Evaluation of Performance Based Concrete for Bridge Decks

WA-RD 845.1

Eric Ferluga
Patrick Glassford

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EVALUATION OF PERFORMANCE BASED CONCRETE FOR BRIDGE DECKS

Washington State Department of Transportation

Prepared by:

Eric Ferluga, P.E.
Patrick Glassford, P.E.
WSDOT Bridge and Structures Office
PO Box 47340
Olympia, WA 98504
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16. ABSTRACT

The Washington State Department of Transportation (WSDOT) revised the concrete specification for bridge decks in 2011 to be more performance based with the desired effect of having less early-age shrinkage cracking. This report evaluates a sample of the bridges constructed with the revised performance based specification against a sample of bridges constructed with the traditional WSDOT specification. The evaluation consists of visual inspections, noting cracks and developing crack intensity diagrams for each bridge. These diagrams are then used to rank and compare the bridge decks. The outcome of this study is that the bridge decks constructed with the performance based specification have much less early-age shrinkage cracking then the traditional WSDOT specification.

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ACKNOWLEDGEMENT

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EXECUTIVE SUMMARY

This report documents the effectiveness of the changes made to the Washington State Department of Transportation (WSDOT) concrete specifications for bridge decks. The bridge deck concrete specifications were revised to eliminate or reduce early-age restraint cracking in bridge decks. Restraint cracking is caused by length changes due to shrinkage or temperature effects that are restrained by girders and internal reinforcement and show up primarily as transverse through cracks. Many of the revisions came from recommendations from the WA-RD Report 747.1 "Mitigation Strategies for Early-Age Shrinkage Cracking in Bridge Decks." Bridge decks constructed with this revised concrete specification are commonly referred to as "Performance Based Bridge Decks."

The undersides of 28 bridge decks were visually inspected for cracks; 15 were constructed using the performance based specification, and 13 were constructed using the traditional WSDOT specification. The information gathered is converted into "crack intensity" diagrams. These diagrams illustrate the severity and location of cracking for each bridge deck.

In general, the performance based concrete specification resulted in fewer visible cracks in bridge decks than the traditional concrete specification. A few of the traditional bridge decks performed similar to the performance based bridge decks, but this appears to be the exception, not the rule. Only one of the performance based concrete decks had a high intensity of cracking. It is unclear what contributed to the poor performance of this particular bridge deck.

What is apparent from this study is that cracking of bridge decks is variable within the same bridge. In some cases, it appears to be variable within the same concrete placement. This indicates that there are many variables that affect the cracking performance of a bridge deck that change during the construction of the bridge.

A secondary objective of this study was to identify trends or issues with the current performance based specification that could be improved. Mix design, test data and temperature information was gathered for the performance based bridge decks evaluated in this study. No correlation could be made between this data and crack intensity; however, improvements in data collection on future projects may provide better data to identify trends or issues.

Ultimately, based on this study, no significant changes to the bridge deck concrete specifications are necessary. Some minor changes related to quality of data submitted by Contractors may be beneficial to identify possible improvements in performance limits identified in the specification.

OVERVIEW

The objective of this report is to evaluate and document the effectiveness of the changes made to the Washington State Department of Transportation (WSDOT) concrete specification for bridge decks. The WSDOT revamped the bridge deck concrete specifications in an effort to eliminate or reduce early-age restraint cracking in bridge decks. Restraint cracking is caused by length changes due to shrinkage or temperature effects that are restrained by girders and internal reinforcement and show up primarily as transverse through cracks. Many of the revisions came from recommendations from the WA-RD Report 747.1 "Mitigation Strategies for Early-Age Shrinkage Cracking in Bridge Decks." Bridge decks constructed with this revised concrete specification are commonly referred to as "Performance Based Bridge Decks."

The term "Performance Based" is used because the revised specification removes prescribed requirements (minimum cement content, use of fly ash, etc.) and adds performance criteria such as shrinkage and permeability limits. Contractors are required to submit test results to prove their concrete mix design meets the specified performance requirements.

The performance based specification was first implemented in mid-2011. Since then, 30+ bridges have been constructed using project specific specifications as well as a handful of bridge deck replacements. The performance based specification is now included in the WSDOT 2014 Standard Specifications (as amended April 6, 2015).

To evaluate the effectiveness of the revised concrete specification, a sample of bridges recently constructed with the performance based specification and the traditional specification have been visually inspected for cracks. This inspection data has been used to judge the severity or intensity of cracking for each bridge deck. The cracking severity is used to compare the bridges and can be used to draw conclusions on the effectiveness of the revised specification to prevent or reduce early-age restraint cracking in the bridge decks.

A secondary objective is to identify any improvements that could be made to the current performance based specification. To facilitate this, the concrete mix design, test results and temperature data submitted by Contractors is collected. This data is then used to identify possible trends that correlate to the cracking performance of the bridge decks.

DECK CONCRETE SPECIFICATION

In April of 2010 WA-RD Report 747.1 “Mitigation for Early-Age Shrinkage Cracking in Bridge Decks” was published and was used to revise the WSDOT specification for bridge deck concrete which is classified as Class 4000D. The 2014 WSDOT Standard Specifications includes revisions to the following sections:

- 6-02.3(2)A – Contractor Mix Design
- 6-02.3(10)D – Concrete Placement, Finishing, and Texturing [for Bridge Decks]
- 6-02.3(11) – Curing Concrete

CONTRACTOR MIX DESIGN

The revisions to the “Contractor Mix Design” remove some of the prescriptive requirements and replace them with performance based requirements. The most significant prescriptive requirement that was removed was the requirement for a minimum cementitious content for the Class 4000D concrete. The previous specification contained a requirement that the 4000D concrete was to contain a minimum of 660 lbs of cement and 75 lbs of fly ash (for a total of 735 lb cementitious material). The revised specification no longer has a minimum cementitious content and does not require the use of fly ash.

The performance based requirement for minimum concrete compressive strength at 28 days remains in the specification as 4,000 psi. Added were performance limits on permeability, length change (“shrinkage”) and scaling (as well as an optional requirement for freeze-thaw durability to reduce prescribed air content). In addition to the performance limits, modulus of elasticity and density are required to be provided (but no limits attached).

Another significant change resulting from recommendations of WA-RD Report 747.1 was to increase the aggregate size. The nominal maximum aggregate size increased from 1” to 1½”. Note that the nominal maximum aggregate size changed from ¾” in the 2008 WSDOT Standard Specifications to 1” in the 2010 WSDOT Standard Specifications.

See Table 1 for a summary of the revisions to the Class 4000D specification.

Table 1 - Summary of 4000D Concrete Specifications

	Original Class 4000D	Revised Class 4000D
Minimum 28-day Compressive Strength	4,000 psi	4,000 psi
Cement	Type I or II Portland	Type I or II Portland
Cementitious Content	735 lbs minimum (660 lbs cement & 75 lbs fly ash)	No set limits
Fly Ash	Required	Optional
Nominal Max. Aggregate Size	1-inch	1½-inch
Water Reducing Admixture	Required	Optional
Air Content	4.5% to 7.5%	4.5% to 7.5%
Freeze-Thaw Durability Test (instead of above air content requirement)	Not an Option	3.0% min. air content 90% minimum durability factor after 300 cycles per AASHTO T 161
Permeability	No Requirement	Less than 2000 coulombs at 56 days per AASHTO T 277
Length Change ("shrinkage")	No Requirement	Less than 0.032% (320 microstrain) at 28 days per AASHTO T 160
Scaling	No Requirement	Visual rating ≤ 2 after 50 cycles per ASTM C 672
Modulus of Elasticity	No Requirement	Measured and Submitted per ASTM C 469
Density	No Requirement	Measured and Submitted per ASTM C 138

The overall intent of the changes to the Class 4000D mix design is to focus on the behavior (or performance) of the concrete rather than providing a set "recipe." This puts more burdens on the Contractor and concrete supplier but allows for more flexibility and provides more information on the actual properties of the concrete being placed.

CONCRETE PLACEMENT, TEXTURING AND CURING

In addition to revisions to the mix design, changes were made to the placement, finishing and texturing portions of the specification. The ultimate goal of these revisions is to begin adequate wet curing as soon as possible. The original specifications for placing and texturing typically resulted in a delay of application of wet burlap to the surface of the bridge deck. This delay occurred because the texturing was done by tining transverse grooves with a metal comb and could not occur until the concrete was sufficiently stiff. After the bridge deck was tined, curing compound was applied. When the deck had taken initial set, the presoaked burlap and soaker hoses were applied and kept in place for 14 consecutive days.

Revisions to the curing portion of the specification require fogging of the deck immediately after the finishing machine passes "maintaining a wet sheen without developing pooling or sheeting water" (see Figure 1). Tining of the bridge deck is eliminated and presoaked burlap is applied almost immediately "without damaging the finish, other than minor marring of the concrete surface" (see Figure 2). The use of curing compound is explicitly forbidden. Fogging shall continue until the concrete has achieved initial set when soaker hoses are added (See Figure 3). The wet burlap and soaker hoses remain in place for 14 consecutive days.

Figure 1 - Fogging of Bridge Deck

Figure 2 - Application of Presoaked Burlap

Figure 3 - Burlap and Soaker Hoses

Since the bridge deck is not textured before the wet burlap is applied (see Figure 4), it has to occur after the concrete has hardened. This is achieved through the use of “diamond tipped saw blades mounted on a power driven, self-propelled machine that is designed to texture concrete surfaces” (see Figure 5). The revised specification results in a bridge deck that has longitudinal grooves instead of transverse grooves provided by a metal comb (see Figure 6).

Figure 4 - Bridge Deck Surface after Curing

Figure 5 - Bridge Deck Texturing Machine

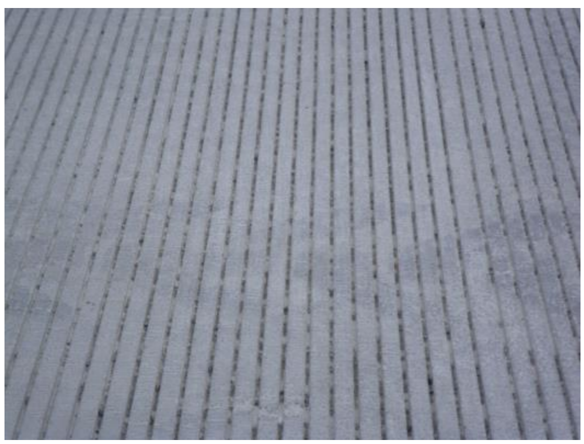


Figure 6 - Finished Bridge Deck Texture

BRIDGE DECK TEMPERATURE

Another change to the Class 4000D specification requires the concrete temperature at the time of placement to be between 55°F and 75°F. The original specification limited concrete placement temperature between 55°F and 90°F. The goal of this revision is to reduce the peak temperature of the concrete during placement and curing. Concrete typically heats up as it sets and hardens (see Figure 7). If concrete temperature is much higher than ambient temperature when it achieves initial set, stresses will be locked in which could cause cracking.

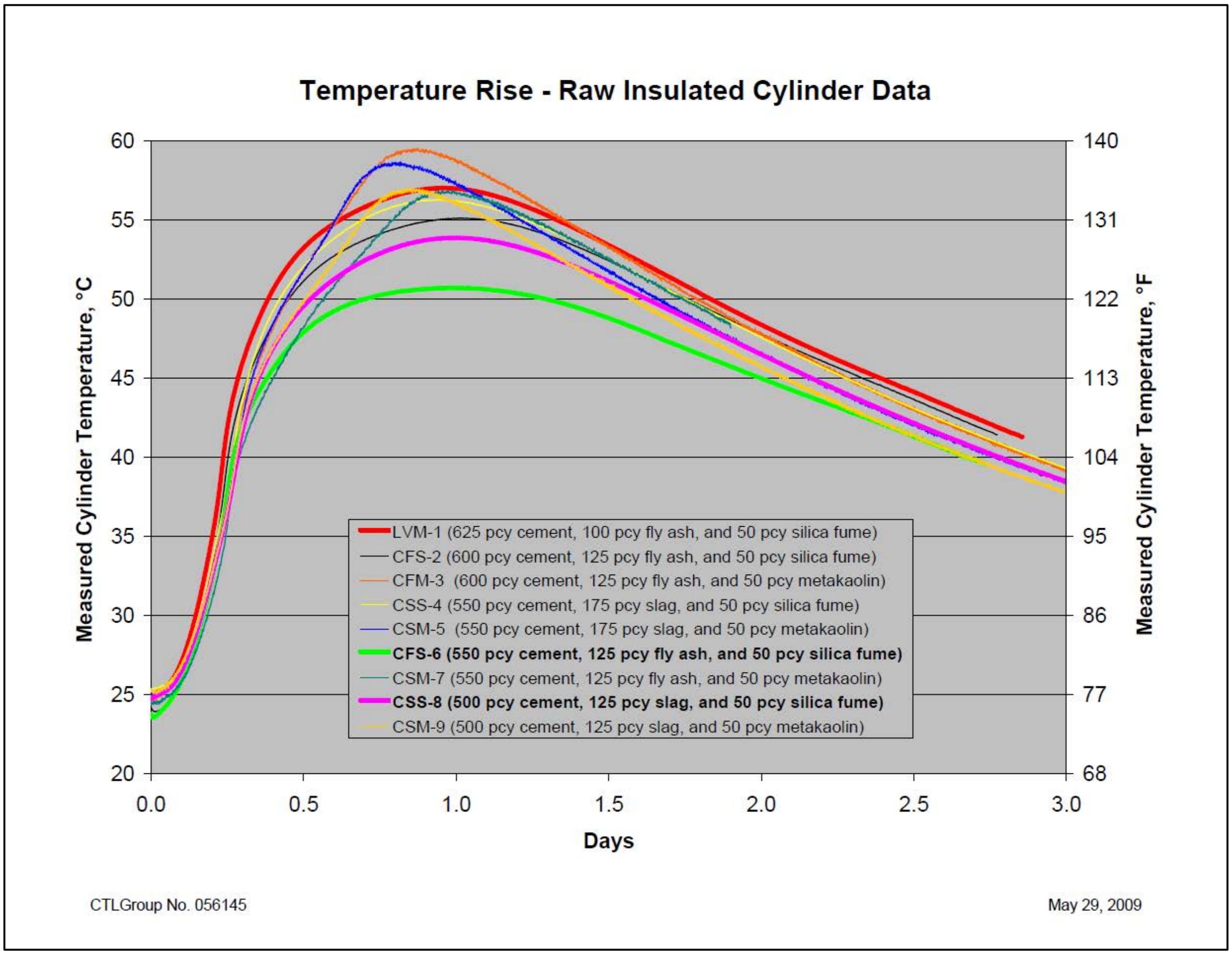


Figure 7 - Example of Concrete Temperature Rise (from “SR 520 – ACME Project Final Findings Report”)

Additionally, requirements were added to monitor the temperature of the bridge deck concrete for 7-days after concrete placement. This is done by embedding temperature monitoring devices in the bridge deck and recording temperatures hourly. Ambient temperature is also recorded from monitoring devises placed near the locations of the monitors embedded in the concrete. The Contractor is then required to submit this data to WSDOT; however, no other contractual limits are placed on this information.

BRIDGE DECK EVALUATION METHOD

The main issue that drove the revisions to the Class 4000D bridge deck concrete specifications is the presence of highly visible cracks on the roadway surface and the underside of bridge decks between girder flanges and in the overhangs. Therefore, "cracking severity" is used as the measure of success for bridge deck concrete.

Cracks on the underside of bridge decks are generally easier to see than those on the top (primarily due to effloresce or "leaching" seen). Cracks on the top of bridge decks can be easily seen after a rain when the deck is drying out. However, this would require careful timing of inspections as well as traffic control. To quickly and easily evaluate deck cracking, visible cracks in the underside of decks between the girders are used to evaluate deck cracking. Cracking in the underside of the overhangs or top of deck are not quantified for this evaluation

To quantify the severity of deck cracking, easily visible cracks are counted on the underside of the deck and converted to "crack intensity" percentage. 100% crack intensity is set as transverse cracks spaced at an average of 2-feet on center. Each bridge is divided up into "bays" which are bounded by girders and diaphragms (or cross-frames for the steel bridges), see Figure 8. The number of cracks for 100% crack intensity is equal to the length of the bay divided by 2-feet. A crack intensity for each bay is calculated by dividing the number of cracks counted (N_{CR}) by the number of cracks for 100% crack intensity (N_{100}). An example of the resulting Crack Intensity Diagram is shown in Figure 9.

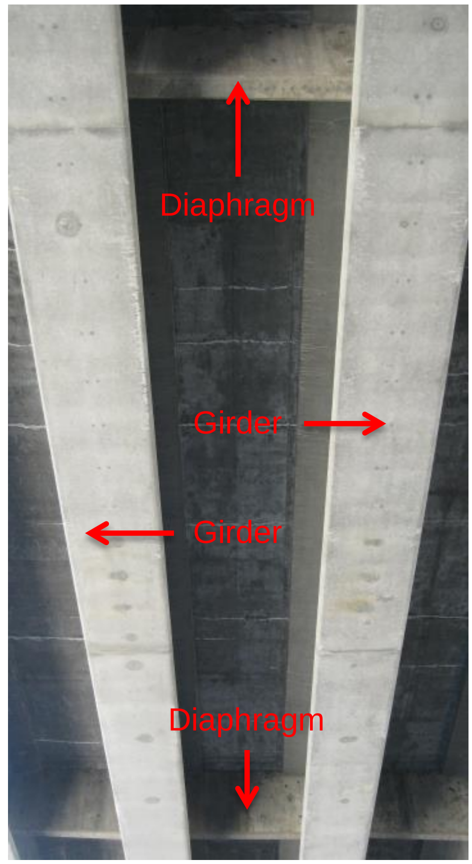


Figure 8 - Example of a "Bay"

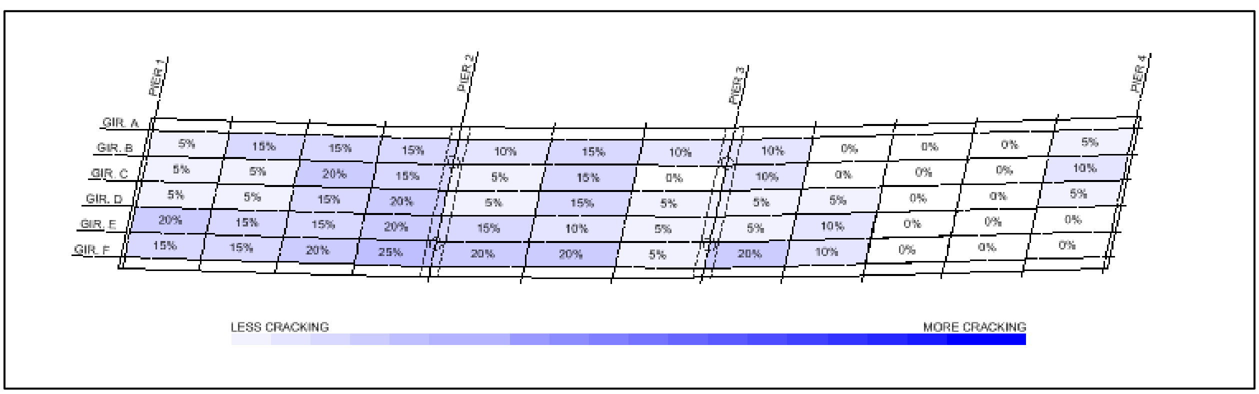


Figure 9 - Crack Intensity Diagram Example

In reality, the cracking in a "bay" is not always uniformly spaced. Sometimes a few cracks are closely spaced, but concentrated in a small portion of the "bay" (see Figure 10). Other times they are more uniformly spaced throughout (see Figure 11). This information is lost in the above diagrams as this evaluation method assumes the cracks are uniformly distributed along the length of the "bay."

Figure 10 - Non-uniform Spaced Cracks

Figure 11 - Uniformly Spaced Cracks

BRIDGES FOR EVALUATION

The criteria for the bridges chosen for this study were:

- Constructed in 2008 or later
- Visibility of the underside of deck
- Relatively easy access
- Relatively simple geometry

A total of 28 bridges were inspected and evaluated; 15 were constructed using the performance based specification and 13 were constructed using the traditional WSDOT specification. Throughout this report the bridges are color coded; red is used for "Traditional" bridge decks, and green is used for "Performance Based" bridge decks.

Prestressed I-girders and steel plate I-girders were selected for the ability to inspect the underside of the decks between girders. Deck bulb-T girders appear to be more common in recent years, and several have been constructed with a performance based topping slab, but these were not included because the underside of the decks are not visible.

The bridges where sorted into four "trips" to different geographical regions which are described in the following sections.

SOUTH TRIP

The bridges included in this trip are in the Centralia area primarily along I-5, as shown in Figure 12. The inspection of these bridges was performed on 4/8/2015.

Br. No.	Bridge Name	Str. ID	Contract	Region	Contractor	Year	Perform.
5/302E	PRAIRIE CREEK NB	0017465A	7465	OR	Scarsella Bros.	2009	No
5/302W	PRAIRIE CREEK SB	0017465B	7465	OR	Scarsella Bros.	2010	No
5/229	MELLEN STREET COUPLET	0018473B	8473	SW	Scarsella Bros.	2014	Yes
5/234W	I-5 OVER BLAKESLEE JCT RR	0018272C	8272	SW	Cascade Bridge	2013	Yes
5/232SCD	SKOOKUMCHUCK RIVER SCD	0018272B	8272	SW	Cascade Bridge	2013	Yes
5/232NCD	SKOOKUMCHUCK RIVER NCD	0018272A	8272	SW	Cascade Bridge	2013	Yes
6/115	S FORK CHEHALIS R	0017587A	7587	SW	Scarsella Bros.	2009	No

Figure 12 - Map of South Trip Bridges

WEST TRIP

The bridges included in this trip are in the Willapa Bay area near the coast, as shown in Figure 13. The inspection of these bridges was performed on 5/7/2015.

Br. No.	Bridge Name	Str. ID	Contract	Region	Contractor	Year	Perform.
105/3	SMITH CREEK	0018345A	8345	SW	Scarsella Bros., Inc.	2013	Yes
105/4	NORTH RIVER	0018345B	8345	SW	Scarsella Bros., Inc.	2014	Yes
101/44	BONE RIVER	0018292A	8292	SW	Cascade Bridge, LLC	2013	Yes
101/31	MIDDLE NEMAH RIVER	0018344A	8344	SW	SB Structures, LLC	2014	Yes
6/8	WILLAPA RIVER	0018464A	8464	SW	Rotschy, Inc.	2014	Yes

Figure 13 - Map of West Trip Bridges

EAST TRIP

The bridges included in this trip are near the Keechelus Lake and Spokane areas along I-90, as shown in Figure 14. The inspection of these bridges was performed on 5/20/2015 and 5/21/2015.

Br. No.	Bridge Name	Str. ID	Contract	Region	Contractor	Year	Perform.
90/106N	GOLD CREEK WB	0017852D	7852	SC	Max J. Kuney Company	2012	No
90/105.5N	GOLD CREEK ANIMAL CROSSING WB	0017852B	7852	SC	Max J. Kuney Company	2012	No
90/105.5S	GOLD CREEK ANIMAL CROSSING EB	0017852A	7852	SC	Max J. Kuney Company	2010	No
195/117	CHENEY SPOKANE RD OVER US 195	0018378A	8378	ER	Selland Construction	2014	Yes
395/441N-E	N-E RAMP OVER N-N RAMP	0017610E	7610	ER	Graham Construction & Manage.	2011	Yes
2/651W-S	W-S RAMP OVER US 2/US 395	0017610D	7610	ER	Graham Construction & Manage.	2011	No
395/442W	US 395 OVER US 2	0017610B	7610	ER	Graham Construction & Manage.	2011	No

Figure 14 - Map of East Trip Bridges

NORTH TRIP

The bridges included in this trip are near Tacoma, Bremerton and Marysville areas, as shown in Figure 15. The inspection of these bridges was performed on 5/21/2015, 5/22/2015 and 5/29/2015.

Br. No.	Bridge Name	Str. ID	Contract	Region	Contractor	Year	Perform.
5/434SCD	SBCD OVER SR 16 HOV & RAMPS	0018189B	8189	OR	Mowat Construction Company	2013	Yes
16/3W	SR 16 OVER HOV	0018189A	8189	OR	Mowat Construction Company	2014	Yes
16/7S-E	S SPRAGUE RAMP	0017594E	7594	OR	Guy F. Atkinson Construction	2010	No
303/4A	MANETTE BRIDGE	0017926A	7926	OR	Manson-Mowat, A Joint Venture	2011	No
2/8.5N-W	N-W RAMP (BICKFORD AVE) OVER US 2	0018286A	8286	NW	Granite Construction Company	2013	Yes
529/25	EBEY SLOUGH	0017948A	7948	NW	Granite Construction Company	2012	No
9/133	SR 9 OVER HARVEY CRK RD	0017267A	7267	NW	Scarsella Bros., Inc.	2008	No
9/134	PILCHUCK CREEK	0018363A	8383	NW	Granite Construction Company	2014	Yes

Figure 15 - Map of North Trip Bridges

BRIDGE DECK SUMMARIES

The cracking of each bridge was evaluated as described in the previous section and grouped into the following categories:

- Single Span Prestressed Girder Bridges
- Two-Span Prestressed Girder Bridges
- Multi-Span Prestressed Girder Bridges
- Multi-Span Steel Plate Girder Bridges

Summaries of each bridge are included in the following sections. For more information on each bridge, see Appendices A through D.

SINGLE SPAN PRESTRESSED GIRDER BRIDGES

Table 2 summarizes and ranks the average crack intensity for each of the single span prestressed girder bridges evaluated. See Appendix A for more information.

Table 2 - Single Span Prestressed Bridge Summary

Br. No.	Bridge Name	Contract	Year	Perform.	Intensity	Cement.	Shrink.
90/105.5S	GOLD CREEK ANIMAL CROSSING EB	7852	2010	No	40%	735	--
90/105.5N	GOLD CREEK ANIMAL CROSSING WB	7852	2012	No	32%	735	--
5/302E	PRAIRIE CREEK NB	7465	2009	No	18%	735	--
9/133	SR 9 OVER HARVEY CRK RD	7267	2008	No	8%	735	--
5/302W	PRAIRIE CREEK SB	7465	2010	No	4%	735	--
5/229	MELLON STREET COUPLET	8473	2014	Yes	< 1%	580	0.028%
101/31	MIDDLE NEMAH RIVER	8344	2014	Yes	0%	610	0.018%

The bridge decks for single span prestressed girder bridges are typically placed in one placement from abutment to abutment.

BRIDGES 90/105.5S & 90/105.5N (GOLD CREEK ANIMAL CROSSING)

These bridges are parallel bridges carrying I-90 over an animal crossing in Kittitas County. Bridge 90/105.5S was constructed in 2010 and Bridge 90/105.5N was constructed in 2012. Both bridges were constructed as part of the **I-90 Hyak to Snowshed Vicinity Phase 1B – Add Lanes and Bridges** contract. The contract used the 2008 WSDOT Standard Specifications which include the traditional bridge deck concrete requirements. See Figures 16 & 17 for the crack intensity diagrams for these bridges. See Figure 18 for pictures depicting the range of cracking represented by the crack intensity diagrams. Both of these bridges are uniformly cracked with the worse cracking intensity occurring near the abutments.

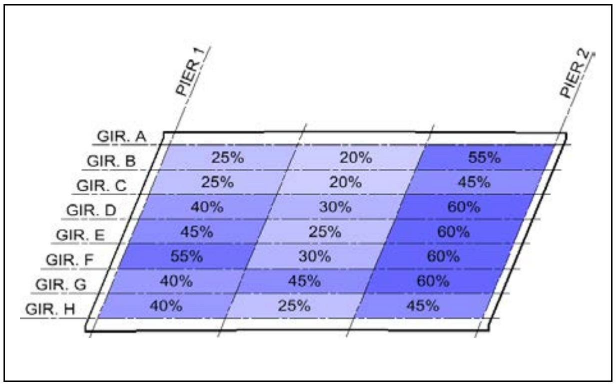


Figure 16 - Bridge 90/105.5S Crack Intensity Diagram

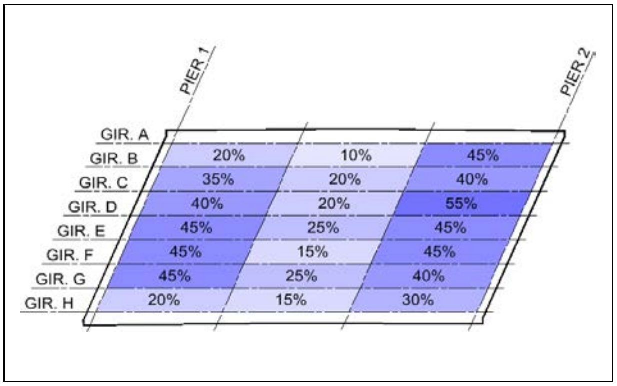


Figure 17 - Bridge 90/105.5N Crack Intensity Diagram

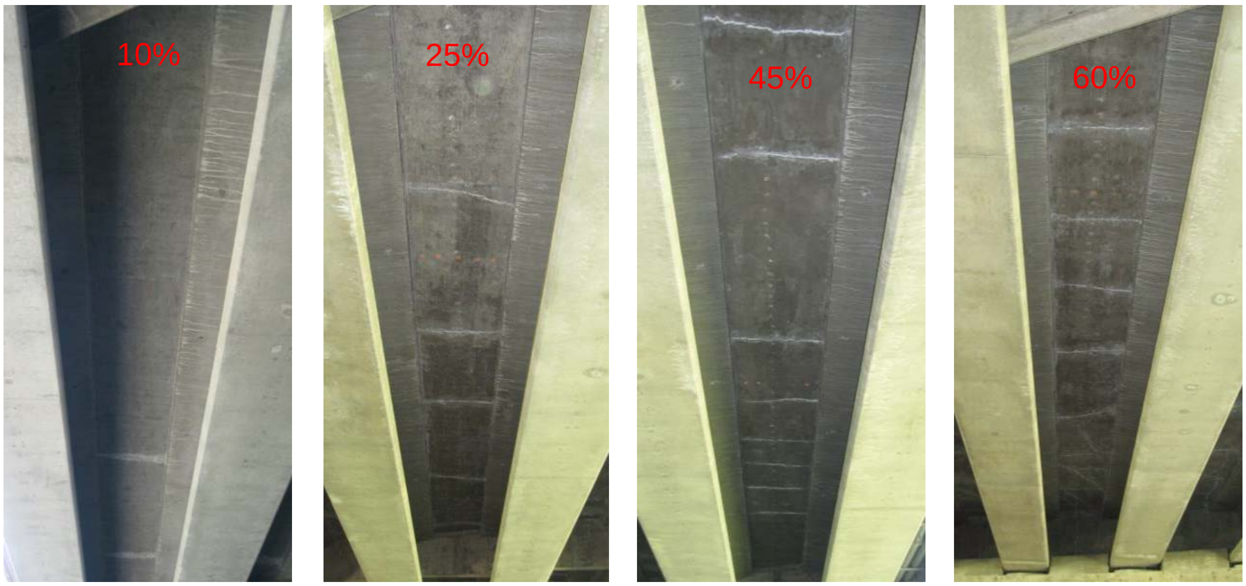


Figure 18 - Range of Deck Cracking for Bridges 90/105.5S & 90/105.5N

BRIDGES 5/302E & 5/302W (PRAIRIE CREEK)

These bridges are parallel bridges carrying I-5 over Prairie Creek in Thurston County. Bridge 5/302W was constructed in 2008 and Bridge 5/302E was constructed in 2009. Both bridges were constructed as part of the **I-5 Grand Mound to Maytown Stage One – Add Lanes** contract. The contract used the 2006 WSDOT Standard Specifications which include the traditional bridge deck concrete requirements. See Figures 19 & 20 for the crack intensity diagrams for these bridges. See Figure 21 for pictures depicting the range of cracking represented by the crack intensity diagrams.

Half of Bridge 5/302E performed well but the other half performed poorly. This bridge was constructed in stages with a longitudinal construction joint for staging. Bridge 5/302W performed well with relatively low cracking.

