier 4 Removal	20	0%	58	10-Jul-25	01-Aug-25	A1610, A2000, ,	A1670, A1216	Install Cofferdam for Ex Pier 4 Removal																																																																																																																																																																																																																																																																																																											
A1235	Remove Cofferdam for Ex Pier 4 Removal	15	0%	55	10-Jul-26	27-Jul-26	A1670, A1215	A1040, A2455	Remove Cofferdam for Ex Pier 4 Removal																																																																																																																																																																																																																																																																																																											
A2455	Remove Pier 7 Cofferdam	10	0%	55	28-Jul-26	07-Aug-26	A1690, A1235	A1840, A1860	Remove Pier 7 Cofferdam																																																																																																																																																																																																																																																																																																											
A2460	Remove Pier 8 Cofferdam	15	0%	65	10-Jul-26	27-Jul-26	A1720	A1860, A2470, A	Remove Pier 8 Cofferdam																																																																																																																																																																																																																																																																																																											
A2470	Remove Pier 9 Cofferdam	15	0%	3	10-Jul-27	27-Jul-27	A1780, A2460	A1920, A1940, A	Remove Pier 9 Cofferdam																																																																																																																																																																																																																																																																																																											
A2510	Remove Pier 10 Cofferdam	10	0%	31	28-Jul-27	07-Aug-27	A1830, A2470	A2418	Remove Pier 10 Cofferdam																																																																																																																																																																																																																																																																																																											
New Bridge									962																																																												0%																																																												0																																																												13-May-24																																																												25-Feb-28																																																											
West Approach									575																																																												0%																																																												387																																																												13-May-24																																																												17-Aug-26																																																											
Demolition									40																																																												0%																																																												237																																																												13-May-24																																																												09-Jul-24																																																											
A1220	Demolish Existing Bridge	40	0%	237	13-May-24	09-Jul-24	A1010	A1635, A2030, A	Demolish Existing Bridge																																																																																																																																																																																																																																																																																																											
Substructure									390																																																												0%																																																												237																																																												10-Jul-24																																																												22-Jan-26																																																											
A1230	Excavate & Shore Bent 1 & Retaining Wall	60	0%	237	10-Jul-24	02-Oct-24	A1220	A1240	Excavate & Shore Bent 1 & Retaining Wall																																																																																																																																																																																																																																																																																																											
A1240	FRP Bent 1 & Retaining Wall	40	0%	237	03-Oct-24	27-Nov-24	A1230	A1250	FRP Bent 1 & Retaining Wall																																																																																																																																																																																																																																																																																																											
A1250	Bent 2 Shafts	40	0%	237	02-Dec-24	28-Jan-25	A1240	A1260, A1270	Bent 2 Shafts																																																																																																																																																																																																																																																																																																											
A1260	RFP Bent 2 Columns & Cap	50	0%	237	29-Jan-25	08-Apr-25	A1250	A1280	RFP Bent 2 Columns & Cap																																																																																																																																																																																																																																																																																																											
A1270	Bent 3 Shafts	40	0%	247	29-Jan-25	25-Mar-25	A1250	A1290, A1280	Bent 3 Shafts																																																																																																																																																																																																																																																																																																											
A1280	RFP Bent 3 Columns & Cap	50	0%	237	09-Apr-25	18-Jun-25	A1260, A1270	A1300	RFP Bent 3 Columns & Cap																																																																																																																																																																																																																																																																																																											
A1290	Bent 4 Shafts	40	0%	257	26-Mar-25	20-May-25	A1270	A1310, A1300	Bent 4 Shafts																																																																																																																																																																																																																																																																																																											
A1300	RFP Bent 4 Columns & Cap	50	0%	237	19-Jun-25	28-Aug-25	A1280, A1290	A1320	RFP Bent 4 Columns & Cap																																																																																																																																																																																																																																																																																																											
A1310	Bent 5 Shafts	40	0%	267	21-May-25	17-Jul-25	A1290	A1330, A1320	Bent 5 Shafts																																																																																																																																																																																																																																																																																																											

█ Actual Work █ Critical Remaining Work █ Summary
█ Remaining Work ◆ Milestone

APPENDIX G-5

Replacement In-Kind Schedule
with Long Span Approaches
with Temporary Bridge

APPENDIX G-6

Replacement In-Kind Schedule
with Long Span Approaches
NO Temporary Bridge

Activity ID	Activity Name	Original Duration	% Complete	Total Float	Start	Finish	Predecessors	Successors	2024												2025												2026												2027												2028																																																																							
									M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D																																																														
EQRB NEPA Replacement In-Kind Long Span Approaches (No Detour E									04-Mar-24																																																												02-Oct-28																																																											
General/Milestones									04-Mar-24																																																												02-Oct-28																																																											
A1000	Notice To Proceed	0	0%	0	04-Mar-24			A1050, A1090	Notice To Proceed																																																																																																																							
A1010	Close Bridge to Traffic	0	0%	1	13-May-24		A1110	A1220, A1590, A	Close Bridge to Traffic																																																																																																																							
A1030	Open New Bridge to Traffic	7	0%	0	01-Aug-28	09-Aug-28*	A1990, A2480, .		Open N																																																																																																																							
A1040	Project Completion	0	0%	0	02-Oct-28*	02-Oct-28*	A2430, A2450, .		P																																																																																																																							
Procurement									04-Mar-24																																																												14-May-26																																																											
A1050	Early Submittals	60	0%	0	04-Mar-24	24-May-24	A1000	A1060, A1070, A	Early Submittals																																																																																																																							
A1060	Procure Work Bridge Piling	30	0%	0	28-May-24	09-Jul-24	A1050	A1160, A1180	Procure Work Bridge Piling																																																																																																																							
A1070	Procure Work Bridge Superstructure	40	0%	120	28-May-24	23-Jul-24	A1050	A1170, A1190	Procure Work Bridge Superstructure																																																																																																																							
A1080	Procure Long Span Steel (Arch Assumed)	500	0%	0	28-May-24	14-May-26	A1050	A1840	Procure Long Span Steel (Arch Assumed)																																																																																																																							
Construction									04-Mar-24																																																												02-Oct-28																																																											
A1090	Mobilize to Site	10	0%	1	04-Mar-24	15-Mar-24	A1000	A1100	Mobilize to Site																																																																																																																							
A1100	Install Site Access/Erosion Control	20	0%	1	18-Mar-24	12-Apr-24	A1090	A1110, A1160	Install Site Access/Erosion Control																																																																																																																							
A1110	Railroad Crossing (East Side)	20	0%	1	15-Apr-24	10-May-24	A1100	A1190, A1010	Railroad Crossing (East Side)																																																																																																																							
Temporary Works									10-Jul-24																																																												02-Oct-28																																																											
Work Bridges									10-Jul-24																																																												02-Oct-28																																																											
A1160	Install West Work Bridge Pile to Pier 7	20	0%	0	10-Jul-24	01-Aug-24	A1100, A1060	A1170, A1180, A	Install West Work Bridge Pile to Pier 7																																																																																																																							
A1170	Install West Work Bridge Superstructure to Pier 7	30	0%	97	26-Aug-24	07-Oct-24	A1160, A1070, .	A1665	Install West Work Bridge Superstructure to Pier 7																																																																																																																							
A1180	Install East Work Bridge Pile to Pier 8	40	0%	0	26-Aug-24	10-Jul-25	A1060, A1160, .	A1190, A2415	Install East Work Bridge Pile to Pier 8																																																																																																																							
A1190	Install East Work Bridge Superstructure To Pier 8	100	0%	0	11-Jul-25	02-Dec-25	A1180, A1070, .	A2416	Install East Work Bridge Superstructure To Pier 8																																																																																																																							
A1660	Install West Work Bridge Piling Around Pier 7	20	0%	0	02-Aug-24	24-Aug-24	A1620, A1600, .	A1665, A2415, A	Install West Work Bridge Piling Around Pier 7																																																																																																																							
A1665	Install West Work Bridge Superstructure Around Pier 7	20	0%	97	08-Oct-24	04-Nov-24	A1660, A1170	A1700	Install West Work Bridge Superstructure Around Pier 7																																																																																																																							
A2415	Install East Work Bridge Piling Around Pier 8	20	0%	57	11-Jul-25	02-Aug-25	A1610, A1630, .	A2416	Install East Work Bridge Piling Around Pier 8																																																																																																																							
A2416	Install East Work Bridge Superstructure Around Pier 8	20	0%	0	03-Dec-25	31-Dec-25	A2415, A1190	A1760	Install East Work Bridge Superstructure Around Pier 8																																																																																																																							
A2417	Remove West Work Bridge From Navigation Channel	10	0%	291	28-Jul-26	10-Aug-26	A2460	A1870	Remove West Work Bridge From Navigation Channel																																																																																																																							
A2418	Remove East Work Bridge From Navigation Channel	10	0%	157	28-Jul-27	10-Aug-27	A2470	A1950	Remove East Work Bridge From Navigation Channel																																																																																																																							
A2420	Remove West Work Bridge Superstructure	30	0%	118	11-Feb-28	23-Mar-28	A1910	A2430	Remove West Work Bridge Superstructure																																																																																																																							
A2430	Remove West Work Bridge Piling	20	0%	53	10-Jul-28	01-Aug-28	A2420	A1040	Remove West Work Bridge Piling																																																																																																																							
A2440	Remove East Work Bridge Superstructure	40	0%	0	03-Jul-28	28-Aug-28	A1980	A2450	Remove East Work Bridge Superstructure																																																																																																																							
A2450	Remove East Work Bridge Piling	30	0%	0	29-Aug-28	02-Oct-28	A2440	A1040	Remove East Work Bridge Piling																																																																																																																							
Cofferdams									10-Jul-24																																																												27-Jul-27																																																											
A1200	Install Pier 7 Cofferdam	30	0%	42	10-Jul-24	13-Aug-24	A1600, A1620	A1205	Install Pier 7 Cofferdam																																																																																																																							
A1205	Install Pier 7 Cofferdams & Dewater	40	0%	35	14-Aug-24	09-Oct-24	A1200	A1640	Install Pier 7 Cofferdams & Dewater																																																																																																																							
A1210	Install Pier 8 Cofferdam	31	0%	1	05-Sep-24	10-Oct-24	A1610, A1630	A1215, A1225	Install Pier 8 Cofferdam																																																																																																																							
A1215	Install Pier 8 Cofferdams & Dewater	40	0%	189	11-Oct-24	09-Dec-24	A1210	A1650, A1235	Install Pier 8 Cofferdams & Dewater																																																																																																																							
A1225	Install Cofferdam for Ex Pier 4 Removal	20	0%	48	10-Jul-25	01-Aug-25	A1610, A2000, .	A1670, A2510	Install Cofferdam for Ex Pier 4 Removal																																																																																																																							
A1235	Remove Cofferdam for Ex Pier 4 Removal	15	0%	202	28-Jul-26	13-Aug-26	A1670, A1215, .	A1040	Remove Cofferdam for Ex Pier 4 Removal																																																																																																																							
A2460	Remove Pier 7 Cofferdam	15	0%	100	10-Jul-26	27-Jul-26	A1720	A1860, A2470, A	Remove Pier 7 Cofferdam																																																																																																																							
A2470	Remove Pier 8 Cofferdam	15	0%	64	10-Jul-27	27-Jul-27	A1780, A2460	A1940, A2418	Remove Pier 8 Cofferdam																																																																																																																							
Towers									10-Jul-24																																																												12-Aug-27																																																											
A2500	Install West Tower 1 (Arch Assumed) On Land	25	0%	286	10-Jul-24	13-Aug-24	A1220	A2510, A2550, A	Install West Tower 1 (Arch Assumed) On Land																																																																																																																							
A2510	Install West Tower 2 Piling (Arch Assumed) In Water	10	0%	48	02-Aug-25	13-Aug-25	A2500, A1225	A2520, A2530	Install West Tower 2 Piling (Arch Assumed) In Water																																																																																																																							
A2520	Install West Tower 2 Remainder (Arch Assumed) In Water	20	0%	171	14-Aug-25	11-Sep-25	A2510	A2540, A1840	Install West Tower 2 Remainder (Arch Assumed) In Water																																																																																																																							
A2530	Install East Tower 1 Piling (Arch Assumed) In Water	10	0%	118	14-Aug-25	25-Aug-25	A2510	A2540	Install East Tower 1 Piling (Arch Assumed) In Water																																																																																																																							
A2540	Install East Tower 1 Remainder (Arch Assumed) In Water	20	0%	307	12-Sep-25	09-Oct-25	A2530, A2520	A1920	Install East Tower 1 Remainder (Arch Assumed) In Water																																																																																																																							
A2550	Install East Tower 2 (Arch Assumed) On Land	25	0%	576	14-Aug-24	18-Sep-24	A2500	A1920	Install East Tower 2 (Arch Assumed) On Land																																																																																																																							
A2560	Remove West Land Tower	15	0%	0	23-Jul-27	12-Aug-27	A1840, A2570	A1851	Remove West Land Tower																																																																																																																							
A2570	Remove West Water Tower	15	0%	0	07-Oct-26	22-Jul-27	A1840	A1851, A2560	Remove West Water Tower																																																																																																																							
A2580	Remove East Land Tower	15	0%	85	17-Jun-27	08-Jul-27	A1920	A1931	Remove East Land Tower																																																																																																																							
A2590	Remove East Water Tower	15	0%	64	10-Jul-27	27-Jul-27	A1920	A1931	Remove East Water Tower																																																																																																																							
New Bridge									13-May-24																																																												31-Jul-28																																																											
West Approach									13-May-24																																																												05-Jun-26																																																											
Demolition									13-May-24																																																												09-Jul-24																																																											
A1220	Demolish Existing Bridge	40	0%	49	13-May-24	09-Jul-24	A1010	A1635, A2030, A	Demolish Existing Bridge																																																																																																																							
Substructure									10-Jul-24																																																												07-Nov-25																																																											
A1230	Excavate & Shore Bent 1 & Retaining Wall	60	0%	411	10-Jul-24	02-Oct-24	A1220	A1240	Excavate & Shore Bent 1 & Retaining Wall																																																																																																																							

█ Actual Work
 █ Critical Remaining Work
 Summary
█ Remaining Work
 ◆ Milestone

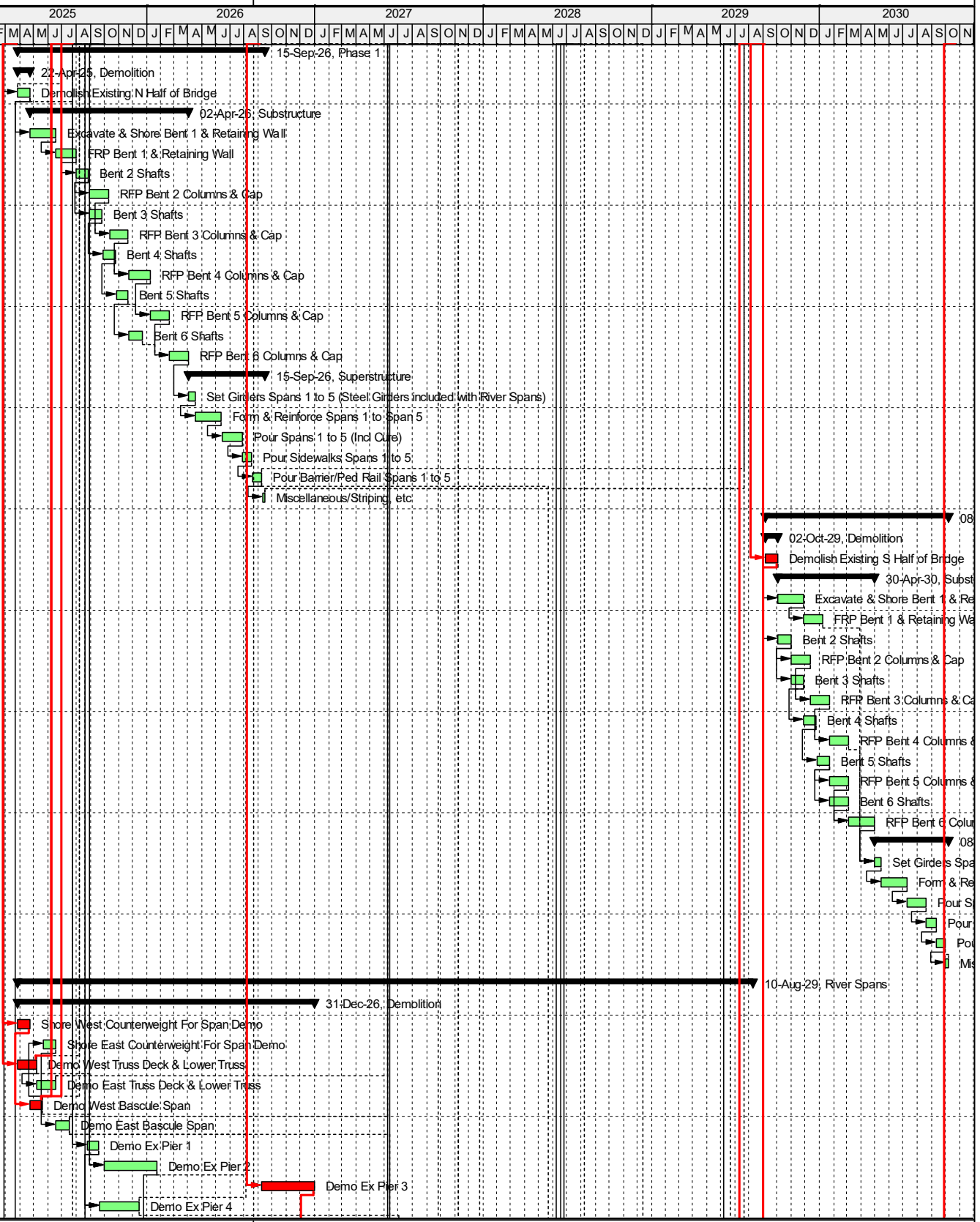
Activity ID	Activity Name	Original Duration	% Complete	Total Float	Start	Finish	Predecessors	Successors	2024												2025												2026												2027												2028											
									M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
A1920	Set Long Span Steel From Bent 8 to Bent 9 (Arch Assumed)	120	0%	0	29-Dec-26	16-Jun-27	A1830, A1780, ,	A1930, A2580, A	[Gantt Chart: A1920 bar from Dec 2026 to Jun 2027]																																																											
A1930	Form & Reinforce Long Span Steel From Bent 8 to Bent 9 (Arch Assumed)	100	0%	0	17-Jun-27	05-Nov-27	A1920	A1960, A1931	[Gantt Chart: A1930 bar from Jun 2027 to Nov 2027]																																																											
A1931	Pour Long Span From Bent 9 to Bent 8 (Arch Assumed)	100	0%	0	08-Nov-27	30-Mar-28	A1930, A2580, ,	A1960	[Gantt Chart: A1931 bar from Nov 2027 to Mar 2028]																																																											
A1940	FRP East Bascule Span Offsite	30	0%	0	11-Feb-28	23-Mar-28	A1910, A1810, ,	A1950	[Gantt Chart: A1940 bar from Feb 2028 to Mar 2028]																																																											
A1950	Float In and Place East Bascule Span	5	0%	0	24-Mar-28	30-Mar-28	A1940, A2418, ,	A1960	[Gantt Chart: A1950 bar from Mar 2028 to Mar 2028]																																																											
A1960	Pour East Bascule Closure (Incl Cure)	15	0%	0	31-Mar-28	20-Apr-28	A1950, A1930, ,	A1970, A1980	[Gantt Chart: A1960 bar from Mar 2028 to Apr 2028]																																																											
A1970	FRP Sidewalk Spans 9 through East Bascule	20	0%	0	21-Apr-28	18-May-28	A1960	A1980	[Gantt Chart: A1970 bar from Apr 2028 to May 2028]																																																											
A1980	FRP Barrier Spans 9 through East Bascule	30	0%	0	19-May-28	30-Jun-28	A1970, A1960	A1990, A2440	[Gantt Chart: A1980 bar from May 2028 to Jun 2028]																																																											
A1990	East Bascule Testing	20	0%	0	03-Jul-28	31-Jul-28	A1980, A2200	A1030	[Gantt Chart: A1990 bar from Jul 2028 to Jul 2028]																																																											
East Approach		530	0%	580	18-May-24	19-Jun-26			[Summary bar from May 2024 to Jun 2026]																																																											
Demolition		95	0%	1015	18-May-24	02-Oct-24			[Summary bar from May 2024 to Oct 2024]																																																											
A2000	Demo Superstructure over I-5 & I-84	8	0%	128	18-May-24	09-Jun-24	A1010	A2010, A1225	[Gantt Chart: A2000 bar from May 2024 to Jun 2024]																																																											
A2010	Demo Superstructure over RR Tracks	10	0%	377	10-Jun-24	21-Jun-24	A2000	A2020, A1815	[Gantt Chart: A2010 bar from Jun 2024 to Jun 2024]																																																											
A2020	Demo Substructure Bents 21 through 24	10	0%	1076	24-Jun-24	08-Jul-24	A2010		[Gantt Chart: A2020 bar from Jun 2024 to Jul 2024]																																																											
A2030	Demo Remainder of East Approach	60	0%	286	10-Jul-24	02-Oct-24	A1220	A1670, A2080	[Gantt Chart: A2030 bar from Jul 2024 to Oct 2024]																																																											
Substructure		210	0%	521	03-Oct-24	31-Jul-25			[Summary bar from Oct 2024 to Jul 2025]																																																											
A2080	Bent 10 Shafts	40	0%	521	03-Oct-24	27-Nov-24	A2030	A2120, A2090	[Gantt Chart: A2080 bar from Oct 2024 to Nov 2024]																																																											
A2090	FRP Bent 10 Columns & Cap	50	0%	521	02-Dec-24	11-Feb-25	A2080	A2130	[Gantt Chart: A2090 bar from Dec 2024 to Feb 2025]																																																											
A2120	Bent 11 Shafts	40	0%	531	02-Dec-24	28-Jan-25	A2080	A2130	[Gantt Chart: A2120 bar from Dec 2024 to Jan 2025]																																																											
A2130	FRP Bent 11 Columns & Cap	50	0%	521	12-Feb-25	22-Apr-25	A2120, A2090	A2150, A2140	[Gantt Chart: A2130 bar from Feb 2025 to Apr 2025]																																																											
A2140	Excavate & Shoring Bent 12	30	0%	521	23-Apr-25	04-Jun-25	A2130	A2150	[Gantt Chart: A2140 bar from Apr 2025 to Jun 2025]																																																											
A2150	FRP Bent 12	40	0%	521	05-Jun-25	31-Jul-25	A2130, A2140	A2160	[Gantt Chart: A2150 bar from Jun 2025 to Jul 2025]																																																											
Superstructure		225	0%	536	01-Aug-25	19-Jun-26			[Summary bar from Aug 2025 to Jun 2026]																																																											
A2160	Erect Girders Spans 9 to 11	20	0%	521	01-Aug-25	28-Aug-25	A2150	A2170	[Gantt Chart: A2160 bar from Aug 2025 to Aug 2025]																																																											
A2170	Form & Reinforce Deck Spans 9 to 11	60	0%	521	29-Aug-25	21-Nov-25	A2160	A2180	[Gantt Chart: A2170 bar from Aug 2025 to Nov 2025]																																																											
A2180	Pour Deck Spans 9 to 11 (Incl Cure)	90	0%	521	24-Nov-25	02-Apr-26	A2170	A2190	[Gantt Chart: A2180 bar from Nov 2025 to Apr 2026]																																																											
A2190	FRP Sidewalk Spans 9 to 11	20	0%	521	03-Apr-26	30-Apr-26	A2180	A2200	[Gantt Chart: A2190 bar from Apr 2026 to Apr 2026]																																																											
A2200	FRP Barrier Spans 9 to 11	30	0%	521	01-May-26	12-Jun-26	A2190	A1990, A2490	[Gantt Chart: A2200 bar from May 2026 to Jun 2026]																																																											
A2490	Miscellaneous/Striping, etc	5	0%	536	15-Jun-26	19-Jun-26	A2200	A1030	[Gantt Chart: A2490 bar from Jun 2026 to Jun 2026]																																																											