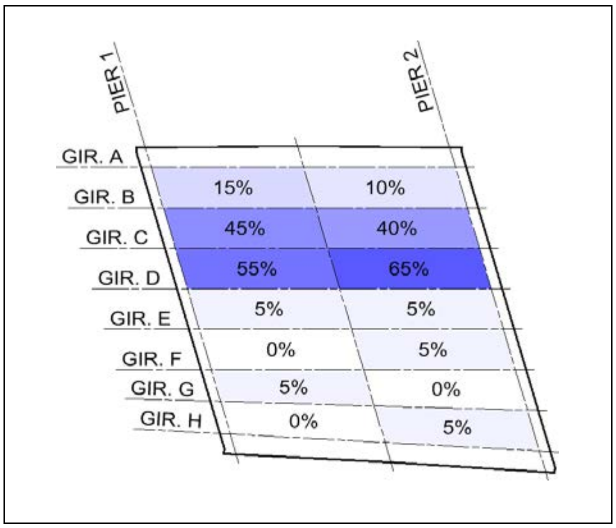


Figure 19 - Bridge 5/302E Crack Intensity Diagram

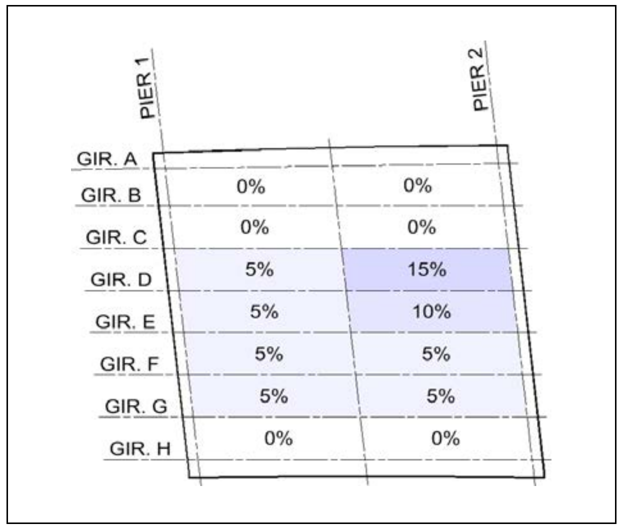


Figure 20 - Bridge 5/302W Crack Intensity Diagram

Figure 21 - Range of Deck Cracking for Bridges 5/302E & 5/302W

BRIDGE 9/133 (HARVEY CREEK ROAD)

This bridge carries SR 9 over Harvey Creek and Harvey Creek Road in Snohomish County. It was constructed in 2014 as part of the **SR 9 Schloman Road to 256th ST NE and 268th ST Intersection** contract. The contract used the 2006 WSDOT Standard Specifications which include the traditional bridge deck concrete requirements. See Figure 22 for the crack intensity diagram for this bridge. See Figure 23 for pictures depicting the range of cracking represented by the crack intensity diagrams. This bridge deck performed very well except for a section near Pier 1. This is a trend that showed up many times during this study.

	PIER 1				PIER 2
GIR. A					
GIR. B	10%	0%	10%	5%	0%
GIR. C	45%	0%	0%	0%	0%
GIR. D	25%	0%	5%	5%	5%
GIR. E	35%	0%	5%	10%	5%
GIR. F	25%	0%	5%	5%	5%

Figure 22 - Bridge 9/133 Crack Intensity Diagram

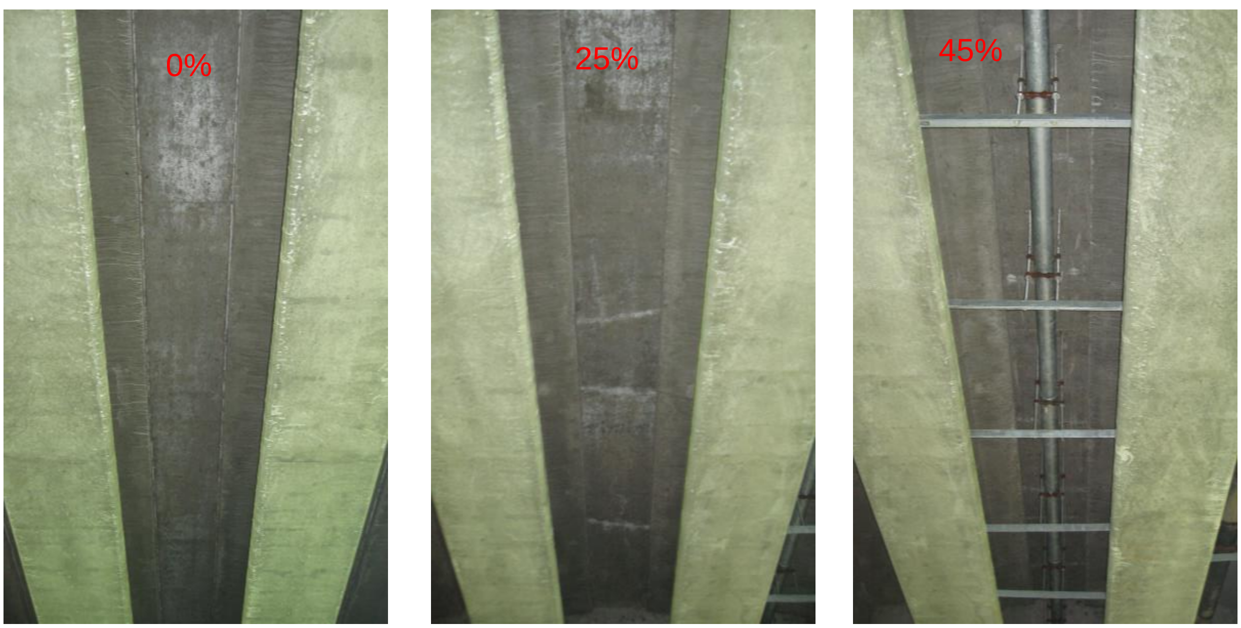


Figure 23 - Range of Deck Cracking for Bridge 9/133

BRIDGE 5/229 (MELLEN STREET COUPLET)

This bridge connects multiple ramps over I-5 in Centralia. It was was constructed in 2008 as part of the **I-5 Mellen Street to Blakeslee Junction – Stage 2** contract. The contract used the 2012 WSDOT Standard Specifications with Special Provisions which include the performance based bridge deck concrete requirements. See Figure 24 for the crack intensity diagram for this bridge. The bays labeled "X X X" were not inspected due to limited access hindered by I-5 traffic. See Figure 25 for pictures depicting the range of cracking represented by the crack intensity diagrams (crack circled). This bridge deck performed very well with only one crack seen.

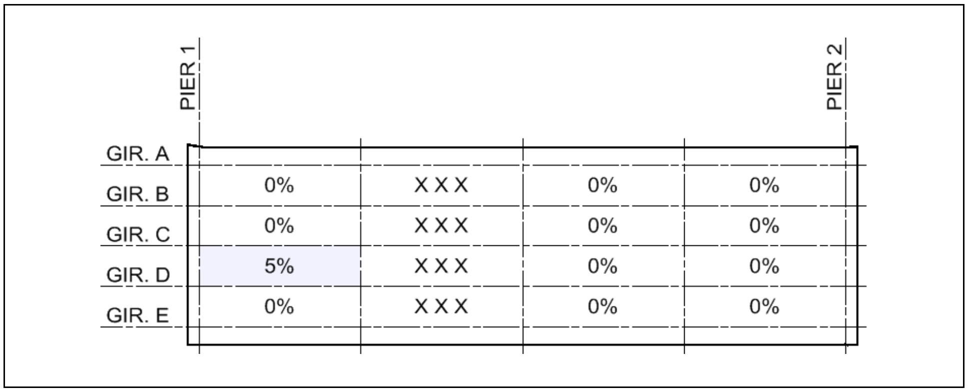


Figure 24 - Bridge 5/229 Crack Intensity Diagram

Figure 25 - Range of Deck Cracking for Bridge 5/229

BRIDGE 101/31 (MIDDLE NEMAH RIVER)

This bridge carries US 101 over the Middle Nemah River in Pacific County. It was constructed in 2014 as part of the **US 101 Middle Nemah River Br. Replace Bridge** contract. The contract used the 2012 WSDOT Standard Specifications with Special Provisions which include the performance based bridge deck concrete requirements. See Figure 26 for the crack intensity diagram for this bridge. See Figure 27 for pictures depicting the range of cracking represented by the crack intensity diagrams. This bridge deck had no visible cracks.

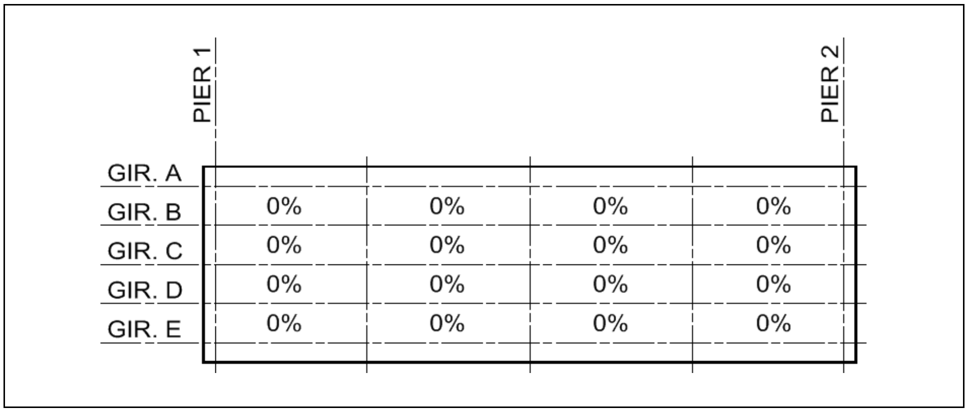


Figure 26 - Bridge 101/31 Crack Intensity Diagram

Figure 27 - Range of Deck Cracking for Bridge 101/31

TWO-SPAN PRESTRESSED GIRDER BRIDGES

Table 3 summarizes and ranks the average crack intensity for each of the two-span prestressed girder bridges evaluated. See Appendix B for more information.

Table 3 - Two-Span Prestressed Bridge Summary

Br. No.	Bridge Name	Contract	Year	Perform.	Intensity	Cement.	Shrink.
16/7S-E	S SPRAGUE RAMP	7594	2010	No	59%	735	--
195/117	CHENEY SPOKANE RD OVER US 195	8378	2014	Yes	10%	0	0.000%
395/442W	US 395 OVER US 2	7610	2011	No	10%	735	--
16/3W	SR 16 OVER HOV	8189	2014	Yes	9%	565	0.028%
2/8.5N-W	N-W RAMP (BICKFORD AVE) OVER US 2	8286	2013	Yes	6%	610	0.032%
395/441N-E	N-E RAMP OVER N-N RAMP	7610	2011	Yes	< 1%	565	0.034%

The bridge decks for two-span prestressed girder bridge decks are typically placed in two placements (one each span) with closure pours over the middle pier.

BRIDGE 16/7S-E (SOUTH SPRAGUE RAMP)

This bridge carries the ramp from SR 16 to Sprague Street as part of the Nalley Valley interchange in Tacoma. It was constructed in 2010 as part of the **I-5/SR 16 WB Nalley Valley I/C** contract and connects into another bridge at Pier 1. The contract used the 2008 WSDOT Standard Specifications which include the traditional bridge deck concrete requirements. See Figure 28 for the crack intensity diagram for this bridge. See Figure 29 for pictures depicting the range of cracking represented by the crack intensity diagrams. This bridge deck has very severe cracking throughout and is one of the worst looking bridge decks evaluated for this study.

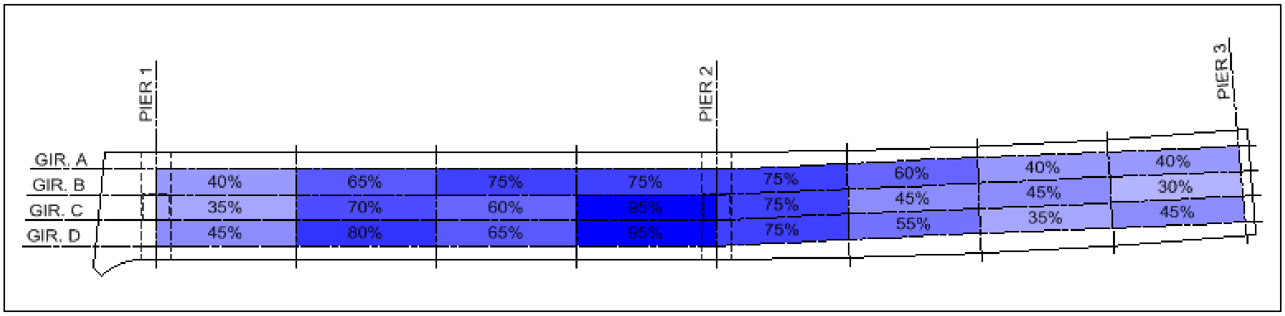


Figure 28 - Bridge 16/7S-E Crack Intensity Diagram

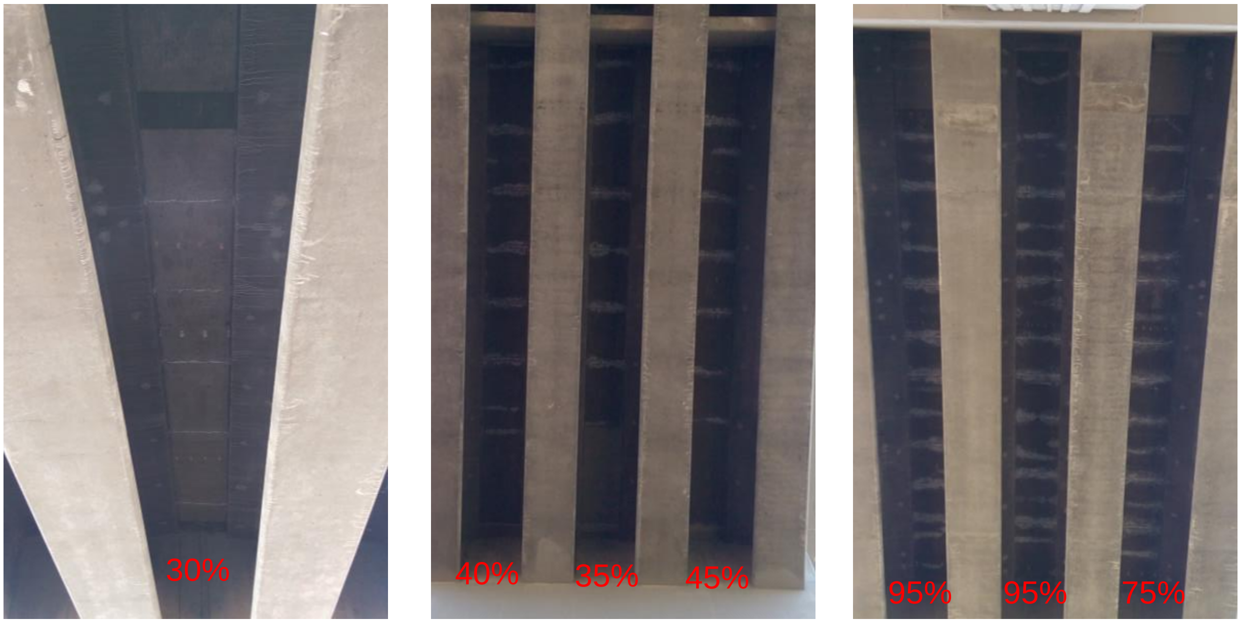


Figure 29 - Range of Deck Cracking for Bridge 16/7S-E

BRIDGE 195/117 (CHENEY-SPOKANE ROAD)

This bridge carries traffic over US 195 at the Cheney-Spokane Road Interchange in Spokane. It was constructed in 2014 as part of the **US 195 Cheney-Spokane Rd – New Interchange** contract. The contract used the 2012 WSDOT Standard Specifications with Special Provisions which include the performance based bridge deck concrete requirements. See Figure 30 for the crack intensity diagram for this bridge. See Figure 31 for pictures depicting the range of cracking represented by the crack intensity diagrams (cracks circled). This bridge deck performed well except for a section in Span 1 near Pier 2.

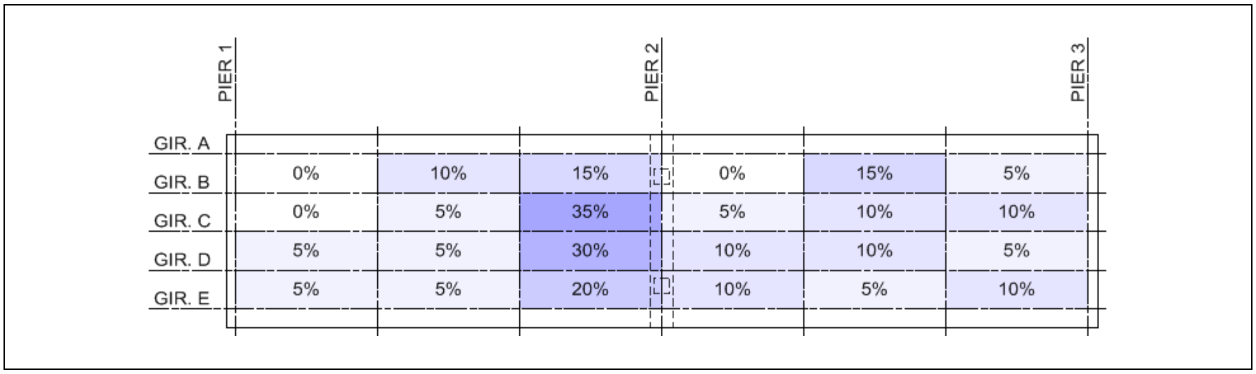


Figure 30 - Bridge 195/117 Crack Intensity Diagram

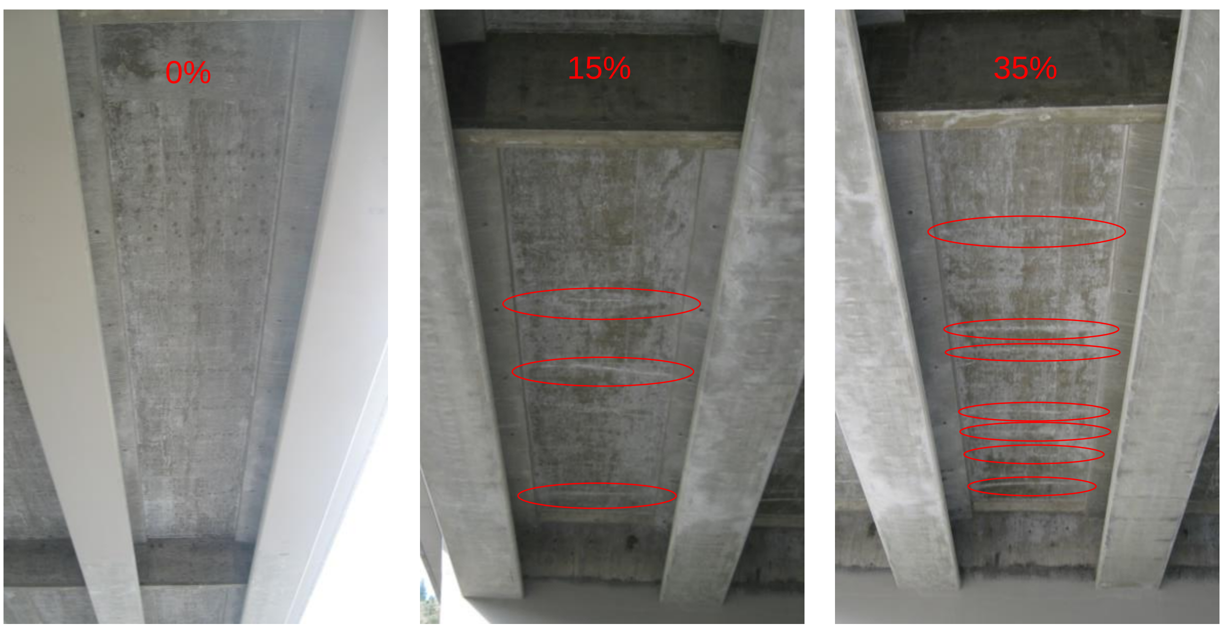


Figure 31 - Range of Deck Cracking for Bridge 195/117

BRIDGE 395/442W (US 395 OVER US 2)

This bridge carries US 395 southbound over US 2 in Spokane County. It was constructed in 2011 as part of the **US 395 NSC – US 2 Lowering** contract. The contract used the 2008 WSDOT Standard Specifications which include the traditional bridge deck concrete requirements. See Figure 32 for the crack intensity diagram for this bridge. See Figure 33 for pictures depicting the range of cracking represented by the crack intensity diagrams (cracks circled). This bridge deck performed well overall but had more cracking near Pier 2 in both spans.

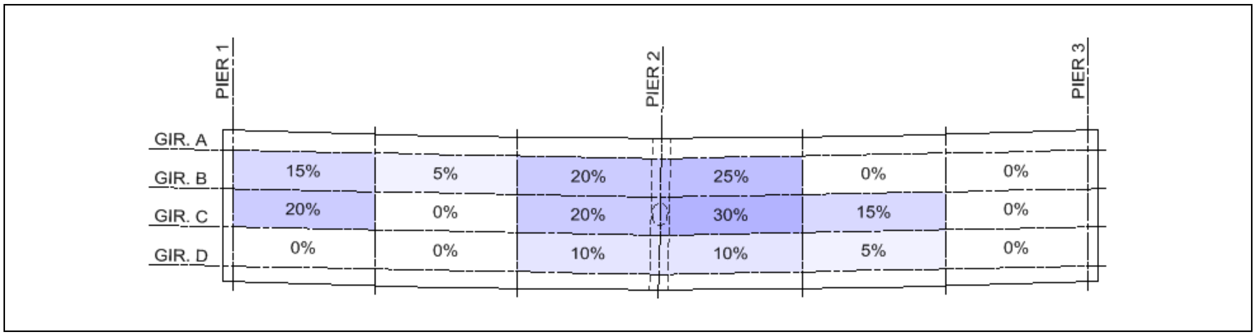


Figure 32 - Bridge 395/442W Crack Intensity Diagram

Figure 33 - Range of Deck Cracking for Bridge 395/442W

BRIDGE 16/3W (SR 16 OVER HOV)

This bridge carries traffic over the future HOV connector between I-5 and SR 16 as part of the Nalley Valley Interchange in Tacoma. It was constructed in 2014 as part of the **I-5 / SR 16 EB Nalley Valley - HOV** contract. The contract used the 2010 WSDOT Standard Specifications with Special Provisions which include the performance based bridge deck concrete requirements. See Figure 34 for the crack intensity diagram for this bridge. See Figure 35 for pictures depicting the range of cracking represented by the crack intensity diagrams. This bridge deck performed very well overall but had more cracking near Pier 2 in Span 1 and near the Pier 3 abutment.

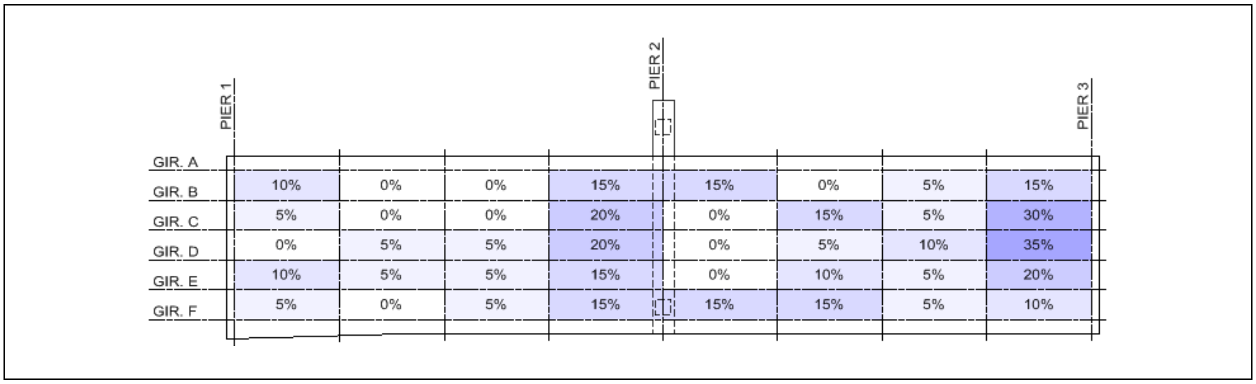


Figure 34 - Bridge 16/3W Crack Intensity Diagram

Figure 35 - Range of Deck Cracking for Bridge 16/3W

BRIDGE 2/8.5N-W (BICKFORD AVE OVER US 2)

This bridge carries traffic over US 2 at the Bickford Ave Interchange in Snohomish County. It was constructed in 2013 as part of the **US 2 Bickford Avenue I/C Safety and Culvert Replacement** contract. The contract used the 2012 WSDOT Standard Specifications with Special Provisions which include the performance based bridge deck concrete requirements. See Figure 36 for the crack intensity diagram for this bridge. See Figure 37 for pictures depicting the range of cracking represented by the crack intensity diagrams. This bridge deck performed well with highest cracking intensity occurring near Pier 2 in Span 1.

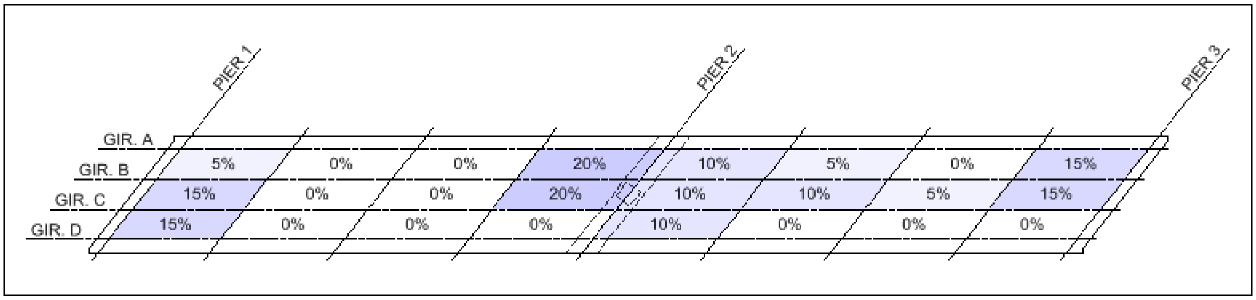


Figure 36 - Bridge 2/8.5N-W Crack Intensity Diagram

Figure 37 - Range of Deck Cracking for Bridge 2/8.5N-W

395/441N-E (N-E RAMP OVER N-N RAMP)

This bridge carries traffic from US 395 to US 2 in Spokane County. It was constructed in 2011 as part of the **US 395 NSC - US 2 Lowering** contract. The contract used the 2008 WSDOT Standard Specifications with Special Provisions which include the performance based bridge deck concrete requirements for this bridge only. It was the first bridge to use the revised bridge deck concrete requirements. See Figure 38 for the crack intensity diagram for this bridge. See Figure 39 for pictures depicting the range of cracking represented by the crack intensity diagrams. This bridge deck performed very well and only one small diagonal crack near the Pier 3 abutment was observed.

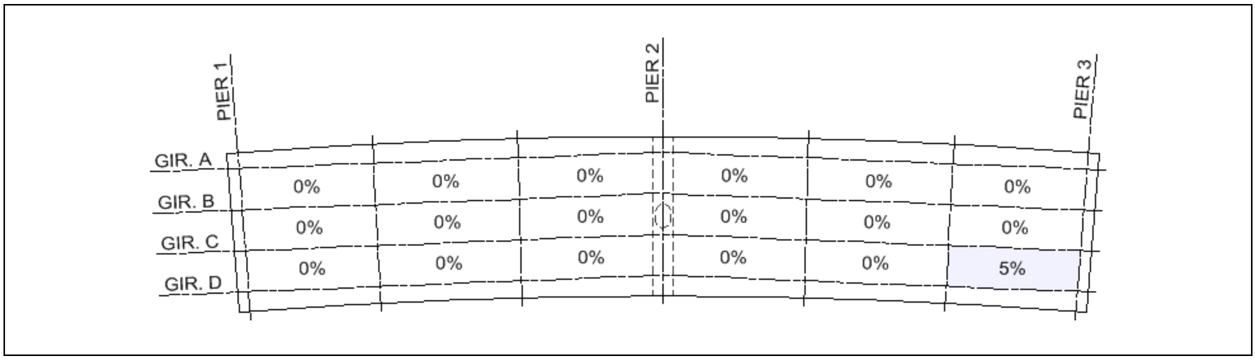


Figure 38 - Bridge 395/441N-E Crack Intensity Diagram

Figure 39 - Range of Deck Cracking for Bridge 395/441N-E

MULTI-SPAN PRESTRESSED GIRDER BRIDGES

Table 4 summarizes and ranks the average crack intensity for each of the multi-span prestressed girder bridges evaluated. See Appendix C for more information.

Table 4 - Multi-Span Prestressed Girder Bridge Summary

Br. No.	Bridge Name	Contract	Year	Perform.	Intensity	Cement.	Shrink.
303/4A	MANETTE BRIDGE	7926	2011	No	73%	735	--
90/106N	GOLD CREEK WB	7852	2012	No	44%	735	--
6/115	S FORK CHEHALIS R	7587	2009	No	32%	735	--
5/234W	I-5 OVER BLAKESLEE JCT RR	8272	2013	Yes	9%	580	0.030%
105/4	NORTH RIVER	8345	2014	Yes	7%	610	0.018%
105/3	SMITH CREEK	8345	2013	Yes	6%	610	0.018%
6/8	WILLAPA RIVER	8464	2014	Yes	5%	610	0.018%
5/232NCD	SKOOKUMCHUCK RIVER NCD	8272	2013	Yes	2%	580	0.030%
5/232SCD	SKOOKUMCHUCK RIVER SCD	8272	2013	Yes	1%	580	0.030%
101/44	BONE RIVER	8292	2013	Yes	1%	610	0.018%

Similar to the two-span prestressed girder bridges, the multi-span prestressed girder bridge decks are typically placed in multiple placements (one each span) with closure pours over the interior piers.

BRIDGE 303/4A (MANETTE BRIDGE)

This bridge connects the City of Bremerton to the neighborhood of Manette over the Port Washington Narrows. It was formerly SR 303 but is no longer part of the state route system. It was constructed in 2011 as part of the **Manette Bridge 303/4A Bridge Replacement** contract. The bridge superstructure consists of precast prestressed spliced girders with a cast-in-place bridge deck. The girder segments were post-tensioned together before the deck was placed. The contract used the 2010 WSDOT Standard Specifications which include the traditional bridge deck concrete requirements. See Figure 40 for the crack intensity diagram for this bridge (spans 3, 4, and 5 not shown). Cracks in Spans 2 thru 5 were not counted due to limited access, but based on a visual comparison the rest of the bridge is similar to the approaches. See Figure 41 for pictures depicting the range of cracking represented by the crack intensity diagrams. This bridge deck performed very poorly and is the worst of the bridge decks evaluated for this report.

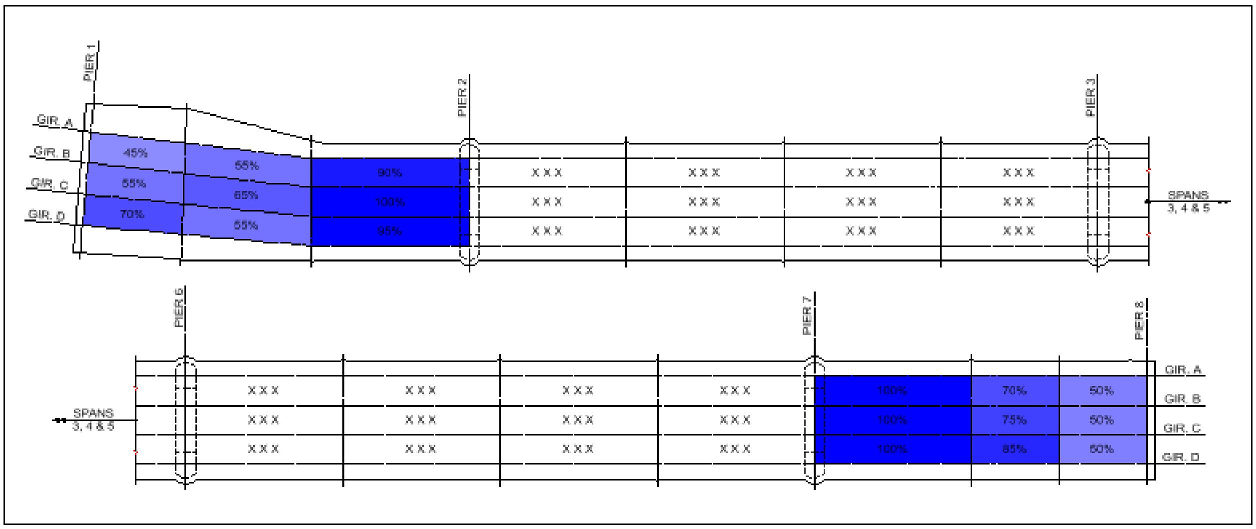


Figure 40 - Bridge 303/4A Crack Intensity Diagram

Figure 41 - Range of Deck Cracking for Bridge 303/4A

BRIDGE 90/106N (GOLD CREEK BRIDGE)

This bridge carries I-90 over Gold Creek in Kittitas County and was constructed in 2012 as part of the **I-90 Hyak to Snowshed Vicinity Phase 1B – Add Lanes and Bridges** contract. The contract used the 2008 WSDOT Standard Specifications which include the traditional bridge deck concrete requirements. See Figure 42 for the crack intensity diagrams for this bridge. See Figure 43 for pictures depicting the range of cracking represented by the crack intensity diagrams. This bridge deck generally performed poor to very poor. While not evaluated for this report, the parallel bridge (90/106S) was similar.