█ Actual Work
 █ Critical Remaining Work
 ▬ Summary
█ Remaining Work
 ◆ Milestone

APPENDIX G-7

Replacement with Couch
Connection Schedule
with Temporary Bridge

Activity ID	Activity Name	Original Duration	% Complete	Total Float	Start	Finish	Predecessors	Successors	2024												2025												2026												2027												2028												2029												2030												
									M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M
Phase 1										375										0%										740										26-Mar-25										15-Sep-26																																											
Demolition										20										0%										81										26-Mar-25										22-Apr-25																																											
A1220	Demolish Existing N Half of Bridge	20	0%	81	26-Mar-25	22-Apr-25	A1010	A1635, A2030, A	2024										2025										2026										2027										2028										2029										2030																								
Substructure										240										0%										590										23-Apr-25										02-Apr-26																																											
A1230	Excavate & Shore Bent 1 & Retaining Wall	40	0%	590	23-Apr-25	18-Jun-25	A1220	A1240	2024										2025										2026										2027										2028										2029										2030																								
A1240	FRP Bent 1 & Retaining Wall	30	0%	590	19-Jun-25	31-Jul-25	A1230	A1250	2024										2025										2026										2027										2028										2029										2030																								
A1250	Bent 2 Shafts	20	0%	590	01-Aug-25	28-Aug-25	A1240	A1260, A1270	2024										2025										2026										2027										2028										2029										2030																								
A1260	RFP Bent 2 Columns & Cap	30	0%	590	29-Aug-25	10-Oct-25	A1250	A1280	2024										2025										2026										2027										2028										2029										2030																								
A1270	Bent 3 Shafts	20	0%	600	29-Aug-25	26-Sep-25	A1250	A1290, A1280	2024										2025										2026										2027										2028										2029										2030																								
A1280	RFP Bent 3 Columns & Cap	30	0%	590	13-Oct-25	21-Nov-25	A1260, A1270	A1300	2024										2025										2026										2027										2028										2029										2030																								
A1290	Bent 4 Shafts	20	0%	610	29-Sep-25	24-Oct-25	A1270	A1310, A1300	2024										2025										2026										2027										2028										2029										2030																								
A1300	RFP Bent 4 Columns & Cap	30	0%	590	24-Nov-25	08-Jan-26	A1280, A1290	A1320	2024										2025										2026										2027										2028										2029										2030																								
A1310	Bent 5 Shafts	20	0%	620	27-Oct-25	21-Nov-25	A1290	A1330, A1320	2024										2025										2026										2027										2028										2029										2030																								
A1320	RFP Bent 5 Columns & Cap	30	0%	590	09-Jan-26	19-Feb-26	A1300, A1310	A1340	2024										2025										2026										2027										2028										2029										2030																								
A1330	Bent 6 Shafts	20	0%	630	24-Nov-25	23-Dec-25	A1310	A1340	2024										2025										2026										2027										2028										2029										2030																								
A1340	RFP Bent 6 Columns & Cap	30	0%	590	20-Feb-26	02-Apr-26	A1320, A1330	A1350	2024										2025										2026										2027										2028										2029										2030																								
Superstructure										115										0%										740										03-Apr-26										15-Sep-26																																											
A1350	Set Girders Spans 1 to 5 (Steel Girders included with F	10	0%	590	03-Apr-26	16-Apr-26	A1340	A1360	2024										2025										2026										2027										2028										2029										2030																								
A1360	Form & Reinforce Spans 1 to Span 5	40	0%	590	17-Apr-26	12-Jun-26	A1350	A1370	2024										2025										2026										2027										2028										2029										2030																								
A1370	Pour Spans 1 to 5 (Incl Cure)	30	0%	590	15-Jun-26	27-Jul-26	A1360	A1380	2024										2025										2026										2027										2028										2029										2030																								
A1380	Pour Sidewalks Spans 1 to 5	15	0%	590	28-Jul-26	17-Aug-26	A1370	A1390	2024										2025										2026										2027										2028										2029										2030																								
A1390	Pour Barrier/Ped Rail Spans 1 to 5	15	0%	590	18-Aug-26	08-Sep-26	A1380	A1910, A1020, A	2024										2025										2026										2027										2028										2029										2030																								
A2480	Miscellaneous/Striping, etc	5	0%	740	09-Sep-26	15-Sep-26	A1390	A1030, A1020	2024										2025										2026										2027										2028										2029										2030																								



Activity ID	Activity Name	Original Duration	% Complete	Total Float	Start	Finish	Predecessors	Successors	2024												2025												2026												2027												2028												2029												2030																																																																							
									M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D																																																		
Substructure		839	0%	16	22-Sep-25	11-Jan-29																																																																																																																																																		
Superstructure		457	0%	0	27-Oct-27	10-Aug-29																																																																																																																																																		
East Approach		1429	0%	0	29-Mar-25	29-Oct-30																																																																																																																																																		
Phase 1		1040	0%	389	29-Mar-25	02-May-29																																																																																																																																																		
Demolition		47	0%	595	29-Mar-25	04-Jun-25																																																																																																																																																		
Substructure		853	0%	72	05-Jun-25	12-Oct-28																																																																																																																																																		
Burnside Connection		638	0%	282	05-Jun-25	09-Dec-27																																																																																																																																																		
Bent 11 Shafts		20	0%	595	05-Jun-25	02-Jul-25	A2020, A2030	A2050, A2060, A																																																																																																																																																
FRP Bent 11 Columns & Cap		30	0%	595	03-Jul-25	14-Aug-25	A2040	A2070																																																																																																																																																
Bent 12 Shafts		20	0%	605	03-Jul-25	31-Jul-25	A2040	A2070, A2080																																																																																																																																																
Jet Grouting Bent 12		15	0%	282	27-Oct-27	16-Nov-27	A1692	A2105																																																																																																																																																
FRP Bent 12 Columns & Cap		30	0%	595	15-Aug-25	26-Sep-25	A2050, A2060	A2090																																																																																																																																																
Bent 13 Shafts		10	0%	625	01-Aug-25	14-Aug-25	A2060	A2090, A2100																																																																																																																																																
FRP Bent 13 Columns & Cap		30	0%	595	29-Sep-25	07-Nov-25	A2080, A2070	A2110																																																																																																																																																
Bent 14 Shafts		10	0%	645	15-Aug-25	28-Aug-25	A2080	A2120, A2110																																																																																																																																																
Jet Grouting Bent 14		15	0%	282	17-Nov-27	09-Dec-27	A2065	A2160																																																																																																																																																
FRP Bent 14 Columns & Cap		30	0%	595	10-Nov-25	23-Dec-25	A2090, A2100	A2130, A2530																																																																																																																																																
Bent 15 Shafts		10	0%	645	29-Aug-25	12-Sep-25	A2100	A2130, A2520																																																																																																																																																

█ Actual Work
 █ Critical Remaining Work
 █ Remaining Work
 ▶ Summary
 ◆ Milestone

APPENDIX G-8

Replacement with Couch
Connection Schedule
NO Temporary Bridge

APPENDIX G-9

Replacement Long-span
Alternative (Narrowed)
Schedule (1A-4A)



Activity ID	Activity Name	Original Duration	Percent Complete	Total Float	Start	Finish	Predecessors	Successors	2025												2026												2027												2028												2029											
									M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
1A: EQRB NEPA Bascule With East Arch																																																																				
General/Milestones																																																																				
A1000	Notice To Proceed	0	0%	0	03-Mar-25	17-Oct-29		A1050, A1090	Notice To Proceed, 03-Mar-25																																																											
A1010	Close Bridge to Traffic	0	0%	17	12-May-25		A1110	A1220, A1590, A1	Close Bridge to Traffic, 12-May-25																																																											
A1030	Open New Bridge to Traffic	7	0%	0	09-Oct-29	17-Oct-29*	A1990, A2480,	A1040																																																												
A1040	Project Completion	0	0%	0	17-Oct-29*		A2430, A2450,																																																													
Procurement																																																																				
A1050	Early Submittals	60	0%	0	03-Mar-25	23-May-25	A1000	A1060, A1070, A1	Early Submittals																																																											
A1060	Procure Work Bridge Piling	30	0%	0	27-May-25	08-Jul-25	A1050	A1160, A1180	Procure Work Bridge Piling																																																											
A1070	Procure Work Bridge Superstructure	40	0%	23	27-May-25	22-Jul-25	A1050	A1170, A1190	Procure Work Bridge Superstructure																																																											
A1080	Procure Structural Steel (Incl East Arch)	500	0%	272	27-May-25	13-May-27	A1050	A1840	Procure Structural Steel (Incl East Arch)																																																											
A1130	Procure West Girder Steel	220	0%	552	27-May-25	07-Apr-26	A1050	A1840	Procure West Girder Steel																																																											
Construction																																																																				
A1090	Mobilize to Site	10	0%	17	03-Mar-25	14-Mar-25	A1000	A1100	Mobilize to Site																																																											
A1100	Install Site Access/Erosion Control	20	0%	17	17-Mar-25	11-Apr-25	A1090	A1110, A1160, A11	Install Site Access/Erosion Control																																																											
A1110	Railroad Crossing (East Side)	20	0%	17	14-Apr-25	09-May-25	A1100	A1190, A1010	Railroad Crossing (East Side)																																																											
A1120	River Dredging/Riprap Removal	40	0%	4	01-Jul-25	20-Aug-25	A1100	A1660, A2416	River Dredging/Riprap Removal																																																											
Temporary Works																																																																				
Work Bridges																																																																				
A1160	Install West Work Bridge Pile to Pier 7	20	0%	0	09-Jul-25	01-Aug-25	A1100, A1060	A1170, A1180, A1	Install West Work Bridge Pile to Pier 7																																																											
A1170	Install West Work Bridge Superstructure to Pier 7	30	0%	0	25-Aug-25	07-Oct-25	A1160, A1070,	A1665	Install West Work Bridge Superstructure to Pier 7																																																											
A1180	Install East Work Bridge Pile to Pier 8	39	0%	12	25-Aug-25	14-Oct-25	A1060, A1160,	A1190, A2415	Install East Work Bridge Pile to Pier 8																																																											
A1190	Install East Work Bridge Superstructure To Pier 8	100	0%	100	14-Oct-25	09-Mar-26	A1180, A1070,	A2416	Install East Work Bridge Superstructure To Pier 8																																																											
A1660	Install West Work Bridge Piling Around Pier 7	20	0%	0	01-Aug-25	25-Aug-25	A1620, A1600,	A1665, A2415, A1	Install West Work Bridge Piling Around Pier 7																																																											
A1665	Install West Work Bridge Superstructure Around Pier 7	20	0%	0	07-Oct-25	04-Nov-25	A1660, A1170	A1700	Install West Work Bridge Superstructure Around Pier 7																																																											
A2415	Install East Work Bridge Piling Around Pier 8	20	0%	14	14-Oct-25	13-Jul-26	A1610, A1630,	A2416	Install East Work Bridge Piling Around Pier 8																																																											
A2416	Install East Work Bridge Superstructure Around Pier 8	20	0%	12	13-Jul-26	10-Aug-26	A2415, A1190,	A1760, A2530	Install East Work Bridge Superstructure Around Pier 8																																																											
A2420	Remove West Work Bridge Superstructure	30	0%	164	21-Dec-28	02-Feb-29	A1910	A2430	Remove West Work Bridge Superstructure																																																											
A2430	Remove West Work Bridge Piling	20	0%	68	02-Jul-29	27-Jul-29	A2420	A1040	Remove West Work Bridge Piling																																																											
A2440	Remove East Work Bridge Superstructure	40	0%	14	26-Jun-29	20-Aug-29	A1960	A2450	Remove East Work Bridge Superstructure																																																											
A2450	Remove East Work Bridge Piling	30	0%	17	21-Aug-29	24-Sep-29	A2440	A1040	Remove East Work Bridge Piling																																																											
Towers																																																																				
A2530	Install East Tower 1 Piling In Water	30	0%	132	10-Aug-26	14-Sep-26	A2416	A2540	Install East Tower 1 Piling In Water																																																											
A2540	Install East Tower 1 Remainder In Water	30	0%	342	14-Sep-26	26-Oct-26	A2530	A1920	Install East Tower 1 Remainder In Water																																																											
A2550	Install East Tower 2 On Land	30	0%	260	13-Jan-27	24-Feb-27	A1820	A1920	Install East Tower 2 On Land																																																											
A2580	Remove East Land Tower	15	0%	85	22-Aug-28	12-Sep-28	A1920	A1931	Remove East Land Tower																																																											
A2590	Remove East Water Tower	15	0%	41	22-Aug-28	07-Sep-28	A1920	A1931	Remove East Water Tower																																																											
New Bridge																																																																				
West Approach																																																																				
Demolition																																																																				
A1220	Demolish Existing Bridge	40	0%	222	12-May-25	08-Jul-25	A1010	A1635, A2030, A1	Demolish Existing Bridge																																																											
Approach/Infill																																																																				
A2780	Place Infill Walls PRM	40	0%	466	12-May-25	08-Jul-25	A1010	A2790	Place Infill Walls PRM																																																											
A2790	Demo Girders/Sidewalk & Shore In Front of PRM	1	0%	466	09-Jul-25	09-Jul-25	A2780	A2800	Demo Girders/Sidewalk & Shore In Front of PRM																																																											
A2800	Demo Remainder of Existing Span 1	10	0%	466	10-Jul-25	23-Jul-25	A2790	A2810, A1230	Demo Remainder of Existing Span 1																																																											
A2810	Construct Abutment Walls	20	0%	466	19-Sep-25	16-Oct-25	A2800, A1230	A2820	Construct Abutment Walls																																																											
A2820	Backfill Abutment	10	0%	466	17-Oct-25	30-Oct-25	A2810	A2830, A1240	Backfill Abutment																																																											
A2830	FRP Approach Slab	10	0%	716	31-Oct-25	13-Nov-25	A2820	A2840	FRP Approach Slab																																																											
A2840	FRP Sidewalk	5	0%	716	14-Nov-25	20-Nov-25	A2830	A1350	FRP Sidewalk																																																											
Substructure																																																																				
A1230	Bent 1 Shafts	40	0%	466	24-Jul-25	18-Sep-25	A1220, A2800	A1240, A2810	Bent 1 Shafts																																																											
A1240	RFP Bent 1 Columns & Cap	50	0%	466	31-Oct-25	14-Jan-26	A1230, A2820	A1250	RFP Bent 1 Columns & Cap																																																											
A1250	Bent 2 Shafts	40	0%	466	15-Jan-26	11-Mar-26	A1240	A1260, A1270	Bent 2 Shafts																																																											

Actual Level of Effort Remaining Work Milestone
 Actual Work Critical Remaining Work summary



EQRB Master
2A: EQRB NEPA Lift With East Arch

02-Jun-21 13:25

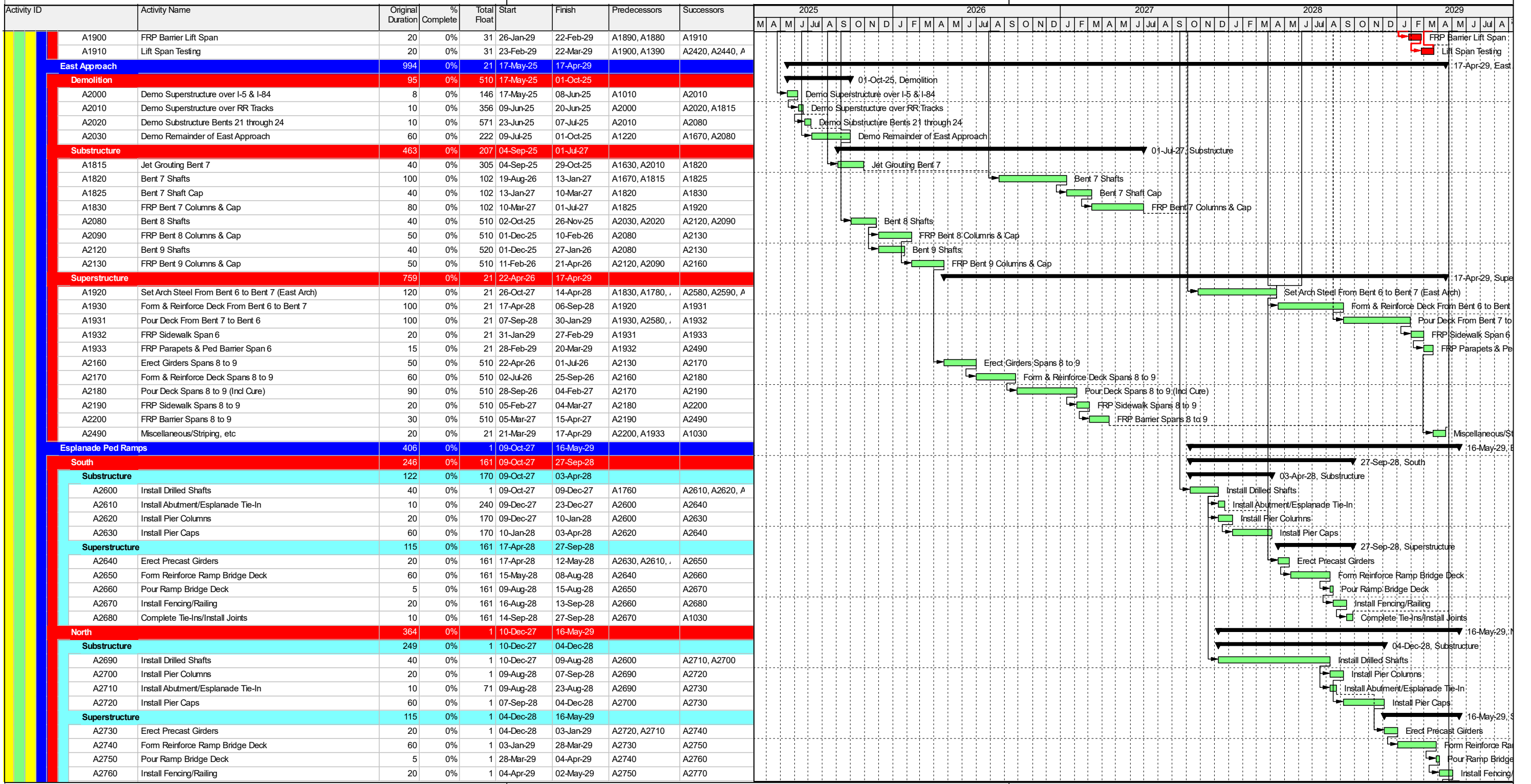
Activity ID	Activity Name	Original Duration	% Complete	Total Float	Start	Finish	Predecessors	Successors	2025												2026												2027												2028												2029											
									M	A	M	J	Jul	A	S	O	N	D	J	F	M	A	M	J	Jul	A	S	O	N	D	J	F	M	A	M	J	Jul	A	S	O	N	D	J	F	M	A	M	J	Jul	A	S	O	N	D	J	F	M	A	M	J	Jul	A	S	O	N	D		
2A: EQRB NEPA Lift With East Arch		1129	0%	0	03-Mar-25	08-Aug-29																																																														
General/Milestones		1129	0%	0	03-Mar-25	08-Aug-29																																																														
A1000	Notice To Proceed	0	0%	1	03-Mar-25			A1050, A1090	Notice To Proceed																																																											
A1010	Close Bridge to Traffic	0	0%	18	12-May-25		A1110	A1220, A1590, A	Close Bridge to Traffic																																																											
A1030	Open New Bridge to Traffic	7	0%	1	16-May-29	25-May-29*	A2480, A2490, ,	A1040	Open New Bridge to Traffic																																																											
A1040	Project Completion	0	0%	0		08-Aug-29*	A2430, A2450, ,		Project Completion																																																											
Procurement		560	0%	267	03-Mar-25	13-May-27			13-May-27, Procurement																																																											
A1050	Early Submittals	60	0%	1	03-Mar-25	23-May-25	A1000	A1060, A1070, A	Early Submittals																																																											
A1060	Procure Work Bridge Piling	30	0%	1	27-May-25	08-Jul-25	A1050	A1160, A1180	Procure Work Bridge Piling																																																											
A1070	Procure Work Bridge Superstructure	40	0%	148	27-May-25	22-Jul-25	A1050	A1170, A1190	Procure Work Bridge Superstructure																																																											
A1080	Procure Structural Steel (Incl East Arch)	500	0%	267	27-May-25	13-May-27	A1050	A1840	Procure Structural Steel (Incl East Arch)																																																											
A1130	Procure West Girder Steel	220	0%	547	27-May-25	07-Apr-26	A1050	A1840	Procure West Girder Steel																																																											
Construction		1129	0%	0	03-Mar-25	08-Aug-29																																																														
A1090	Mobilize to Site	10	0%	18	03-Mar-25	14-Mar-25	A1000	A1100	Mobilize to Site																																																											
A1100	Install Site Access/Erosion Control	20	0%	18	17-Mar-25	11-Apr-25	A1090	A1110, A1160, A	Install Site Access/Erosion Control																																																											
A1110	Railroad Crossing (East Side)	20	0%	18	14-Apr-25	09-May-25	A1100	A1190, A1010	Railroad Crossing (East Side)																																																											
A1120	River Dredging/Riprap Removal	40	0%	5	01-Jul-25	20-Aug-25	A1100	A1660, A2416	River Dredging/Riprap Removal																																																											
Temporary Works		1039	0%	0	09-Jul-25	08-Aug-29																																																														
Work Bridges		1039	0%	0	09-Jul-25	08-Aug-29																																																														
A1160	Install West Work Bridge Pile to Pier 7	20	0%	1	09-Jul-25	01-Aug-25	A1100, A1060	A1170, A1180, A	Install West Work Bridge Pile to Pier 7																																																											
A1170	Install West Work Bridge Superstructure to Pier 7	30	0%	173	25-Aug-25	07-Oct-25	A1160, A1070, ,	A1665	Install West Work Bridge Superstructure to Pier 7																																																											
A1180	Install East Work Bridge Pile to Pier 8	39	0%	1	25-Aug-25	14-Oct-25	A1060, A1160, ,	A1190, A2415	Install East Work Bridge Pile to Pier 8																																																											
A1190	Install East Work Bridge Superstructure To Pier 8	100	0%	89	14-Oct-25	09-Mar-26	A1180, A1070, ,	A2416	Install East Work Bridge Superstructure To Pier 8																																																											
A1660	Install West Work Bridge Piling Around Pier 7	20	0%	1	01-Aug-25	25-Aug-25	A1620, A1600, ,	A1665, A2415, A	Install West Work Bridge Piling Around Pier 7																																																											
A1665	Install West Work Bridge Superstructure Around Pier 7	20	0%	173	07-Oct-25	04-Nov-25	A1660, A1170	A1700	Install West Work Bridge Superstructure Around Pier 7																																																											
A2415	Install East Work Bridge Piling Around Pier 8	20	0%	1	14-Oct-25	13-Jul-26	A1610, A1630, ,	A2416	Install East Work Bridge Piling Around Pier 8																																																											
A2416	Install East Work Bridge Superstructure Around Pier 8	20	0%	1	13-Jul-26	10-Aug-26	A2415, A1190, ,	A1760, A2500	Install East Work Bridge Superstructure Around Pier 8																																																											
A2420	Remove West Work Bridge Superstructure	30	0%	51	23-Mar-29	03-May-29	A1910	A2430	Remove West Work Bridge Superstructure																																																											
A2430	Remove West Work Bridge Piling	20	0%	10	02-Jul-29	27-Jul-29	A2420	A1040	Remove West Work Bridge Piling																																																											
A2440	Remove East Work Bridge Superstructure	40	0%	31	23-Mar-29	17-May-29	A1910	A2450	Remove East Work Bridge Superstructure																																																											
A2450	Remove East Work Bridge Piling	30	0%	0	02-Jul-29	08-Aug-29	A2440	A1040	Remove East Work Bridge Piling																																																											
Towers		509	0%	76	10-Aug-26	11-Aug-28																																																														
A2500	Install West Tower 1 On Land	30	0%	213	10-Aug-26	22-Sep-26	A1220, A2416	A2510, A2550, A	Install West Tower 1 On Land																																																											
A2510	Install West Tower 2 Piling In Water	30	0%	48	22-Sep-26	02-Jul-27	A2500	A2520, A2530	Install West Tower 2 Piling In Water																																																											
A2520	Install West Tower 2 Remainder In Water	30	0%	41	02-Jul-27	16-Aug-27	A2510	A2540, A1840	Install West Tower 2 Remainder In Water																																																											
A2530	Install East Tower 1 Piling In Water	30	0%	53	02-Jul-27	10-Aug-27	A2510	A2540	Install East Tower 1 Piling In Water																																																											
A2540	Install East Tower 1 Remainder In Water	30	0%	41	16-Aug-27	28-Sep-27	A2530, A2520	A1920	Install East Tower 1 Remainder In Water																																																											
A2550	Install East Tower 2 On Land	30	0%	268	22-Sep-26	03-Nov-26	A2500	A1920	Install East Tower 2 On Land																																																											
A2560	Remove West Land Tower	15	0%	76	21-Jul-28	11-Aug-28	A1840, A2570	A1851	Remove West Land Tower																																																											
A2570	Remove West Water Tower	15	0%	83	01-Jul-28	21-Jul-28	A1840	A1851, A2560	Remove West Water Tower																																																											
A2580	Remove East Land Tower	15	0%	106	17-Apr-28	05-May-28	A1920	A1931	Remove East Land Tower																																																											
A2590	Remove East Water Tower	15	0%	65	01-Jul-28	21-Jul-28	A1920	A1931	Remove East Water Tower																																																											
New Bridge		1019	0%	1	12-May-25	16-May-29																																																														
West Approach		916	0%	104	12-May-25	20-Dec-28																																																														
Demolition		40	0%	222	12-May-25	08-Jul-25																																																														
A1220	Demolish Existing Bridge	40	0%	222	12-May-25	08-Jul-25	A1010	A1635, A2030, A	Demolish Existing Bridge																																																											
Approach/Infill		136	0%	716	12-May-25	20-Nov-25																																																														
A2780	Place Infill Walls PRM	40	0%	466	12-May-25	08-Jul-25	A1010	A2790	Place Infill Walls PRM																																																											
A2790	Demo Girders/Sidewalk & Shore In Front of PRM	1	0%	466	09-Jul-25	09-Jul-25	A2780	A2800	Demo Girders/Sidewalk & Shore In Front of PRM																																																											
A2800	Demo Remainder of Existing Span 1	10	0%	466	10-Jul-25	23-Jul-25	A2790	A2810, A1230	Demo Remainder of Existing Span 1																																																											
A2810	Construct Abutment Walls	20	0%	466	19-Sep-25	16-Oct-25	A2800, A1230	A2820	Construct Abutment Walls																																																											
A2820	Backfill Abutment	10	0%	466	17-Oct-25	30-Oct-25	A2810	A2830, A1240	Backfill Abutment																																																											

█ Remaining Level of Effort █ Remaining Work ◆ Milestone
█ Actual Work █ Critical Remaining Work ▶ Summary



EQRB Master
2A: EQRB NEPA Lift With East Arch

02-Jun-21 13:25

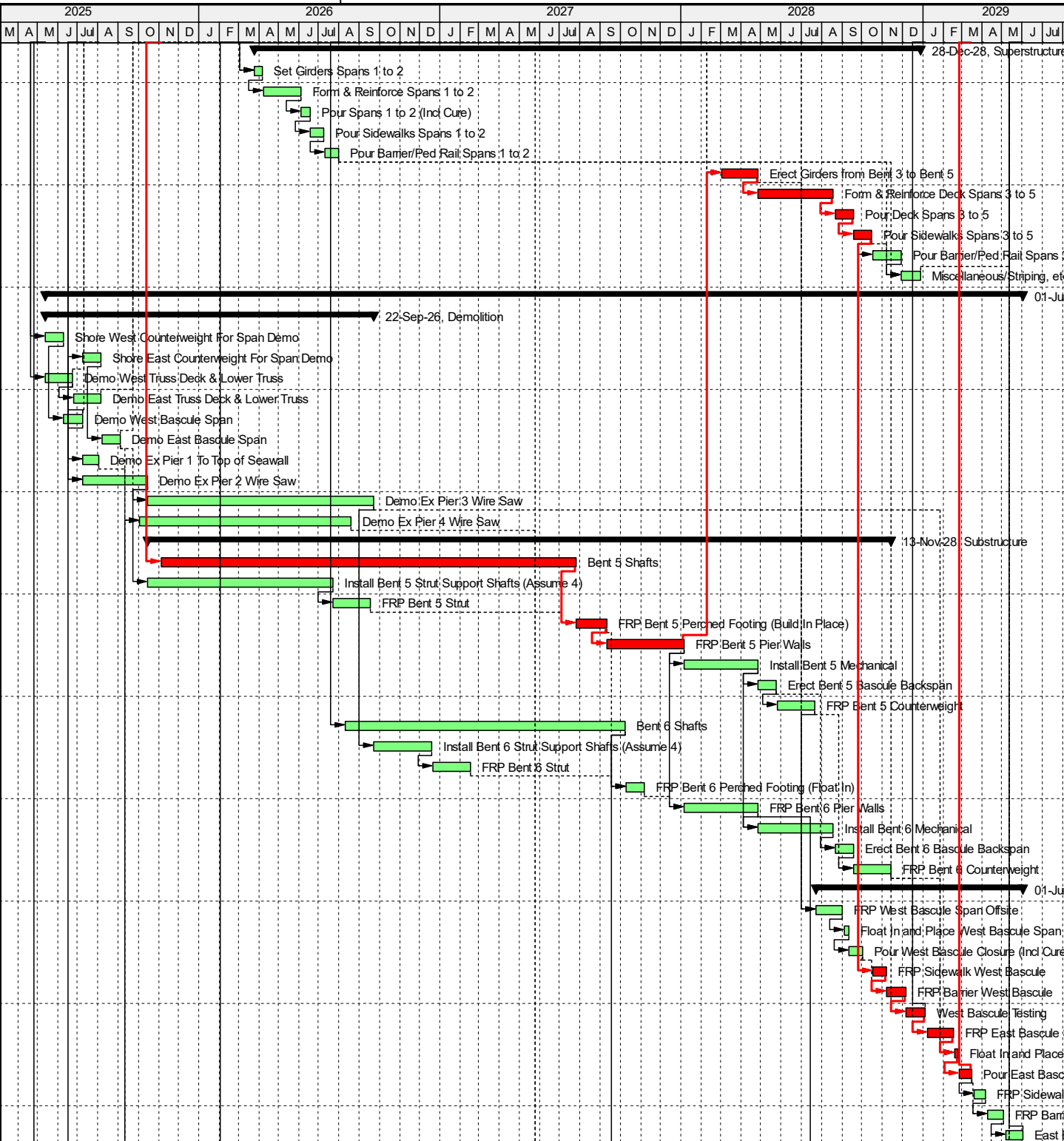


█ Remaining Level of Effort █ Remaining Work ◆ Milestone
█ Critical Remaining Work ▬ Summary
█ Actual Work

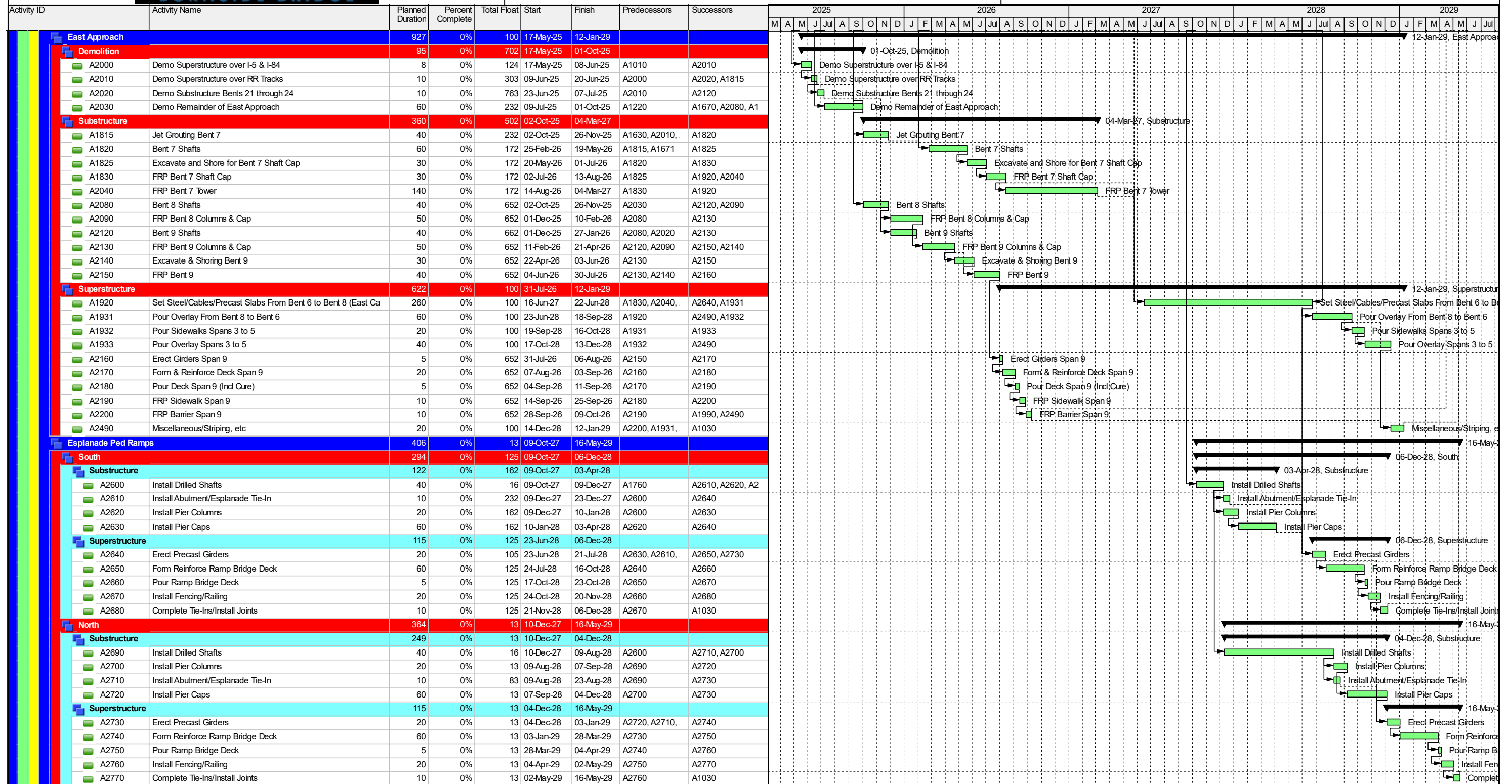
G-57



Activity ID	Activity Name	Planned Duration	Percent Complete	Total Float	Start	Finish	Predecessors	Successors	2025					2026					2027					2028					2029															
									M	A	M	J	Jul	A	S	O	N	D	J	F	M	A	M	J	Jul	A	S	O	N	D	J	F	M	A	M	J	Jul	A	S	O	N	D	J	F
Superstructure																																												
A1350	Set Girders Spans 1 to 2	10	0%	110	25-Mar-26	28-Dec-28	A1280, A2840,	A1360																																				
A1360	Form & Reinforce Spans 1 to 2	40	0%	597	08-Apr-26	03-Jun-26	A1350	A1370																																				
A1370	Pour Spans 1 to 2 (Incl Cure)	10	0%	597	04-Jun-26	17-Jun-26	A1360	A1380																																				
A1380	Pour Sidewalks Spans 1 to 2	15	0%	597	18-Jun-26	09-Jul-26	A1370	A1390																																				
A1390	Pour Barrier/Ped Rail Spans 1 to 2	15	0%	597	10-Jul-26	30-Jul-26	A1380	A1910, A2480																																				
A1840	Erect Girders from Bent 3 to Bent 5	40	0%	0	02-Mar-28	26-Apr-28	A1130, A1720,	A1860, A1851																																				
A1851	Form & Reinforce Deck Spans 3 to 5	80	0%	0	27-Apr-28	18-Aug-28	A1840	A1855																																				
A1855	Pour Deck Spans 3 to 5	20	0%	0	21-Aug-28	18-Sep-28	A1851	A1861																																				
A1861	Pour Sidewalks Spans 3 to 5	20	0%	0	19-Sep-28	16-Oct-28	A1855	A1890, A2480, A1																																				
A1871	Pour Barrier/Ped Rail Spans 3 to 5	30	0%	110	17-Oct-28	29-Nov-28	A1861	A2480																																				
A2480	Miscellaneous/Striping, etc	20	0%	110	30-Nov-28	28-Dec-28	A1390, A1861,	A1030																																				
River Spans																																												
Demolition																																												
A1590	Shore West Counterweight For Span Demo	20	0%	17	12-May-25	09-Jun-25	A1010	A1620																																				
A1595	Shore East Counterweight For Span Demo	20	0%	213	09-Jul-25	05-Aug-25	A1620	A1630																																				
A1600	Demo West Truss Deck & Lower Truss	30	0%	27	12-May-25	23-Jun-25	A1010	A1610, A1640, A1																																				
A1610	Demo East Truss Deck & Lower Truss	30	0%	233	24-Jun-25	05-Aug-25	A1600	A2415																																				
A1620	Demo West Bascule Span	20	0%	17	10-Jun-25	08-Jul-25	A1590	A1595, A1640, A1																																				
A1630	Demo East Bascule Span	20	0%	213	06-Aug-25	03-Sep-25	A1595	A1650, A2415, A1																																				
A1635	Demo Ex Pier 1 To Top of Seawall	20	0%	205	09-Jul-25	01-Aug-25	A1220	A1670																																				
A1640	Demo Ex Pier 2 Wire Saw	80	0%	46	09-Jul-25	15-Oct-25	A1600, A1620	A1650, A1701																																				
A1650	Demo Ex Pier 3 Wire Saw	80	0%	46	15-Oct-25	22-Sep-26	A1640, A1630	A1950, A1761																																				
A1670	Demo Ex Pier 4 Wire Saw	60	0%	155	02-Oct-25	19-Aug-26	A1635, A2030	A1920																																				
Substructure																																												
A1700	Bent 5 Shafts	180	0%	35	15-Oct-25	13-Nov-28	A1665	A1710																																				
A1701	Install Bent 5 Strut Support Shafts (Assume 4)	60	0%	120	15-Oct-25	22-Jul-26	A1640	A1702																																				
A1702	FRP Bent 5 Strut	40	0%	216	22-Jul-26	17-Sep-26	A1701	A1710																																				
A1710	FRP Bent 5 Perched Footing (Build In Place)	40	0%	0	26-Jul-27	10-Sep-27	A1700, A1702	A1720, A1770																																				
A1720	FRP Bent 5 Pier Walls	80	0%	0	10-Sep-27	05-Jan-28	A1710	A1730, A1780, A1																																				
A1730	Install Bent 5 Mechanical	80	0%	10	06-Jan-28	26-Apr-28	A1720	A1740, A1790																																				
A1740	Erect Bent 5 Bascule Backspan	20	0%	10	27-Apr-28	24-May-28	A1730	A1750, A1800																																				
A1750	FRP Bent 5 Counterweight	40	0%	10	25-May-28	21-Jul-28	A1740	A1810, A1860																																				
A1760	Bent 6 Shafts	180	0%	16	10-Aug-26	08-Oct-27	A2416	A1770, A2600																																				
A1761	Install Bent 6 Strut Support Shafts (Assume 4)	60	0%	79	22-Sep-26	19-Dec-26	A1650	A1762																																				
A1762	FRP Bent 6 Strut	40	0%	200	21-Dec-26	16-Feb-27	A1761	A1770																																				
A1770	FRP Bent 6 Perched Footing (Float In)	20	0%	34	09-Oct-27	06-Nov-27	A1760, A1710,	A1780																																				
A1780	FRP Bent 6 Pier Walls	80	0%	35	06-Jan-28	26-Apr-28	A1770, A1720	A1790, A1920																																				
A1790	Install Bent 6 Mechanical	80	0%	35	27-Apr-28	18-Aug-28	A1780, A1730	A1800																																				
A1800	Erect Bent 6 Bascule Backspan	20	0%	35	21-Aug-28	18-Sep-28	A1790, A1740	A1810																																				
A1810	FRP Bent 6 Counterweight	40	0%	35	19-Sep-28	13-Nov-28	A1800, A1750	A1940, A1950																																				
Superstructure																																												
A1860	FRP West Bascule Span Offsite	30	0%	10	24-Jul-28	01-Sep-28	A1750, A1840,	A1870																																				
A1870	Float In and Place West Bascule Span	5	0%	10	05-Sep-28	11-Sep-28	A1860	A1880																																				
A1880	Pour West Bascule Closure (Incl Cure)	15	0%	10	12-Sep-28	02-Oct-28	A1870	A1890, A1900																																				
A1890	FRP Sidewalk West Bascule	15	0%	0	17-Oct-28	06-Nov-28	A1880, A1861	A1900																																				
A1900	FRP Barrier West Bascule	20	0%	0	07-Nov-28	06-Dec-28	A1890, A1880	A1910																																				
A1910	West Bascule Testing	20	0%	0	07-Dec-28	05-Jan-29	A1900, A1390	A1940, A2420																																				
A1940	FRP East Bascule Span Offsite	30	0%	0	08-Jan-29	16-Feb-29	A1910, A1810	A1950																																				
A1950	Float In and Place East Bascule Span	5	0%	0	19-Feb-29	23-Feb-29	A1940, A1810,	A1960																																				
A1960	Pour East Bascule Closure (Incl Cure)	15	0%	0	26-Feb-29	16-Mar-29	A1950	A1970, A2440, A1																																				
A1970	FRP Sidewalk East Bascule	15	0%	0	19-Mar-29	06-Apr-29	A1960	A1980																																				
A1980	FRP Barrier East Bascule	20	0%	0	09-Apr-29	04-May-29	A1970, A1960	A1990																																				
A1990	East Bascule Testing	20	0%	0	07-May-29	01-Jun-29	A1980, A2200	A1030																																				