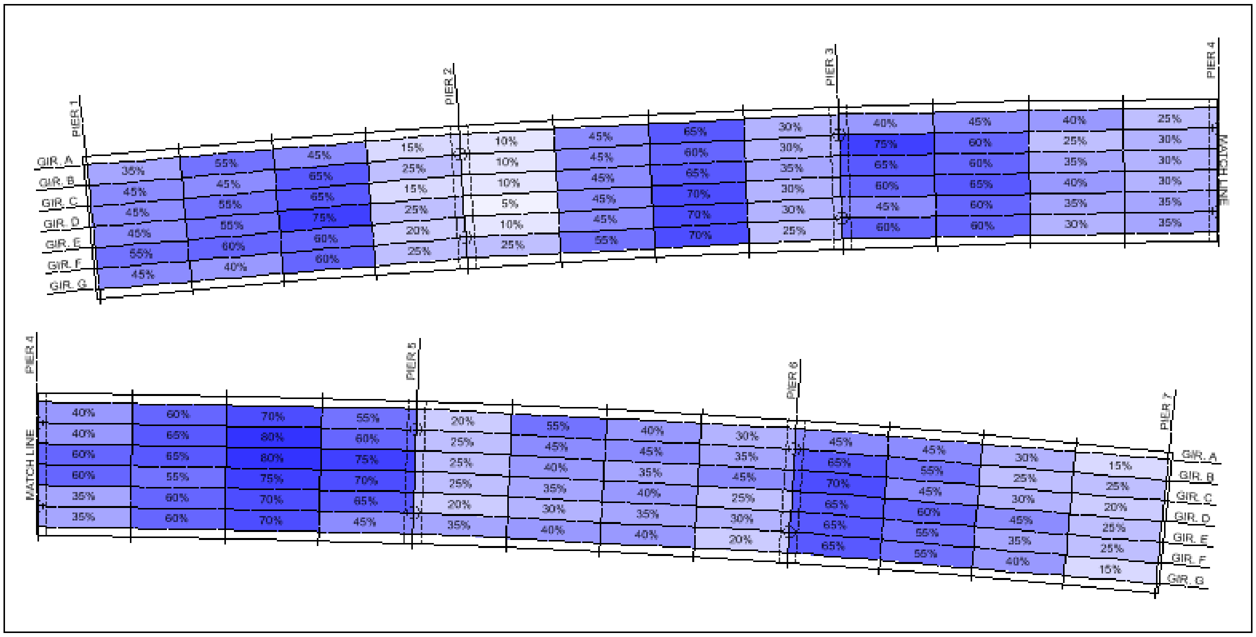


Figure 42 - Bridge 90/106N Crack Intensity Diagram

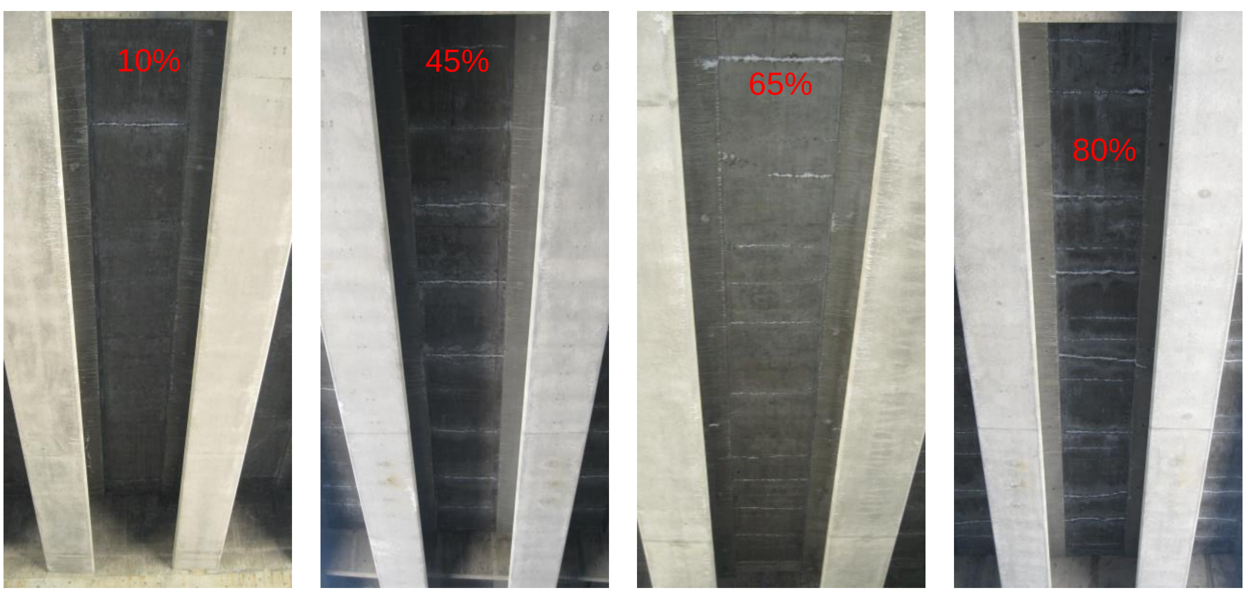


Figure 43 - Range of Deck Cracking for Bridge 90/106N

BRIDGE 6/115 (SOUTH FORK CHEHALIS RIVER)

This bridge carries SR 6 over South Fork Chehalis River in Lewis County and was constructed in 2009 as part of the **SR 6 So. Fork Chehalis River Bridge** contract. The contract used the 2008 WSDOT Standard Specifications which include the traditional bridge deck concrete requirements. See Figure 44 for the crack intensity diagrams for this bridge. See Figure 45 for pictures depicting the range of cracking represented by the crack intensity diagrams. This bridge deck had portions that performed well and portions that performed very poor.

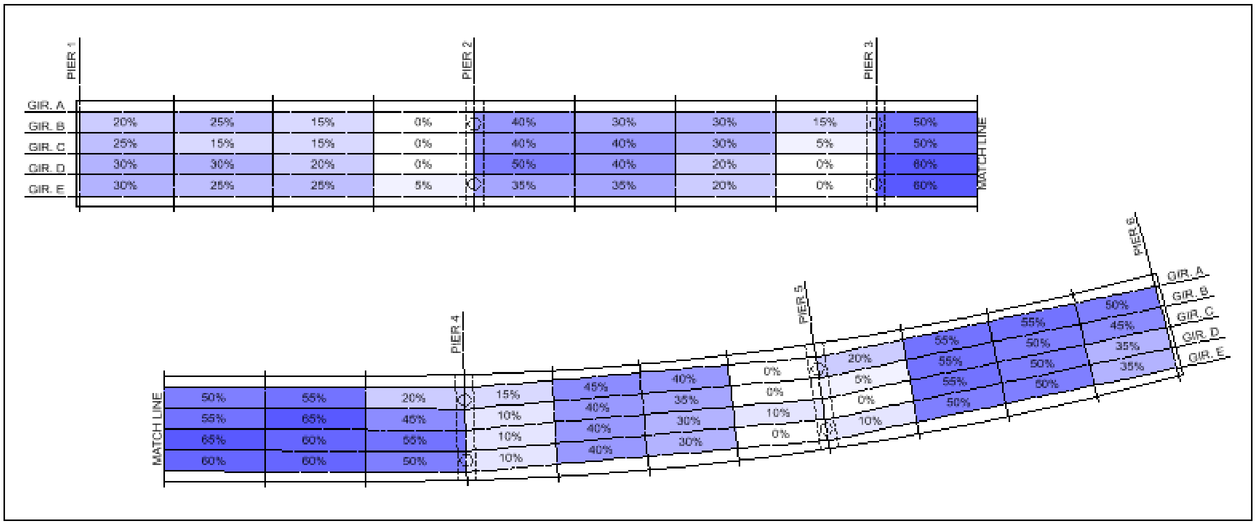


Figure 44 - Bridge 6/115 Crack Intensity Diagram

Figure 45 - Range of Deck Cracking for Bridge 6/115

BRIDGE 5/234W (I-5 OVER BLAKESLEE RAILROAD JUNCTION)

This bridge carries southbound I-5 over West Reynolds Avenue in Centralia. It was constructed in 2013 as part of the **I-5 Mellen Street to Blakeslee Junction – Stage 1** contract. The contract used the 2012 WSDOT Standard Specifications with Special Provisions which include the performance based bridge deck concrete requirements. See Figure 46 for the crack intensity diagram for this bridge. See Figure 47 for pictures depicting the range of cracking represented by the crack intensity diagrams (cracks circled). Spans 1 & 2 of this bridge deck performed well while Span 3 performed very well.

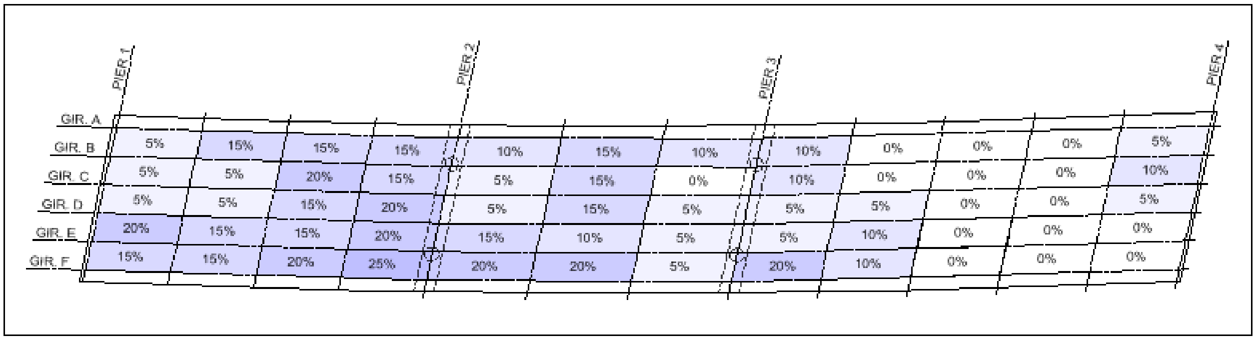


Figure 46 - Bridge 5/234W Crack Intensity Diagram

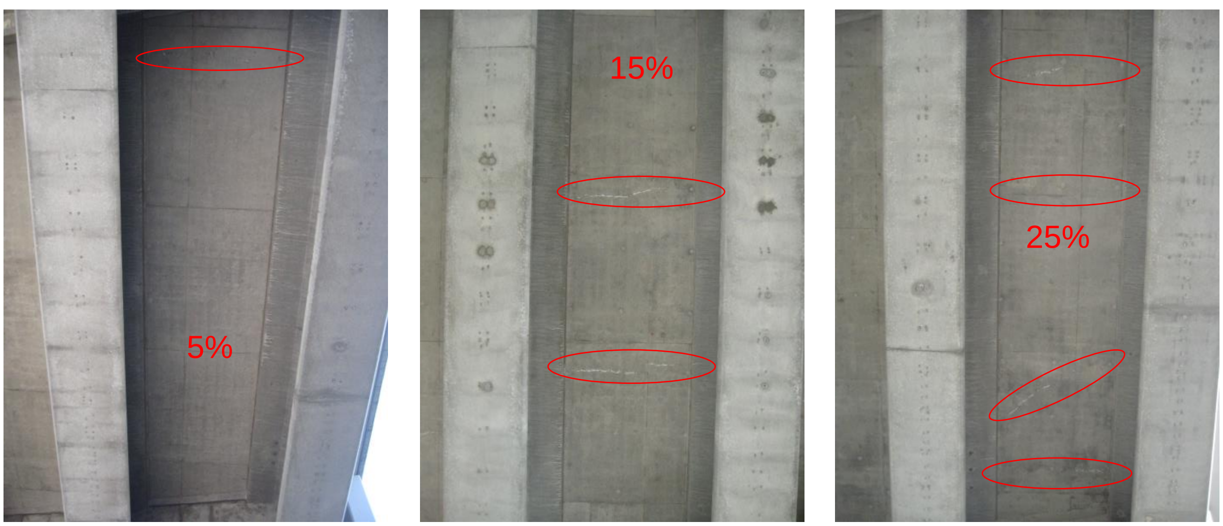


Figure 47 - Range of Deck Cracking for Bridge 5/234W

BRIDGE 105/4 (NORTH RIVER)

This bridge carries SR 105 over North River in Pacific County. It was constructed in 2014 as part of the **SR 105 Smith Creek and North River Replace Bridges** contract. The contract used the 2012 WSDOT Standard Specifications with Special Provisions which include the performance based bridge deck concrete requirements. See Figure 48 for the crack intensity diagram for this bridge. Cracks in portions of Span 1 and all of Spans 2 & 3 were not counted due to limited access. See Figure 49 for pictures depicting the range of cracking represented by the crack intensity diagrams. The bridge deck performed well near the piers and very well near the abutments.

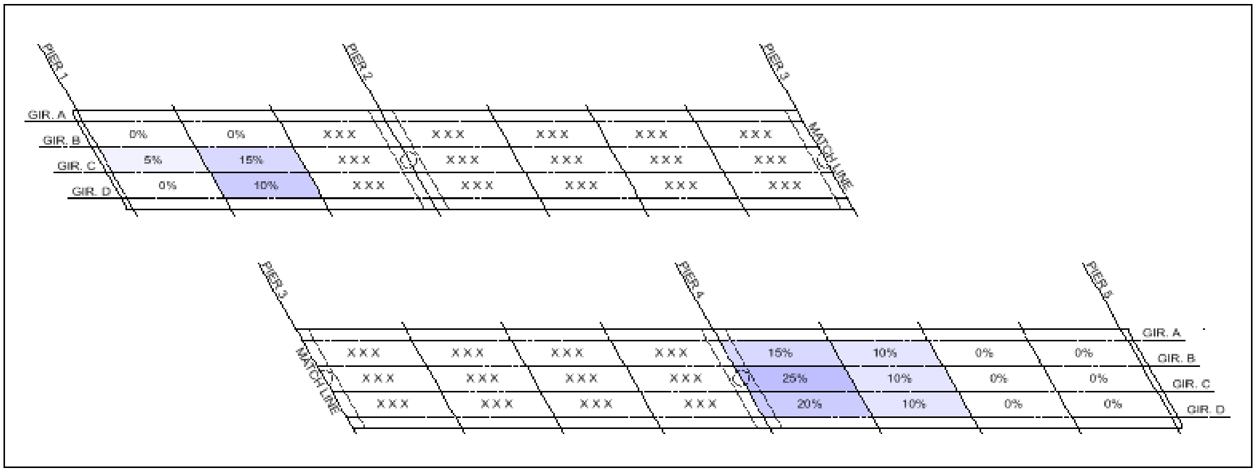


Figure 48 - Bridge 105/4 Crack Intensity Diagram

Figure 49 - Range of Deck Cracking for Bridge 105/4

BRIDGE 105/3 (SMITH CREEK)

This bridge carries SR 105 over Smith Creek. It was constructed in 2013 as part of the **SR 105 Smith Creek and North River Replace Bridges** contract. The contract used the 2012 WSDOT Standard Specifications with Special Provisions which required the performance based bridge deck concrete requirements. See Figure 50 for the crack intensity diagram for this bridge. Cracks in Span 2 were not counted due to limited access. See Figure 51 for pictures depicting the range of cracking represented by the crack intensity diagrams. The bridge deck performed well near the piers and very well near the abutments.

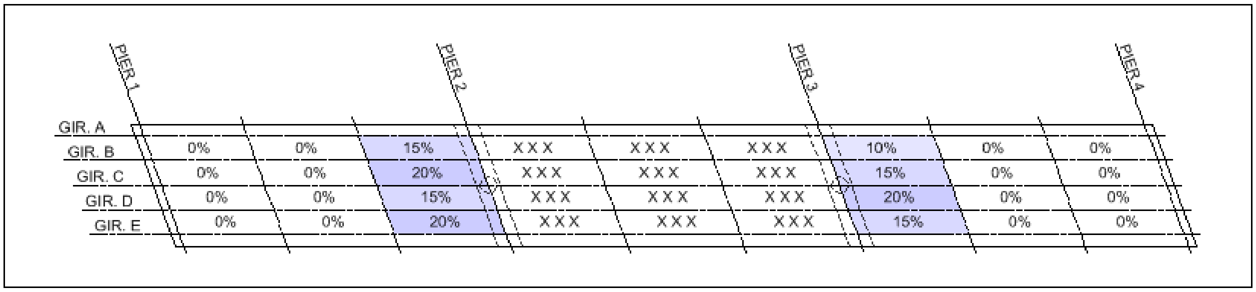


Figure 50 - Bridge 105/3 Crack Intensity Diagram

Figure 51 - Range of Deck Cracking for Bridge 105/3

BRIDGE 6/8 (WILLAPA RIVER)

This bridge carries SR 6 over Willapa River. It was constructed in 2014 as part of the **SR 6 Willapa River Bridge Replace Bridge** contract. The contract used the 2012 WSDOT Standard Specifications with Special Provisions which include the performance based bridge deck concrete requirements. See Figure 52 for the crack intensity diagram for this bridge. See Figure 53 for pictures depicting the range of cracking represented by the crack intensity diagrams. The bridge deck performed generally very well.

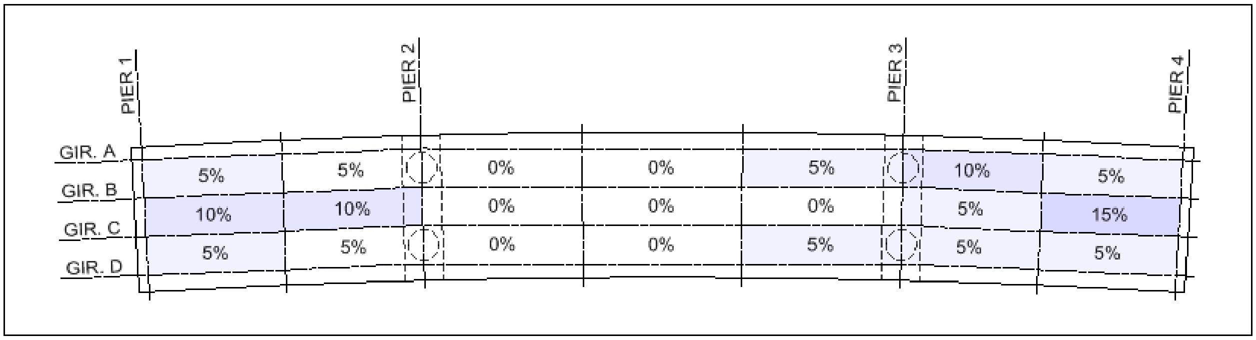


Figure 52 - Bridge 6/8 Crack Intensity Diagram

Figure 53 - Range of Deck Cracking for Bridge 6/8

BRIDGES 5/232NCD AND 5/232SCD (SKOOKUMCHUCK RIVER CD)

These parallel bridges are collector distributors for I-5 over the Skookumchuck River. They were constructed in 2013 as part of the **I-5 Mellen Street to Blakeslee Junction – Stage 1** contract. The contract used the 2012 WSDOT Standard Specifications with Special Provisions which include the performance based bridge deck concrete requirements. See Figures 54 & 55 for the crack intensity diagram for these bridges. Cracks were not counted for the middle of Span 2 for Bridge 5/232NCD due to limited access. See Figure 56 for pictures depicting the range of cracking represented by the crack intensity diagrams. The bridge decks for these bridges performed very well.

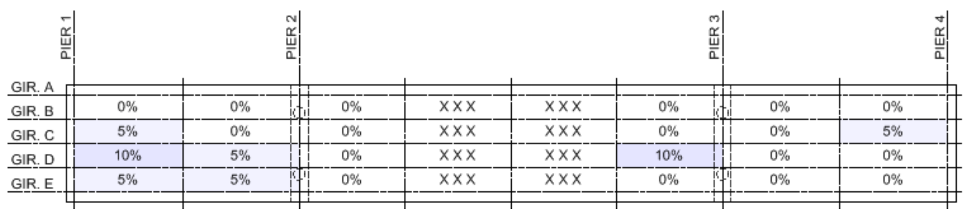


Figure 54 - Bridge 5/232NCD Crack Intensity Diagram

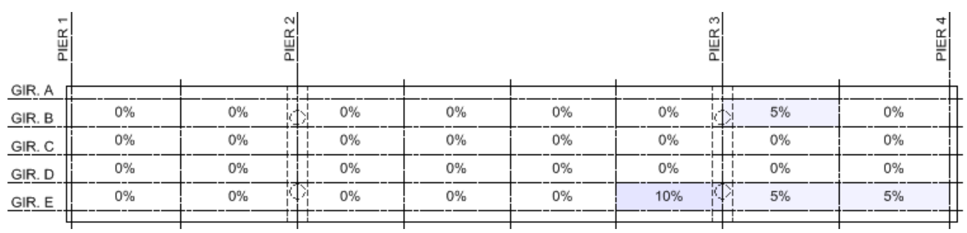


Figure 55 - Bridge 5/232SCD Crack Intensity Diagram

Figure 56 - Range of Deck Cracking for Bridges 5/232NCD & 5/232SCD

101/44 (BONE RIVER)

This bridge carries US 101 over Bone River. It was constructed in 2013 as part of the **US 101 Bone River Bridge Replace Bridge** contract. The contract used the 2012 WSDOT Standard Specifications with Special Provisions which include the performance based bridge deck concrete requirements. See Figure 57 for the crack intensity diagram for this bridge. Cracks in Span 2 were not counted due to limited access. See Figure 58 for pictures depicting the range of cracking represented by the crack intensity diagrams (cracks circled). The bridge deck performed very well.

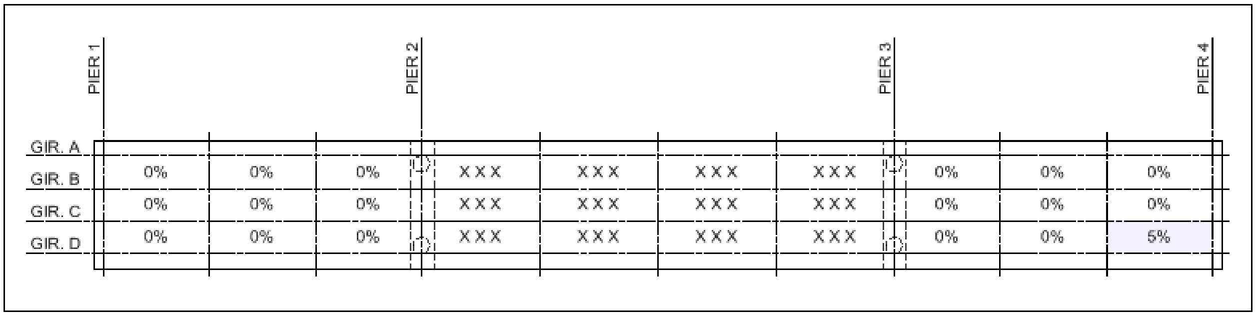


Figure 57 - Bridge 101/44 Crack Intensity Diagram

Figure 58 - Range of Deck Cracking for Bridge 101/44

MULTI-SPAN STEEL PLATE GIRDER BRIDGES

Table 5 summarizes and ranks the average crack intensity for each of the multi-span steel plate girder bridges evaluated. See Appendix D for more information.

Table 5 - Multi-Span Steel Plate Girder Bridge Summary

Br. No.	Bridge Name	Contract	Year	Perform.	Intensity	Cement.	Shrink.
5/434SCD	SBCD OVER SR 16 HOV & RAMPS	8189	2013	Yes	36%	565	0.028%
529/25	EBEY SLOUGH	7948	2012	No	36%	735	--
2/651W-S	W-S RAMP OVER US 2/US 395	7610	2011	No	13%	735	--
9/134	PILCHUCK CREEK	8383	2014	Yes	7%	611	0.031%

Unlike prestressed girder bridges, steel plate girder bridges do not place bridge deck concrete by span. They have a specific placement order with transverse construction joints within each span. See Figure 59 for an example.

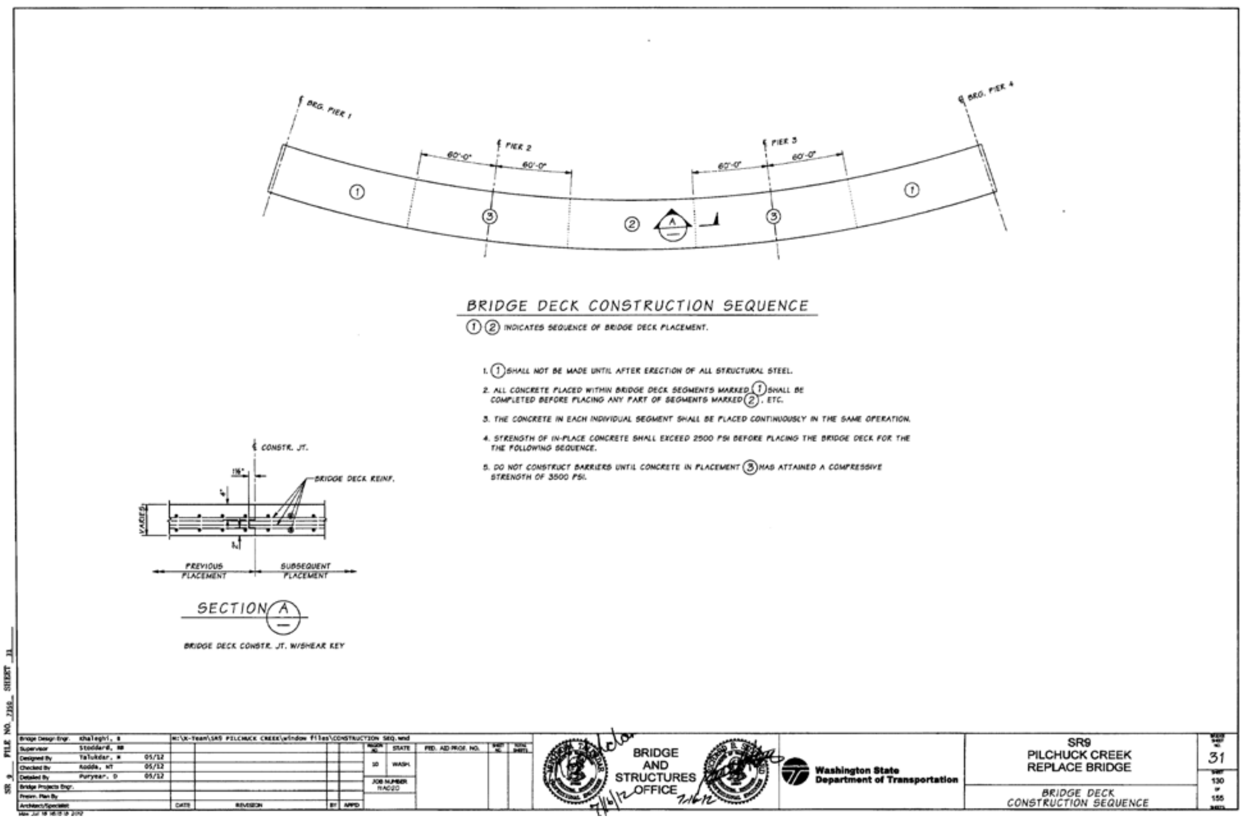


Figure 59 - Steel Plate Girder Bridge Deck Construction Joints

5/434SCD (SBCD OVER SR 16 HOV AND RAMPS)

This bridge is a collector distributor for I-5 over SR 16 at the Nalley Valley Interchange in Tacoma. It was constructed in 2013 as part of the **I-5 / SR 16 EB Nalley Valley - HOV** contract. The contract used the 2012 WSDOT Standard Specifications with Special Provisions which included the performance based bridge deck concrete requirements. See Figure 60 for the crack intensity diagram for this bridge. See Figure 61 for pictures depicting the range of cracking represented by the crack intensity diagrams. The bridge deck performed very poorly near Piers 2 & 3 and in Span 2, but very well in Spans 1 & 3 near the abutments. This bridge exhibits the worst cracking of the performance based bridge decks.

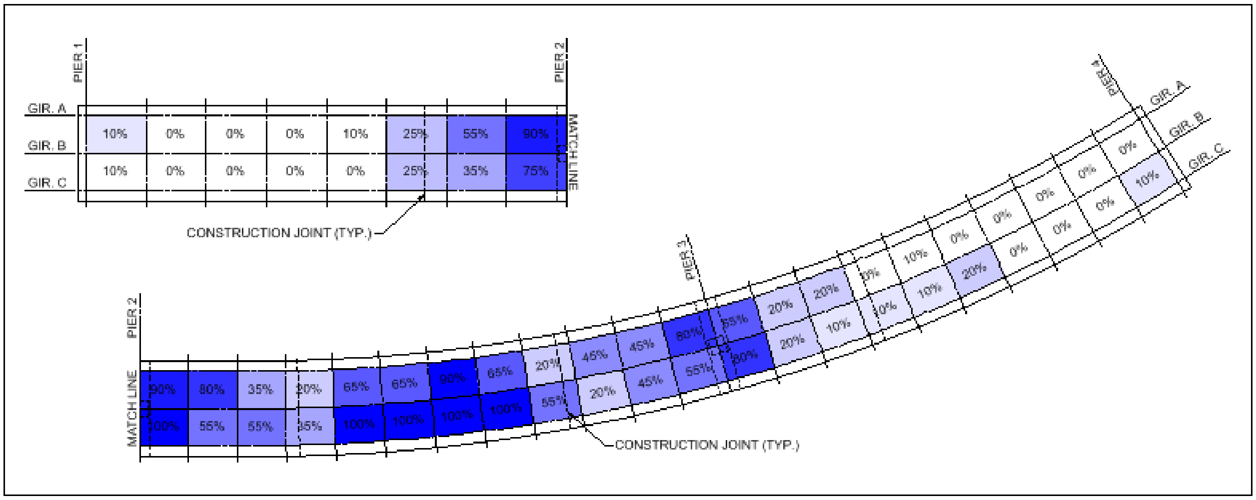


Figure 60 - Bridge 5/434SCD Crack Intensity Diagram

Figure 61 - Range of Deck Cracking for Bridge 5/434SCD

529/25 (EBEY SLOUGH)

This bridge carries SR 529 over Ebey Slough in Marysville and was constructed in 2012 as part of the **SR 529 Ebey Slough Br. – Replace Bridge** contract. The contract used the 2010 WSDOT Standard Specifications which include the traditional bridge deck concrete requirements. See Figure 62 for the crack intensity diagrams for this bridge. Cracks were not counted in the majority of the interior spans due to limited access. See Figure 63 for pictures depicting the range of cracking represented by the crack intensity diagrams (spans 2 and 3 not shown). This bridge deck performed poor to very poor.

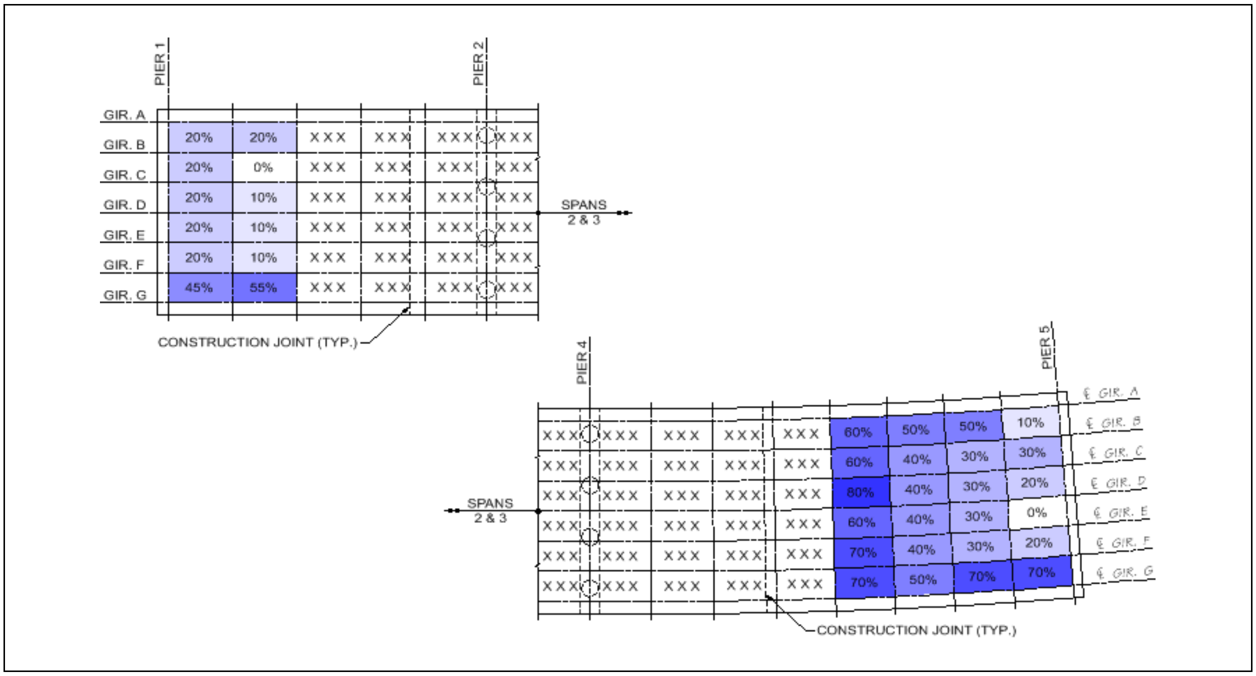


Figure 62 - Bridge 529/25 Crack Intensity Diagram

Figure 63 - Range of Deck Cracking for Bridge 529/25

2/651W-S (W-S RAMP OVER US 2 / US 395)

This bridge carries traffic from US 395 to US 2 in Spokane County and was constructed in 2012 as part of the **US 395 NSC – US 2 Lowering** contract. The contract used the 2008 WSDOT Standard Specifications which include the traditional bridge deck concrete requirements. See Figure 64 for the crack intensity diagrams for this bridge. See Figure 65 for pictures depicting the range of cracking represented by the crack intensity diagrams. This bridge deck performance ranged from well to poor with some spots of very poor.