Actual Level of Effort (Blue bar) Remaining Work (Green bar) Milestone (Diamond) summary (Black arrow)
 Actual Work (Blue bar) Critical Remaining Work (Red bar)



■ Actual Level of Effort ■ Remaining Work ■ Critical Remaining Work
▬ Actual Work ▬ Critical Remaining Work



EQRB Master
4A: EQRB NEPA Lift With East Cable Stay

02-Jun-21 13:26

Activity ID	Activity Name	Original Duration	% Complete	Total Float	Start	Finish	Predecessors	Successors	2025												2026												2027												2028												2029											
									M	A	M	J	Jul	A	S	O	N	D	J	F	M	A	M	J	Jul	A	S	O	N	D	J	F	M	A	M	J	Jul	A	S	O	N	D	J	F	M	A	M	J	Jul	A	S	O	N	D	J	F	M	A	M	J	Jul	A	S	O	N	D		
4A: EQRB NEPA Lift With East Cable Stay																																																																				
General/Milestones																																																																				
A1000	Notice To Proceed	0	0%	1	03-Mar-25			A1050, A1090	Notice To Proceed																																																											
A1010	Close Bridge to Traffic	0	0%	18	12-May-25		A1110	A1220, A1590, A	Close Bridge to Traffic																																																											
A1030	Open New Bridge to Traffic	7	0%	1	22-Jun-29	02-Jul-29*	A2480, A2490, ,	A1040	Open New Bridge to Traffic																																																											
A1040	Project Completion	0	0%	0		08-Aug-29*	A2430, A2450, ,		Project Completion																																																											
Procurement																																																																				
A1050	Early Submittals	60	0%	1	03-Mar-25	23-May-25	A1000	A1060, A1070, A	Early Submittals																																																											
A1060	Procure Work Bridge Piling	30	0%	1	27-May-25	08-Jul-25	A1050	A1160, A1180	Procure Work Bridge Piling																																																											
A1070	Procure Work Bridge Superstructure	40	0%	24	27-May-25	22-Jul-25	A1050	A1170, A1190	Procure Work Bridge Superstructure																																																											
A1080	Procure Structural Steel (Movable & East Cable Stay)	500	0%	137	27-May-25	13-May-27	A1050	A1860, A1920	Procure Structural Steel (Movable & East Cable Stay)																																																											
A1130	Procure West Girder Steel	380	0%	217	27-May-25	20-Nov-26	A1050	A1840	Procure West Girder Steel																																																											
Construction																																																																				
A1090	Mobilize to Site	10	0%	18	03-Mar-25	14-Mar-25	A1000	A1100	Mobilize to Site																																																											
A1100	Install Site Access/Erosion Control	20	0%	18	17-Mar-25	11-Apr-25	A1090	A1110, A1160, A	Install Site Access/Erosion Control																																																											
A1110	Railroad Crossing (East Side)	20	0%	18	14-Apr-25	09-May-25	A1100	A1190, A1010	Railroad Crossing (East Side)																																																											
A1120	River Dredging/Riprap Removal	40	0%	5	01-Jul-25	20-Aug-25	A1100	A1660, A2416	River Dredging/Riprap Removal																																																											
Temporary Works																																																																				
Work Bridges																																																																				
A1160	Install West Work Bridge Pile to Pier 7	20	0%	1	09-Jul-25	01-Aug-25	A1100, A1060	A1170, A1180, A	Install West Work Bridge Pile to Pier 7																																																											
A1170	Install West Work Bridge Superstructure to Pier 7	30	0%	1	25-Aug-25	07-Oct-25	A1160, A1070, ,	A1665	Install West Work Bridge Superstructure to Pier 7																																																											
A1180	Install East Work Bridge Pile to Pier 8	39	0%	12	25-Aug-25	14-Oct-25	A1060, A1160, ,	A1190, A2415	Install East Work Bridge Pile to Pier 8																																																											
A1190	Install East Work Bridge Superstructure To Pier 8	100	0%	116	14-Oct-25	09-Mar-26	A1180, A1070, ,	A2416	Install East Work Bridge Superstructure To Pier 8																																																											
A1660	Install West Work Bridge Piling Around Pier 7	20	0%	1	01-Aug-25	25-Aug-25	A1620, A1600, ,	A1665, A2415, A	Install West Work Bridge Piling Around Pier 7																																																											
A1665	Install West Work Bridge Superstructure Around Pier 7	20	0%	1	07-Oct-25	04-Nov-25	A1660, A1170	A1700	Install West Work Bridge Superstructure Around Pier 7																																																											
A2415	Install East Work Bridge Piling Around Pier 8	20	0%	33	14-Oct-25	13-Jul-26	A1610, A1630, ,	A2416	Install East Work Bridge Piling Around Pier 8																																																											
A2416	Install East Work Bridge Superstructure Around Pier 8	20	0%	28	13-Jul-26	10-Aug-26	A2415, A1190, ,	A1760	Install East Work Bridge Superstructure Around Pier 8																																																											
A2420	Remove West Work Bridge Superstructure	30	0%	51	23-Mar-29	03-May-29	A1910	A2430	Remove West Work Bridge Superstructure																																																											
A2430	Remove West Work Bridge Piling	20	0%	10	02-Jul-29	27-Jul-29	A2420	A1040	Remove West Work Bridge Piling																																																											
A2440	Remove East Work Bridge Superstructure	40	0%	31	23-Mar-29	17-May-29	A1910	A2450	Remove East Work Bridge Superstructure																																																											
A2450	Remove East Work Bridge Piling	30	0%	0	02-Jul-29	08-Aug-29	A2440	A1040	Remove East Work Bridge Piling																																																											
New Bridge																																																																				
West Approach																																																																				
Demolition																																																																				
A1220	Demolish Existing Bridge	40	0%	187	12-May-25	08-Jul-25	A1010	A1635, A2030, A	Demolish Existing Bridge																																																											
Approach/Infill																																																																				
A2780	Place Infill Walls PRM	40	0%	771	12-May-25	08-Jul-25	A1010	A2790	Place Infill Walls PRM																																																											
A2790	Demo Girders/Sidewalk & Shore In Front of PRM	1	0%	771	09-Jul-25	09-Jul-25	A2780	A2800	Demo Girders/Sidewalk & Shore In Front of PRM																																																											
A2800	Demo Remainder of Existing Span 1	10	0%	771	10-Jul-25	23-Jul-25	A2790	A2810	Demo Remainder of Existing Span 1																																																											
A2810	Construct Abutment Walls	20	0%	742	04-Sep-25	01-Oct-25	A2800, A1230	A2820	Construct Abutment Walls																																																											
A2820	Backfill Abutment	10	0%	742	02-Oct-25	15-Oct-25	A2810	A2830, A1240	Backfill Abutment																																																											
A2830	FRP Approach Slab	10	0%	777	16-Oct-25	29-Oct-25	A2820	A2840	FRP Approach Slab																																																											
A2840	FRP Sidewalk	5	0%	777	30-Oct-25	05-Nov-25	A2830	A1350	FRP Sidewalk																																																											
Substructure																																																																				
A1230	Bent 1 Shafts	40	0%	187	09-Jul-25	03-Sep-25	A1220	A1240, A1250, A	Bent 1 Shafts																																																											
A1240	RFP Bent 1 Columns & Cap	50	0%	742	16-Oct-25	29-Dec-25	A1230, A2820	A1350	RFP Bent 1 Columns & Cap																																																											
A1250	Bent 2 Shafts	40	0%	187	04-Sep-25	29-Oct-25	A1220, A1230	A1260, A1270	Bent 2 Shafts																																																											
A1260	RFP Bent 2 Columns & Cap	50	0%	682	30-Oct-25	13-Jan-26	A1250	A1280	RFP Bent 2 Columns & Cap																																																											
A1270	Bent 3 Shafts	40	0%	187	30-Oct-25	29-Dec-25	A1250	A1280, A1671	Bent 3 Shafts																																																											
A1280	RFP Bent 3 Columns & Cap	50	0%	682	14-Jan-26	24-Mar-26	A1260, A1270	A1350	RFP Bent 3 Columns & Cap																																																											
A1671	Bent 4 Shafts	40	0%	187	30-Dec-25	24-Feb-26	A1050, A1270	A1672, A1820	Bent 4 Shafts																																																											
A1672	Excavate and Shore for Bent 4 Shaft Cap	15	0%	372	25-Feb-26	17-Mar-26	A1671	A1673	Excavate and Shore for Bent 4 Shaft Cap																																																											

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EQRB Master
4A: EQRB NEPA Lift With East Cable Stay

02-Jun-21 13:26

Activity ID | Activity Name | Original Duration | % Complete | Total Float | Start | Finish | Predecessors | Successors | 2025 | 2026 | 2027 | 2028 | 2029

Legend: Remaining Level of Effort (Green), Actual Work (Blue), Remaining Work (Light Green), Critical Remaining Work (Red), Milestone (Diamond), Summary (Arrow)

TASK filter: All Activities

Appendix H. Summary of Bridge Alternative Comparisons

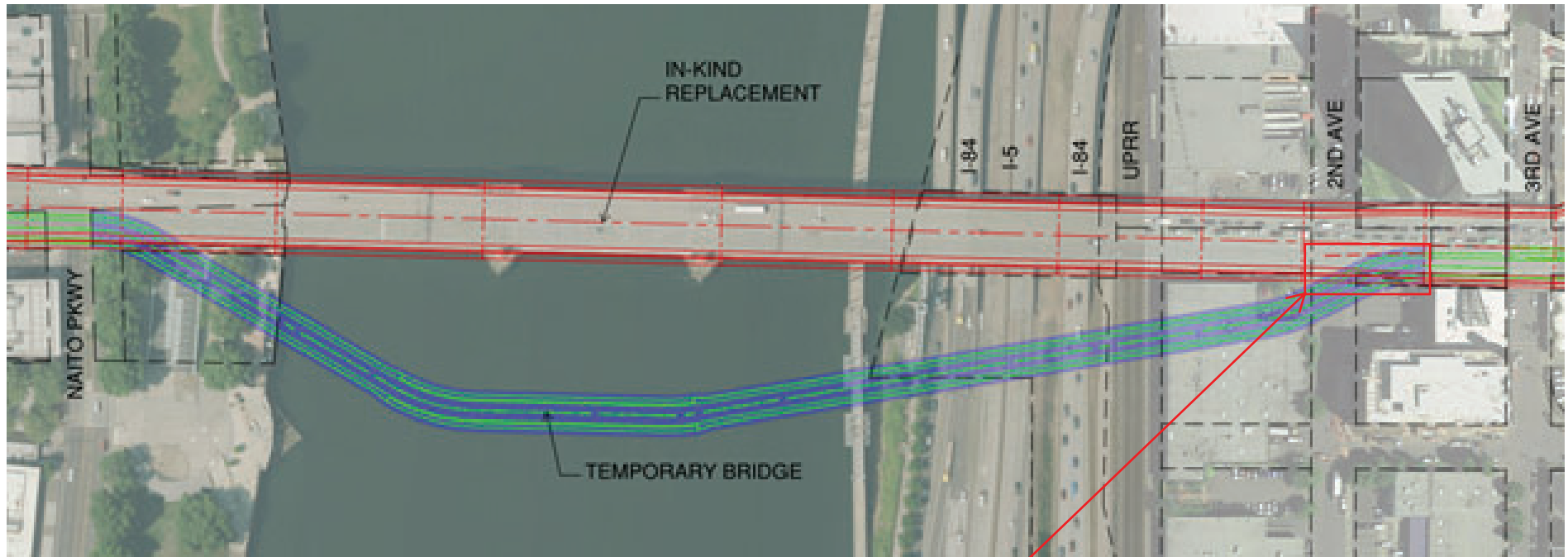
Anticipated Construction Impact Comparison Chart

Note: Not All Impacts Shown; Only Those That Vary By Alternative

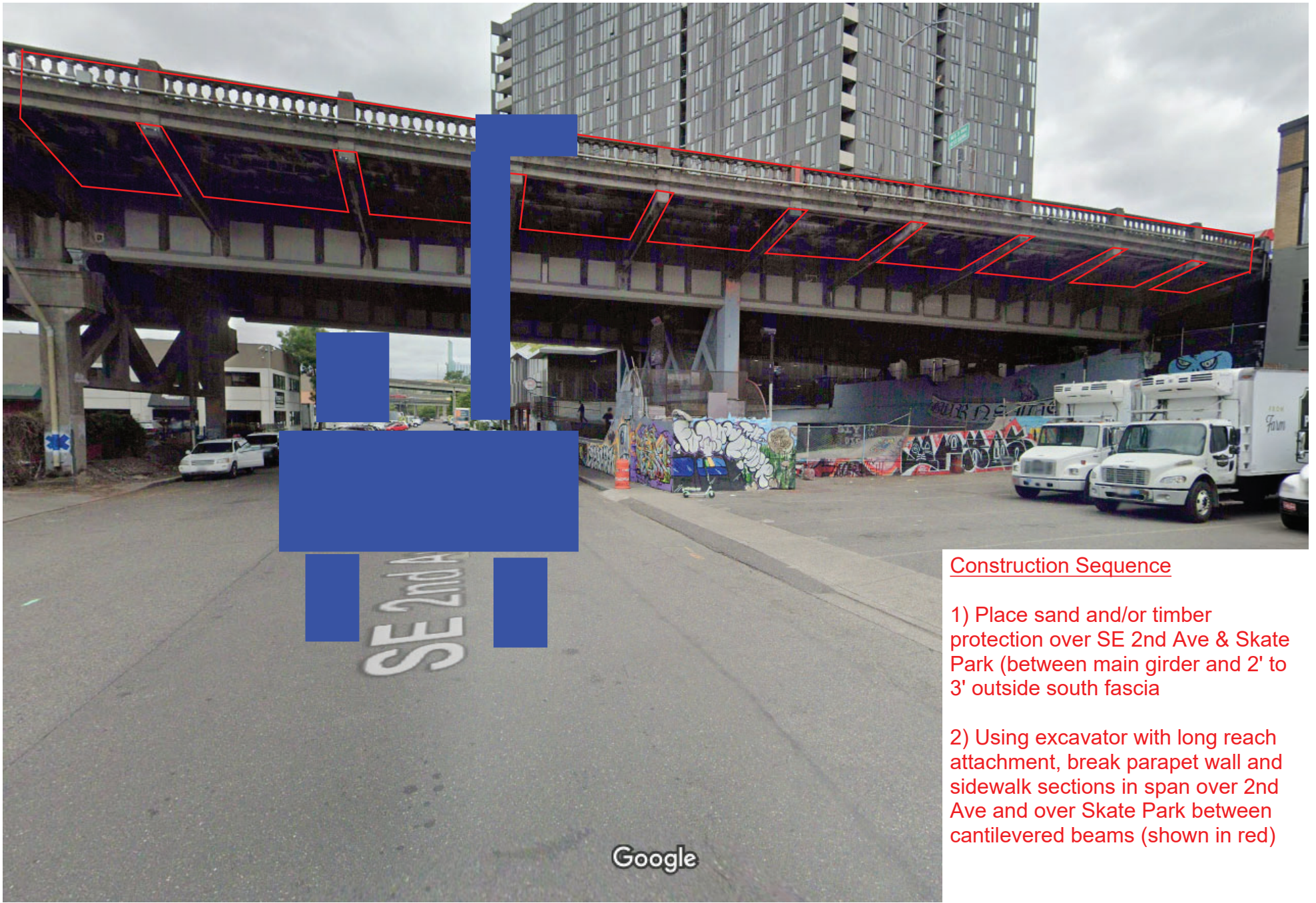
Anticipated Impact	Alternative			
	Enhanced Retrofit	Replacement In-Kind With Conventional Span Approaches	Replacement In-Kind with Long Span Approaches	Replacement with Couch Connection
Construction Duration (with Temporary Diversion Bridge)	5 yrs	6.5 yrs	6.5 yrs	6.5 yrs
Construction Duration (no Temporary Diversion Bridge)	3.5 yrs	4.5 yrs	4.5 yrs	4.5 yrs
Cofferdam Required at Ex Pier 1/Bent 7	Yes	Yes - for Ground Improvements	No	Yes - for Ground Improvements
Cofferdam Required at Bent 10	N/A	Yes	No	Yes
Relocation of City Sewer Pipes Required at Ex Pier 1	Yes	No	No	No
Removal and Replacement of Harbor Wall Required	Yes	Potentially - to accommodate ground improvements	No	Potentially - to accommodate ground improvements
New Pier Built In Waterfront Park	N/A	Yes	No	Yes
Piers Requiring Ground Improvements	Pier 1, Pier 4, Bent 22, Bent 24/25, Bent 26	Bents 7, 10, 11, 12, and 13	Bent 9	Bents 7, 10, 11, 12, and 13
I-5 and I-84 Ramp Closures	Weekends Required	Weekends Required	Weeknights Possible if Ex. Deck used as false deck	Weekends Required
Esplanade Closures	26 Months	30 Months	18 Months	30 Months
Burnside Skate Park Impacts/Closures	Closed for Duration of Project and Rebuilt	Intermittent Closures During Demolition and Girder Erection	Intermittent Closures During Demolition and Girder Erection	Intermittent Closures During Demolition and Girder Erection
Business and Resident Access Affected On Couch St	No	No	No	Yes
TriMet LRT Cumulative Closure Duration (no Temp Diversion Bridge)	8 Weeks	5 Weeks	5 Weeks	5 Weeks

Appendix I. East Approach Temporary Bridge Tie-In and Construction Sequence

Possible Construction Sequence for East Approach Temporary Bridge Tie-In



East approach
temporary bridge
tie-in

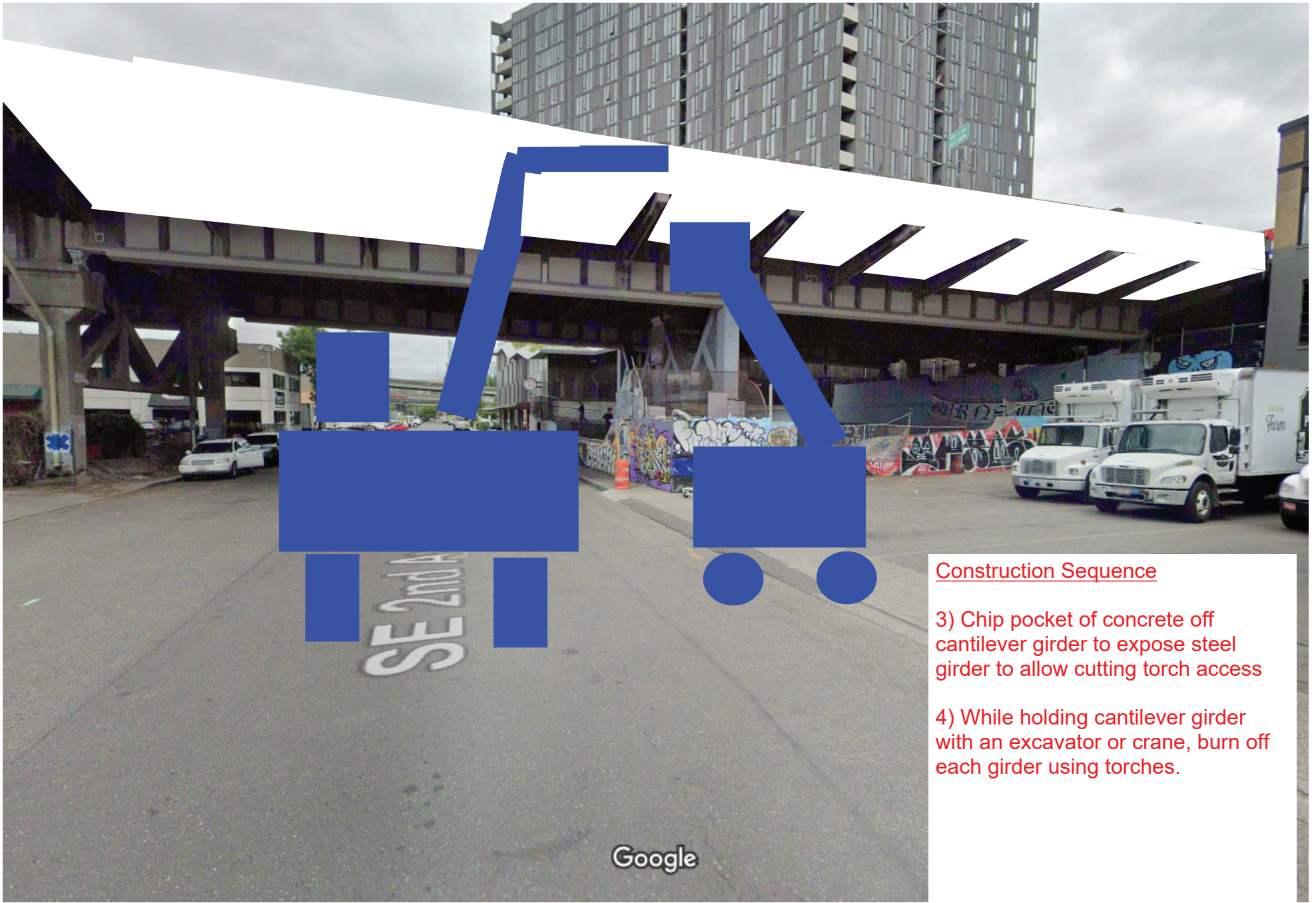


Construction Sequence

1) Place sand and/or timber protection over SE 2nd Ave & Skate Park (between main girder and 2' to 3' outside south fascia)

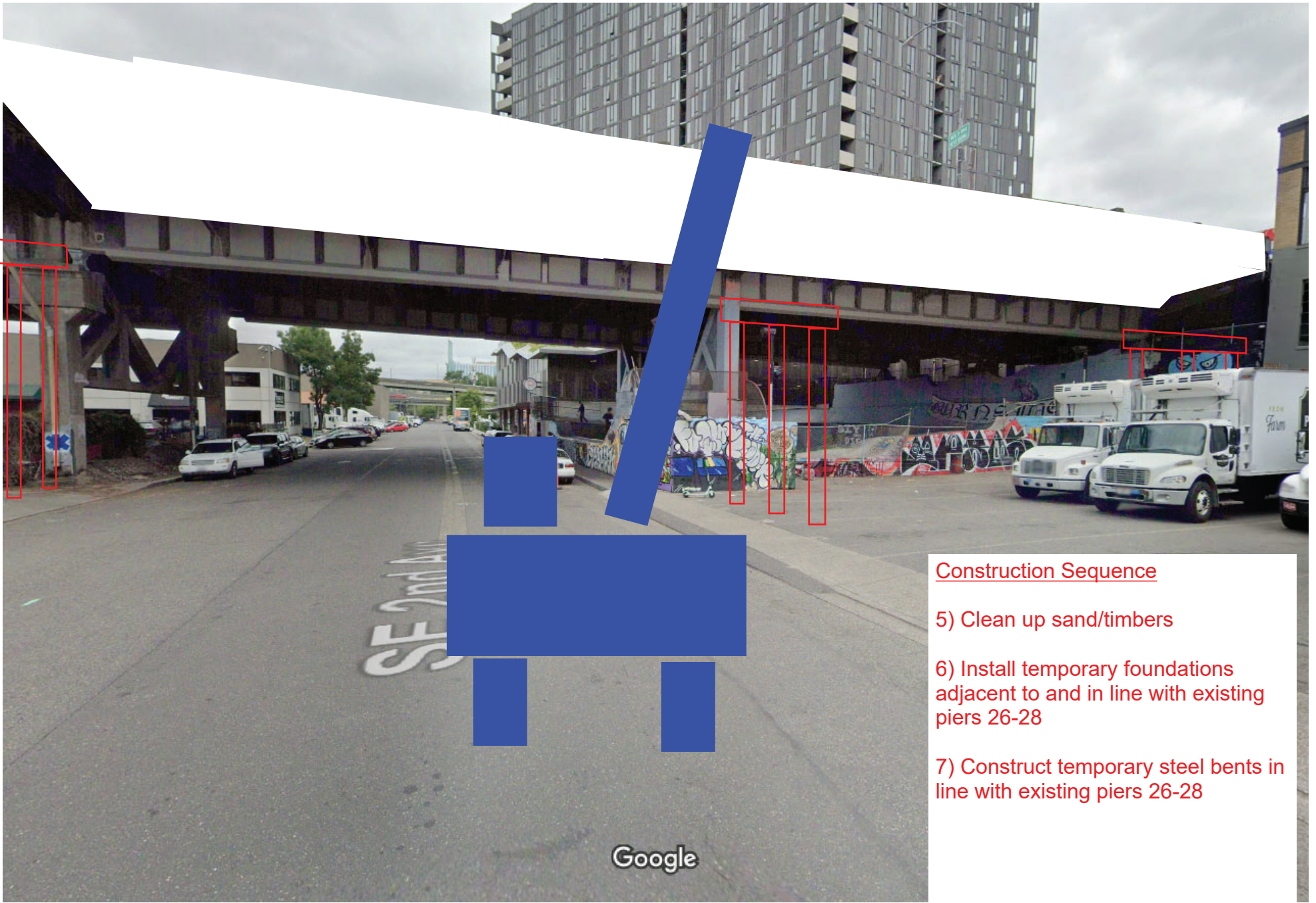
2) Using excavator with long reach attachment, break parapet wall and sidewalk sections in span over 2nd Ave and over Skate Park between cantilevered beams (shown in red)

Google



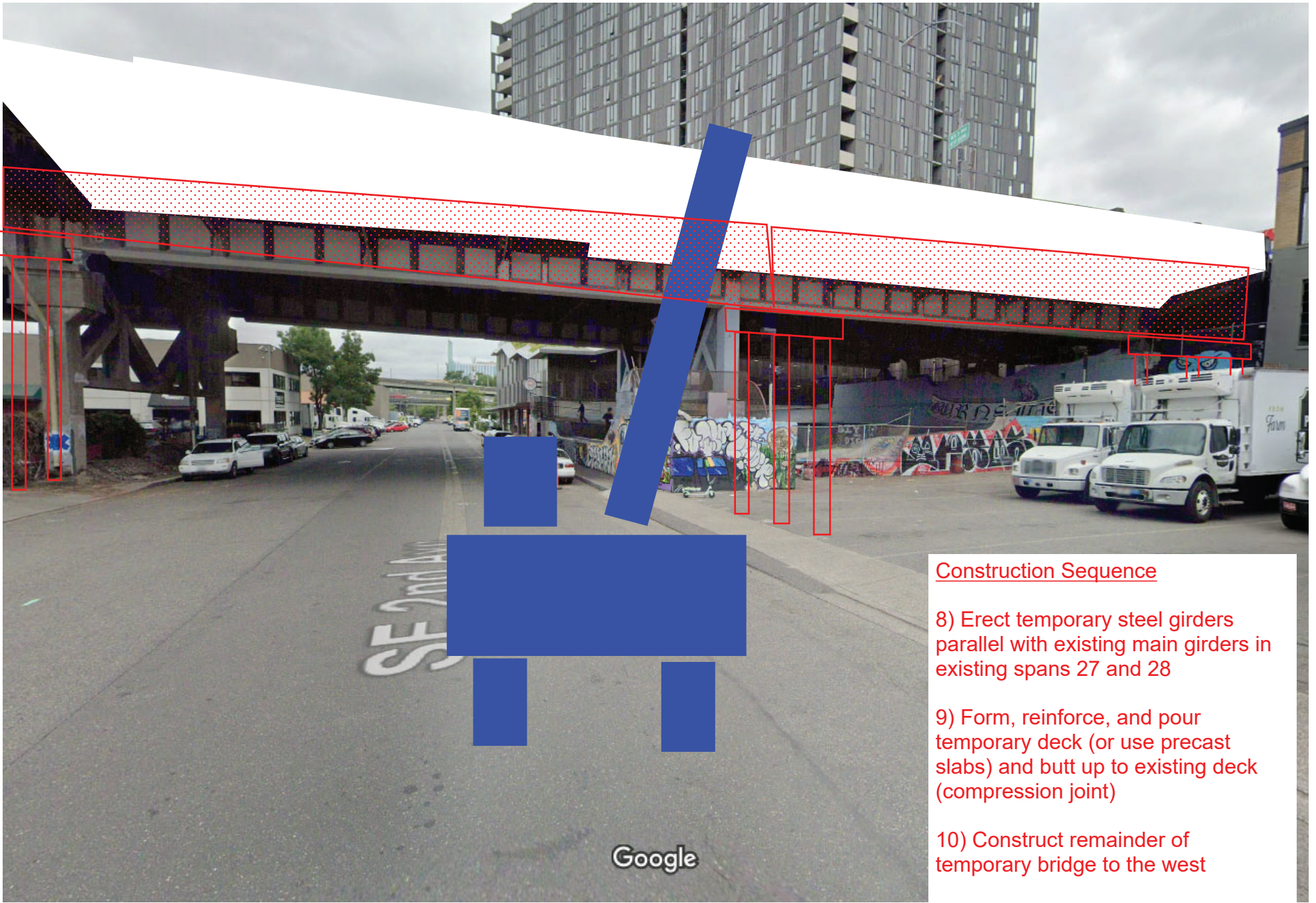
Construction Sequence

- 3) Chip pocket of concrete off cantilever girder to expose steel girder to allow cutting torch access
- 4) While holding cantilever girder with an excavator or crane, burn off each girder using torches.



Construction Sequence

- 5) Clean up sand/timbers
- 6) Install temporary foundations adjacent to and in line with existing piers 26-28
- 7) Construct temporary steel bents in line with existing piers 26-28

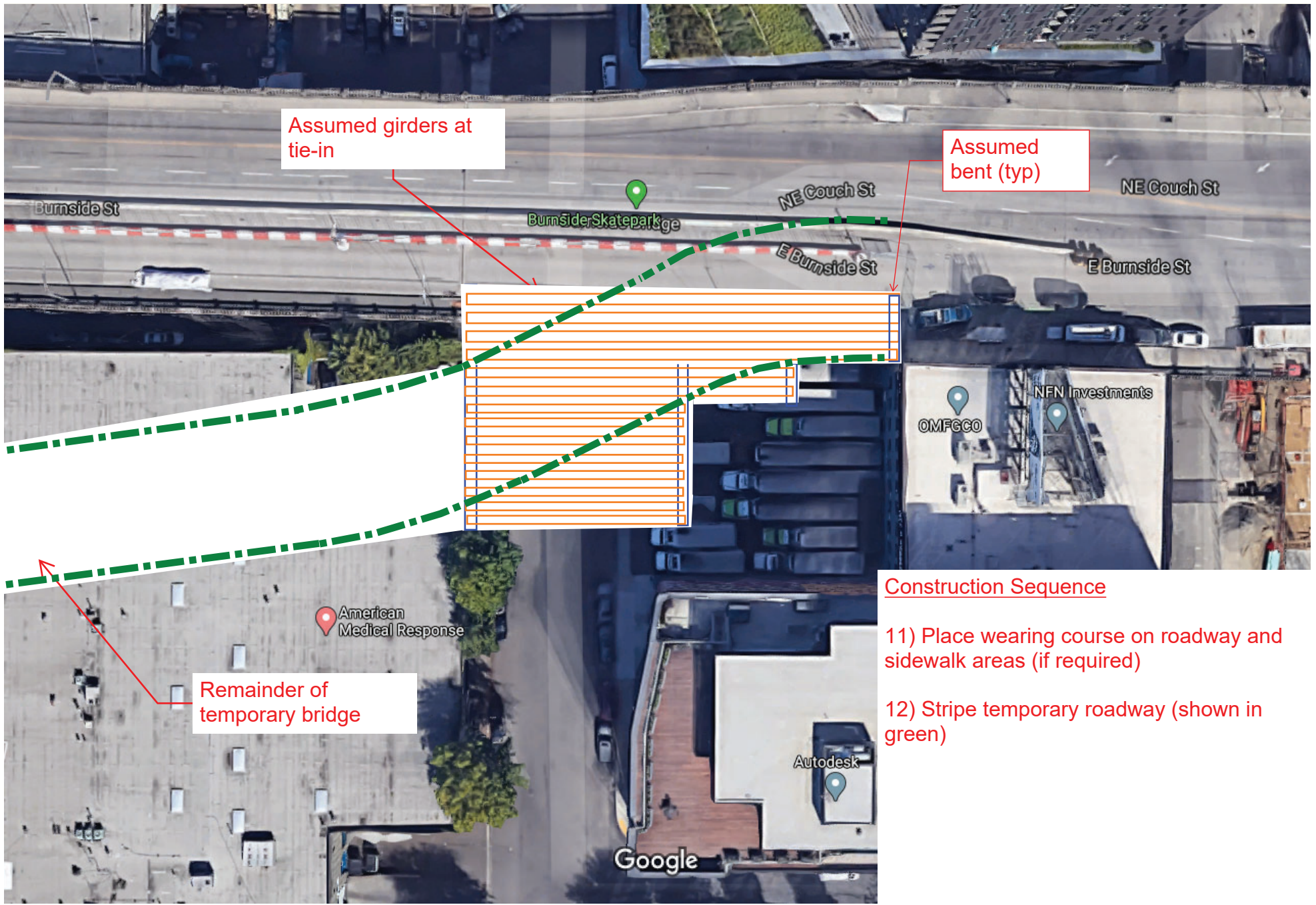


Construction Sequence

8) Erect temporary steel girders parallel with existing main girders in existing spans 27 and 28

9) Form, reinforce, and pour temporary deck (or use precast slabs) and butt up to existing deck (compression joint)

10) Construct remainder of temporary bridge to the west



Assumed girders at tie-in

Assumed bent (typ)

Remainder of temporary bridge

Construction Sequence

- 11) Place wearing course on roadway and sidewalk areas (if required)
- 12) Stripe temporary roadway (shown in green)



Construction Sequence

13) Chip off concrete on cross beams under deck over 2nd Ave to expose steel to be cut/torched

14) Install temporary bents on either side of 2nd Ave for temporary shoring

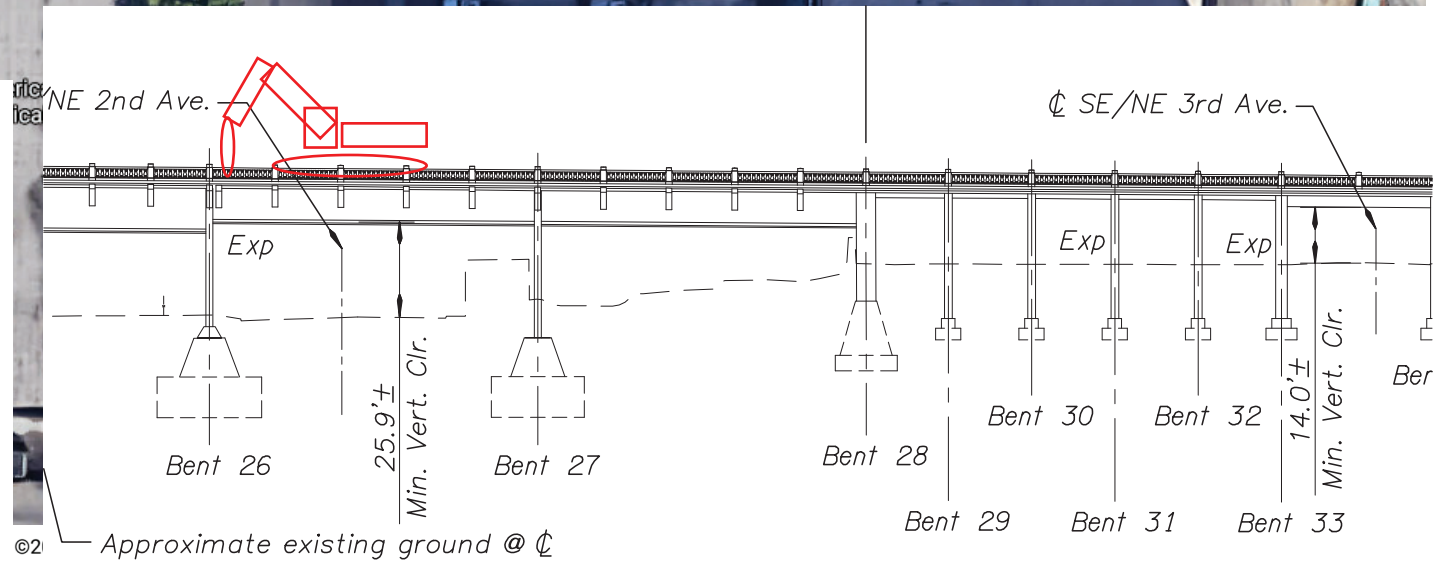
15) Using hydraulic jacks, install temporary shoring beam along centerline of bridge to allow demolition of north half

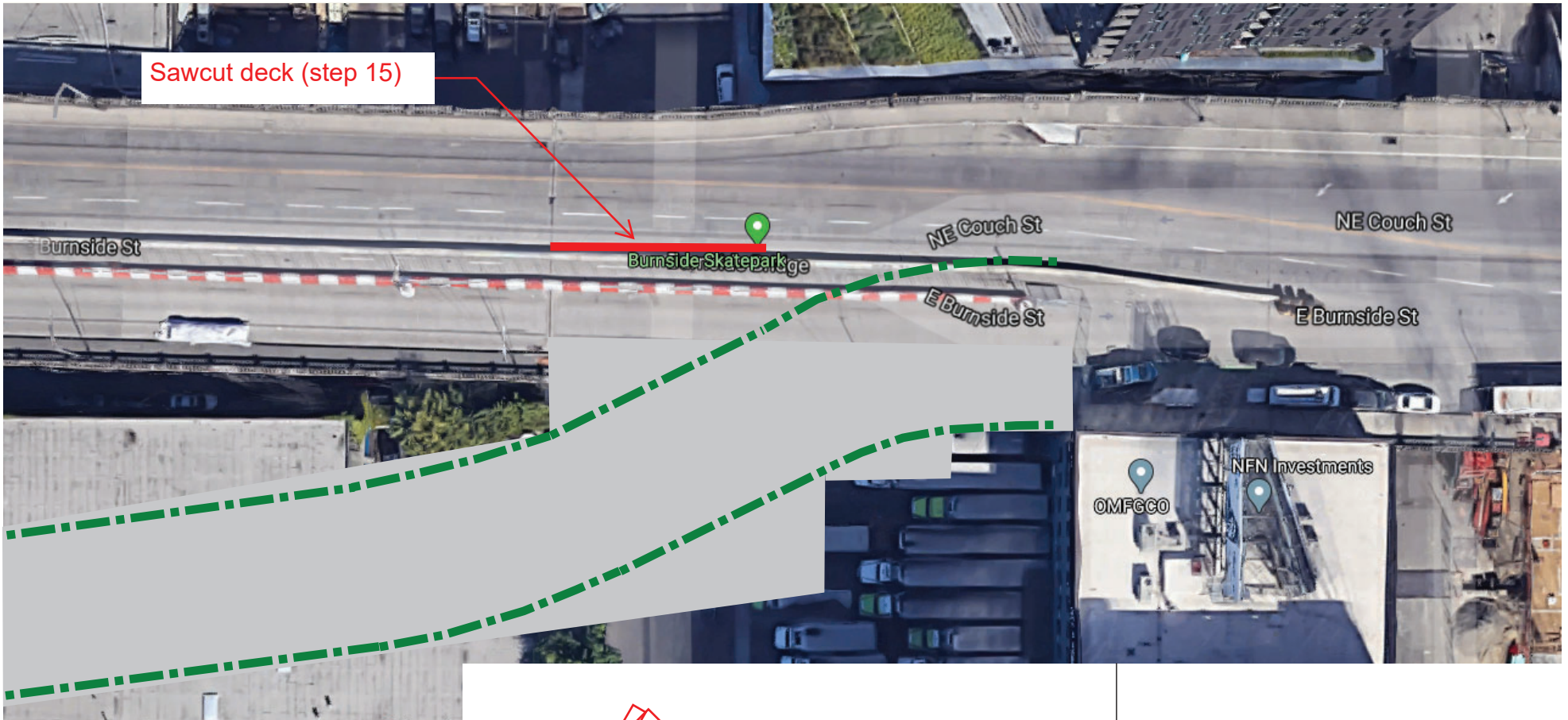


Construction Sequence

16) Place sand and/or timbers over 2nd Ave and timbers over the skate park for protection

17) Using excavator with bucket attachment, pull north parapet in span 26 back onto deck and load into trucks (entering & leaving from east approach).



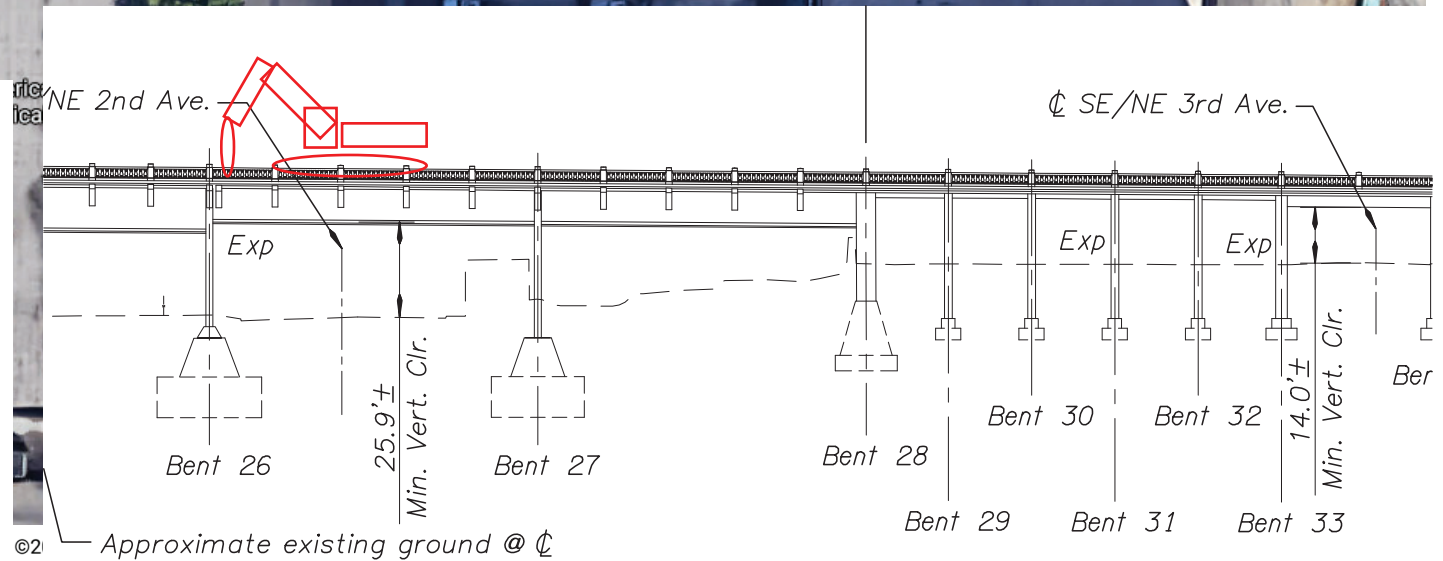


Sawcut deck (step 15)

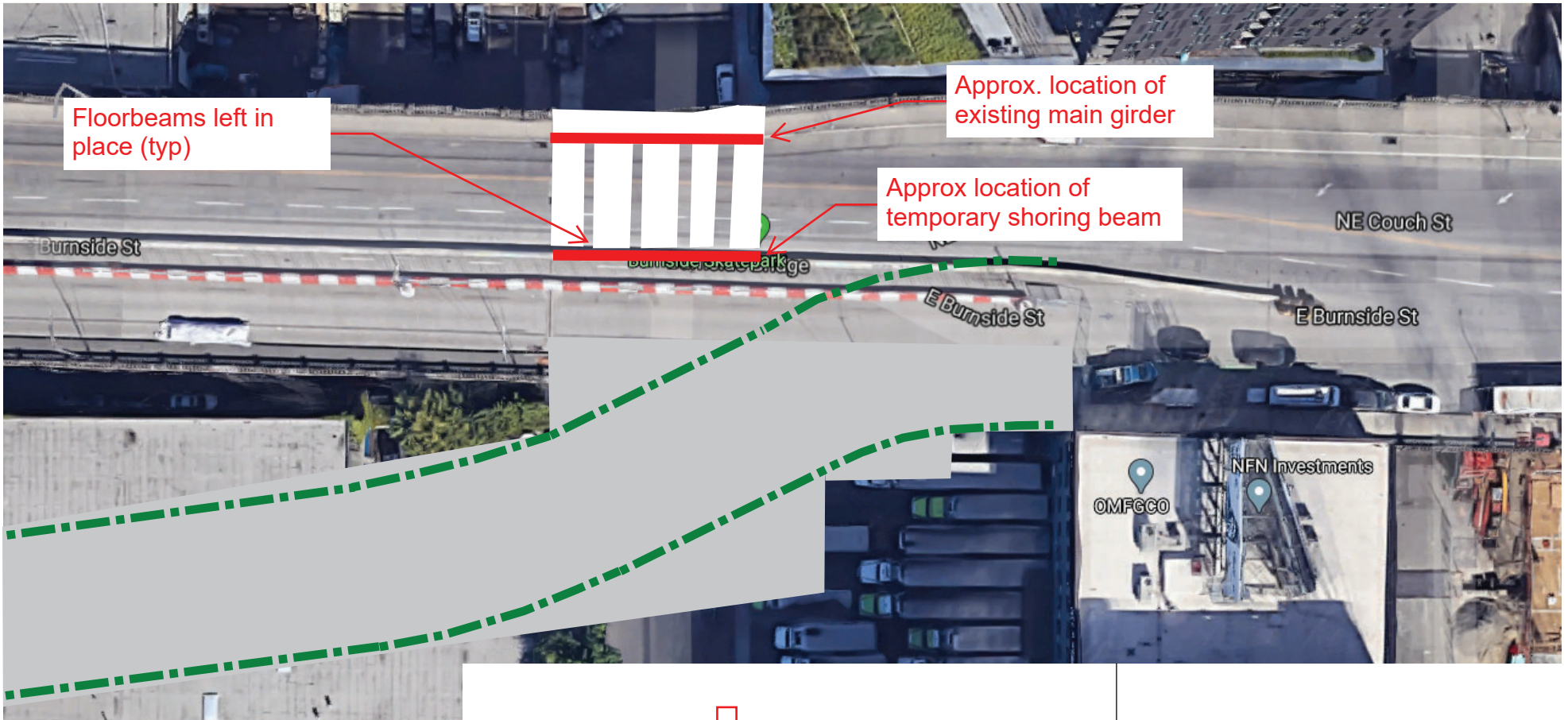
Construction Sequence

18) Sawcut longitudinal cut through deck just north of temporary support beam to allow clean separation.