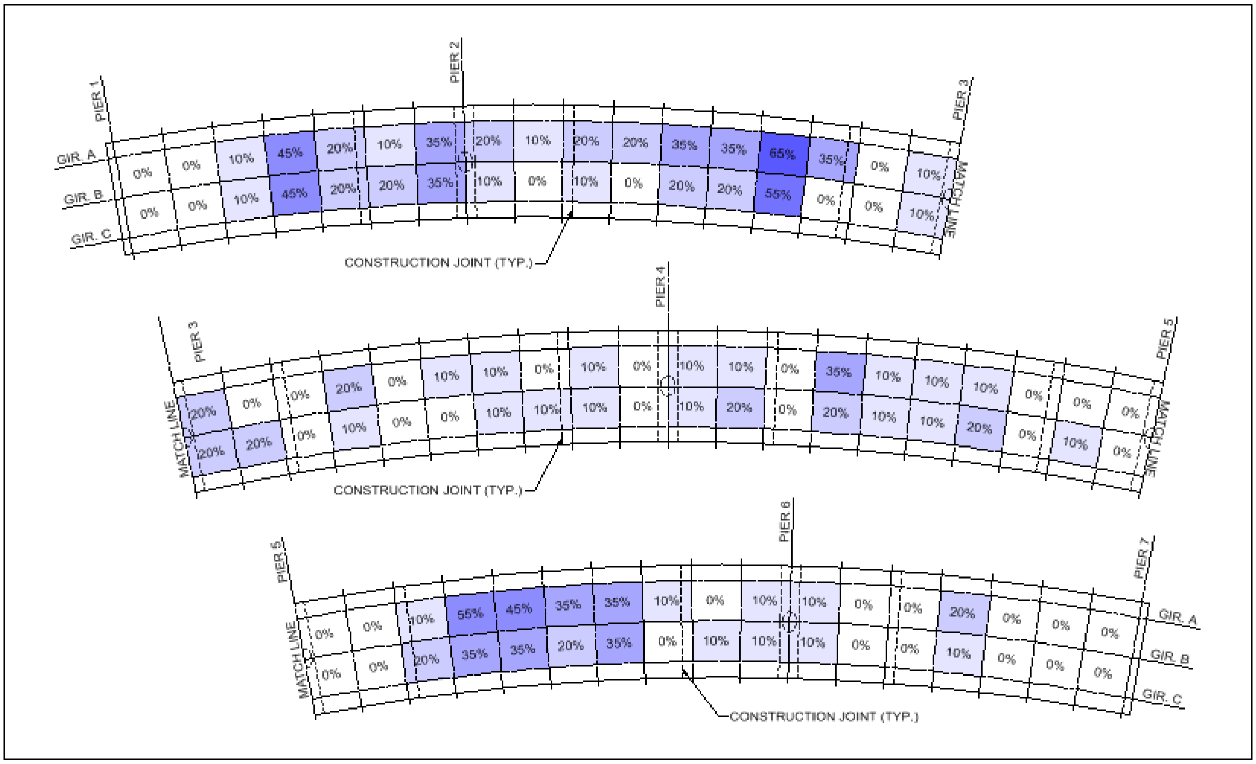


Figure 64 - Bridge 2/651W-S Crack Intensity Diagram

Figure 65 - Range of Deck Cracking for Bridge 2/651W-S

9/134 (PILCHUCK CREEK)

This bridge carries SR 9 over Pilchuck Creek. It was constructed in 2014 as part of the **SR 9 Pilchuck Creek Replace Bridge** contract. The contract used the 2012 WSDOT Standard Specifications with Special Provisions which include the performance based bridge deck concrete requirements. See Figure 66 for the crack intensity diagram for this bridge. See Figure 67 for pictures depicting the range of cracking represented by the crack intensity diagrams. The bridge deck performed very well throughout most of the bridge with a few areas of good to poor performance near the construction joints.

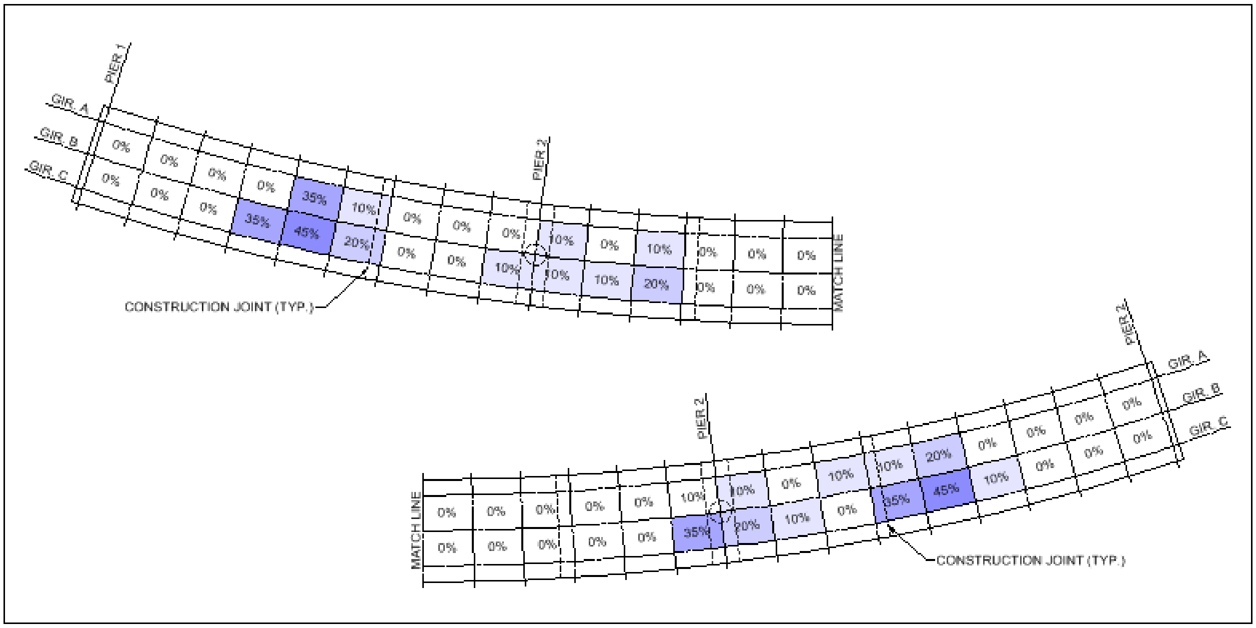


Figure 66 - Bridge 9/134 Crack Intensity Diagram

Figure 67 - Range of Deck Cracking for Bridge 9/134

BRIDGE DECK EVALUATION SUMMARY

Table 6 ranks all the bridges evaluated from most severe to least severe average crack intensity. Also listed are total maximum and minimum crack intensity, total cementitious content and shrinkage test results at 28-days.

Table 6 – Bridges Ranked by Average Crack Intensity

Br. No.	Bridge Name	Contract	Year	Perform.	Average Crack Intensity	Min. Crack Intensity	Max. Crack Intensity	Total Cement.	Shrink at 28-days
303/4A	MANETTE BRIDGE	7926	2011	No	73%	45%	100%	735	--
16/7S-E	S SPRAGUE RAMP	7594	2010	No	59%	30%	95%	735	--
90/106N	GOLD CREEK WB	7852	2012	No	44%	5%	80%	735	--
90/105.5S	GOLD CREEK ANIMAL CROSSING EB	7852	2010	No	40%	20%	60%	735	--
5/434SCD	SBCD OVER SR 16 HOV & RAMPS	8189	2013	Yes	36%	0%	100%	565	0.028%
529/25	EBEY SLOUGH	7948	2012	No	36%	0%	80%	735	--
6/115	S FORK CHEHALIS R	7587	2009	No	32%	0%	65%	735	--
90/105.5N	GOLD CREEK ANIMAL CROSSING WB	7852	2012	No	32%	10%	55%	735	--
5/302E	PRAIRIE CREEK NB	7465	2009	No	18%	0%	65%	735	--
2/651W-S	W-S RAMP OVER US 2/US 395	7610	2011	No	13%	0%	65%	735	--
195/117	CHENEY SPOKANE RD OVER US 195	8378	2014	Yes	10%	0%	33%	no records found	
395/442W	US 395 OVER US 2	7610	2011	No	10%	0%	30%	735	--
5/234W	I-5 OVER BLAKESLEE JCT RR	8272	2013	Yes	9%	0%	25%	580	0.030%
16/3W	SR 16 OVER HOV	8189	2014	Yes	9%	0%	35%	565	0.028%
9/133	SR 9 OVER HARVEY CRK RD	7267	2008	No	8%	0%	45%	735	--
9/134	PILCHUCK CREEK	8383	2014	Yes	7%	0%	45%	611	0.031%
105/4	NORTH RIVER	8345	2014	Yes	7%	0%	25%	610	0.018%
2/8.5N-W	N-W RAMP (BICKFORD AVE) OVER US 2	8286	2013	Yes	6%	0%	20%	610	0.032%
105/3	SMITH CREEK	8345	2013	Yes	6%	0%	20%	610	0.018%
6/8	WILLAPA RIVER	8464	2014	Yes	5%	0%	15%	610	0.018%
5/302W	PRAIRIE CREEK SB	7465	2010	No	4%	0%	15%	735	--
5/232NCD	SKOOKUMCHUCK RIVER NCD	8272	2013	Yes	2%	0%	10%	580	0.030%
5/232SCD	SKOOKUMCHUCK RIVER SCD	8272	2013	Yes	1%	0%	10%	580	0.030%
5/229	MELLON STREET COUPLET	8473	2014	Yes	< 1%	0%	5%	580	0.028%
395/441N-E	N-E RAMP OVER N-N RAMP	7610	2011	Yes	< 1%	0%	5%	565	0.034%
101/44	BONE RIVER	8292	2013	Yes	< 1%	0%	5%	610	0.018%
101/31	MIDDLE NEMAH RIVER	8344	2014	Yes	0%	0%	0%	610	0.018%

In general, the performance based concrete specification resulted in fewer restraint cracks in bridge decks than the traditional concrete specification. A few of the traditional bridge decks performed similar to the performance based bridge decks, but this appears to be the exception, not the rule. Only one of the performance based concrete decks had a high intensity of cracking. It is unclear what contributed to the poor performance of this particular bridge deck.

What is apparent from this study is that cracking of bridge decks is variable within same bridge. In some cases, it appears to be variable within the same concrete placement. This indicates that there are many variables that affect the cracking performance of a bridge deck that change during the construction of the bridge.

As a measure of overall success, 10% average crack intensity could be defined as good performance. For individual bays, a possible scale for bridge deck cracking performance could be:

Good = 0% to 25% Fair = 25% to 50% Bad = 50% to 100%

DECK CONCRETE SPECIFICATION EVALUATION

Overall, the current performance based specification appears to be providing good results in a practical manner. There is no evidence that the performance based limits need to be changed. It does not appear that Contractors have had issues achieving them and the superstructure lump sum costs do not appear to have increased dramatically.

There are areas of the specification that could be improved as it relates to specifying shrinkage reducing ad-mixtures, reporting test results and monitoring deck temperatures. As they are currently written, there is much inconsistency with how these elements are provided to WSDOT.

SHRINKAGE REDUCING AD-MIXTURE

Shrinkage reducing ad-mixtures (SRA) are used to meet the shrinkage limits in the specification. All of the performance based bridges evaluated had SRA in the deck concrete. Contractors are required to submit their mix design on WSDOT form 350-040 which allows estimated ranges for ad-mixtures. See Appendix A though D for concrete mix designs submitted for the performance based bridge decks.

Some of the concrete mix design submittals received for this report list a range for the SRA (e.g. 1 – 150 oz/cy). This could lead to a concrete mix being tested for shrinkage with SRA at the high end of the range but being placed in the field with SRA at the low end of the range. To correct this potential issue, the SRA dose should be listed as one number on the Concrete Mix Design form (or a very narrow range), and the SRA used in the shrinkage test should match.

TEST REPORT FOR SHRINKAGE

Shrinkage tests are required to be performed in accordance with AASHTO T 160 (or equivalent ASTM C 157) and submitted following the reporting requirements of these procedures; however, there is much inconsistency in the shrinkage test reports submitted. See Appendix A though D for shrinkage test reports submitted for the performance based bridge decks.

In general, the shrinkage test is performed in the following way:

- Three specimens are cast in molds
- Specimens are removed from the molds a day after casting
- Specimens are measured for the initial length reading
- Specimens are stored in lime-saturated water until they have reached an age of 28-days
- Specimens are measured for a length reading at the end of the curing (drying day zero)
- Specimens are stored in air and allowed to shrink
- All three specimens are measured at 4, 7, 14 and 28 days
- These readings are converted into length change percentages (or microstrains)
- The average length change of the three specimens is reported

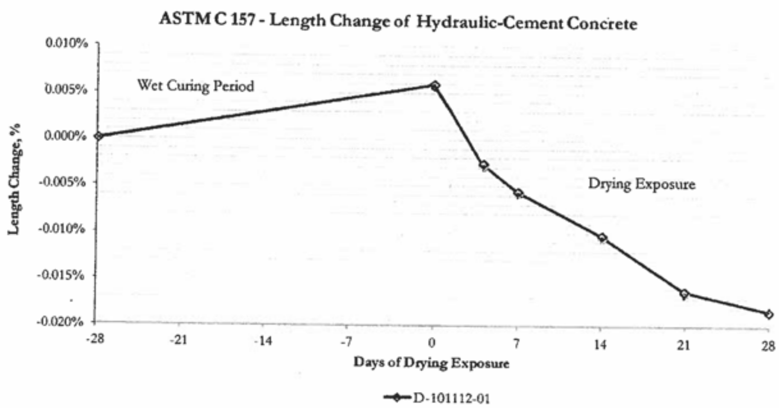
See Figure 68 for a typical shrinkage report.

ASTM C 157 Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete

Material:		Concrete
Number of Specimens per Mixture:		4
Size of Specimens, in.:	Length:	10.0
	Width:	4.0
	Height:	4.0
Method of Consolidation:		4
Period of Moist Curing:		28-days
Drying Exposure Conditions:		23°C, 50% RH

Length Change

Reading	D-101112-01
Initial	0.000%
0-days dry	0.006%
4-days dry	-0.003%
7-days dry	-0.006%
14-days dry	-0.010%
21-days dry	-0.016%
28-days dry	-0.018%



R18439 3

Figure 68 - Shrinkage Test Report

The information included in the shrinkage reports received for this study did not always include length change values at each of the days specified in the test procedure; one report only listed a single value. In addition, the values for the individual test specimens where not always given. Most of the reports only listed the average of the three specimens.

To ensure proper conformance with the performance limit, consistent information needs to be provided for review and acceptance.

TEMPERATURE MONITORING

Contractors are required to embed temperature monitors and record deck temperatures for seven days after concrete placement and submit the data to WSDOT. There is a limit on concrete temperature at the time of placement, but there are no contractual limits associated with the temperature of the deck concrete after placement (as it sets and cures). Contractors are also required to measure ambient air temperature near the embedded temperature monitors.

One of the expectations going into this study was to correlate concrete temperatures to performance. No correlation could be found because temperature data received for this study varied and was often incomplete or obviously in error. For example, multi-span bridges evaluated in this study often only had one set of temperature readings even though there are multiple deck placements. A couple sets of temperature data had very high and very low temperatures (500°F+ to -32°F) which are obviously in error.

Additionally, when good temperature data was received, it was difficult to identify where the temperature readings were taken. This made it challenging to correlate the temperature with deck performance in local areas. The visual inspections performed for this study indicate that performance can vary significantly within in the same concrete placement and exact placement of the temperature readings could have been very informative.

Peak temperature or differences between concrete temperature and ambient temperature could correlate with deck performance. Good documentation of these temperatures in a consistent format could help identify possible performance limits to place on peak temperature or temperature difference.

RECOMMENDATIONS

Based on the visual inspection, concrete submittals and temperature data for the bridges evaluated in this study, the following recommendations are suggested to continue achieving reduced early-age cracks in bridge decks. Additional suggestions are provided to aid in the continuation of collection of data to further refine or justify the performance limits required.

1. No current changes to the performance limits, aggregate size, curing method or texturing methods are recommended.

2. Continuation of bridge deck evaluation is recommended. Suggest using the same method as outlined in this report for bridges which the underside of the deck is visible. Perhaps a team or individual can be tasked with collecting data and evaluating the bridge decks shortly after they are completed. A spreadsheet similar to those used for this evaluation can be utilized to record information for future bridges.

3. Development of an evaluation method for bridges which the underside of the deck is not visible (deck bulb-tee's) is recommended.

4. It is recommended that a form is provided to the Contractor for the required test results for ease of tracking and comparison.

5. Locating the embedded temperature monitors in the contract plans is recommended. Multiple temperature monitors should be included for each deck placement. At a minimum, one at each end and one mid-span. The embedded monitors should be located as close to mid-slab thickness as possible.

6. Temperature monitor data could be very informative and it is recommended that the data received from the Contractor should include, at a minimum, the following elements: date and time which concrete placement started, where concrete placement started, location of monitor, temperature measurements at hour max intervals. Perhaps a form can be provided for ease of review.

7. It is recommended that peak temperature and maximum temperature limits be established. This may provide a tool to reject a deck that performs very poorly due to extreme temperature or temperature differences. While no evidence of type of this behavior was seen in this study, adding contractual limits requirements may result in better temperature data.

8. Information on the temperature changes over time for a specific concrete mix may be useful during the mix design phase. It could be used to compare one mix to the other and possibly aid in developing performance based limits that can be added to the concrete mix design requirements. See the "SR 520 – ACME Project Final Findings Report" dated November 30, 2010 for examples of temperature data collection during the mix design phase.

APPENDIX A

SINGLE SPAN PRESTRESSED GIRDER BRIDGES

BRIDGE 90/105.5S (GOLD CREEK ANIMAL CROSSING EB)

BRIDGE 90/105.5N (GOLD CREEK ANIMAL CROSSING WB)

BRIDGE 5/302E (PRAIRIE CREEK NB)

BRIDGE 5/302W (PRAIRIE CREEK SB)

BRIDGE 9/133 (SR 9 OVER HARVEY CREEK ROAD)

BRIDGE 5/229 (MELLEN STREET COUPLET)

BRIDGE 101/31 (MIDDLE NEMAH RIVE)

BRIDGE 90/105.5S (GOLD CREEK ANIMAL CROSSING EB)

Bridge #	90/105.5S	Bridge Name	Gold Creek Animal Crossing EB	Structure ID	0017852A
Contract #	7852 Region SC	Project Engineer	Will Smith	Performance Deck Concrete?	No
Contractor	Max J. Kuney Company	Concrete Supplier		Deck Placement	≈ 2010
Bridge Description	Single Span (118.5'), 8-WF50G Girders, 3-Lanes (56' wide roadway)				

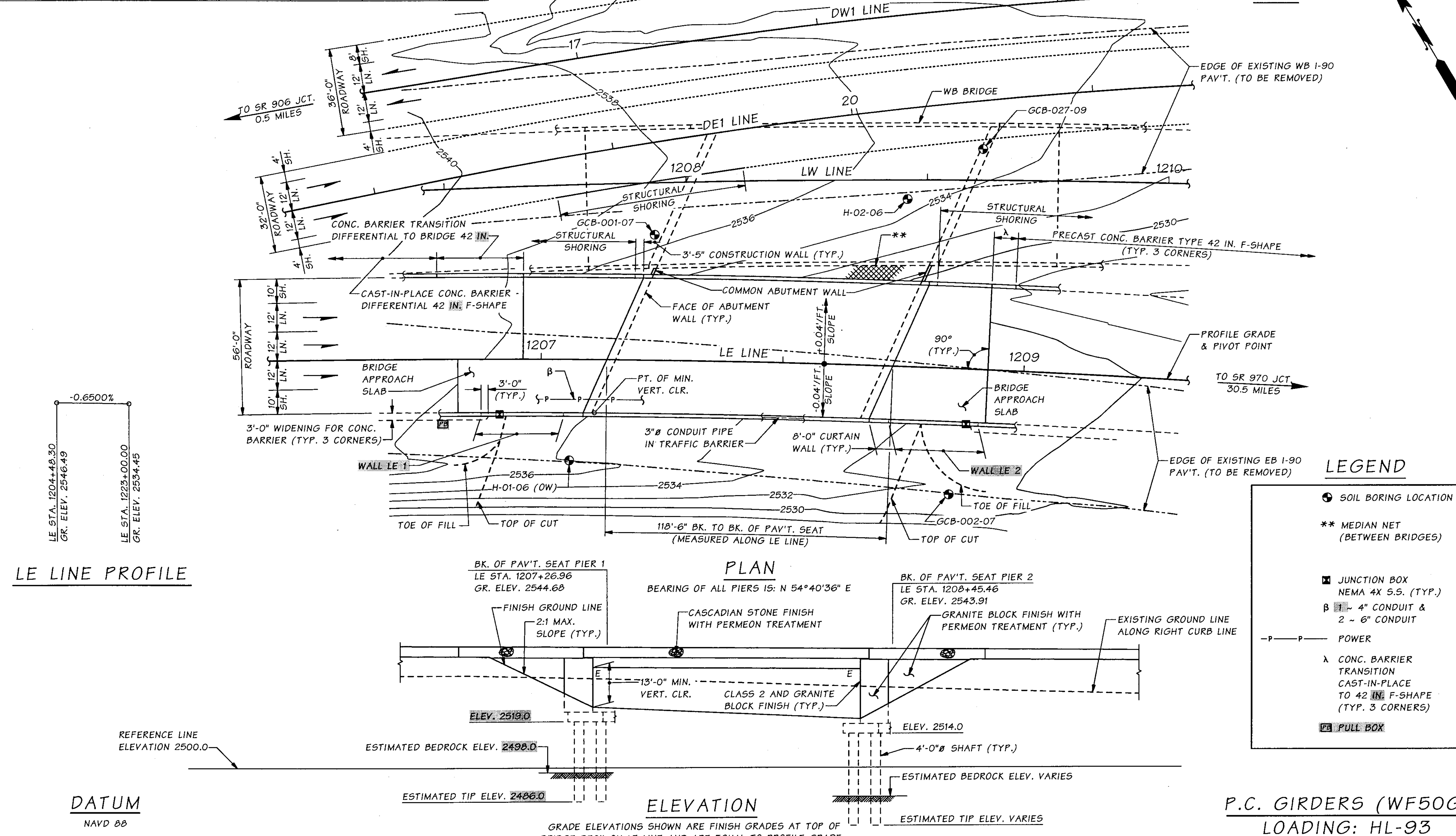
CONTENTS

1. Layout Plan Sheet
2. Field Notes
3. Crack Summary
4. Crack Intensity Diagram

LE LINE CURVE DATA					
P.I. STA.	Δ	RADIUS	TANGENT	LENGTH	BACK TANGENT BEARING
1213+82.75	22°33'36" RT.	4685.00'	934.45'	1844.69'	S 62°03'43" E

SEC. 15, T.22N., R.11E., W.M.

KITTITAS COUNTY



DATUM

NAVD 88

GRADE ELEVATIONS SHOWN ARE FINISH GRADES AT TOP OF BRIDGE DECK ON LE LINE AND ARE EQUAL TO PROFILE GRADE.

LEGEND

- SOIL BORING LOCATION
- ** MEDIAN NET (BETWEEN BRIDGES)
- JUNCTION BOX NEMA 4X S.S. (TYP.)
- β 1 ~ 4" CONDUIT & 2 ~ 6" CONDUIT
- —P——P— POWER
- λ CONC. BARRIER TRANSITION CAST-IN-PLACE TO 42 IN. F-SHAPE (TYP. 3 CORNERS)
- PB PULL BOX

P.C. GIRDERS (WF50G)

LOADING: HL-93

Bridge Design Engr.	Khaleghi, B	
Supervisor	Stoddard, RB	
Designed By	Bingle, J	07/09
Checked By	PRG/JD	10/09
Detailed By	Bontemps, W	07/09
Bridge Projects Engr.	Lewis, R	08/08
Prelim. Plan By	Wei, J.	08/08
Architect/Specialist	PDK, BSA, GAW	08/08

Mon Dec 07 13:16:41 2009

M:\X-Team\I-90 HYAK - SS VIC\GOLD CR ANIMAL BR EB\Window files\LAYOUT.WND

DATE	REVISION	BY	APP'D
12/09/09	CHANGED ELEVS. AND WALL NAMES & LENGHTS, REVISED CONDUIT, CHANGED JUNCTION BOX AND CALLOUTS	JB	

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 09Y019

BRIDGE AND STRUCTURES OFFICE

Washington State Department of Transportation

I-90

HYAK TO SNOWSHED VICINITY PHASE 1B - ADD LANES AND BRIDGES

GOLD CR ANIMAL CROSSING BRIDGE EB

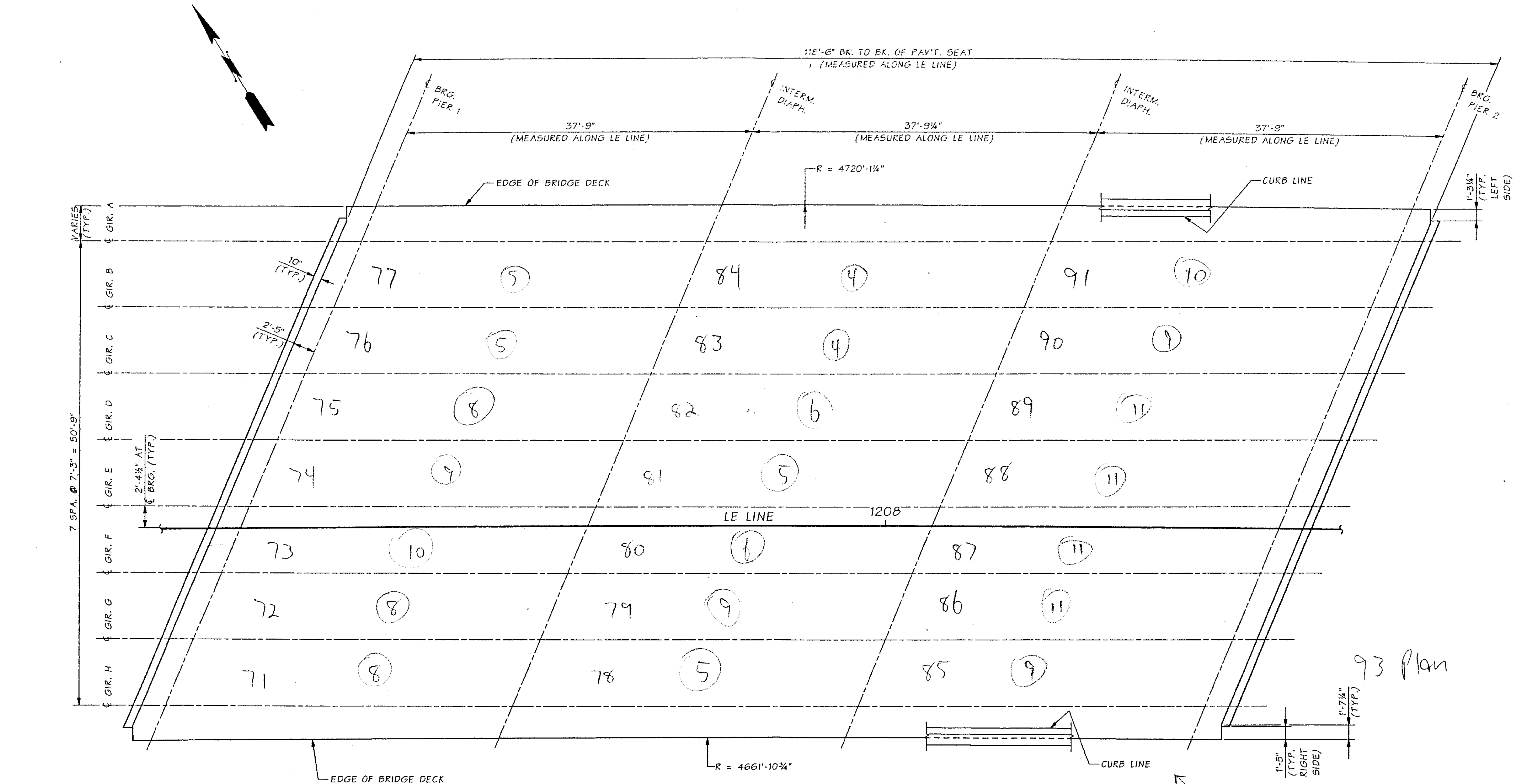
LAYOUT

BRIDGE SHEET NO. BA1

SHEET 484 OF 808 SHEETS

SR 90 FILE NO. 7257 SHEET BA1

C. S. 190115 ~ PROJ. NO. XL2779G~ SOUTH CENTRAL REGION ~ I-90 ~ MP 55.30 TO MP 55.32 ~ GOLD CR ANIMAL CROSSING BRIDGE EB



FRAMING PLAN

BEARING OF PIERS AND INTERM. DIAPH. IS : N 54°40'36" E
BEARING OF GIRDERS IS : S 57°55'46" E

Bridge Design Engr.	Khaleghi, B	
Supervisor	Stoddard, RB	
Designed By	Bingle, J	05/09
Checked By	Dao, J	10/09
Detailed By	Bontemps, W	06/09
Bridge Projects Engr.		
Prelim. Plan By		
Architect/Specialist		

M:\X-Team\I-90 HYAK - SS VIC\GOLD CR ANIMAL BR EB\Window files\FRAMING PLAN.WND

DATE	REVISION	BY	APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 09Y019

BRIDGE AND STRUCTURES OFFICE

10-15-09   10/19/09

Washington State Department of Transportation

I-90
HYAK TO SNOWSHED VICINITY PHASE 1B - ADD LANES AND BRIDGES
GOLD CR ANIMAL CROSSING BRIDGE EB

FRAMING PLAN

BRIDGE SHEET NO. BA16

SHEET 499 OF 808 SHEETS

SR 90 FILE NO. 7257 SHEET BA16

Thu Oct 15 13:49:23 2009

90/105.5 S

Bridge Deck Concrete Study

Washington State Department of Transportation

Bridge #	90/105.5S	Bridge Name	Gold Creek Animal Crossing EB	Structure ID	0017852A
Contract #	7852	Region: SC	Project Engineer: Will Smith	Performance Deck Concrete?	No
Contractor	Max J. Kuney Company	Concrete Supplier		Deck Placement	≈ 2010
Bridge Description	Single Span (118.5'), 8-WF50G Girders, 3-Lanes (56' wide roadway)				

L = length between diaphragms (or length of "bay")

S = girder spacing

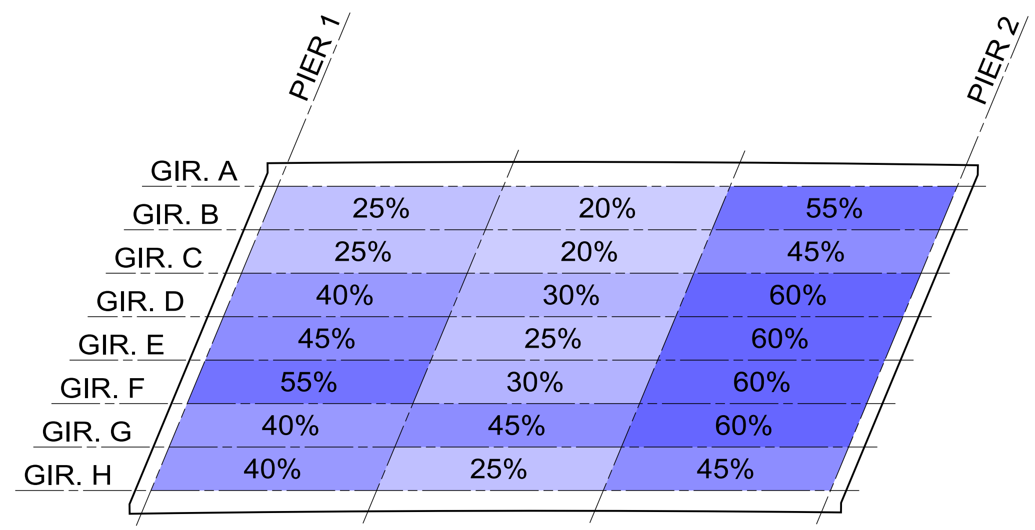
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	40%
Min. =	20%
Max. =	60%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	37.75	7.25	5	19	25%
1	1	B	C	37.75	7.25	5	19	25%
1	1	C	D	37.75	7.25	8	19	40%
1	1	D	E	37.75	7.25	9	19	45%
1	1	E	F	37.75	7.25	10	19	55%
1	1	F	G	37.75	7.25	8	19	40%
1	1	G	H	37.75	7.25	8	19	40%
1	2	A	B	37.75	7.25	4	19	20%
1	2	B	C	37.75	7.25	4	19	20%
1	2	C	D	37.75	7.25	6	19	30%
1	2	D	E	37.75	7.25	5	19	25%
1	2	E	F	37.75	7.25	6	19	30%
1	2	F	G	37.75	7.25	9	19	45%
1	2	G	H	37.75	7.25	5	19	25%
1	3	A	B	37.75	7.25	10	19	55%
1	3	B	C	37.75	7.25	9	19	45%
1	3	C	D	37.75	7.25	11	19	60%
1	3	D	E	37.75	7.25	11	19	60%
1	3	E	F	37.75	7.25	11	19	60%
1	3	F	G	37.75	7.25	11	19	60%
1	3	G	H	37.75	7.25	9	19	45%



CRACKING INTENSITY ~ BRIDGE 90/105.5S

100% = CRACK EVERY 2 FT.

BRIDGE NUMBER	90/105.5S
BRIDGE NAME	GOLD CREEK ANIMAL CROSSING EB
INSPECTION DATE	5/20/2015
DECK CONCRETE	TRADITIONAL

BRIDGE 90/105.5N (GOLD CREEK ANIMAL CROSSING WB)

Bridge #	90/105.5N	Bridge Name	Gold Creek Animal Crossing WB			Structure ID	0017852B	
Contract #	7852	Region	SC	Project Engineer	Will Smith	Performance Deck Concrete?	No	
Contractor	Max J. Kuney Company			Concrete Supplier		Deck Placement	≈ 2012	
Bridge Description	Single Span (120'), 8-WF50G Girders, 3-Lanes (56' wide roadway)							

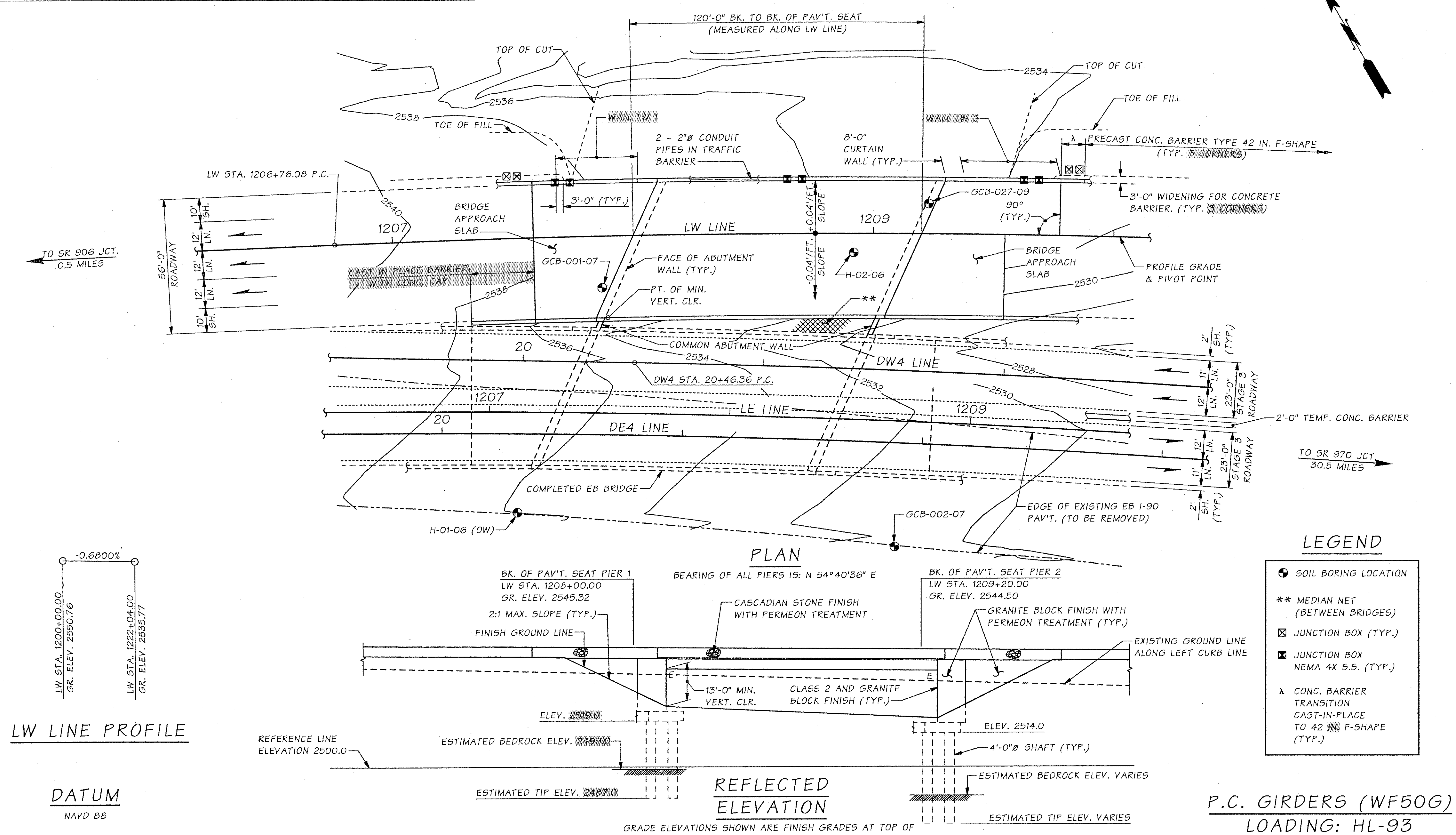
CONTENTS

1. Layout Plan Sheet
2. Field Notes
3. Crack Summary
4. Crack Intensity Diagram

LW LINE CURVE DATA					
P.I. STA.	Δ	RADIUS	TANGENT	LENGTH	BACK TANGENT BEARING
1214+45.27	18°38'51" RT.	4685.00'	769.19'	1524.78'	S 61°50'12" E

SEC. 15, T.22N., R.11E., W.M.
KITTITAS COUNTY

I-90



GRADE ELEVATIONS SHOWN ARE FINISH GRADES AT TOP OF BRIDGE DECK ON LW LINE AND ARE EQUAL TO PROFILE GRADE.

P.C. GIRDERS (WF50G)
LOADING: HL-93

C. S. 190115 ~ PROJ. NO. XL2779B ~ SOUTH CENTRAL REGION ~ I-90 ~ MP 55.31 TO MP 55.33 ~ GOLD CR ANIMAL CROSSING BRIDGE WB

SR 90 FILE NO. 7257 SHEET BB1

Bridge Design Engr.	Khaleghi, B	
Supervisor	Stoddard, RB	
Designed By	Bingle, J	07/09
Checked By	PRG/JD	10/09
Detailed By	Bontemps, W	07/09
Bridge Projects Engr.	Lewis, R	08/08
Prelim. Plan By	Wei, J.	07/08
Architect/Specialist	PDK, BSA, GAW	08/08

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DATE	REVISION	BY	APP'D
12/09/09	CHANGED ELEVS, WALL NAMES AND LENGTHS, AND ADDED CALLOUTS	JB	

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 09Y019

BRIDGE AND STRUCTURES OFFICE

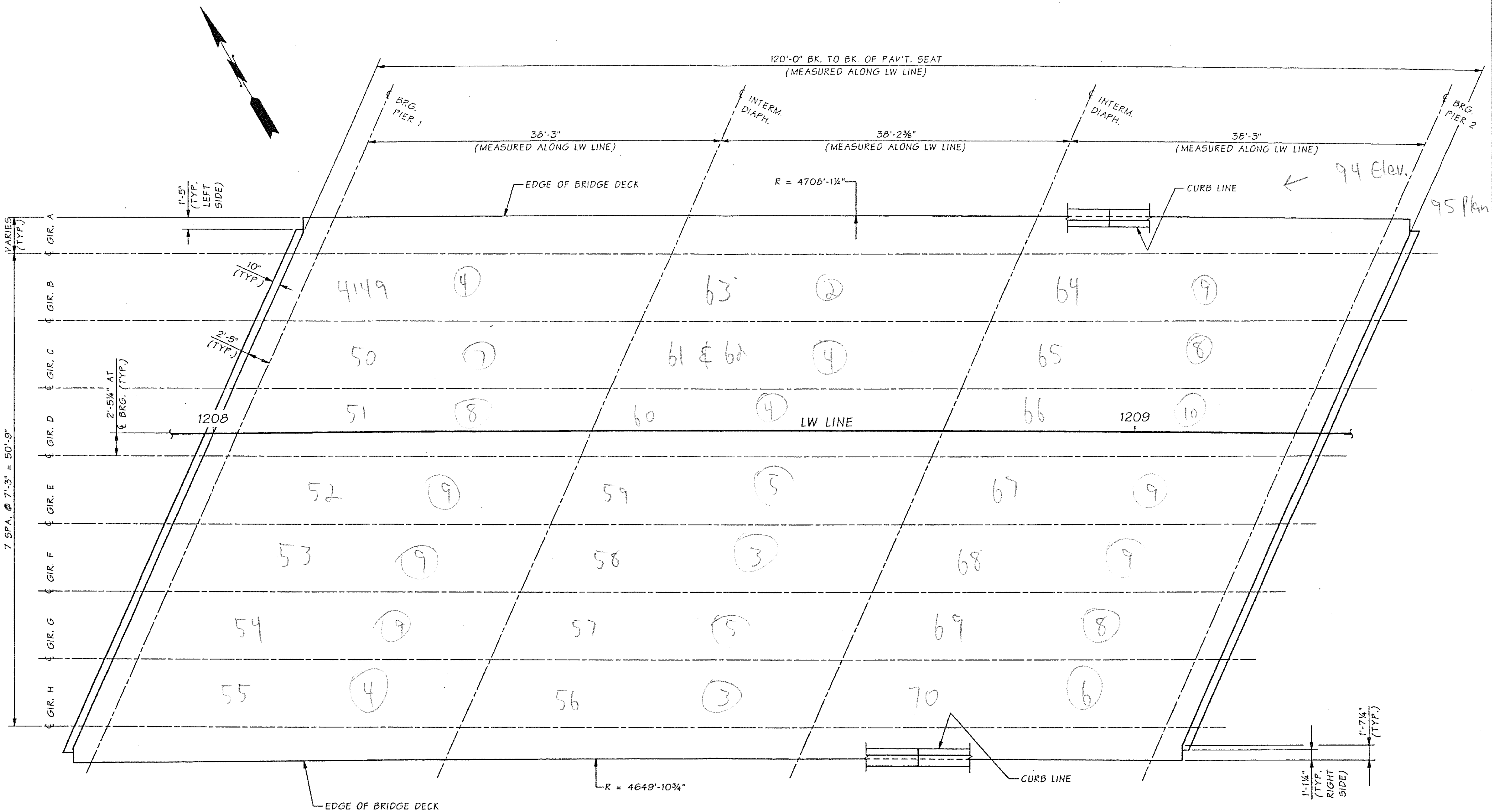
Washington State Department of Transportation

I-90
HYAK TO SNOWSHED VICINITY PHASE 1B - ADD LANES AND BRIDGES
GOLD CR ANIMAL CROSSING BRIDGE WB

LAYOUT

BRIDGE SHEET NO. BB1
SHEET 519 OF 808 SHEETS

Mon Dec 07 13:53:27 2009



FRAMING PLAN

BEARING OF PIERS AND INTERM. DIAPH. IS : N 54°40'36" E
BEARING OF GIRDERS IS : S 59°35'14" E

Bridge Design Engr.	Khaleghi, B	
Supervisor	Stoddard, RB	
Designed By	Bingle, J	05/09
Checked By	Dao, J	10/09
Detailed By	Bontemps, W	06/09
Bridge Projects Engr.		
Prelim. Plan By		
Architect/Specialist		

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DATE	REVISION	BY	APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 09Y019

BRIDGE AND STRUCTURES OFFICE

JEDEDIAH BINGLE — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER
10-15-09

RICHARD B. STODDARD — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER
10/19/09

Washington State Department of Transportation

I-90
HYAK TO SNOWSHED VICINITY PHASE 1B - ADD LANES AND BRIDGES
GOLD CR ANIMAL CROSSING BRIDGE WB

FRAMING PLAN

BRIDGE SHEET NO. BB15
SHEET 533 OF 808 SHEETS

SR 90 FILE NO. 7257 SHEET BB15

Thu Oct 15 14:38:04 2009

90/105.5 N

Bridge #	90/105.5N	Bridge Name	Gold Creek Animal Crossing WB	Structure ID	0017852B
Contract #	7852	Region SC	Project Engineer Will Smith	Performance Deck Concrete?	No
Contractor	Max J. Kuney Company	Concrete Supplier		Deck Placement	≈ 2012
Bridge Description	Single Span (120'), 8-WF50G Girders, 3-Lanes (56' wide roadway)				

L = length between diaphragms (or length of "bay")

S = girder spacing

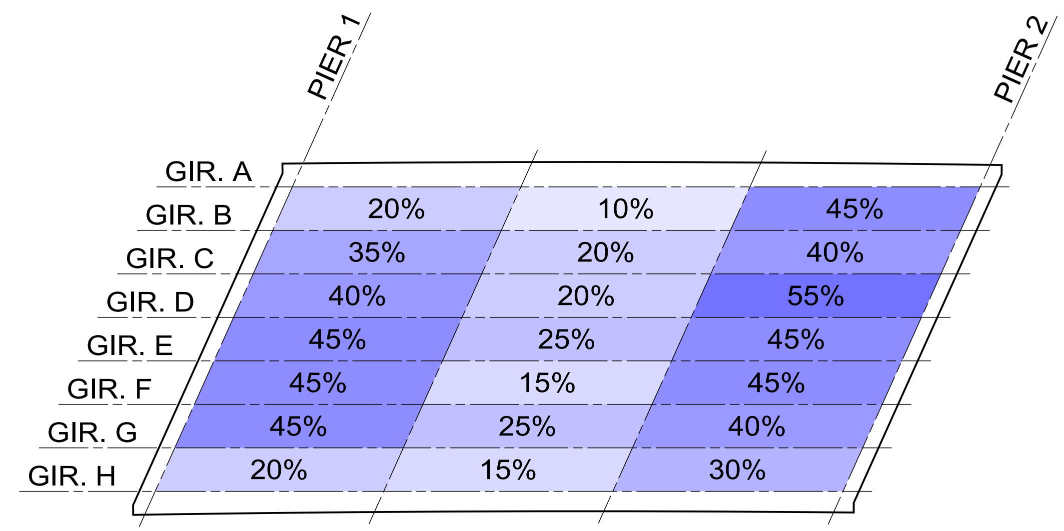
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	32%
Min. =	10%
Max. =	55%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	38.25	7.25	4	19	20%
1	1	B	C	38.25	7.25	7	19	35%
1	1	C	D	38.25	7.25	8	19	40%
1	1	D	E	38.25	7.25	9	19	45%
1	1	E	F	38.25	7.25	9	19	45%
1	1	F	G	38.25	7.25	9	19	45%
1	1	G	H	38.25	7.25	4	19	20%
1	2	A	B	38.25	7.25	2	19	10%
1	2	B	C	38.25	7.25	4	19	20%
1	2	C	D	38.25	7.25	4	19	20%
1	2	D	E	38.25	7.25	5	19	25%
1	2	E	F	38.25	7.25	3	19	15%
1	2	F	G	38.25	7.25	5	19	25%
1	2	G	H	38.25	7.25	3	19	15%
1	3	A	B	38.25	7.25	9	19	45%
1	3	B	C	38.25	7.25	8	19	40%
1	3	C	D	38.25	7.25	10	19	55%
1	3	D	E	38.25	7.25	9	19	45%
1	3	E	F	38.25	7.25	9	19	45%
1	3	F	G	38.25	7.25	8	19	40%
1	3	G	H	38.25	7.25	6	19	30%



CRACKING INTENSITY ~ BRIDGE 90/105.5N

100% = CRACK EVERY 2 FT.

LESS CRACKING — MORE CRACKING

BRIDGE NUMBER	90/105.5N
BRIDGE NAME	GOLD CREEK ANIMAL CROSSING WB
INSPECTION DATE	5/20/2015
DECK CONCRETE	TRADITIONAL

BRIDGE 5/302E (PRAIRIE CREEK NB)

Bridge #	5/302E	Bridge Name	Prairie Creek NB	Structure ID	0017465A
Contract #	7465	Region	SW	Project Engineer	McNutt/Engel
Performance Deck Concrete?	No	Contractor	Scarsella Bros.	Concrete Supplier	
Deck Placement	≈ 2009	Bridge Description	Single-Span (77'), 8-WF42G Girders, 4-Lanes (variable wdth roadway abt. 70' wide)		

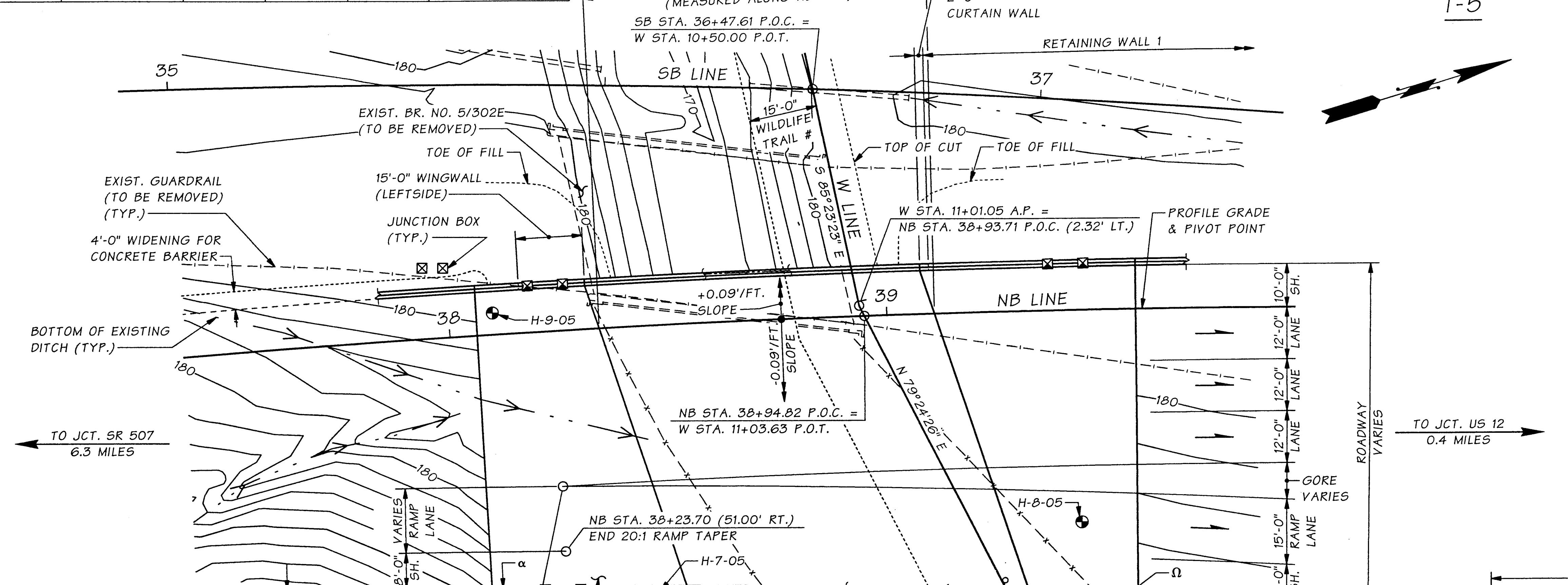
CONTENTS

CURVE DATA

P.I. STATION	Δ	RADIUS	TANGENT	LENGTH	BK. TANGENT BRG.
SB 29+88.49	45°06'33.0" RT.	2380.00'	988.49'	1873.78'	N 20°57'41" W
NB 32+55.96	45°06'33.0" RT.	3024.00'	1255.96'	2380.81'	N 20°57'41" W

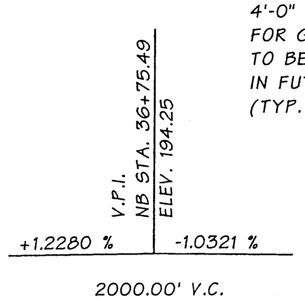
SEC. 12, T.15N., R.3W., W.M.
THURSTON COUNTY

I-5



PLAN

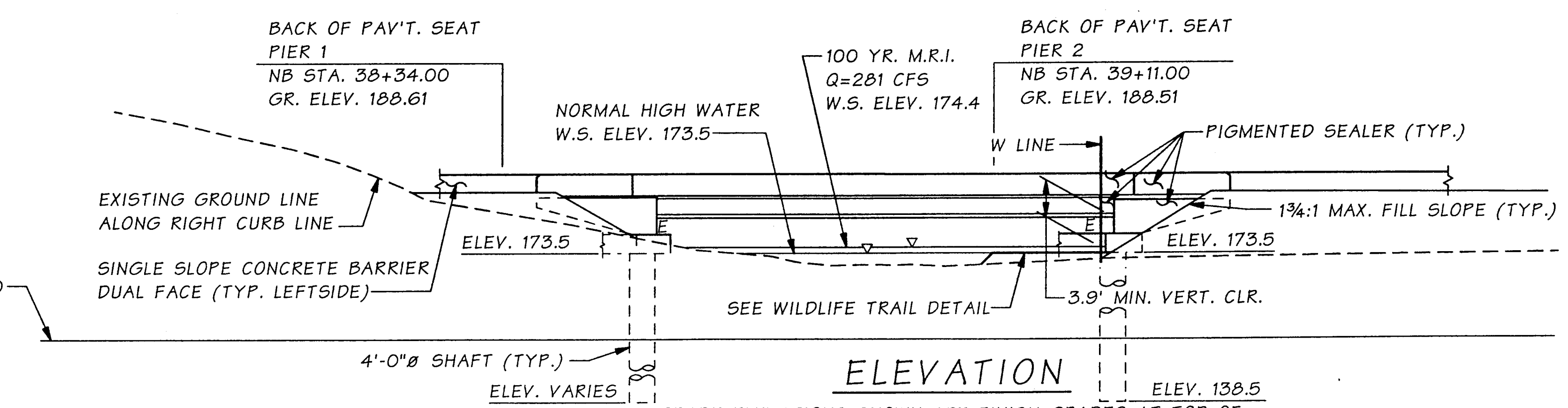
BEARING OF ALL PIERS IS S 88°00'00" W



NB LINE PROFILE

DATUM

NAVD 1988



ELEVATION

GRADE ELEVATIONS SHOWN ARE FINISH GRADES AT TOP OF ROADWAY SLAB ON NB LINE AND ARE EQUAL TO PROFILE GRADE. SEE STD. PLAN H-9 FOR EMBANKMENT DETAILS AT BRIDGE ENDS.

* 2 ~ 2"ø CONDUIT PIPES IN TRAFFIC BARRIER FOR FULL LENGTH OF BRIDGE, WING WALLS & RETAINING WALLS (TYP.)

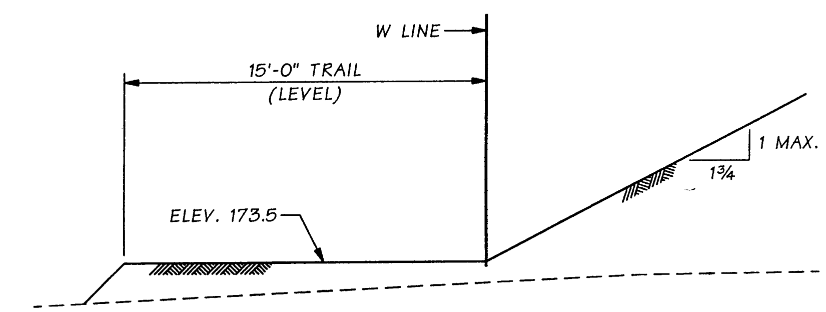
\# SEE WILDLIFE TRAIL DETAIL.

Ω CONNECTION TYPE "F" (SEE STD. PLAN C-5) TO BE INSTALLED IN FUTURE PROJECT

α BEAM GUARDRAIL (TYPE 31) TRANSITION SECTION TYPE 21 (SEE STD. PLAN C-25.20-00) TO BE INSTALLED IN FUTURE PROJECT

TEST HOLE

JUNCTION BOX NEMA 4X S.S. (TYP.)



WILDLIFE TRAIL DETAIL

LOOKING BACK ON STATION

LEGEND

(B / PE15) IDENTIFIES SECTION, VIEW OR DETAIL — TAKEN OR SHOWN ON BRIDGE SHEET PE15

(B / —) TAKEN OR SHOWN ON THE SAME SHEET

NOTE:

1. 500 YR MRI
   Q = 478 CFS
   W.S. ELEV. 175.6
2. ORDINARY HIGH WATER LEVEL
   ELEV. 171.4

P.C. GIRDERS (WF42G)
LOADING: HL-93

Bridge Design Engr.	Khaleghi, B	
Supervisor	Anderson, MW	
Designed By	Bingle, J	12/06
Checked By	Tran, LH	06/07
Detailed By	Bontemps, W	01/07
Bridge Projects Engr.	Kirker, KN	08/05
Prelim. Plan By	Chu, A	04/05
Architect/Specialist	PDK/BK	08/05

M:\X-Team\GRAND MOUND TO MAYTOWN\PRAIRIE CR. BR. 5-302 E\Window files\LAYOUT.WND

DATE | REVISION | BY | APP'D

REGION NO. 10 | STATE WASH. | FED. AID PROJ. NO. | SHEET NO. | TOTAL SHEETS

JOB NUMBER 07C501

BRIDGE AND STRUCTURES OFFICE

JUGESH KAPUR — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER — 33400 — EXPIRES 5/19/08

11.21.07

Washington State Department of Transportation

I-5
GRAND MOUND TO MAYTOWN
STAGE ONE - ADD LANES
PRAIRIE CREEK BRIDGE NO. 5/302E

LAYOUT

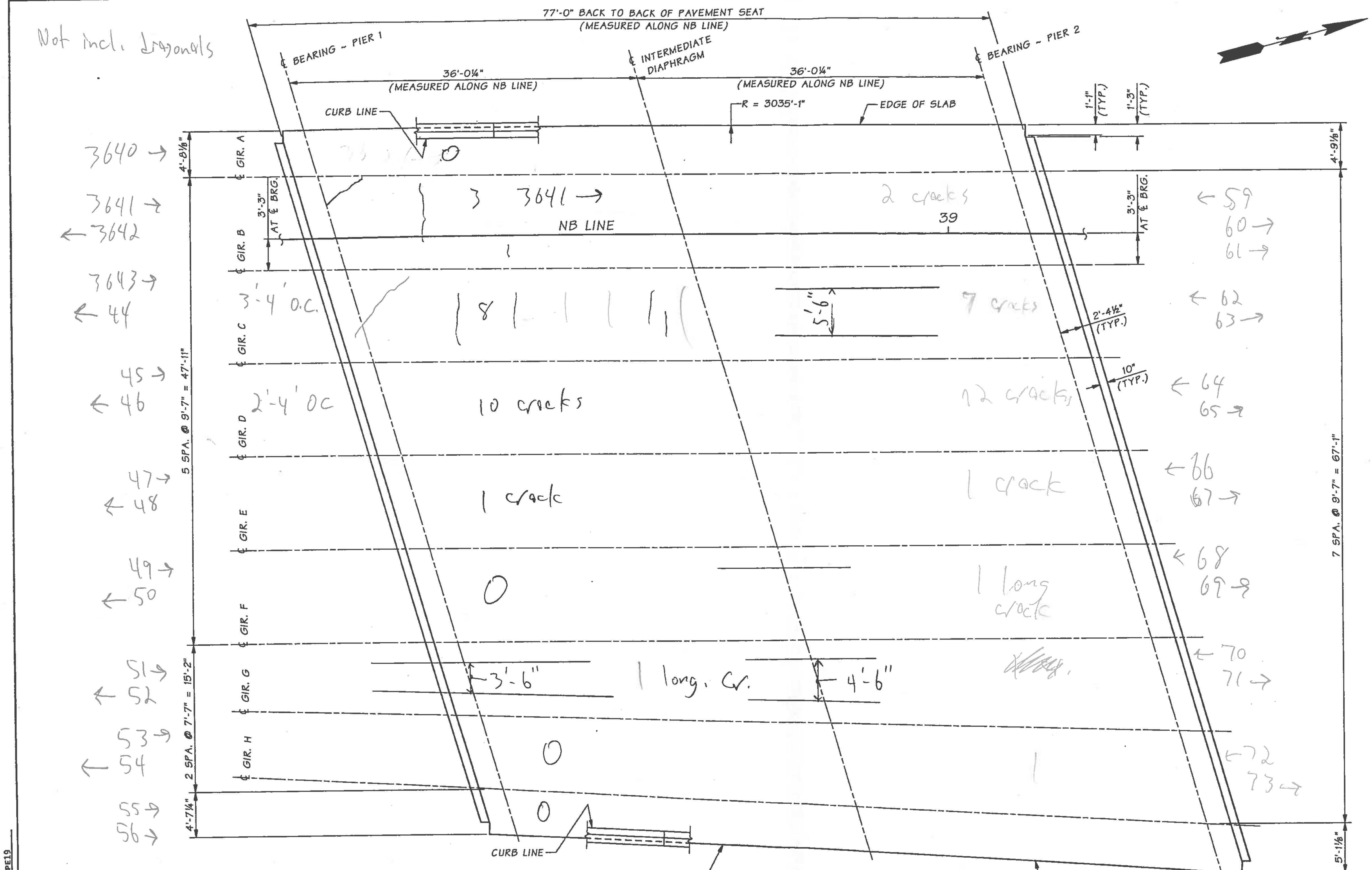
BRIDGE SHEET NO. PE1

SHEET 620 OF 772 SHEETS

Mon Nov 19 08:32:06 2007

SR 5 JOB NO. 7412 SHEET PE1

C.S. 3401 ~ PROJ. NO. 0L3451D ~ OLYMPIC REGION ~ I-5 ~ GRAND MOUND TO MAYTOWN ~ PRAIRIE CREEK BRIDGE NO. 5/302E REPL.



FRAMING PLAN

BEARING OF PIERS IS S 88°00'00" W
BEARING OF GIRDERS A THRU F IS N 14°31'01" E
BEARING OF GIRDER G IS N 16°05'39" E
BEARING OF GIRDER H IS N 17°38'37" E

SR 5 JOB NO. 7412 SHEET PE19

Bridge Design Engr.	Khaleghi, B	
Supervisor	Anderson, MW	
Designed By	Bingle, J	12/06
Checked By	Tran, LH	06/07
Detailed By	Bontemps, W	01/07
Bridge Projects Engr.		
Prelim. Plan By		
Architect/Specialist		

Wed Nov 21 10:10:34 2007

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DATE	REVISION	BY	APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 07C501

MARK W. ANDERSON, STATE OF WASHINGTON, REGISTERED PROFESSIONAL ENGINEER, EXPIRES 9/30/08

BRIDGE AND STRUCTURES OFFICE

BIJAN KHALEGHI, STATE OF WASHINGTON, REGISTERED PROFESSIONAL ENGINEER, EXPIRES 8/23/08

Washington State Department of Transportation

I-5
GRAND MOUND TO MAYTOWN
STAGE ONE - ADD LANES
PRAIRIE CREEK BRIDGE NO. 5/302E

FRAMING PLAN

BRIDGE SHEET NO. PE19

SHEET 638 OF 772 SHEETS

Bridge Deck Concrete Study

Washington State Department of Transportation

Bridge #	5/302E	Bridge Name	Prairie Creek NB	Structure ID	0017465A
Contract #	7465 Region SW	Project Engineer	McNutt/Engel	Performance Deck Concrete?	No
Contractor	Scarsella Bros.	Concrete Supplier		Deck Placement	≈ 2009
Bridge Description	Single-Span (77'), 8-WF42G Girders, 4-Lanes (variable wdth roadway abt. 70' wide)				

L = length between diaphragms (or length of "bay")

S = girder spacing

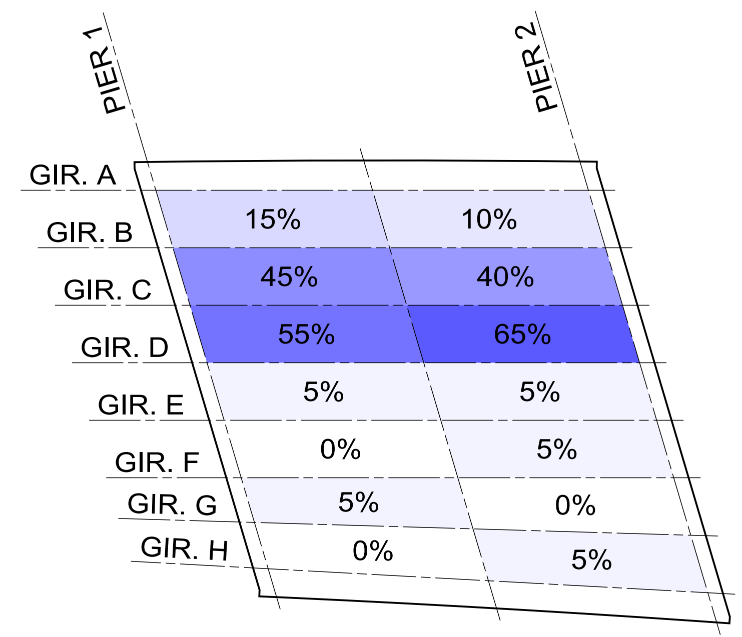
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	18%
Min. =	0%
Max. =	65%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	36.00	5.50	3	18	15%
1	1	B	C	36.00	5.50	8	18	45%
1	1	C	D	36.00	5.50	10	18	55%
1	1	D	E	36.00	5.50	1	18	5%
1	1	E	F	36.00	5.50	0	18	0%
1	1	F	G	36.00	3.50	1	18	5%
1	1	G	H	36.00	3.50	0	18	0%
2	2	A	B	36.00	5.50	2	18	10%
2	2	B	C	36.00	5.50	7	18	40%
2	2	C	D	36.00	5.50	12	18	65%
2	2	D	E	36.00	5.50	1	18	5%
2	2	E	F	36.00	5.50	1	18	5%
2	2	F	G	36.00	4.50	0	18	0%
2	2	G	H	36.00	4.50	1	18	5%



CRACKING INTENSITY ~ BRIDGE 5/302E

100% = CRACK EVERY 2 FT.