19) Using processing attachment, break sidewalk and deck into small (less than 6") pieces and drop to sand bed on 2nd below. Break only span 26.



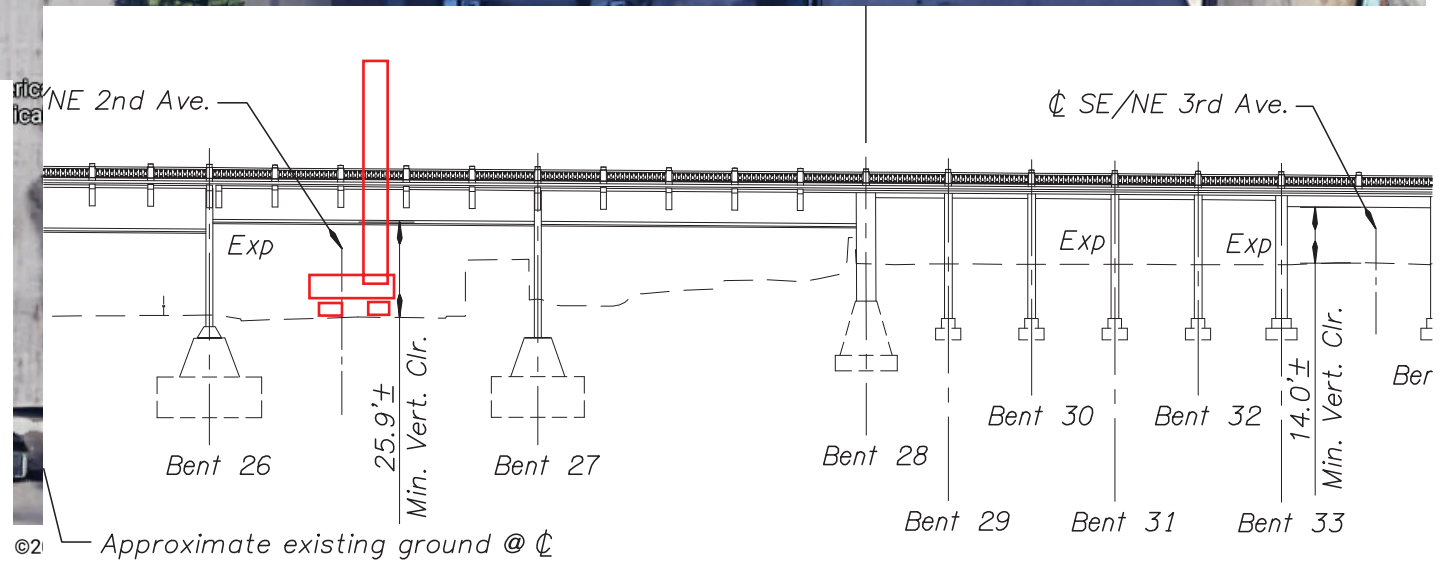
©2 — Approximate existing ground @ ∇

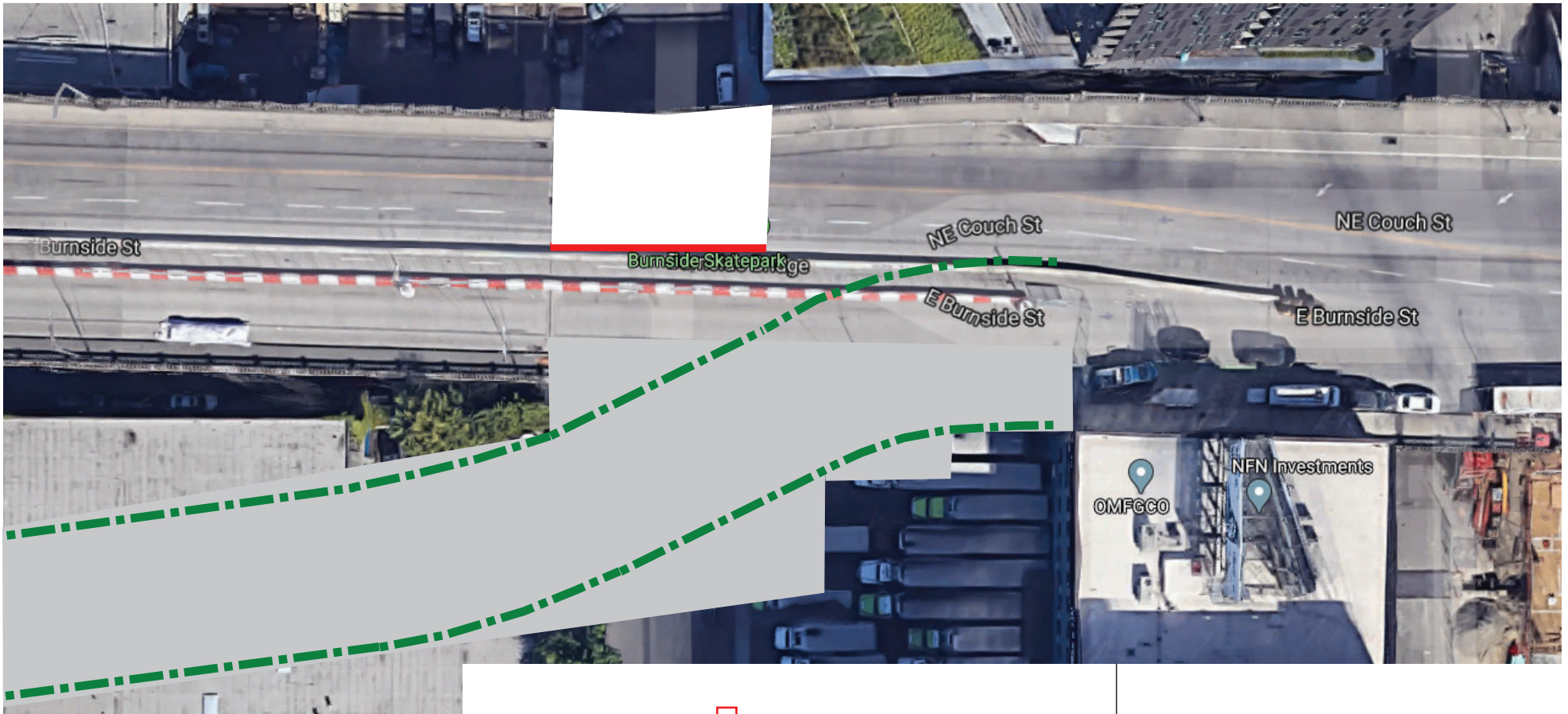


Construction Sequence

20) Using chipping gun, chip away concrete encasement on structural steel transverse floor beams at north end and just north of temporary support beam to expose steel.

21) Using crane from 2nd Ave and picking strap, attach to furthest sidewalk cantilever beam, cut cantilever beams near main girder from manlift on 2nd Ave, and lower cantilever beam onto truck for disposal.



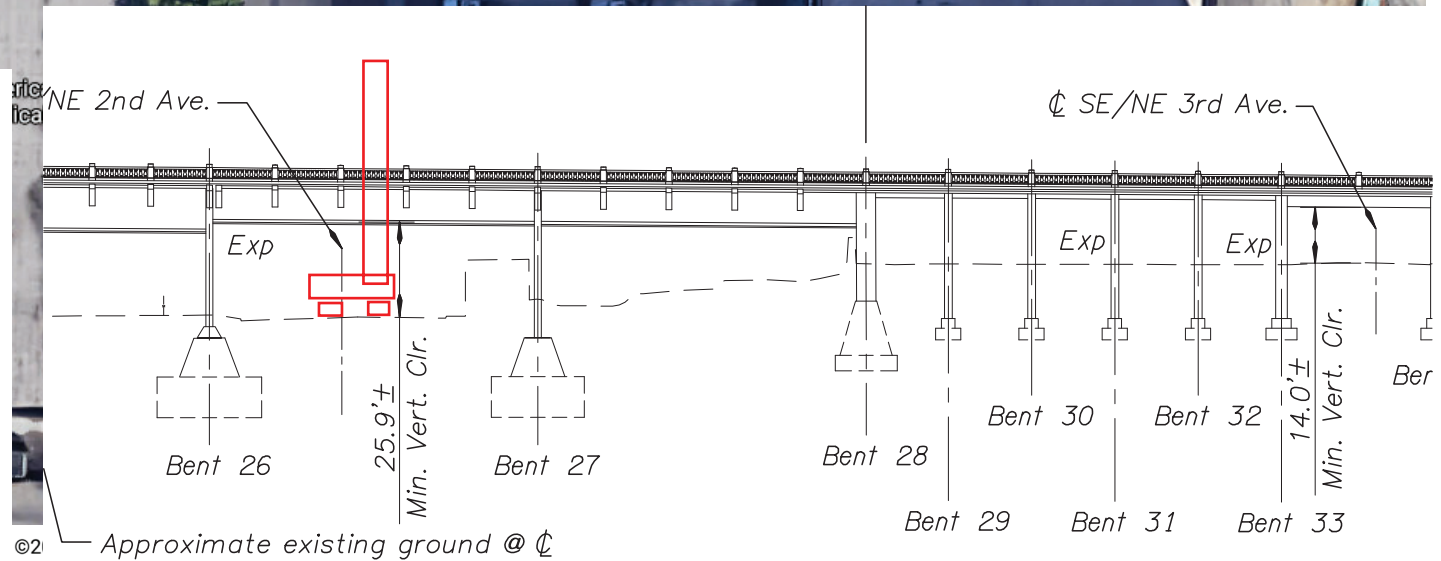


Construction Sequence

22) Add temporary bracing to top flange of north existing main girder such as prestressing strand or stiffening truss to ensure main girder is stable.

23) Using crane and picking strap, attach to furthest floorbeam, cut floorbeam near north end at main girder and just north of temporary support beam from manlift and lift floorbeam onto truck for disposal.

24) Repeat removing all floorbeams (only main beam left standing).

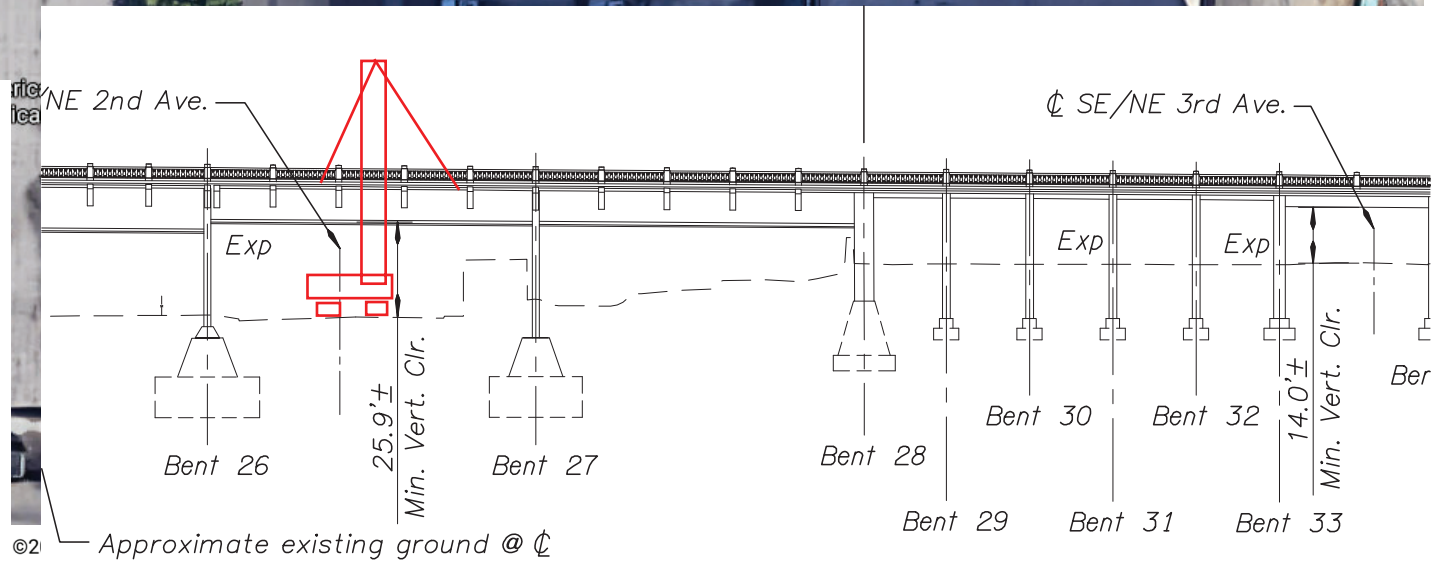




Construction Sequence

25) Using a crane on 2nd Ave, cut and lift out north main girder and load on truck.

26) Sawcut Span 27 (over skate park) deck, sidewalk, and north parapet into manageable sizes to be lifted off in pieces

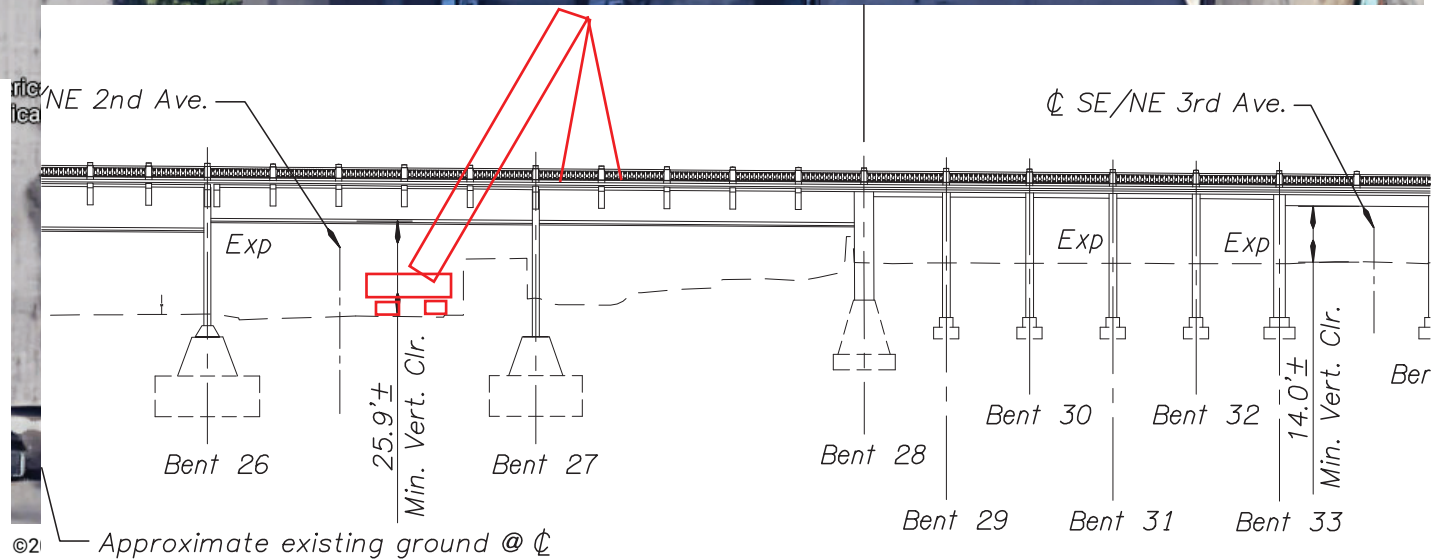


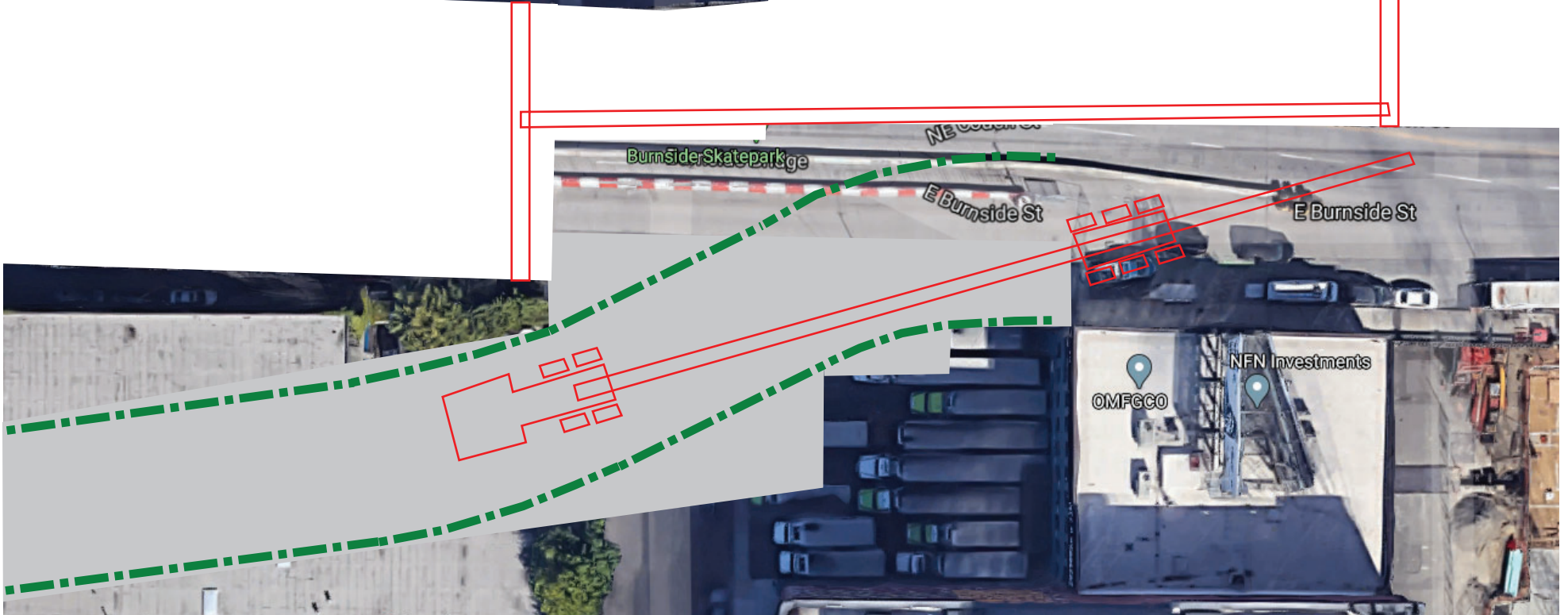


Construction Sequence

27) Using a crane on 2nd Ave, lift out deck, sidewalk, and parapet pieces one by one and load on truck.