BRIDGE NUMBER	5/302E
BRIDGE NAME	PRAIRIE CREEK NB
INSPECTION DATE	4/8/2015
DECK CONCRETE	TRADITIONAL

BRIDGE 5/302W (PRAIRIE CREEK SB)

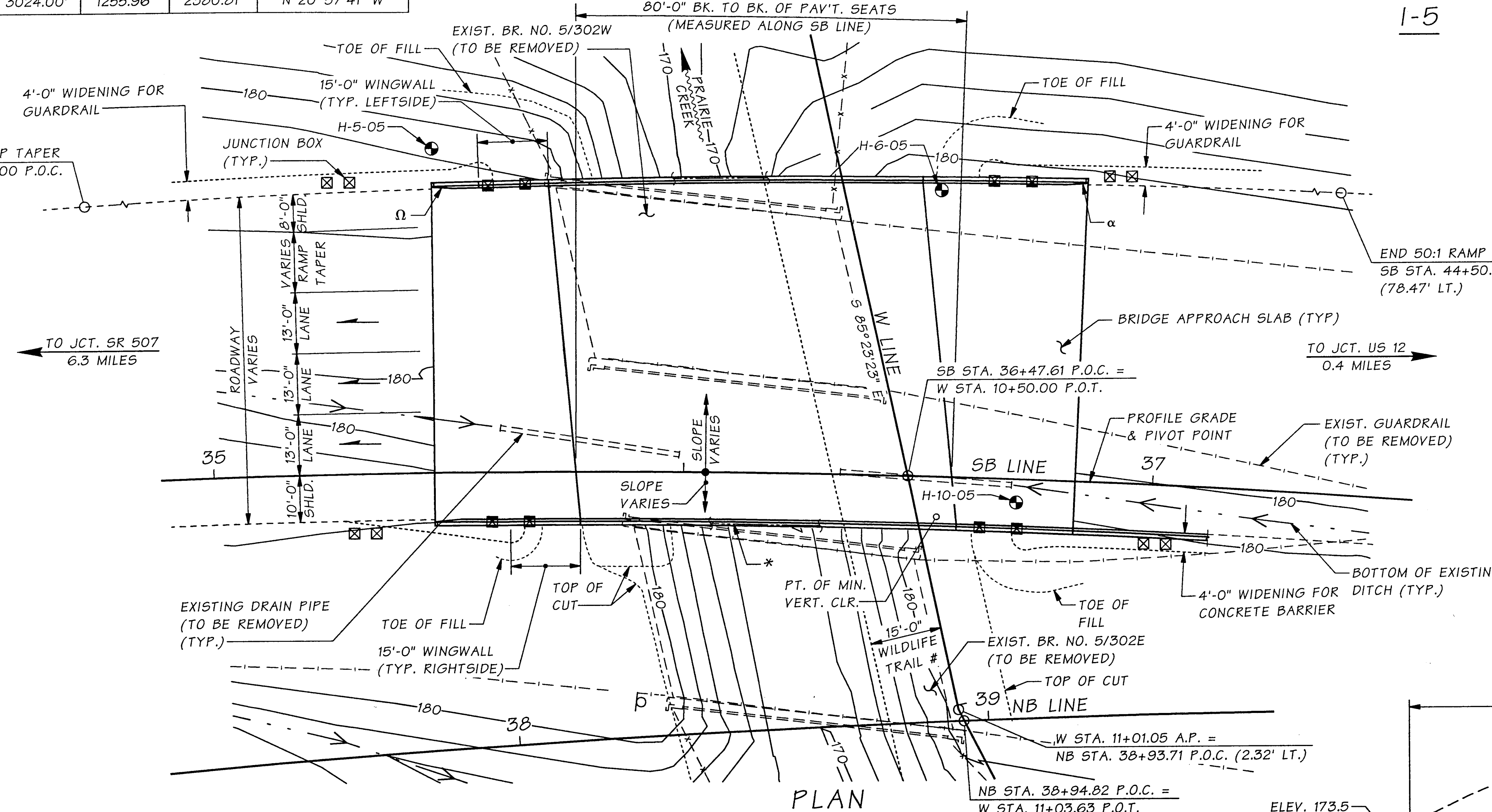
Bridge #	5/302W	Bridge Name	Prairie Creek SB	Structure ID	0017465B
Contract #	7465	Region	SW	Project Engineer	McNutt/Engel
Performance Deck Concrete?	No	Contractor	Scarsella Bros.	Concrete Supplier	Unknown
Deck Placement	≈ 2010	Bridge Description	Single-Span (80'), 8-WF42G Girders, 4-Lanes (variable wdth roadway abt. 76' wide)		

CONTENTS

CURVE DATA					
P.I. STATION	Δ	RADIUS	TANGENT	LENGTH	BK. TANGENT BRG.
SB 29+88.49	45°06'33.0" RT.	2380.00'	988.49'	1873.78'	N 20°57'41" W
NB 32+55.96	45°06'33.0" RT.	3024.00'	1255.96'	2380.81'	N 20°57'41" W

SEC. 12, T.15N., R.3W., W.M.
THURSTON COUNTY

I-5



PLAN

BEARING OF ALL PIERS IS N 78°30'00" W

* 2 ~ 2"ø CONDUIT PIPES IN TRAFFIC BARRIER FOR FULL LENGTH OF BRIDGE & WINGWALLS (TYP.)

SEE WILDLIFE TRAIL DETAIL.

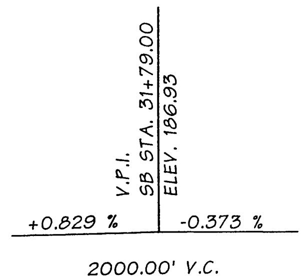
ρ 4.5' MIN. VERT. CLR.

Ω CONNECTION TYPE "F" (SEE STD. PLAN C-5)

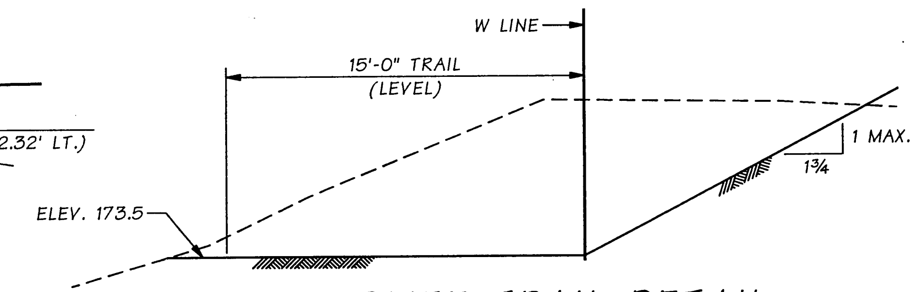
α BEAM GUARDRAIL (TYPE 31) TRANSITION SECTION TYPE 21 (SEE STD. PLAN C-25.20-00)

TEST HOLE

JUNCTION BOX NEMA 4X S.S. (TYP.)

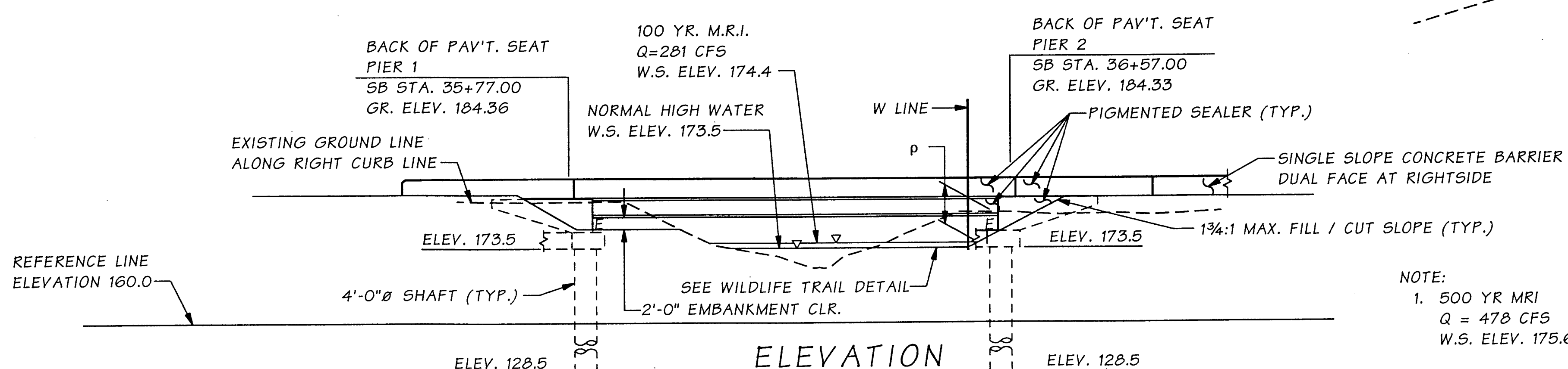


SB LINE PROFILE



WILDLIFE TRAIL DETAIL

LOOKING BACK ON STATION



ELEVATION

GRADE ELEVATIONS SHOWN ARE FINISH GRADES AT TOP OF ROADWAY SLAB ON SB LINE AND ARE EQUAL TO PROFILE GRADE. SEE STD. PLAN H-9 FOR EMBANKMENT DETAILS AT BRIDGE ENDS.

DATUM

NAVD 1988

NOTE:
1. 500 YR MRI
   Q = 478 CFS
   W.S. ELEV. 175.6
2. ORDINARY HIGH WATER LEVEL
   ELEV. 171.4

LEGEND

B / PW15 — IDENTIFIES SECTION, VIEW OR DETAIL — TAKEN OR SHOWN ON BRIDGE SHEET PW15

B / — — TAKEN OR SHOWN ON THE SAME SHEET

P.C. GIRDERS (WF42G)

LOADING: HL-93

Bridge Design Engr.	Khaleghi, B		
Supervisor	Anderson, MW		
Designed By	Pickett, A	06/06	
Checked By	JB/LHT	12/06	
Detailed By	Bontemps, W	06/06	
Bridge Projects Engr.	Kirker, KN	08/05	
Prelim. Plan By	Chu, A	04/05	
Architect/Specialist	PDK/BK	08/05	

Wed Nov 21 09:29:08 2007

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DATE | REVISION | BY | APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 07C501

BRIDGE AND STRUCTURES OFFICE

JUGESH KAPUR — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER — EXPIRES 5/19/08

11-21-07

Washington State Department of Transportation

I-5
GRAND MOUND TO MAYTOWN
STAGE ONE - ADD LANES
PRAIRIE CREEK BRIDGE NO. 5/302W

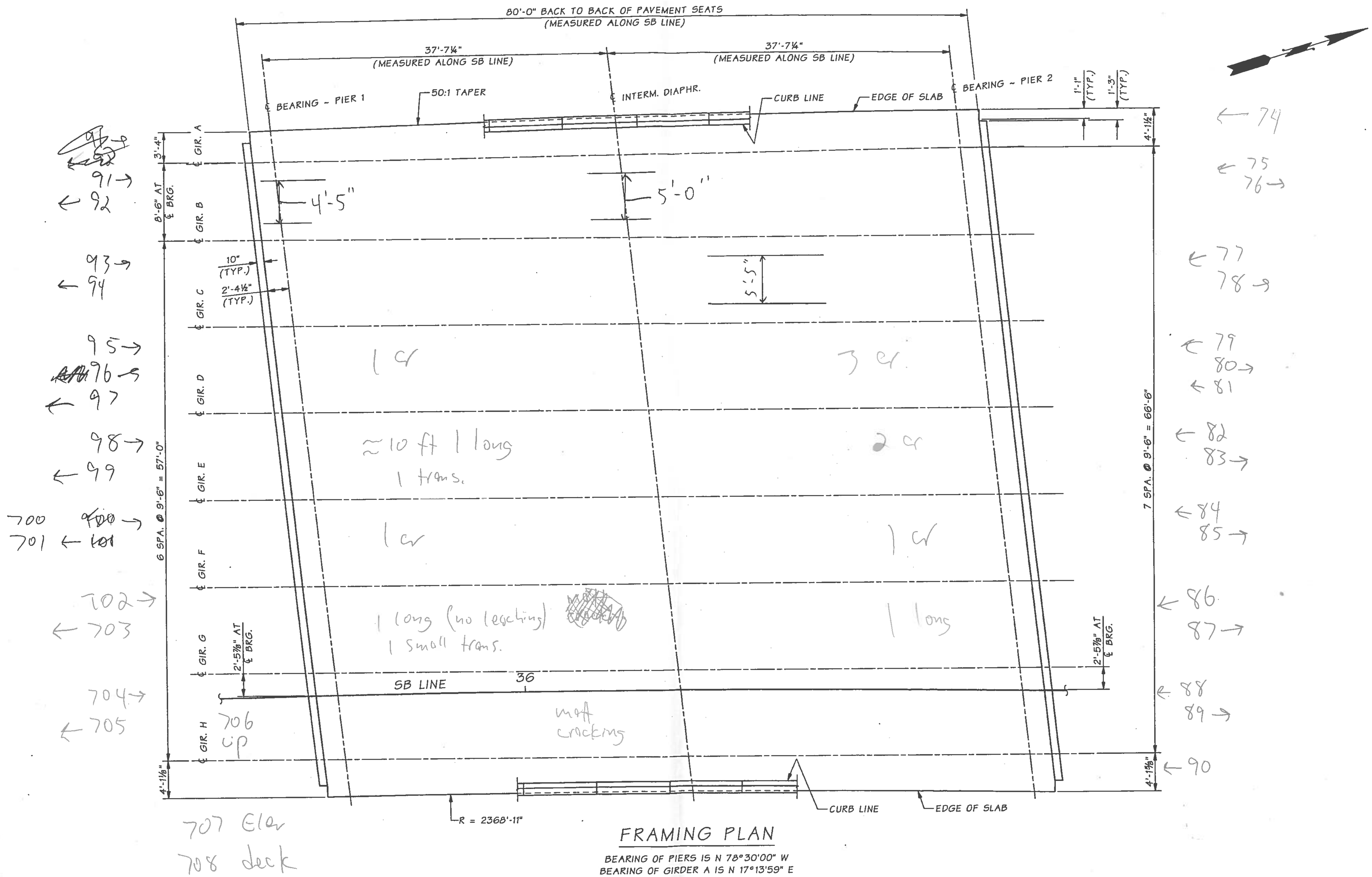
LAYOUT

BRIDGE SHEET NO. PW1

SHEET 656 OF 772 SHEETS

SR 5 JOB NO. 7412 SHEET PW1

C.S. 3401 ~ PROJ. NO. OL3451D ~ OLYMPIC REGION ~ I-5 ~ GRAND MOUND TO MAYTOWN ~ PRAIRIE CREEK BRIDGE NO. 5/302W REPL.



FRAMING PLAN

BEARING OF PIERS IS N 78°30'00" W
BEARING OF GIRDER A IS N 17°13'59" E
BEARING OF GIRDERS B THRU H IS N 17°57'57" E

SR 5 JOB NO. 7412 SHEET PW16

Bridge Design Engr.	Khaleghi, B	
Supervisor	Anderson, MW	
Designed By	Pickett, A	09/06
Checked By	Bingle, J	12/06
Detailed By	Bontemps, W	09/06
Bridge Projects Engr.		
Prelim. Plan By		
Architect/Specialist		

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DATE	REVISION	BY	APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 07C501

BRIDGE AND STRUCTURES OFFICE

11/19/07 11/20/07

EXPIRES 9/30/08 EXPIRES 8/23/08

Washington State Department of Transportation

I-5
GRAND MOUND TO MAYTOWN
STAGE ONE - ADD LANES
PRAIRIE CREEK BRIDGE NO. 5/302W

FRAMING PLAN

BRIDGE SHEET NO. PW16

SHEET 671 OF 772 SHEETS

Mon Nov 19 08:34:59 2007

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	5/302W	Bridge Name	Prairie Creek SB	Structure ID	0017465B
Contract #	7465	Region	SW	Project Engineer	McNutt/Engel
Performance Deck Concrete?	No	Contractor	Scarsella Bros.	Concrete Supplier	Unknown
Deck Placement	≈ 2010				

Bridge Description: Single-Span (80'), 8-WF42G Girders, 4-Lanes (variable wdth roadway abt. 76' wide)

L = length between diaphragms (or length of "bay")

S = girder spacing

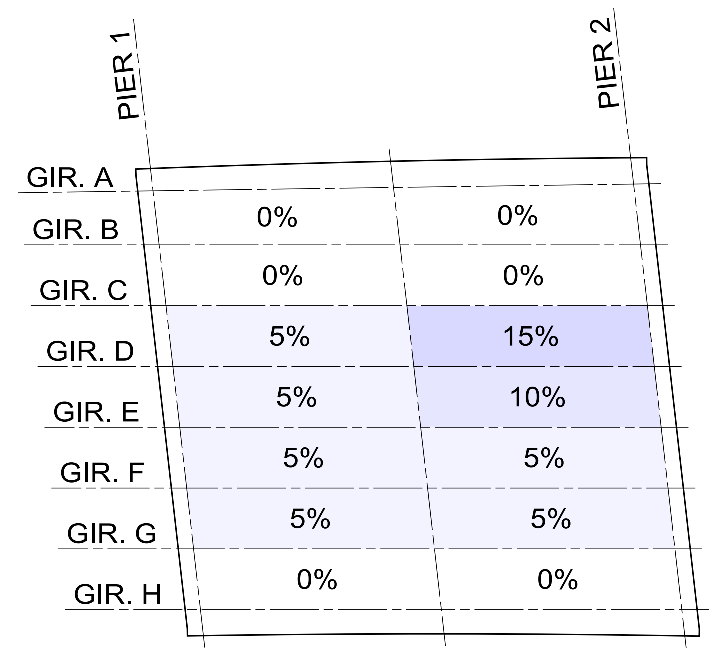
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	4%
Min. =	0%
Max. =	15%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	36.00	5.00	0	18	0%
1	1	B	C	36.00	5.50	0	18	0%
1	1	C	D	36.00	5.50	1	18	5%
1	1	D	E	36.00	5.50	1	18	5%
1	1	E	F	36.00	5.50	1	18	5%
1	1	F	G	36.00	5.50	1	18	5%
1	1	G	H	36.00	5.50	0	18	0%
2	2	A	B	36.00	5.00	0	18	0%
2	2	B	C	36.00	5.50	0	18	0%
2	2	C	D	36.00	5.50	3	18	15%
2	2	D	E	36.00	5.50	2	18	10%
2	2	E	F	36.00	5.50	1	18	5%
2	2	F	G	36.00	5.50	1	18	5%
2	2	G	H	36.00	5.50	0	18	0%



CRACKING INTENSITY ~ BRIDGE 5/302W

100% = CRACK EVERY 2 FT.

LESS CRACKING — MORE CRACKING

BRIDGE NUMBER	5/302W
BRIDGE NAME	PRAIRIE CREEK SB
INSPECTION DATE	4/8/2015
DECK CONCRETE	TRADITIONAL

BRIDGE 9/133 (SR 9 OVER HARVEY CREEK ROAD)

Bridge #	9/133	Bridge Name	SR 9 over Harvey Creek Road	Structure ID	0017267A
Contract #	7267 Region NW	Project Engineer	Janice Fahning	Performance Deck Concrete?	No
Contractor	Scarsella Brothers	Concrete Supplier		Deck Placement	≈ 2008
Bridge Description	Single Span (180'), 6-WF83G Girders, 2-Lane (40' wide roadway)				

CONTENTS

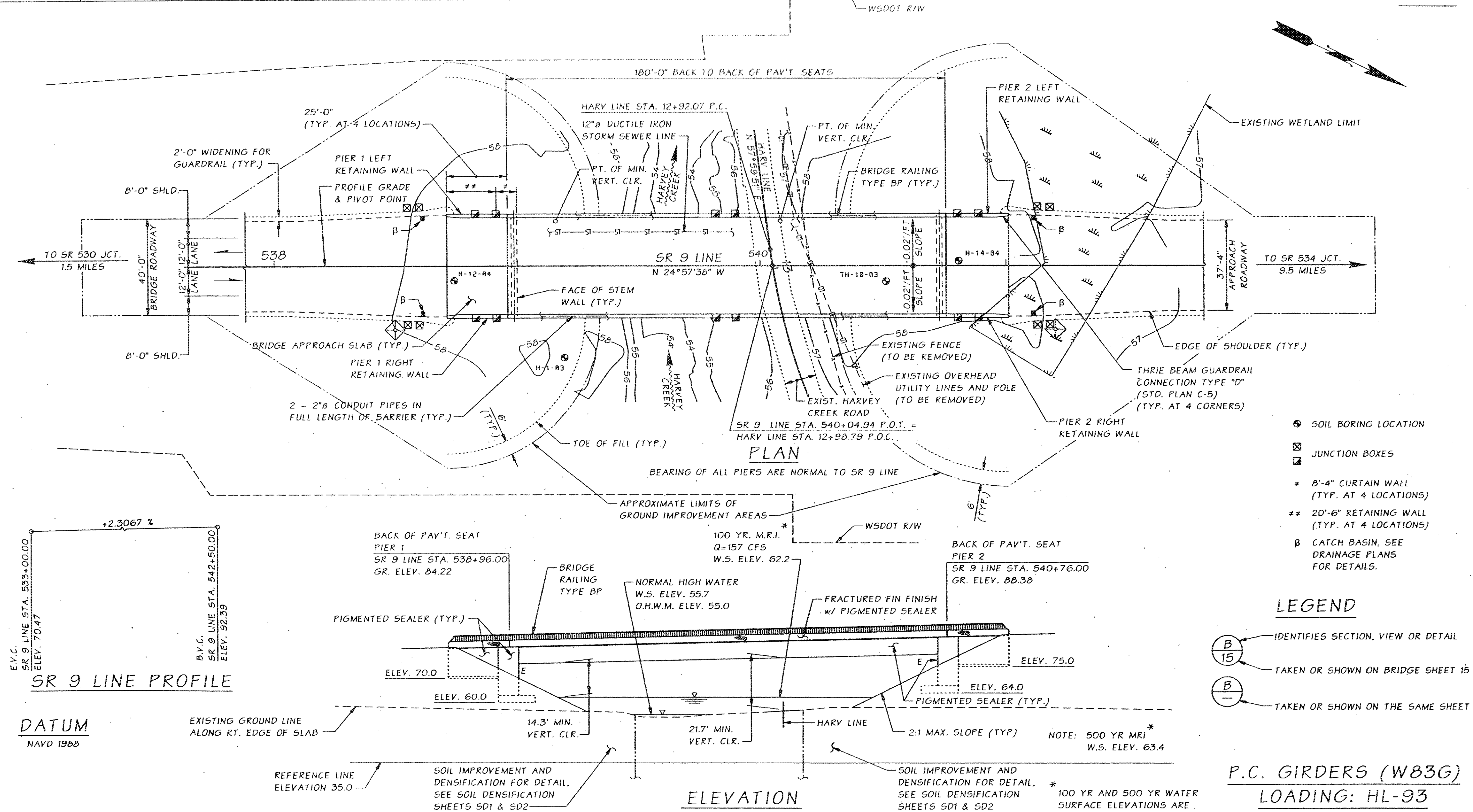
1. Layout Plan Sheet
2. Field Notes
3. Crack Summary
4. Crack Intensity Diagram

CURVE DATA					
P.I. STATION	Δ	RADIUS	TANGENT	LENGTH	BK TANGENT BRG
HARV 13+36.97	20°21'51" LT.	250.00'	44.90'	88.86'	N 57°59'51" E

SEC. 35, T.32N., R.5E., W.M.

SNOHOMISH COUNTY

SR 9



GRADE ELEVATIONS SHOWN ARE FINISH GRADES AT TOP OF ROADWAY SLAB ON SR 9 LINE AND ARE EQUAL TO PROFILE GRADE. SEE STD. PLAN H-9 FOR EMBANKMENT DETAILS AT BRIDGE ENDS.

DATUM

NAVD 1988

NOTE: 500 YR MRI* W.S. ELEV. 63.4

* 100 YR AND 500 YR WATER SURFACE ELEVATIONS ARE CONTROLLED BY BACKWATER FROM THE STILLAGUAMISH RIVER

LEGEND

- SOIL BORING LOCATION
- JUNCTION BOXES
- * 8'-4" CURTAIN WALL (TYP. AT 4 LOCATIONS)
- ** 20'-6" RETAINING WALL (TYP. AT 4 LOCATIONS)
- β CATCH BASIN, SEE DRAINAGE PLANS FOR DETAILS.
- B/15 IDENTIFIES SECTION, VIEW OR DETAIL; TAKEN OR SHOWN ON BRIDGE SHEET 15
- B/— TAKEN OR SHOWN ON THE SAME SHEET

P.C. GIRDERS (W83G)

LOADING: HL-93

Bridge Design Engr.	Khaleghi, B	
Supervisor	Stoddard, RB	
Designed By	Lee, CS	09/06
Checked By	Minns, GEC	09/06
Detailed By	Foote, N	09/06
Bridge Projects Engr.	Lewis, RA	09/06
Prelim. Plan By	Lee, CS	09/06
Architect/Specialist	Kinderman, P	09/06

M:\Y-Team\SR9 HARVEY CREEK RD\Window files\LAYOUT.WND

DATE | REVISION | BY | APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 06A033

BRIDGE AND STRUCTURES OFFICE

BIJAN KHALEGHI, STATE OF WASHINGTON, REGISTERED PROFESSIONAL ENGINEER, EXPIRES 2/23/08

9/11/06

Washington State Department of Transportation

SR 9
SCHLOMAN ROAD TO 256TH ST NE AND 268TH ST INTERSECTION
HARVEY CREEK BRIDGE

LAYOUT

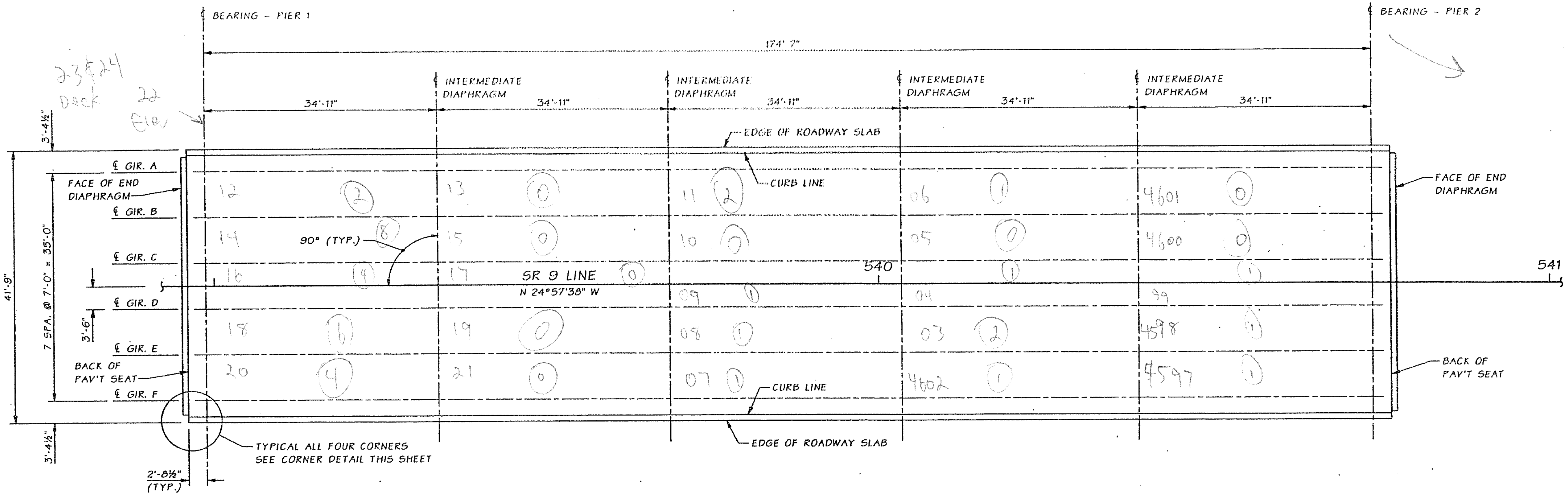
BRIDGE SHEET NO. 1

SHEET 216 OF 267 SHEETS

C.S. 3135 ~ PROJ. NO. XL 1273A ~ NORTHWEST REGION ~ SR 9 ~ SCHLOMAN ROAD VICINITY TO 256TH ST. NE & 268TH ST. NE ~ HARVEY CR. RD/ARMSTRONG CR. OVERCROSSING

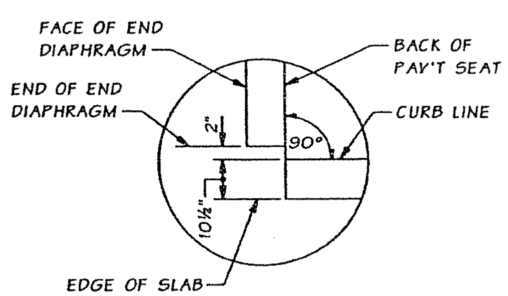
SR 9 JOB NO. SHEET 1

Mon Dec 11 08:36:27 2006



FRAMING PLAN

BEARING OF PIERS AND DIAPHRAGMS IS NORMAL TO SR 9 LINE



CORNER DETAIL

Bridge Design Engr.	Khaleghi, B		
Supervisor	Stoddard, RB		
Designed By	Lee, CS	09/06	
Checked By	HINNS, GEC	09/06	
Detailed By	Foote, N	09/06	
Bridge Projects Engr.			
Prelim. Plan By			
Architect/Specialist			

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DATE	REVISION	BY	APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 06A033

BRIDGE AND STRUCTURES OFFICE

EXPIRES 2/6/08 — EXPIRES 6/5/08

Washington State Department of Transportation

SR 9
SCHLOMAN ROAD TO 256TH ST NE AND 268TH ST INTERSECTION
HARVEY CREEK BRIDGE

FRAMING PLAN

BRIDGE SHEET NO. 17

SHEET 232 OF 267 SHEETS

SR 9 JOB NO. SHEET 17

Fri Dec 08 14:41:54 2006

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	9/133	Bridge Name	SR 9 over Harvey Creek Road	Structure ID	0017267A
Contract #	7267 Region NW	Project Engineer	Janice Fahning	Performance Deck Concrete?	No
Contractor	Scarsella Brothers	Concrete Supplier		Deck Placement	≈ 2008
Bridge Description	Single Span (180'), 6-WF83G Girders, 2-Lane (40' wide roadway)				

L = length between diaphragms (or length of "bay")
S = girder spacing
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)
N_{cr} = number of leaching cracks counted during visual inspection
% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	8%
Min. =	0%
Max. =	45%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	34.92	7.00	2	17	10%
1	1	B	C	34.92	7.00	8	17	45%
1	1	C	D	34.92	7.00	4	17	25%
1	1	D	E	34.92	7.00	6	17	35%
1	1	E	F	34.92	7.00	4	17	25%
1	2	A	B	34.92	7.00	0	17	0%
1	2	B	C	34.92	7.00	0	17	0%
1	2	C	D	34.92	7.00	0	17	0%
1	2	D	E	34.92	7.00	0	17	0%
1	2	E	F	34.92	7.00	0	17	0%
1	3	A	B	34.92	7.00	2	17	10%
1	3	B	C	34.92	7.00	0	17	0%
1	3	C	D	34.92	7.00	1	17	5%
1	3	D	E	34.92	7.00	1	17	5%
1	3	E	F	34.92	7.00	1	17	5%
1	4	A	B	34.92	7.00	1	17	5%
1	4	B	C	34.92	7.00	0	17	0%
1	4	C	D	34.92	7.00	1	17	5%
1	4	D	E	34.92	7.00	2	17	10%
1	4	E	F	34.92	7.00	1	17	5%
1	5	A	B	34.92	7.00	0	17	0%
1	5	B	C	34.92	7.00	0	17	0%
1	5	C	D	34.92	7.00	1	17	5%
1	5	D	E	34.92	7.00	1	17	5%
1	5	E	F	34.92	7.00	1	17	5%

	PIER 1				PIER 2
GIR. A					
GIR. B	10%	0%	10%	5%	0%
GIR. C	45%	0%	0%	0%	0%
GIR. D	25%	0%	5%	5%	5%
GIR. E	35%	0%	5%	10%	5%
GIR. F	25%	0%	5%	5%	5%

CRACKING INTENSITY ~ BRIDGE 9/133

100% = CRACK EVERY 2 FT.

LESS CRACKING — MORE CRACKING

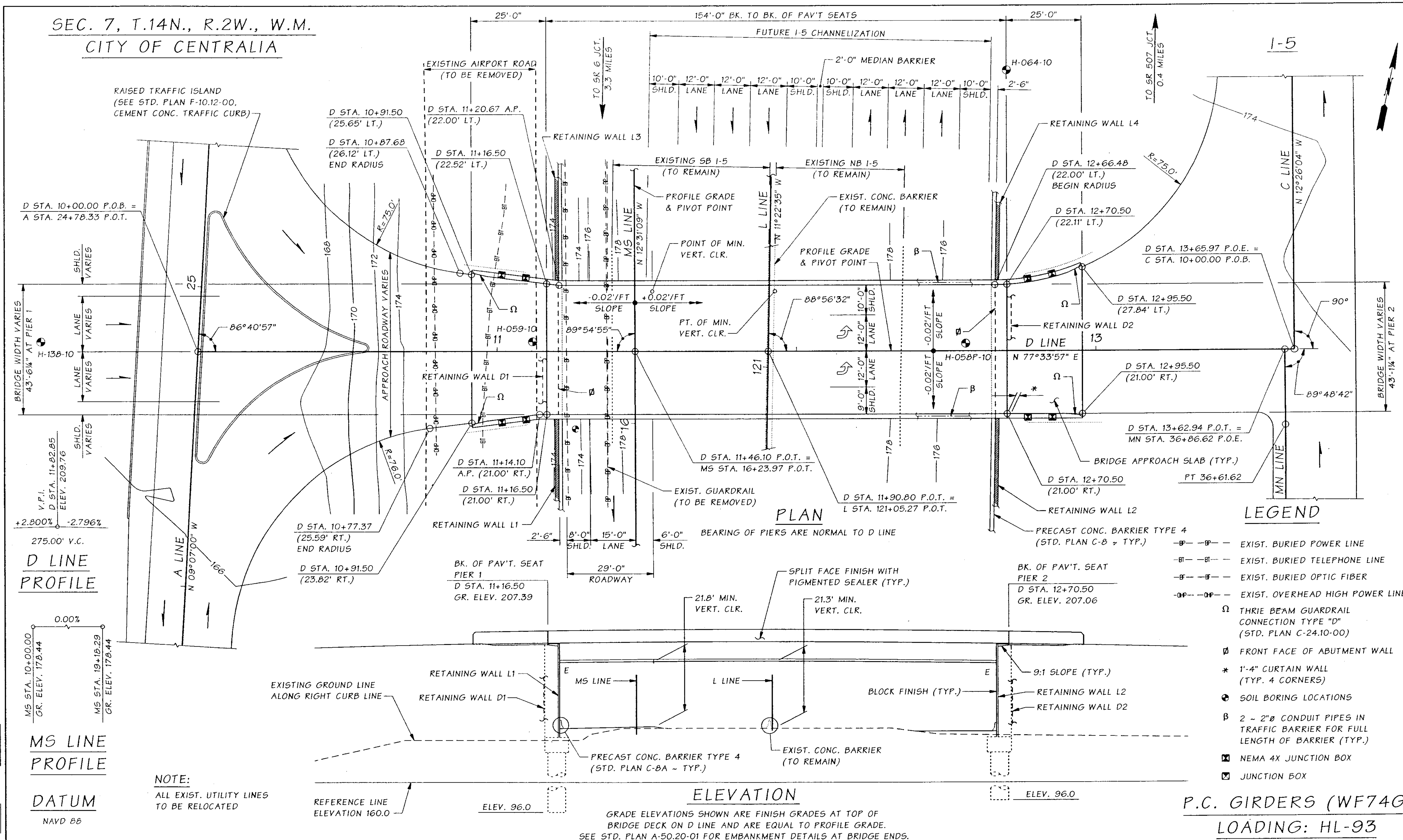
BRIDGE NUMBER	9/133
BRIDGE NAME	SR 9 OVER HARVEY CREEK ROAD
INSPECTION DATE	5/22/2015
DECK CONCRETE	TRADITIONAL

BRIDGE 5/229 (MELLEN STREET COUPLET)

Bridge #	5/229	Bridge Name	Mellen Street Couplet Bridge	Structure ID	0018473B
Contract #	8473	Region	SW	Project Engineer	Colin Newell
Performance Deck Concrete?	YES				
Contractor	Scarella Bros.	Concrete Supplier	Miles Sand & Gravel	Deck Placement	4/18/2014
Bridge Description	Single-Span (154'), 5-WF74G Girders, 2-Lanes (43' wide roadway)				

CONTENTS

1. Layout Plan Sheet
2. Mix Design Summary
3. Concrete Mix Design Form
4. Concrete Test Results
5. Field Notes
6. Crack Summary
7. Crack Intensity Diagram



SR 5 FILE NO. 7479 SHEET c1

Bridge Design Engr.	Khaleghi, B	
Supervisor	Khaleghi, B	
Designed By	Chu, A	08/12
Checked By	Nash, PM	10/12
Detailed By	DL/DJM	08/12
Bridge Projects Engr.	Lewis, RA	05/11
Prelim. Plan By	Wei, J	02/10
Architect/Specialist	PDK/BSA/GAW	04/10

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DATE | REVISION | BY | APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 13X300

BRIDGE AND STRUCTURES OFFICE

JUGESH KAPUR — STATE OF WASHINGTON — 25400 — PROFESSIONAL ENGINEER

3/27/13

Washington State Department of Transportation

I-5
MELLEN STREET TO BLAKESLEE JUNCTION - STAGE 2
COUPLET BRIDGE OVER I-5
LAYOUT

BRIDGE SHEET NO. C1
SHEET 783 OF 904 SHEETS

Tue Mar 26 14:40:07 2013

Bridge Deck Concrete Study

Washington State Department of Transportation

Bridge #	5/229	Bridge Name	Mellen Street Couplet Bridge	Structure ID	0018473B
Contract #	8473	Region	SW	Project Engineer	Colin Newell
Performance Deck Concrete?	YES	Contractor	Scarella Bros.	Concrete Supplier	Miles Sand & Gravel
Deck Placement	4/18/2014	Bridge Description	Single-Span (154'), 5-WF74G Girders, 2-Lanes (43' wide roadway)		

Mix Design (WSDOT Form 350-040)

Water (max) = 223 lbs/cy w/c = 0.40 max

Cementitious Materials	Lbs/cy	Source	Type, Class or Grade
cement	464	Ash Grove	Type I-II
fly ash	116	Lafarge	Type F
slag			
latex			
microsilica			

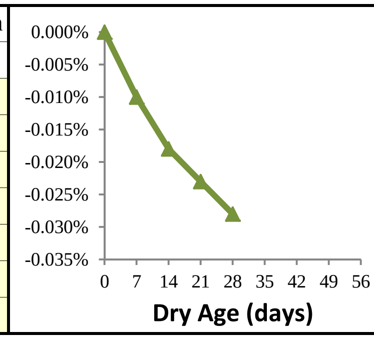
Concrete Admixtures	oz/cy	Manufacturer	Product
air entrainment	1-15	BASF	MB-AE-90
water reducer			
HR water reduce	23-40	BASF	Glenium 7500
set retarder			
shrink. reducer	32	BASF	MasterLife SRA

Concrete Test Results

compressive strength @ 28 days	5,560	psi
modulus of elasticity	5,230,000	psi
permeability @ 56 days	1,129	coulombs
mix design density	145.5	lb/cf

Shrinkage Test Results

Dry Age (days)	% Length Change
0	0.0000%
4	
7	-0.0100%
14	-0.0180%
21	-0.0230%
28	-0.0280%
56	



Aggregate

	Comp. 1	Comp. 2	Comp. 3	Comp. 4	Comp. 5
WSDOT Pit #	B-329	B-329	B-329	B-333	
Grading	No. 4	No. 57	No. 8	Class 2	
% Total	15.4%	33.3%	16.0%	35.3%	
Lbs/cy	480	1040	500	1100	

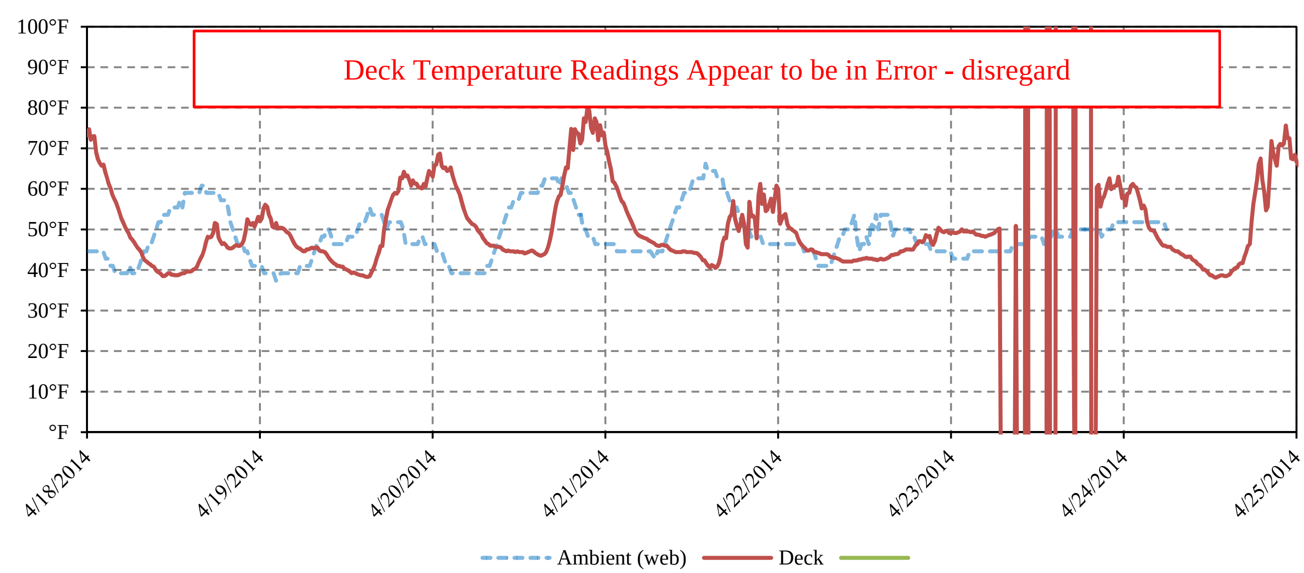
ASR Mitigation: None Required

Notes

Very Similar Mix Design as:

* Bridge 5/232NCD
* Bridge 5/232SCD
* Bridge 5/234W

Temperature



Washington State Department of Transportation

Concrete Mix Design

Contractor	Submitted By	Date
Scarcella Bros	SB Structures	3-26-2014

Concrete Supplier	Plant Location
Miles Sand & Gravel	Rochester

Contract Number	Contract Name
8473	I-5/Mellen Street to Blakeslee Junction - Stage 2

This mix is to be used in the following Bid Item No(s): 86 & 87

Concrete Class: ***(check one only)***

☐ 3000 ☐ 4000 ☒ 4000D[a] ☐ 4000P[a] ☐ 4000W ☐ Concrete Overlay ☐ Cement Concrete Pavement[d]

☐ Other Shrinkage Reducer

Remarks:

Mix Design No. 0444AFL2 **Plant No.** 222

Cementitious Materials	Source	Type, Class or Grade	Sp. Gr.	Lbs/cy
Cement	Ash Grove	I-II	3.15	464
Fly Ash[a]	Lafarge	F	2.54	116
GGBFS (Slag)				
Latex				
Microsilica				

Concrete Admixtures	Manufacturer	Product	Type	Est. Range (oz/cy)
Air Entrainment	BASF	MB-AE-90		1-15
Water Reducer				
High-Range Water Reducer	BASF	Glenium 7500	F	23-40
Set Retarder				
Other Shrinkage Reducer	BASF	MasterLife SRA		32

Water (Maximum) 233 lbs/cy

Is any of the water Recycled or Reclaimed? ☐ Yes[e] ☒ No

Water Cementitious Ratio (Maximum) 0.40

Mix Design Density 145.5 lbs/cf[d]

Design Performance	1	2	3	4	5	Average[f]
28 Day Compressive Strength (cylinders) psi	4,920	5,420	5,330	6,290	5,860	5,560
14 Day Flexural[d] Strength (beams) psi						

Agency Use Only (Check appropriate Box)

☐ **This Mix Design MEETS CONTRACT SPECIFICATIONS and may be used on the bid items noted above**

☐ **This Mix Design DOES NOT MEET CONTRACT SPECIFICATIONS and is being returned for corrections**

Reviewed By: ______________________ PE Signature ______________ Date

DOT Form 350-040 EF
Revised 6/06

Distribution: Original - Contractor
Copies To - State Materials Lab-Structural Materials Eng. ; Regional Materials Lab; Project Inspector

Mix Design No. 0444AFL2 **Plant No.** 222

Aggregate Information

Concrete Aggregates	Component 1	Component 2	Component 3	Component 4	Component 5	Combined Gradation
WSDOT Pit No.	B-333	B-333	B-333	B-333		
WSDOT ASR 14-day Results (%) [b]	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☐ No	
Grading[c]	4	57	8	Class 2		
Percent of Total Aggregate						100%
Specific Gravity	2.71	2.69	2.68	2.65		
Lbs/cy (ssd)	480	1040	500	1100		

Percent Passing

2 inch	100	100	100	100		100
1-1/2 inch	100	100	100	100		100
1 inch	32.6	100	100	100		89.6
3/4 inch	1.6	80.0	100	100		78.2
1/2 inch	0.4	30.1	100	100		61.4
3/8 inch	0.2	7.8	88.6	100		52.1
No. 4	0.1	0.3	22.4	99.4		38.8
No. 8	0.1	0.2	1.4	90.2		32.1
No. 16	0.1	0.1	0.2	70		24.8
No. 30	0.1	0.1	0.2	44.1		15.6
No. 50	0.1	0.1	0.2	20		7.1
No. 100	0.1	0.1	0.2	6		2.2
No. 200	0.1	0.1	0.2	1.7		0.7

Fineness Modulus: 2.70 (Required for Class 2 Sand)

ASR Mitigation Method Proposed [b] : ______

Notes:

a Required for Class 4000D and 4000P mixes.

b Alkali Silica Reactivity Mitigation is required for sources with expansions over 0.20% - Incidate method for ASR mitigation.
For expansion of 0.21% - o.45%, acceptable mitigation can be the use of low alkali cement or 25% type F fly ash.
Any other proposed mitigation method or for pits with greater than 0.45% expansion, proof of mitigating measure, either ASTM C1260 / AASHTO T303 test results must be attached.
If ASTM C 1293 testing has been submitted indicating 1-year expansion of 0.04% or less, mitigation is not required.

c AASHTO No. 467, 57, 67, 7, 8; WSDOT Class 1, Class 2; or combined gradation. See Standard Specification 9-03.1.

d Required for Cement Concrete Pavements.

e Attach test results indicating conformance to Standard Specification 9-25.1.

f Actual Average Strength as determined from testing or estimated from ACI 211.

Carlson Testing, Inc.

Bend Office	(541) 330-9155
Geotechnical Office	(503) 601-8250
Eugene Office	(541) 345-0289
Salem Office	(503) 589-1252
Tigard Office	(503) 684-3460

October 25, 2013
T1309423

Ashgrove Cement
5 Centerpoint Dr. Suite 350
Lake Oswego, OR 97035

Attn: Dave Berg

Re: **Modulus of Elasticity - ASTM C469**
Miles Sand & Gravel Special 4000D
Report Reference # D-092313-1
WSDOT 4000D Specifications

As requested, Carlson Testing Inc. has completed modulus of elasticity testing on the 6x12 concrete cylinders referenced above. The lab cylinders were cast on September 23, 2013 and delivered to our Tigard facility. Twenty eight day modulus testing was done on October 21, 2013. Following are the results:

Modulus of Elasticity Testing: ASTM C469

AGE OF SPECIMEN	AVE PSI	MODULUS – CYL A	MODULUS – CYL B	AVERAGE MODULUS ELASTICITY
28 DAYS	4160	5.18E + 06	5.28E + 06	5.23E + 06

*Attached are the modulus graphs

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If there are any further questions regarding this matter, please do not hesitate to contact this office.

Respectfully submitted,

CARLSON TESTING, INC.

Greg Leeper
Project Manager

(Attachments)

ASH GROVE CEMENT COMPANY

TECHNICAL SERVICE

Portland Lab
3737 N. Port Center Way
Portland, OR 97217

ASTM C 157 - Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete

Subject

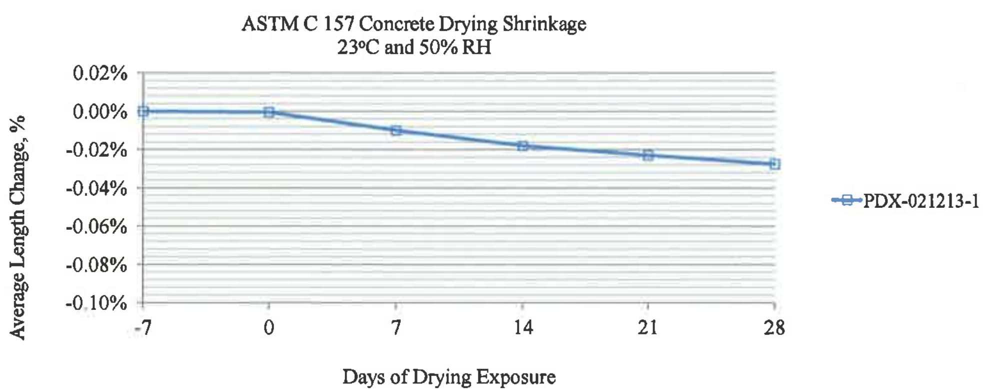
On 2/12/2013 weperformed a laboratory trial batch for drying shrinkage testing for Mr. Keith Muhich with Miles Sand & Gravel.

Summary

The concrete laboratory trial batch was prepared according to your mix design 4000D with 0.25 gallon of SRA per cubic yard. The beams were cured in standard water bath for 28 days prior to drying exposure.

Test Results

Length Change, %:	Age, days	PDX-021213-1
	Initial	0.000%
	0	0.000%
	7	-0.010%
	14	-0.018%
	21	-0.023%
	28	-0.028%



Submitted by,

David Burg

David Burg
Technical Services Manager

Ash Grove Technical Center
11011 Cody Street, Suite 125
Overland Park, Kan. 66210
July 26, 2013 – Preliminary Report
August 26, 2013 – Final Report

Report No.: **R18785**

Work Order No.: **WO-130315**

SUBJECT

On July 8, 2013, a request for technical service was issued on behalf of Mr. Keith Muhich of Miles Sand and Gravel in Auburn, Washington. Mr. Dave Burg requested that the Technical Center conduct AASHTO T 277 testing on the two supplied cylinders, 1 @ 28 days, and 2 @ 56 days of age.

SAMPLE IDENTIFICATION

Sample No.	Sample Description	Date Received
S-130851	(3) 4x8 Concrete Cylinders, Cast 6-27-13, labeled WSDOT 4000D mix design.	07/08/2013

TEST RESULTS

AASHTO T 277 - Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
Accelerated Cure

Sample No.	Diameter, in.	Charge Passed, C	Corrected Charge, C	Qualitative Equivalent	Date of Test	Age, days
S-130851 *	4.03	987	**855**	Very Low	07/25/2013	28

* Acc. Curing started at 11 days of age.
Cylinders were received at 11 days of age.

AASHTO T 277 - Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
Standard Cure

Sample No.	Diameter, in.	Charge Passed, C	Corrected Charge, C	Qualitative Equivalent	Date of Test	Age, days
S-130851	4.02	1,297	**1,129**	Low	08/22/2013	56
S-130851	4.03	1,236	**1,070**	Low	08/22/2013	56

Note: Corrected Charge = Charge Passed X $(95/\text{diameter in mm})^2$
1 in. = 25.4 mm

Chloride Ion Penetrability Based on Charge Passed
(Excerpted from AASHTO T 277)

Charge Passed (coulombs)	Chloride Ion Penetrability
> 4,000	High
2,000 – 4,000	Moderate
1,000 – 2,000	Low
100 – 1,000	Very Low
< 100	Negligible

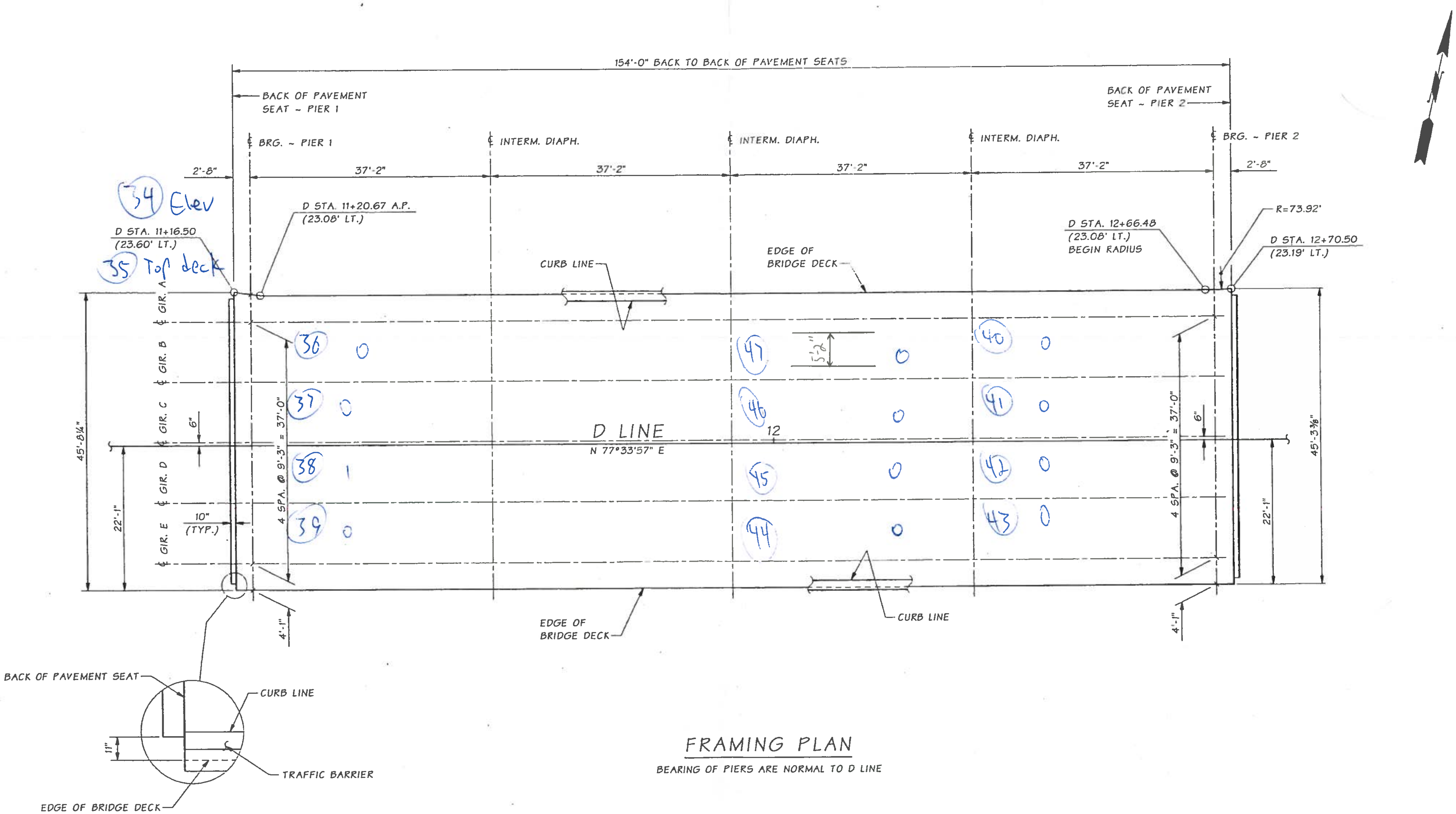
METHODOLOGY

AASHTO T 277 Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration by Bruce Payne.

Submitted by,

Krist Freeman

Kristen Freeman
Geologist/Petrographer



FRAMING PLAN

BEARING OF PIERS ARE NORMAL TO D LINE

NOTE:
OTHERS CORNERS SIMILAR.

SR 5 FILE NO. 7479 SHEET C13

Bridge Design Engr.	Khaleghi, B	
Supervisor	Khaleghi, B	
Designed By	Chu, A	05/11
Checked By	Nash, PM	10/12
Detailed By	McCarthy, DJ	05/11
Bridge Projects Engr.		
Prelim. Plan By		
Architect/Specialist		

M:\X-Team\MELLEN TO BLAKESLEE JCT\COUPLET BR\window files\FRAMING PLANS.wnd

DATE	REVISION	BY	APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 13X300

ARTHUR CHU — STATE OF WASHINGTON — PROFESSIONAL ENGINEER 3/21/13

BRIDGE AND STRUCTURES OFFICE

BIJAN KHALEGHI — STATE OF WASHINGTON — PROFESSIONAL ENGINEER 3/26/13

Washington State Department of Transportation

I-5
MELLEN STREET TO BLAKESLEE JUNCTION - STAGE 2
COUPLET BRIDGE OVER I-5

FRAMING PLAN

BRIDGE SHEET NO. C13
SHEET 795 OF 904 SHEETS

Tue Mar 26 14:40:31 2013

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	5/229	Bridge Name	Mellen Street Couplet Bridge	Structure ID	0018473B
Contract #	8473	Region	SW	Project Engineer	Colin Newell
Performance Deck Concrete?	YES	Contractor	Scarella Bros.	Concrete Supplier	Miles Sand & Gravel
Deck Placement	4/18/2014	Bridge Description	Single-Span (154'), 5-WF74G Girders, 2-Lanes (43' wide roadway)		

L = length between diaphragms (or length of "bay")

S = girder spacing

N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	0%
Min. =	0%
Max. =	5%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	37.17	9.25	0	19	0%
1	1	B	C	37.17	9.25	0	19	0%
1	1	C	D	37.17	9.25	1	19	5%
1	1	D	E	37.17	9.25	0	19	0%
1	2	A	B	37.17	9.25	#N/A	19	#N/A
1	2	B	C	37.17	9.25	#N/A	19	#N/A
1	2	C	D	37.17	9.25	#N/A	19	#N/A
1	2	D	E	37.17	9.25	#N/A	19	#N/A
1	3	A	B	37.17	9.25	0	19	0%
1	3	B	C	37.17	9.25	0	19	0%
1	3	C	D	37.17	9.25	0	19	0%
1	3	D	E	37.17	9.25	0	19	0%
1	4	A	B	37.17	9.25	0	19	0%
1	4	B	C	37.17	9.25	0	19	0%
1	4	C	D	37.17	9.25	0	19	0%
1	4	D	E	37.17	9.25	0	19	0%

	PIER 1			PIER 2
GIR. A				
GIR. B	0%	X X X	0%	0%
GIR. C	0%	X X X	0%	0%
GIR. D	5%	X X X	0%	0%
GIR. E	0%	X X X	0%	0%

CRACKING INTENSITY ~ BRIDGE 5/229

100% = CRACK EVERY 2 FT.

X X X = CRACKS NOT COUNTED DUE TO LIMITED ACCESS

LESS CRACKING

MORE CRACKING

BRIDGE NUMBER	5/229
BRIDGE NAME	MELLEN STREET COUPLET BRIDGE
INSPECTION DATE	4/8/2015
DECK CONCRETE	PERFORMANCE BASED

BRIDGE 101/31 (MIDDLE NEMAH RIVER)

Bridge #	101/31	Bridge Name	Middle Nemah River	Structure ID	0018464A
Contract #	8344	Region	SW	Project Engineer	Lori Figone
Performance Deck Concrete?	YES				
Contractor	SB Structures	Concrete Supplier	Bayview Redi Mix, Inc	Deck Placement	1/14/2014
Bridge Description	Single-Span, 5-WF50G Girders (127' bridge length), 2-Lanes (36' wide roadway)				

CONTENTS

1. Layout Plan Sheet
2. Mix Design Summary
3. Concrete Mix Design Form
4. Concrete Test Results
5. Field Notes
6. Crack Summary
7. Crack Intensity Diagram

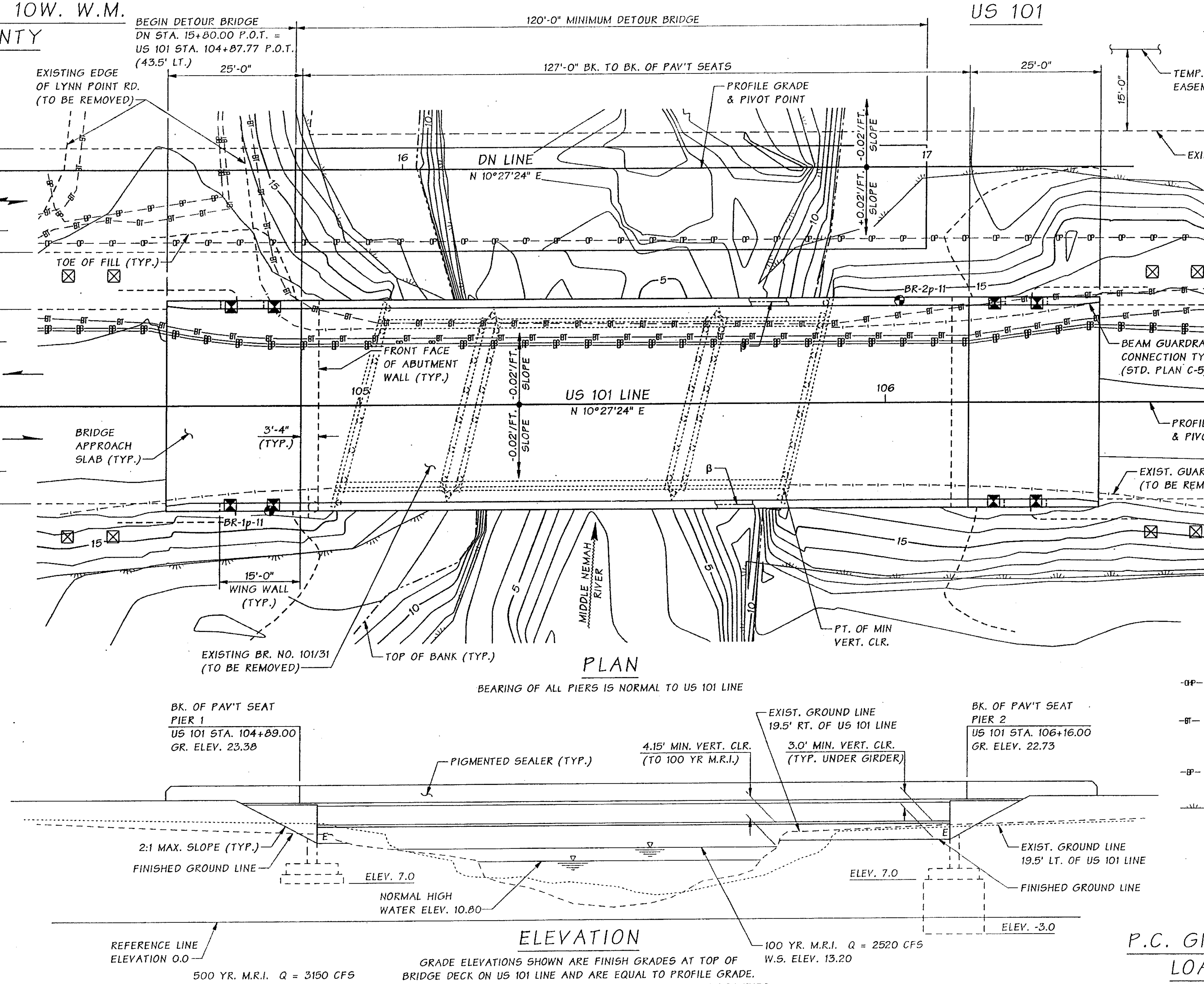
SEC. 27, T. 12 N, R. 10W. W.M.

PACIFIC COUNTY

US 101

DETOUR BRIDGE NOTE:

- MIN. HORIZONTAL CLEAR SPAN SHALL CLEAR NORMAL HIGH W.S. LIMIT.
- MIN. VERT. CLR. SHALL CLEAR NORMAL HIGH W.S. ELEV.



GRADE ELEVATIONS SHOWN ARE FINISH GRADES AT TOP OF BRIDGE DECK ON US 101 LINE AND ARE EQUAL TO PROFILE GRADE.
SEE STD. PLAN A-50.10-00 FOR EMBANKMENT DETAILS AT BRIDGE ENDS.