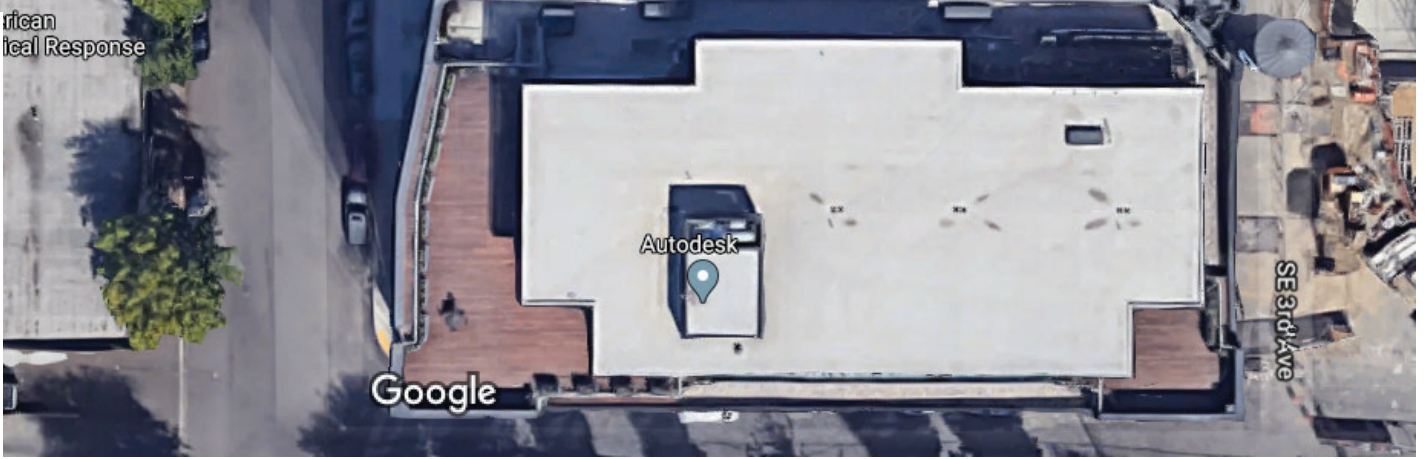
28) Repeat steps 17 through 25 for span 27 except that in lieu of demolishing to temporary support beam, demolition would occur to just north of existing center main girder



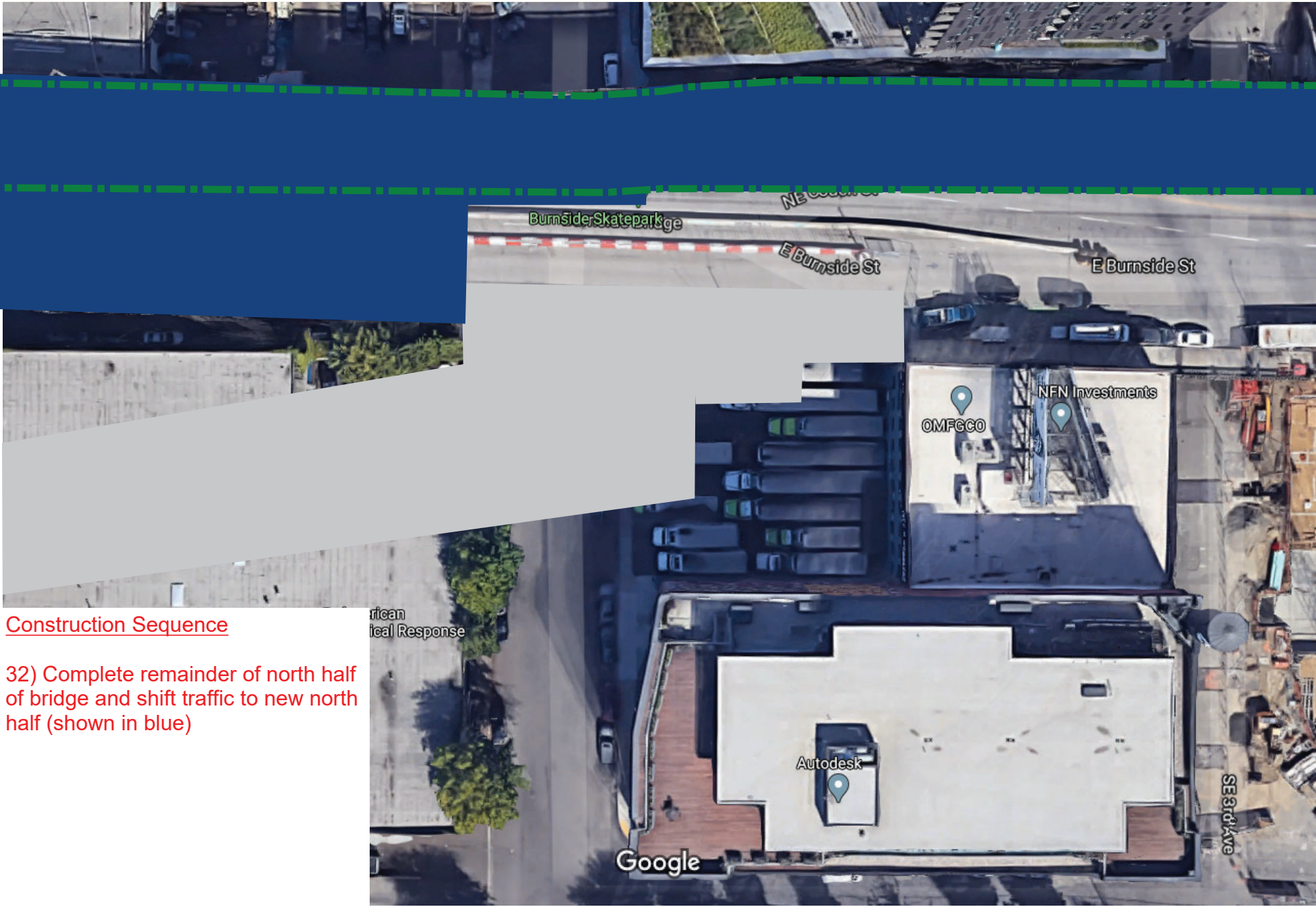


Construction Sequence

- 29) Demolish remainder of bridge to approximate limits shown
- 30) Construct new substructure for replacement bridge (north half of approaches)
- 31) Using cranes on 2nd Ave and 3rd Ave, erect pre-built steel girders from south to north



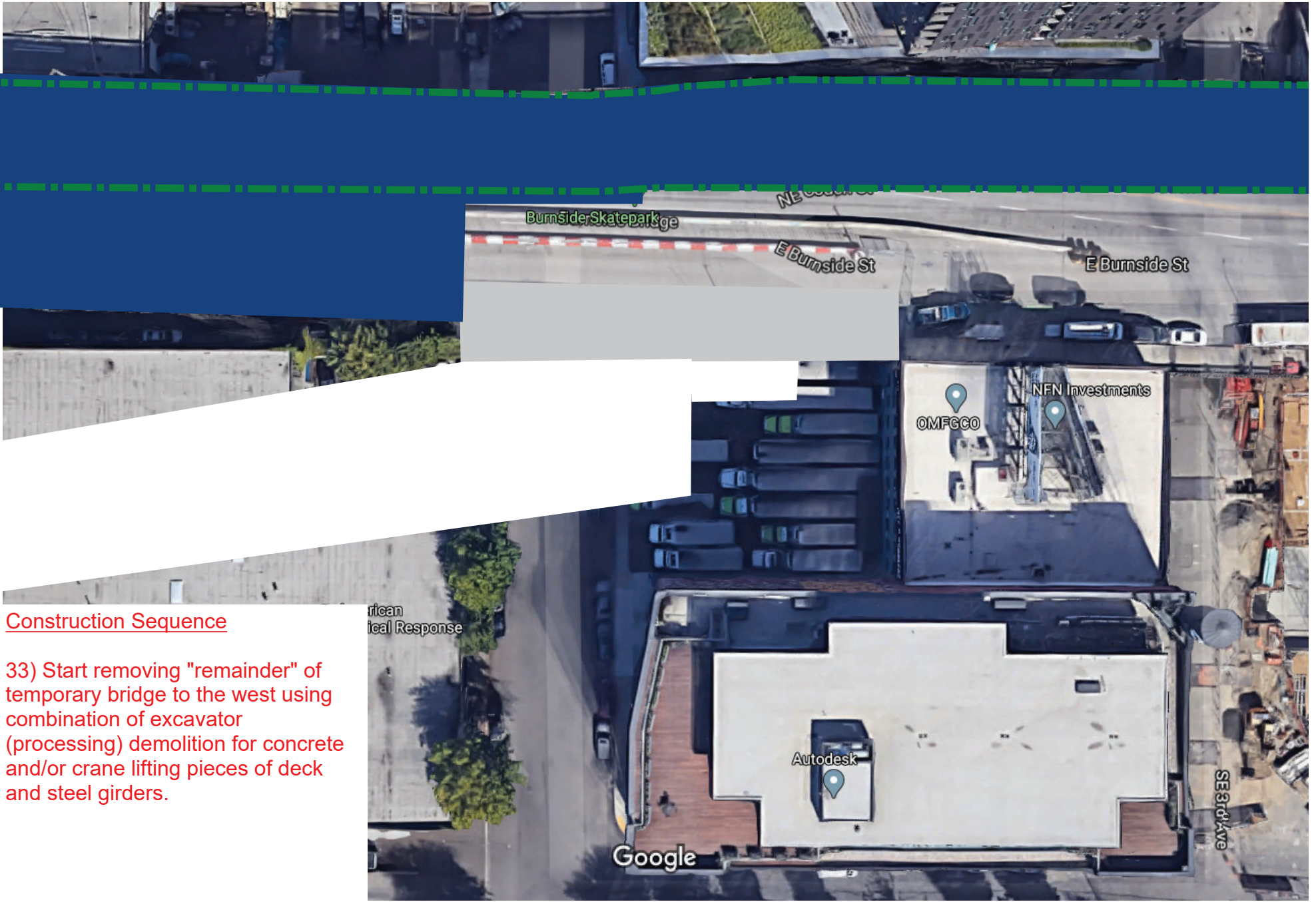
©2020 Google, Imagery ©2020 Maxar Technologies, Metro, Portland Oregon, State of Oregon, U.S. Geological Survey, Map data ©2020 20 ft



Construction Sequence

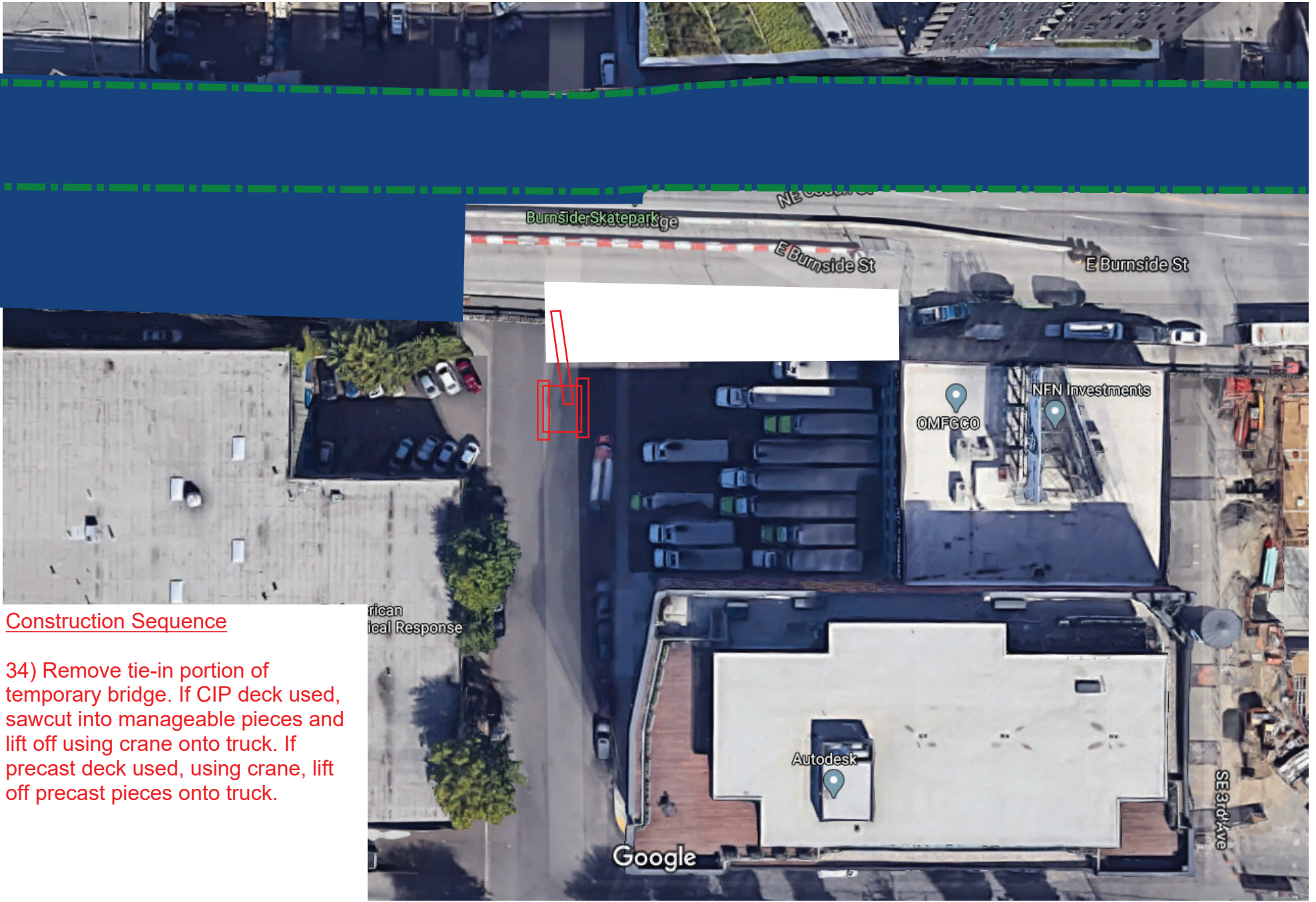
32) Complete remainder of north half of bridge and shift traffic to new north half (shown in blue)

American
Political Response



Construction Sequence

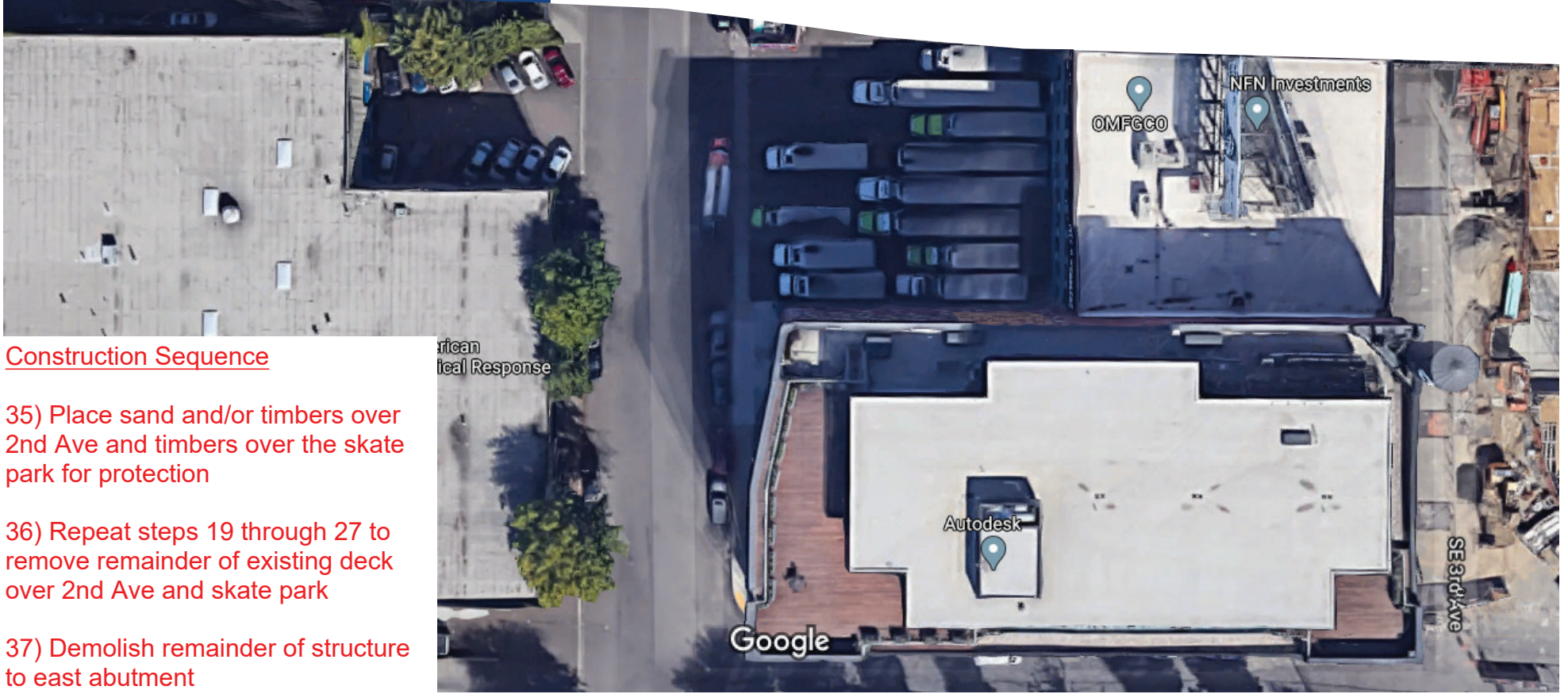
33) Start removing "remainder" of temporary bridge to the west using combination of excavator (processing) demolition for concrete and/or crane lifting pieces of deck and steel girders.



Construction Sequence

34) Remove tie-in portion of temporary bridge. If CIP deck used, sawcut into manageable pieces and lift off using crane onto truck. If precast deck used, using crane, lift off precast pieces onto truck.

American
 Technical Response

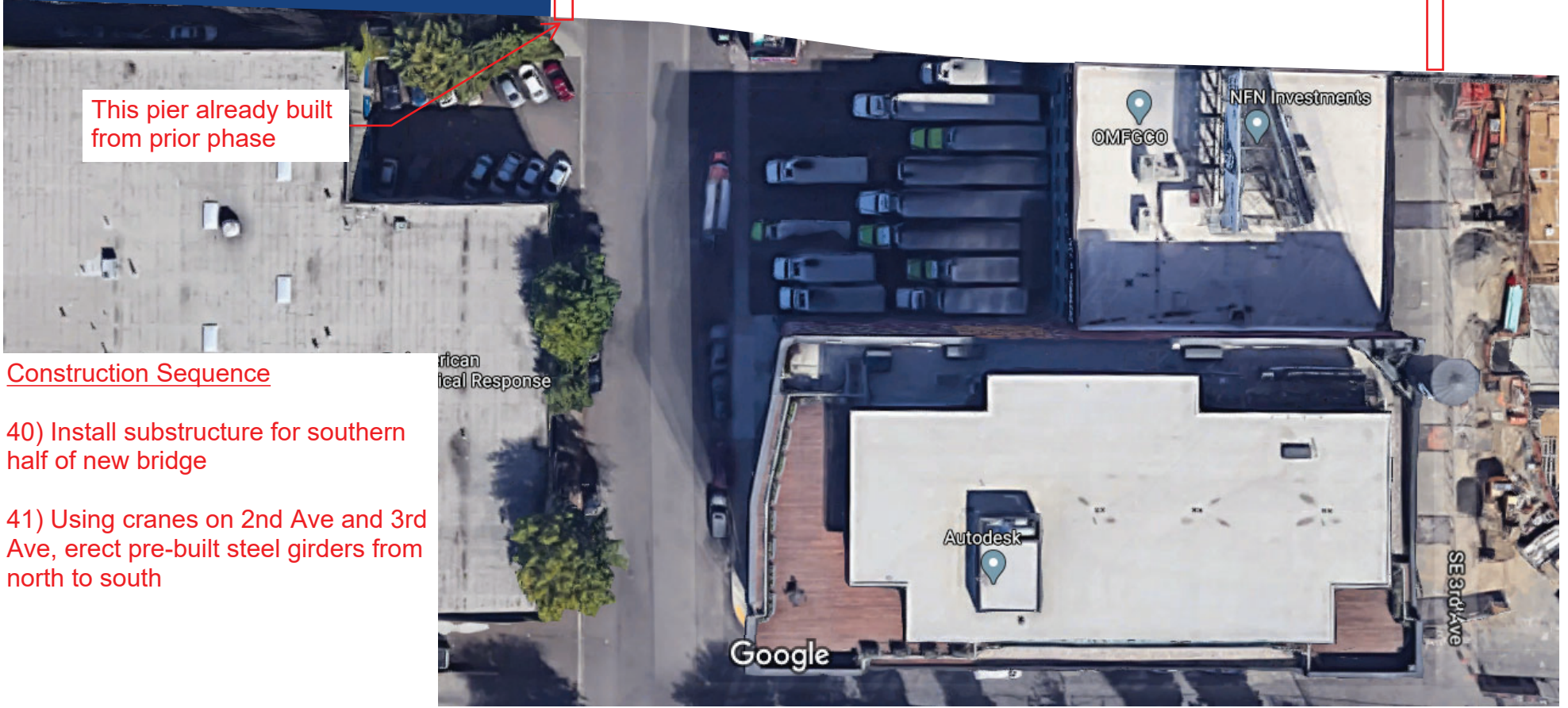


Construction Sequence

- 35) Place sand and/or timbers over 2nd Ave and timbers over the skate park for protection
- 36) Repeat steps 19 through 27 to remove remainder of existing deck over 2nd Ave and skate park
- 37) Demolish remainder of structure to east abutment



This pier already built from prior phase



Construction Sequence

- 40) Install substructure for southern half of new bridge
- 41) Using cranes on 2nd Ave and 3rd Ave, erect pre-built steel girders from north to south



Construction Sequence

40) Complete remainder of south half of bridge and shift traffic to final alignment (shown in blue)

American Medical Response

Autodesk

OMFGCO

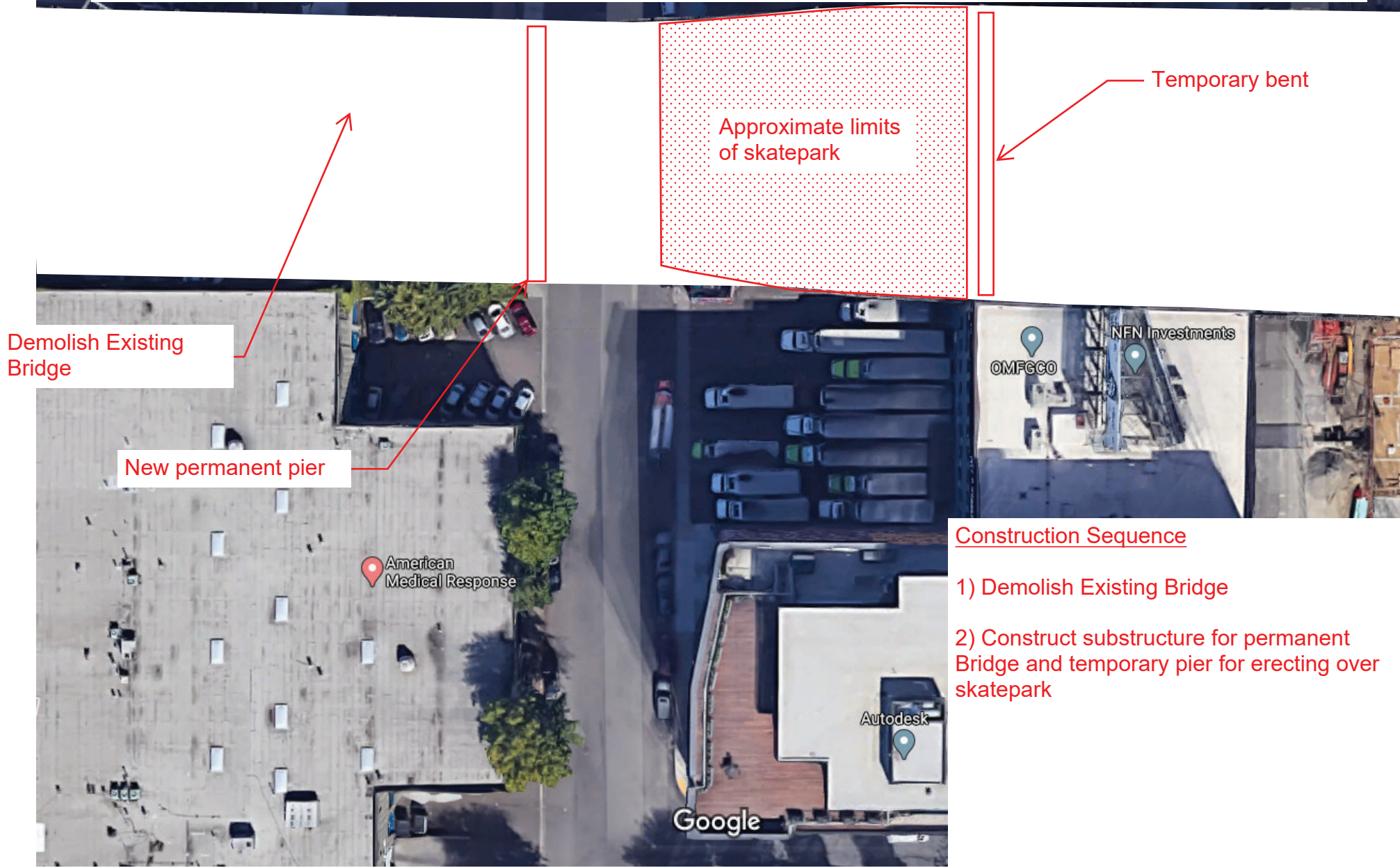
NFN Investments

Google

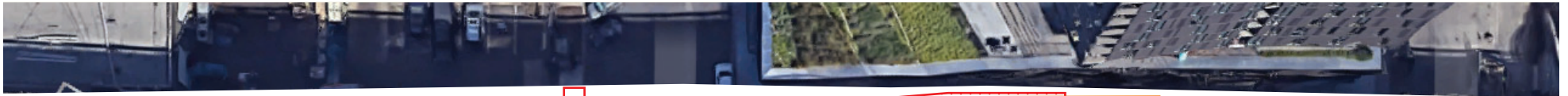
SE 31st Ave

Appendix J. Girder Erection over Burnside Skatepark with No Detour Bridge

Possible Construction Sequence for East Approach with No Temporary Detour Bridge

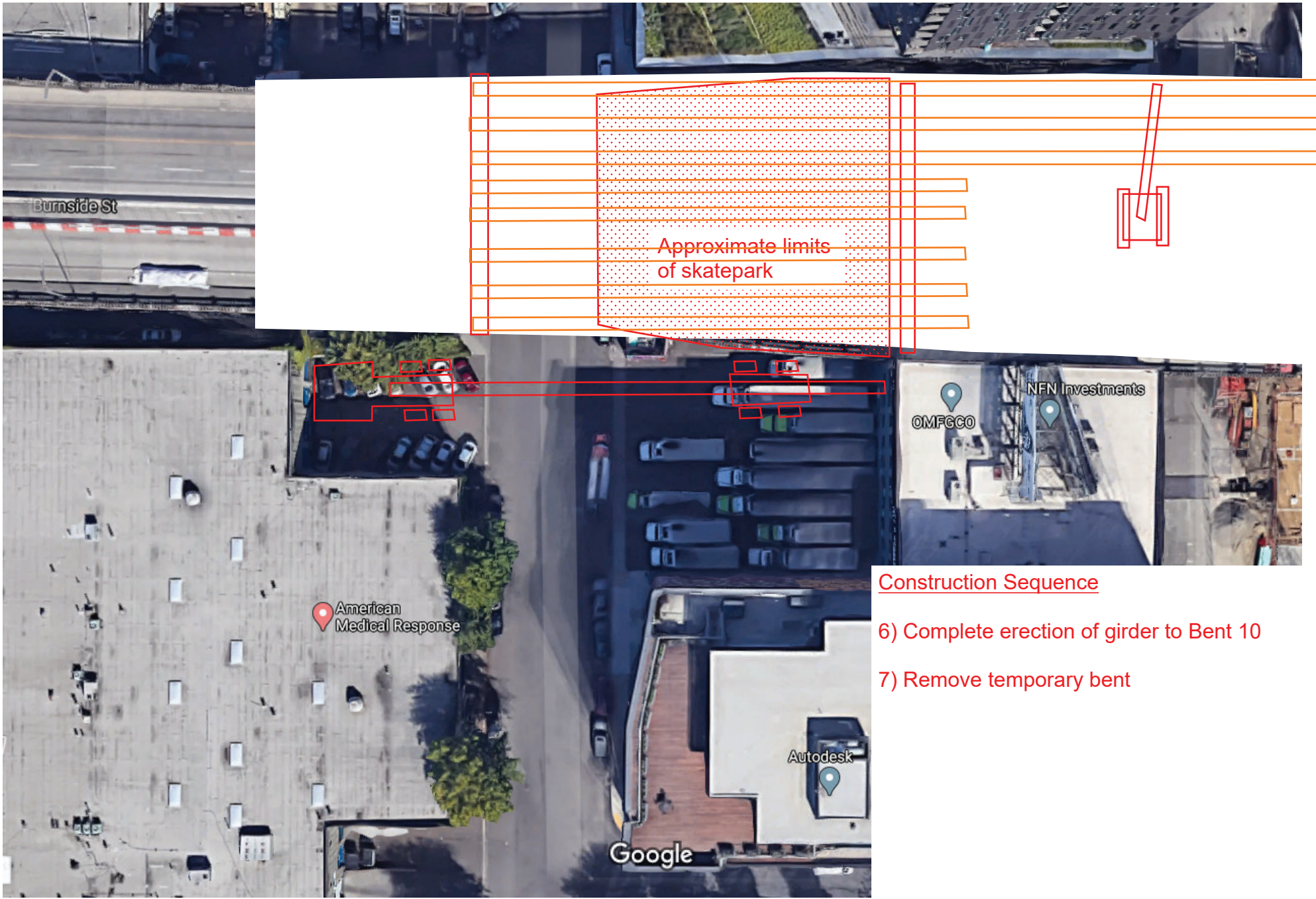


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Construction Sequence

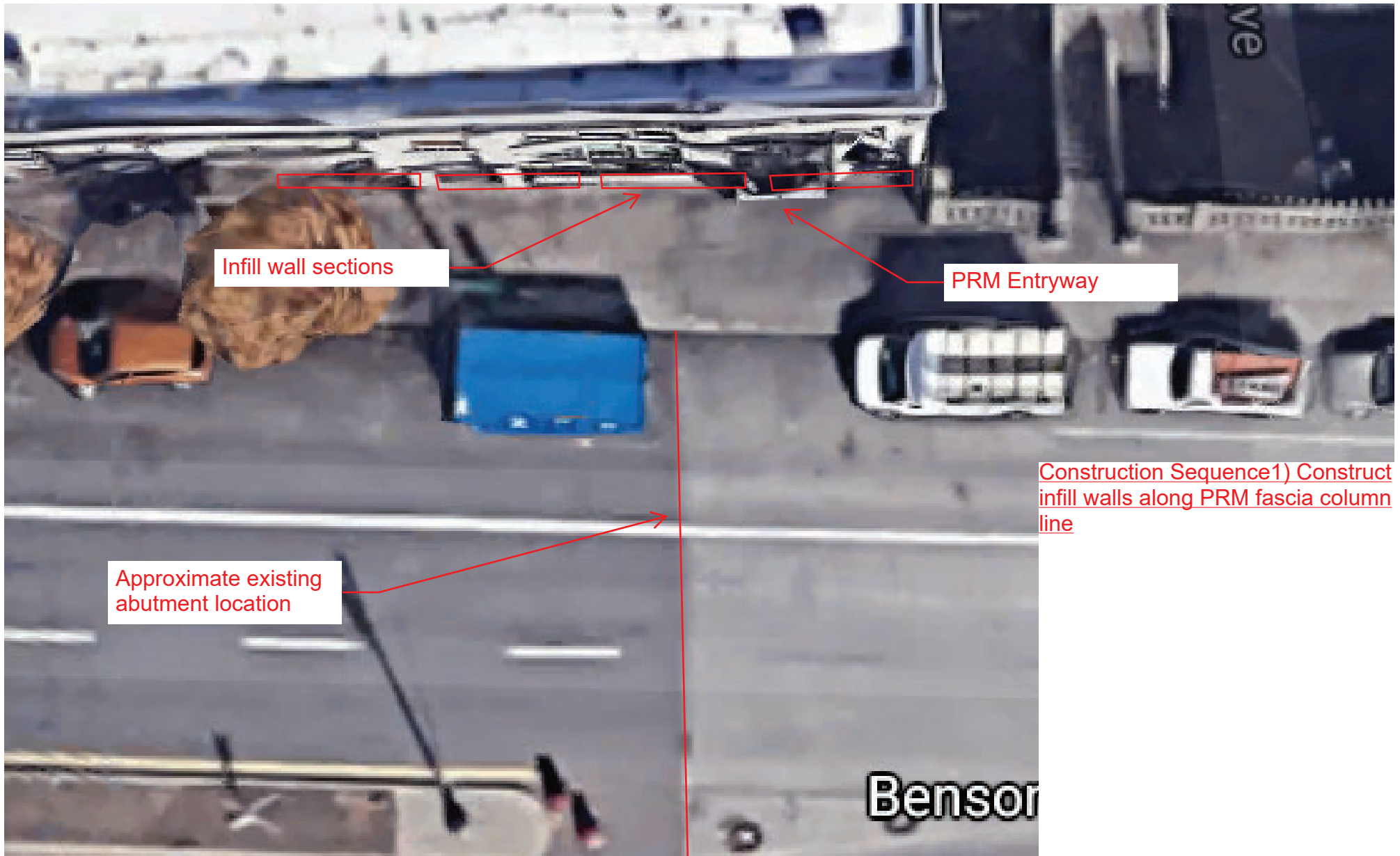
- 3) Set up one crane at permanent Bent 9 and one crane in the old parking lot. Each crane radius must be large enough to reach from the south end (where the truck will be located) to the north end where the first girder will be placed
- 4) Truck pre-spliced girder across 2nd Ave and into parking lot adjacent to skatepark
- 5) Erect girder from Bent 9 to temporary splice, starting at north end and finishing at the south end

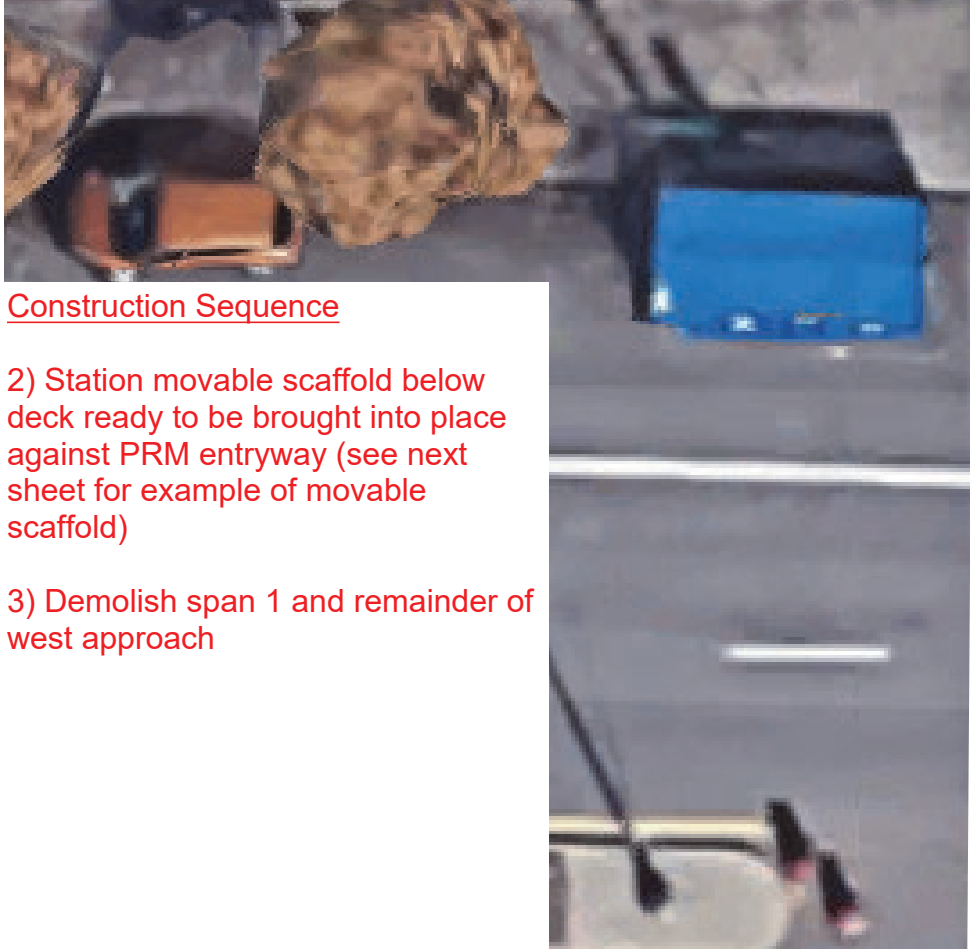


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Appendix K. Span 1 Elimination and Portland Rescue Mission Access

Span 1 Elimination & MSE Wall Construction Sequence





Construction Sequence

2) Station movable scaffold below deck ready to be brought into place against PRM entryway (see next sheet for example of movable scaffold)

3) Demolish span 1 and remainder of west approach

Example of movable scaffold



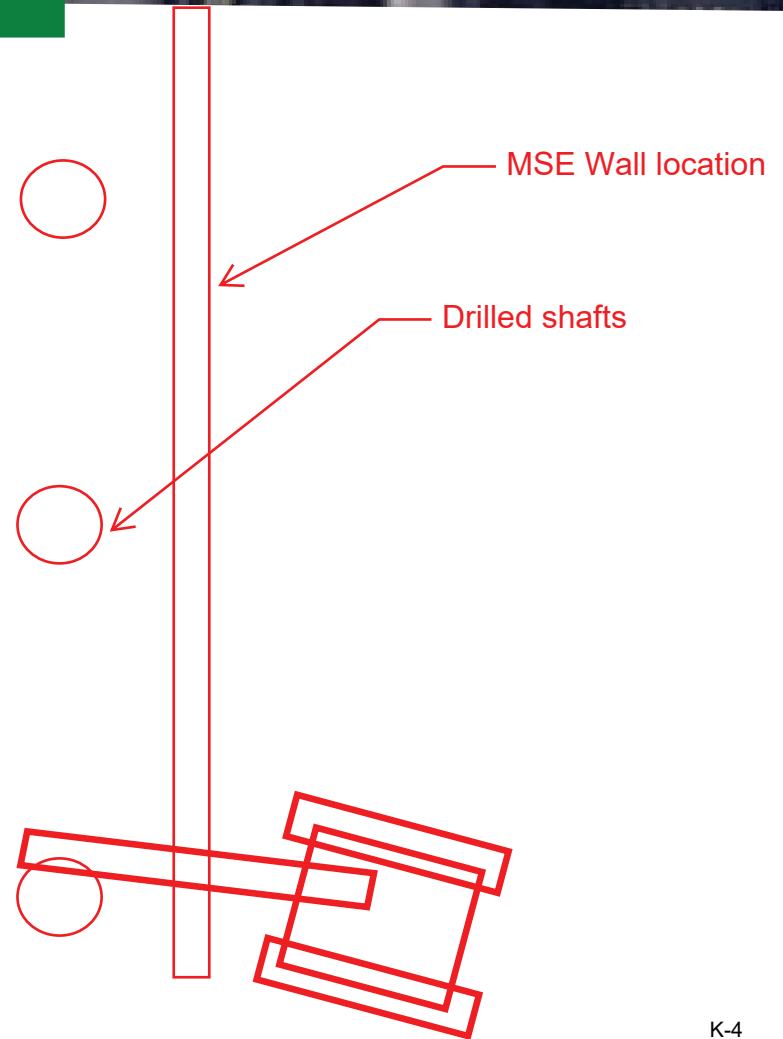
Single Mast Climber

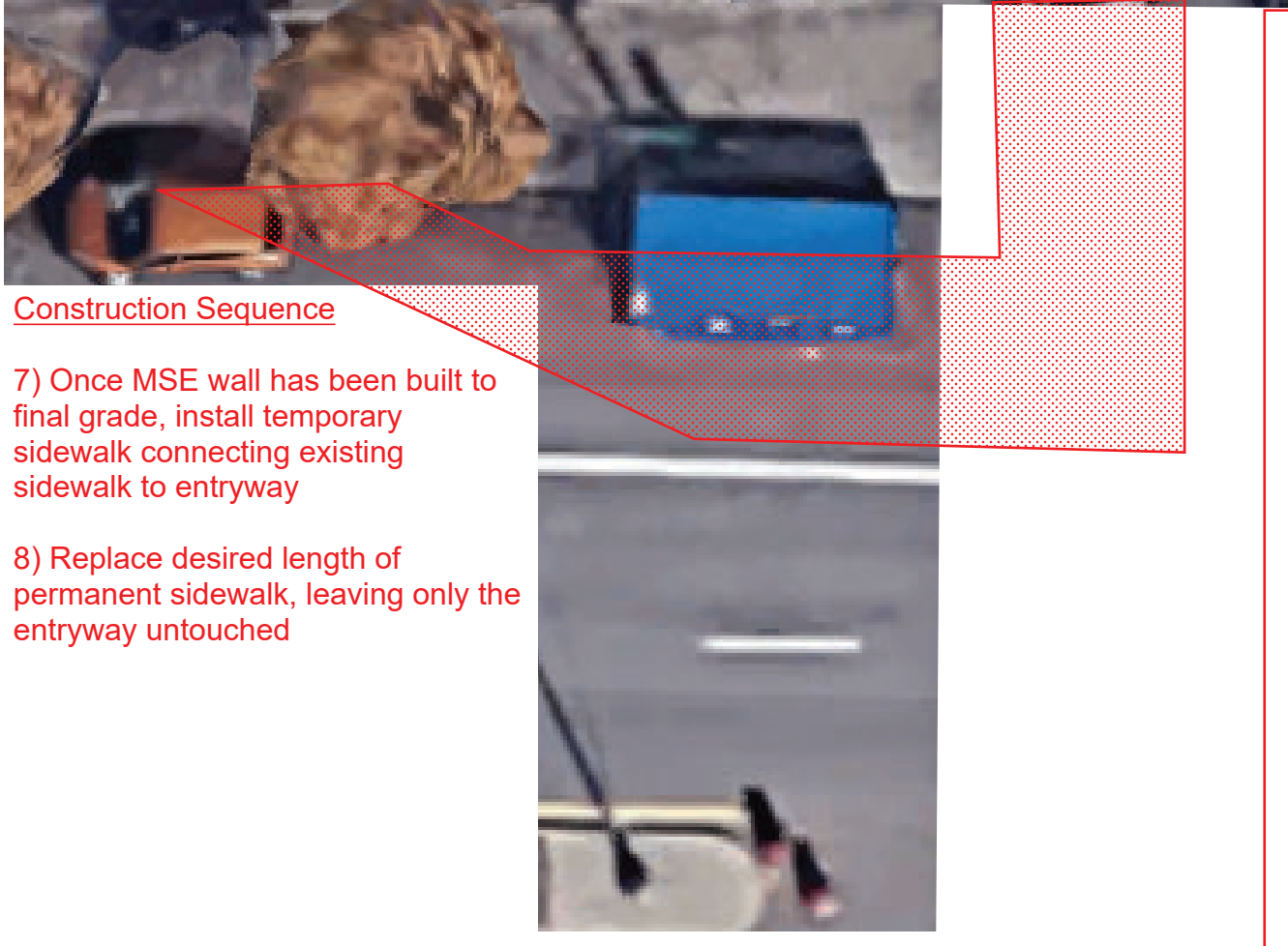


Temporary scaffold in place for ingress

Construction Sequence

- 4) Install drilled shafts for new abutment
- 5) Install columns (or column blockouts) for new abutment
- 6) Begin constructing MSE wall. Remove scaffold at beginning of each shift for aggregate and strap placement. Return scaffold to entryway at the end of each shift until work is complete





Construction Sequence

- 7) Once MSE wall has been built to final grade, install temporary sidewalk connecting existing sidewalk to entryway
- 8) Replace desired length of permanent sidewalk, leaving only the entryway untouched



Construction Sequence

9) Demolish entryway concrete. If necessary, use steel plate or like for access to building overnight

10) Using high-early concrete, pour back entryway to PRM

11) Remove temporary sidewalk