DN STA. 15+33.00 GR. ELEV. 22.14
DN STA. 17+50.00 GR. ELEV. 18.97
-1.460%

DN LINE PROFILE

V.P.I. US 101 STA. 102+50.00 ELEV. 24.60
+1.417% -0.510%
470' V.C.

US101 LINE PROFILE

DATUM

NAVD 88

LEGEND

- β 2 ~ 2"Ø CONDUIT PIPES IN TRAFFIC BARRIER
- —OP— —OP— EXIST. OVERHEAD POWER (TO BE RELOCATED)
- —BT— —BT— EXIST. UNDERGROUND TELEPHONE CABLE (TO BE RELOCATED)
- —BP— —BP— EXIST. UNDERGROUND POWER (TO BE RELOCATED)
- WETLAND BOUNDARY
- SOIL BORING
- JUNCTION BOX NEMA 4X S.S.
- JUNCTION BOX

P.C. GIRDERS (WF50G)

LOADING: HL-93

C. S. 2501 ~ PROJ. NO. XL3615 ~ SOUTHWEST REGION ~ US 101 ~ MP 33.80 TO MP 33.90 ~ MIDDLE NEMAH RIVER BRIDGE NO. 101/31 REPLACEMENT (NEW STRUCTURE)

SR US101 FILE NO. 7061 SHEET BR1

Bridge Design Engr.	Khaleghi, B	
Supervisor	Anderson, MW	
Designed By	Sargent, S	08/11
Checked By	Martin, J	05/12
Detailed By	Nettle, J	08/11
Bridge Projects Engr.		
Prelim. Plan By		
Architect/Specialist		

M:\Y-Team\US 101 - NEMAH RIVER REPL\window files\LAYOUT.wnd

DATE | REVISION | BY | APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 12X303

BRIDGE AND STRUCTURES OFFICE

YUGESH KAPUR STATE OF WASHINGTON 25930 PROFESSIONAL ENGINEER

5/15/12

Washington State Department of Transportation

US 101
MIDDLE NEMAH RIVER BR.
REPLACE BRIDGE
MIDDLE NEMAH R BR. NO. 101/31 REPL.

LAYOUT

BRIDGE SHEET NO. BR1
SHEET 50 OF 83 SHEETS

Tue May 15 08:40:05 2012

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	101/31	Bridge Name	Middle Nemah River	Structure ID	0018464A
Contract #	8344	Region	SW	Project Engineer	Lori Figone
Performance Deck Concrete?	YES	Contractor	SB Structures	Concrete Supplier	Bayview Redi Mix, Inc
Deck Placement	1/14/2014				

Bridge Description: Single-Span, 5-WF50G Girders (127' bridge length), 2-Lanes (36' wide roadway)

Mix Design (WSDOT Form 350-040)

Water (max) = 230 lbs/cy w/c = 0.38 max

Cementitious Materials	Lbs/cy	Source	Type, Class or Grade
cement	460	Ashgrove	Type I-II
fly ash	150	Lafarge	Type F
slag			
latex			
microsilica			

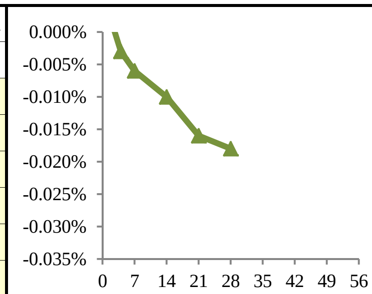
Concrete Admixtures	oz/cy	Manufacturer	Product
air entrainment	1-15	BASF	Micro Air
water reducer			
HR water reduce	20-30	BASF	Glenium 7500
set retarder			
shrink. reducer	120-140	BASF	Masterlife

Concrete Test Results

compressive strength @ 28 days	5,691	psi
modulus of elasticity	4,012,122	psi
permeability @ 56 days	1,677	coulombs
mix design density	150.1	lb/cf

Shrinkage Test Results

Dry Age (days)	% Length Change
0	0.0060%
4	-0.0030%
7	-0.0060%
14	-0.0100%
21	-0.0160%
28	-0.0180%
56	



Aggregate

	Comp. 1	Comp. 2	Comp. 3	Comp. 4	Comp. 5
WSDOT Pit #	PS-X-130	PS-X-130	PS-X-130		
Grading	#67	#4	Class II		
% Total	42.0%	20.0%	38.0%		
Lbs/cy	1350	650	1213		

ASR Mitigation: None Required

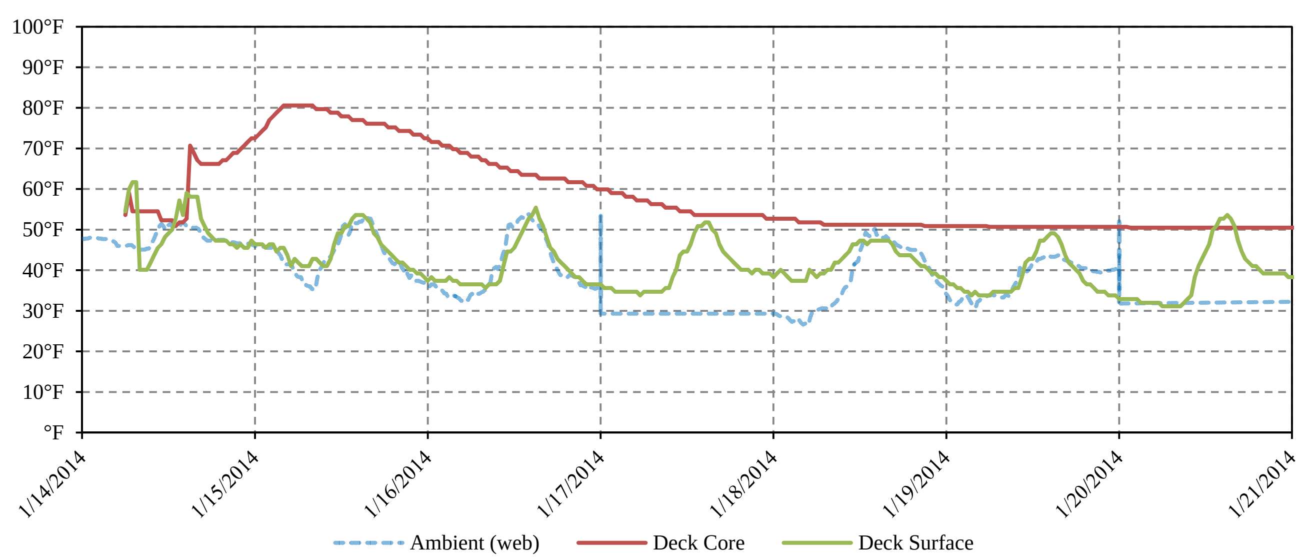
Notes

Same Mix Design as:

* Bridge 6/8
* Bridge 101/44
* Bridge 105/4
* Bridge 105/3

if swell of concrete speciman is included, total change in length at 28 days drying is 240 microstrain (0.0060% + 0.0180%)

Temperature



SB - K. Slater #107
Received 7/23/13
(Page 1 of 4)

Washington State Department of Transportation

Concrete Mix Design

Contractor	Submitted By	Date
SB Structures	Bayview Redi-Mix, Inc	07/22/2013

Concrete Supplier	Plant Location
Bayview Redi Mix, Inc	Raymond 041, Aberdeen 011

Contract Number	Contract Name
8344	Middle Nemah River Bridge Replacement Bridge

This mix is to be used in the following Bid Item No(s): ____

Concrete Class: ***(check one only)***

☐ 3000 ☐ 4000 ☒ 4000D[a] ☐ 4000P[a] ☐ 4000W ☐ Concrete Overlay ☐ Cement Concrete Pavement[d]

☐ Other Shrinkage

Remarks: ____

Mix Design No. WSDT4DS130 **Plant No.** 041, 011

Cementitious Materials	Source	Type, Class or Grade	Sp. Gr.	Lbs/cy
Cement	Ashgrove, Seattle, WA	Type I-II	3.15	460
Fly Ash[a]	Lafarge, Centralia, WA	Type F	2.58	150
GGBFS (Slag)				
Latex				
Microsilica				

Concrete Admixtures	Manufacturer	Product	Type	Est. Range (oz/cy)
Air Entrainment	BASF Cleveland, OH	Micro Air		1-15
Water Reducer				
High-Range Water Reducer	BASF Cleveland, OH	Glenium 7500	F	20-30
Set Retarder				
Other Shrinkage	BASF Cleveland, OH	Masterlife		120-140

Water (Maximum) 230 lbs/cy   Is any of the water Recycled or Reclaimed? ☐ Yes[e] ☒ No

Water Cementitious Ratio (Maximum) .38   Mix Design Density 150.1 lbs/cf[d]

Design Performance	1	2	3	4	5	Average[f]
28 Day Compressive Strength (cylinders) psi	5,775	5,766	5,623	5,561	5,730	5,691
14 Day Flexural[d] Strength (beams) psi						

7/24/13
BO

Agency Use Only (Check appropirate Box)

☒ **This Mix Design MEETS CONTRACT SPECIFICATIONS and may be used on the bid items noted above**

☐ **This Mix Design DOES NOT MEET CONTRACT SPECIFICATIONS and is being returned for corrections**

Reviewed By: Lori Tjyme   7/24/13

PE Signature   Date

Distribution: Original - Contractor
Copies To - State Materials Lab-Structural Materials Eng. ; Regional Materials Lab; Project Inspector

Mix Design No. WSDT4DS130 **Plant No.** 041, 011

Aggregate Information

Concrete Aggregates	Component 1	Component 2	Component 3	Component 4	Component 5	Combined Gradation
WSDOT Pit No.	PS-X-130	PS-X130	PS-X-130			
WSDOT ASR 14-day Results (%) [b]	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	
Grading[c]	AAASHTO #67	AAASHTO #4	Class II			
Percent of Total Aggregate	42	20	38			100%
Specific Gravity	2.825	2.825	2.747			
Lbs/cy (ssd)	1350	650	1213			

Percent Passing

2 inch	100	100	100			100	
1-1/2 inch	100	100	100			100	
1 inch	100	52	100			90	90.4
3/4 inch	93	1	100			77	77.3
1/2 inch	58	1	100			63	62.6
3/8 inch	30	1	100			51	50.8
No. 4	7	0	99			41	40.6
No. 8	0	0	78			30	29.6
No. 16	0	0	58			22	✓
No. 30	0	0	35			13	13.3
No. 50	0	0	14			5	5.3
No. 100	0	0	3			1	1.1
No. 200	0	.1	1.1			0.5	0.4

Fineness Modulus: 3.14 (Required for Class 2 Sand)

ASR Mitigation Method Proposed [b]: Not Required for this Source

Notes:

a Required for Class 4000D and 4000P mixes.

b Alkali Silica Reactivity Mitigation is required for sources with expansions over 0.20% - Incidate method for ASR mitigation.
For expansion of 0.21% - o.45%, acceptable mitigation can be the use of low alkali cement or 25% type F fly ash.
Any other proposed mitigation method or for pits with greater than 0.45% expansion, proof of mitigating measure, either ASTM C1260 / AASHTO T303 test results must be attached.
If ASTM C 1293 testing has been submitted indicating 1-year expansion of 0.04% or less, mitigation is not required.

c AASHTO No. 467, 57, 67, 7, 8; WSDOT Class 1, Class 2; or combined gradation. See Standard Specification 9-03.1.

d Required for Cement Concrete Pavements.

e Attach test results indicating conformance to Standard Specification 9-25.1.

f Actual Average Strength as determined from testing or estimated from ACI 211.

SB-K. Slater #101
Received 7/23/13
(Page 3 of 4)

LAFARGE
NORTH AMERICA

Lafarge North America Concrete Lab
5400 W Marginal Way SW
Seattle, WA. 98106

Report To: **Bayview Ready Mix**
Attention: **Quality Control Personnel**

Date: July 9, 2013

Subject: Bayview Ready Mix 4000D - WSDOT Performance Deck Mix

Project: 4000D Mix of Bayview Ready Mix

Date Sampled: **June 11, 2013 by Bayview on site**

Strength c-31

6x12 – 180000 lbs = 6370 psi
6x12 – 184560 lbs = 6530 psi

Modulus of Elasticity c-469

SP p. 88
ASTM c 469

4,012,122 psi

Rob Shogren, P.E, Ph.D.
Technical Service Engineer
Lafarge North America

ASH GROVE

Ash Grove Technical Center

11011 Cody Street, Suite 125
Overland Park, Kan. 66210
December 12, 2012

Report Number: **R18439**

Work Order Number: **WO-120489**

SUBJECT

On October 4, 2012 a request for technical service was issued on behalf of Marvin Prince of Bay View Redi-Mix in Aberdeen, Washington. Mr. Dave Burg requested that the Technical Center batch concrete with the submitted aggregates and cast specimens for rapid chloride penetrability (AASHTO T 277) and drying shrinkage (ASTM C 157) testing.

SAMPLE IDENTIFICATION

Sample No.	Sample Description	Date Received
S-120817	(1) 3.5-gal. bucket of Lafarge Centralia Plant Class F fly ash, Centralia, Oregon	03/26/2012
S-121541	(3) 5-gal. buckets of Ash Grove Cement Company Seattle Plant T I/II Portland Cement	07/17/2012
S-122202	(2) 5-gallon buckets of Bay View Redi-Mix fine aggregate, Pit # X-130	10/02/2012
S-122203	(2) 5-gallon buckets of Bay View Redi-Mix coarse aggregate, 3/4-in. to No. 4, Pit # X-130	10/02/2012
S-122204	(2) 5-gallon buckets of Bay View Redi-Mix coarse aggregate, 1.5-in. to 3/4-in., Pit # X-130	10/02/2012
S-122225	(1) 3.5-gal. bucket of BASF Master Life SRA 20	10/04/2012
S-122302	(1) 3.5-gal. bucket of BASF Glenium 7500	10/11/2012
S-122303	(1) 3.5-gal. bucket of BASF Micro-Air	10/11/2012

SUMMARY

Concrete mix proportions were provided by Mr. Burg. A concrete trial batch was performed with the submitted materials, and specimens were cast in accordance with applicable standards. Four cylinder specimens were cast for determination of chloride penetrability per AASHTO T 277 testing and three prisms were cast for determination of drying shrinkage per ASTM C 157.

One of the cylinder specimens was subjected to accelerated curing conditions and tested at 28-days of age. The remaining three specimens were cured in standard conditions. Of those, one was tested at 28-days of age and two were tested at 56-days of age.

The concrete drying shrinkage prisms were wet-cured for four weeks prior to their exposure to drying conditions (23°C and 50% RH). Their length change was monitored for an additional four weeks while stored in drying conditions.

TEST RESULTS

ASTM C 192 - Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory

Concrete Mixture Proportions — **4,000 PSI Mix**

Trial Mix Results Calculated to 1yd³ — **D-101112-01**

S-Number	Description	SpG	Mass, lbs	Vol. Cuft
S-121541	AG Seattle Type I/II	3.15	462	2.35
S-120817	Lafarge Centralia Class F	2.58	151	0.94
S-122202	Pit X-130 Fine Agg.	2.75	1,217	7.09
S-122204	Pit X-130 1.5 to 3/4 Agg.	2.83	652	3.69
S-122203	Pit X-130 3/4 to No. 4 Agg.	2.83	1,357	7.68
---	Overland Park Municipal	1.00	233	3.73
-	Air	-	5.6%	1.51
		Totals:	4,072	27.00

Admixtures

S-Number	Description	Dosage, oz/cwt
S-122303	BASF Micro-Air	1.0
S-122302	BASF Glenium 7500	4.0
S-122225	BASF Master Life SRA 20	21.0

Plastic Properties	D-101112-01
Slump, in:	6.75
Unit Weight, lbs/cuft:	150.8
Air Content (Calculated), %:	5.6
w/cm ratio:	0.38
Concrete Temperature, F:	74°

AASHTO T 277 - Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
Accelerated Cure

Sample No.	Diameter, in.	Charge Passed, C	Corrected Charge, C	Qualitative Equivalent	Age, days
D-101112-01	4.00	739	650	Very Low	28

AASHTO T 277 - Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
Standard Cure

Sample No.	Diameter, in.	Charge Passed, C	Corrected Charge, C	Qualitative Equivalent	Age, days
D-101112-01	4.00	1,902	1,672	Low	28
	4.00	1,750	1,538	Low	56
	4.00	1,908	1,677	Low	56

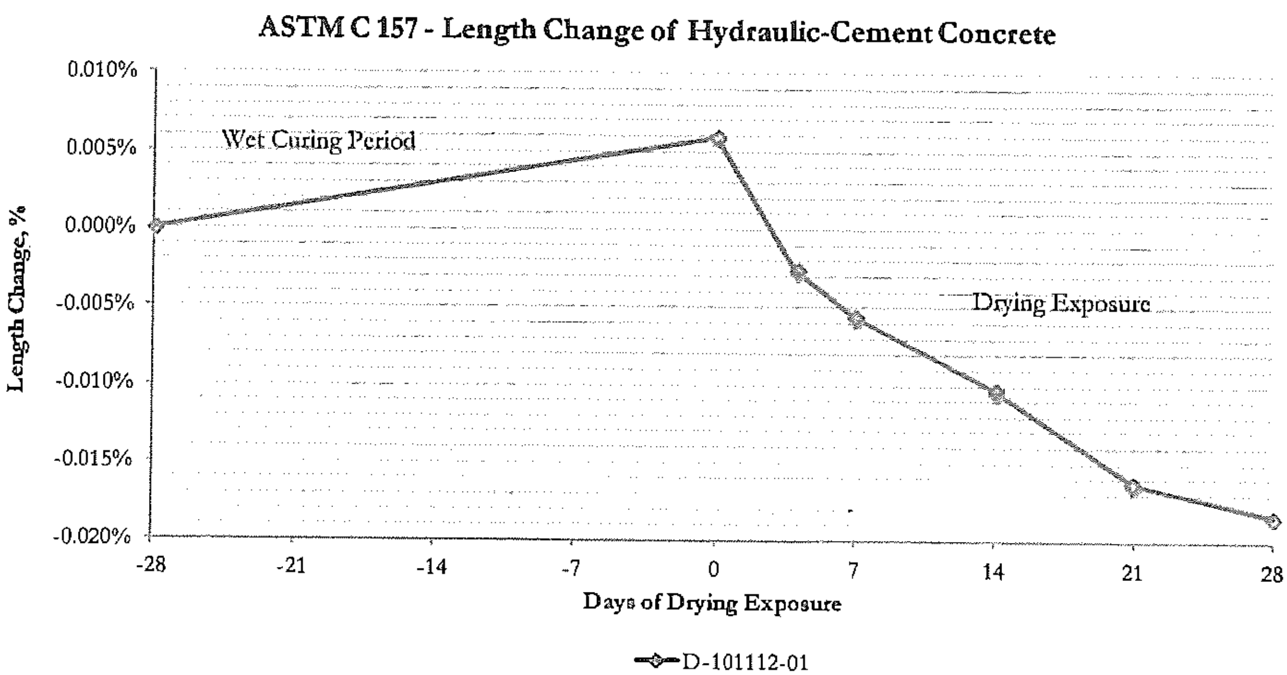
SP. P.88
Permeability < 2000C
in 56 days

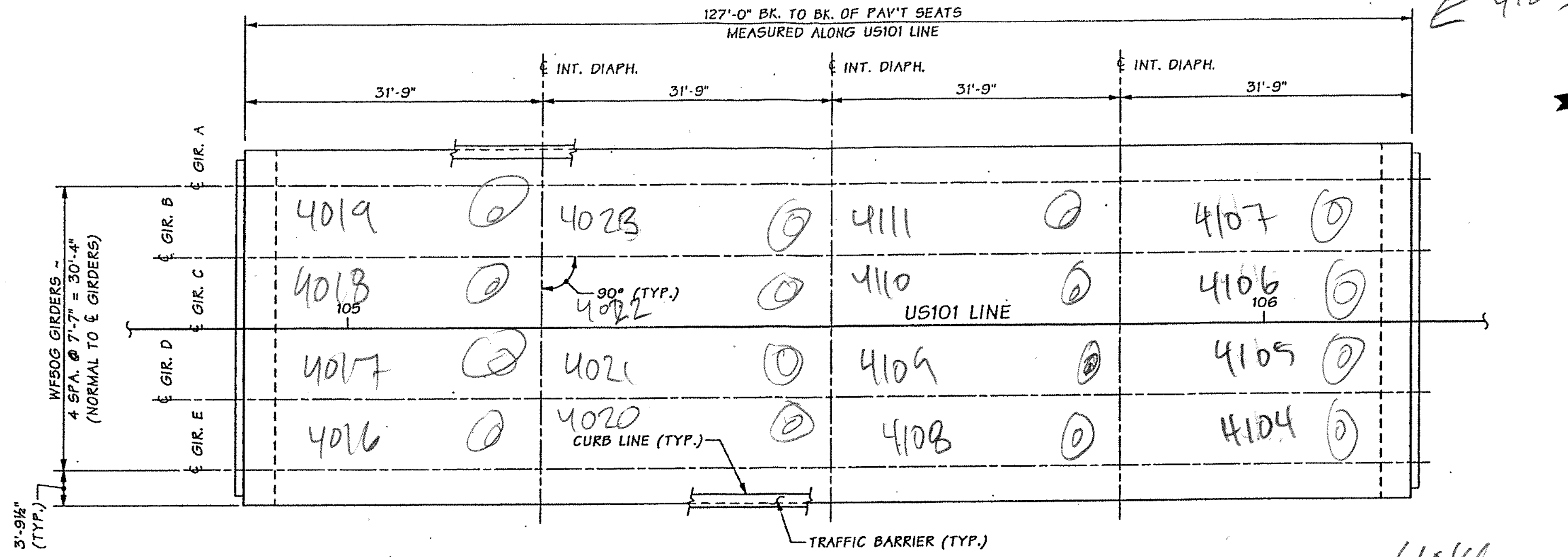
ASTM C 157 Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete

Material:		Concrete
Number of Specimens per Mixture:		4
Size of Specimens, in.:	Length:	10.0
	Width:	4.0
	Height:	4.0
Method of Consolidation:		4
Period of Moist Curing:		28-days
Drying Exposure Conditions:		23°C, 50% RH

Length Change

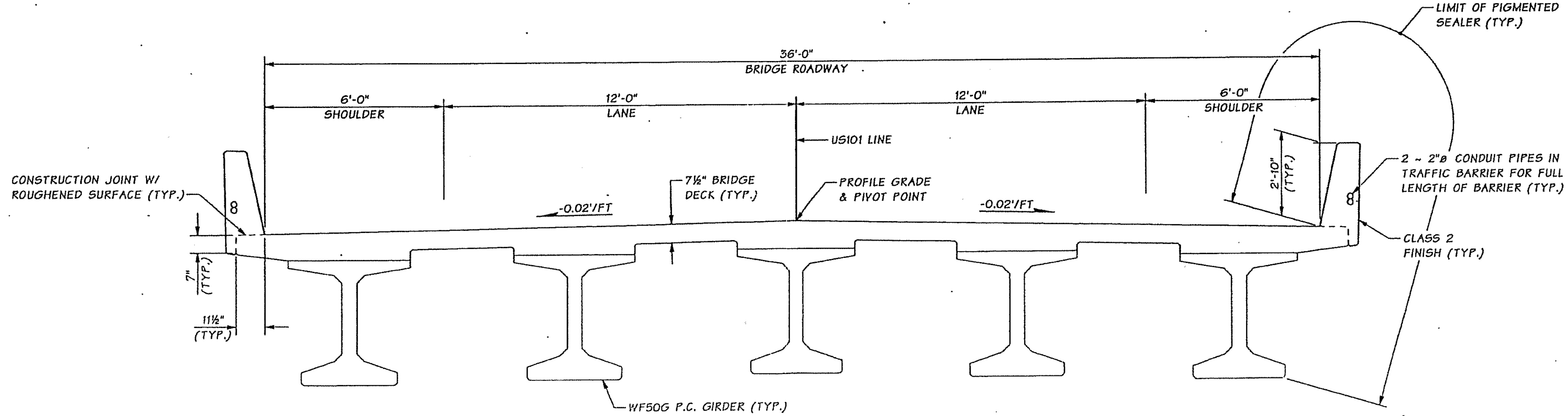
Reading	D-101112-01
Initial	0.000%
0-days dry	0.006%
4-days dry	-0.003%
7-days dry	-0.006%
14-days dry	-0.010%
21-days dry	-0.016%
28-days dry	-0.018%





FRAMING PLAN

BEARING OF ALL PIERS AND DIAPHRAGMS ARE: N 79°32'36" W



TYPICAL SECTION

SHOWN NEAR MID-SPAN

SR US101 FILE NO. 7061 SHEET BR10

Bridge Design Engr.	Khaleghi, B	
Supervisor	Anderson, MW	
Designed By	Sargent, S	08/11
Checked By	Martin, J	05/12
Detailed By	Nettle, J	08/11
Bridge Projects Engr.		
Prelim. Plan By		
Architect/Specialist		

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DATE | REVISION | BY | APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 12X303

WILLIAM SCOTT SARGENT — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER 5/15/12

BRIDGE AND STRUCTURES OFFICE

PROFESSIONAL ENGINEER 5/15/12

Washington State Department of Transportation

US 101
MIDDLE NEMAH RIVER BR.
REPLACE BRIDGE
MIDDLE NEMAH R BR. NO. 101/31 REPL.

FRAMING PLAN

BRIDGE SHEET NO. BR10

SHEET 59 OF 83 SHEETS

Tue May 15 08:40:22 2012

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	101/31	Bridge Name	Middle Nemah River	Structure ID	0018464A
Contract #	8344	Region	SW	Project Engineer	Lori Figone
Performance Deck Concrete?	YES	Contractor	SB Structures	Concrete Supplier	Bayview Redi Mix, Inc
Deck Placement	1/14/2014	Bridge Description	Single-Span, 5-WF50G Girders (127' bridge length), 2-Lanes (36' wide roadway)		

L = length between diaphragms (or length of "bay")

S = girder spacing

N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	0%
Min. =	0%
Max. =	0%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	31.75	7.58	0	16	0%
1	1	B	C	31.75	7.58	0	16	0%
1	1	C	D	31.75	7.58	0	16	0%
1	1	D	E	31.75	7.58	0	16	0%
1	2	A	B	31.75	7.58	0	16	0%
1	2	B	C	31.75	7.58	0	16	0%
1	2	C	D	31.75	7.58	0	16	0%
1	2	D	E	31.75	7.58	0	16	0%
1	3	A	B	31.75	7.58	0	16	0%
1	3	B	C	31.75	7.58	0	16	0%
1	3	C	D	31.75	7.58	0	16	0%
1	3	D	E	31.75	7.58	0	16	0%
1	4	A	B	31.75	7.58	0	16	0%
1	4	B	C	31.75	7.58	0	16	0%
1	4	C	D	31.75	7.58	0	16	0%
1	4	D	E	31.75	7.58	0	16	0%

PIER 1 — PIER 2

GIR. A				
GIR. B	0%	0%	0%	0%
GIR. C	0%	0%	0%	0%
GIR. D	0%	0%	0%	0%
GIR. E	0%	0%	0%	0%

CRACKING INTENSITY ~ BRIDGE 101/31

100% = CRACK EVERY 2 FT.

LESS CRACKING — MORE CRACKING

BRIDGE NUMBER	101/31
BRIDGE NAME	MIDDLE NEMAH RIVER
INSPECTION DATE	5/7/2015
DECK CONCRETE	PERFORMANCE BASED

APPENDIX B

TWO-SPAN PRESTRESSED GIRDER BRIDGES

BRIDGE 16/7S-E (SOUTH SPRAGUE RAMP)

BRIDGE 195/117 (CHENEY-SPOKANE ROAD OVER US 195)

BRIDGE 395/442W (US 395 OVER US 2)

BRIDGE 16/3W (SR 16 OVER HOV)

BRIDGE 2/8.5N-W (BICKFORD AVE OVER US 2)

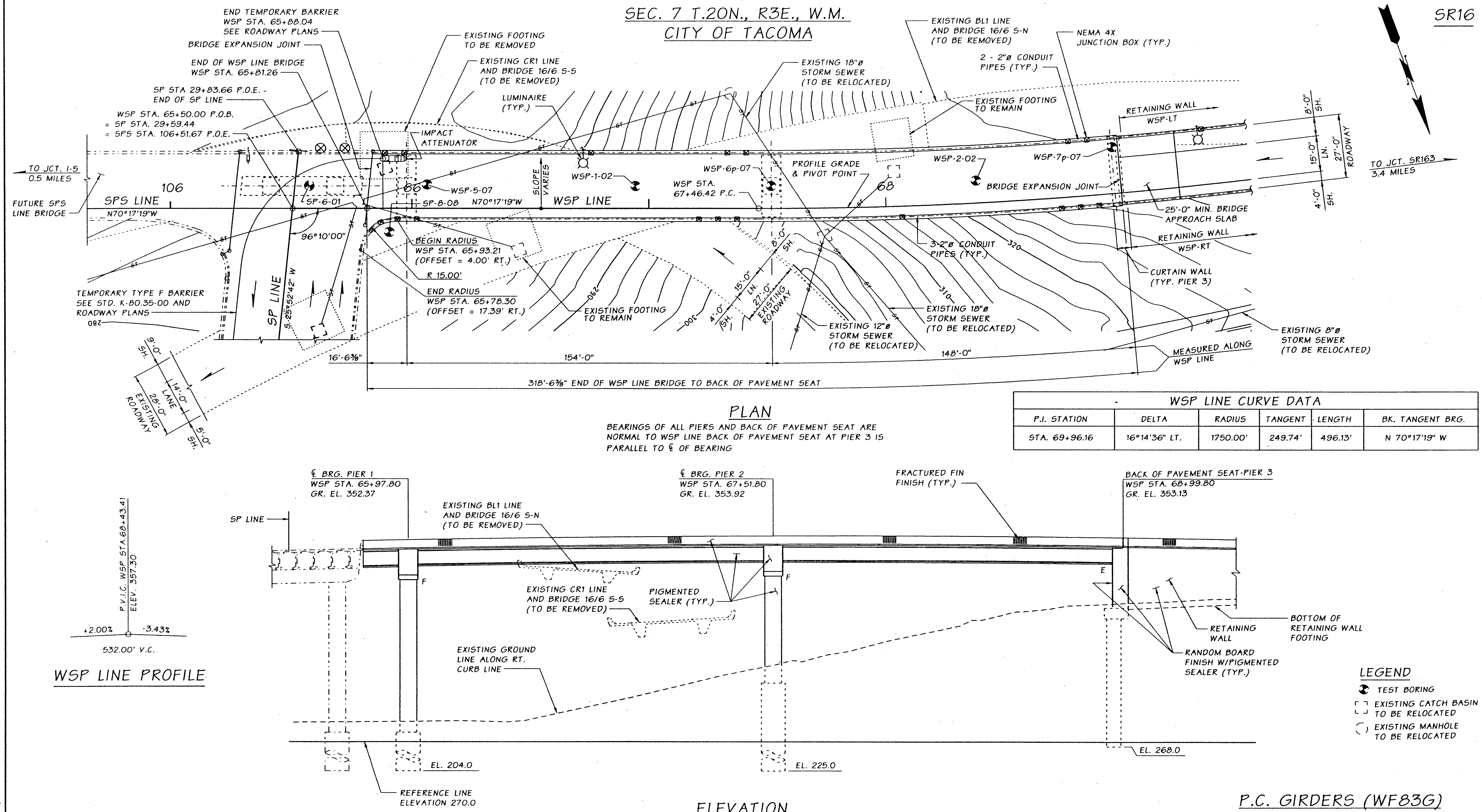
BRIDGE 395/441N-E (N-E RAMP OVER N-N RAMP)

BRIDGE 16/7S-E (SOUTH SPRAGUE RAMP)

Bridge #	16/7S-E	Bridge Name	South Sprague Ramp	Structure ID	0017594E
Contract #	7594	Region	OR	Project Engineer	Jon Deffenbacher
Performance Deck Concrete?	No	Contractor	Guy F. Atkinson Const.	Concrete Supplier	
Deck Placement	≈ 2010				

Bridge Description: 2-Span (154' / 148'), 4-WF83G Girders (320' bridge length), 1-Lane (27' wide roadway)

CONTENTS



WSP LINE CURVE DATA

P.I. STATION	DELTA	RADIUS	TANGENT	LENGTH	BK. TANGENT BRG.
STA. 69+96.16	16°14'36" LT.	1750.00'	249.74'	496.13'	N 70°17'19" W

P.C. GIRDERS (WF83G)
CONT. FOR L.L.
LOADING: HL-93

DATUM
N.A.V.D. OF 1988

Bridge Design Engr	
Supervisor	
Designed By	E. HERZSTEIN
Checked By	W. ELKEY
Detailed By	O. ROTH
Bridge Proj Engr	
Prelim Plan By	
Architect/Specialist	

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DATE | REVISION | BY | APPD

REGION NO. 10 | STATE WASH | FED.AID PROJ.NO. | SHEET NO. | TOTAL SHEETS
JOB NUMBER 07C546

PARSONS

BRIDGE AND STRUCTURES OFFICE

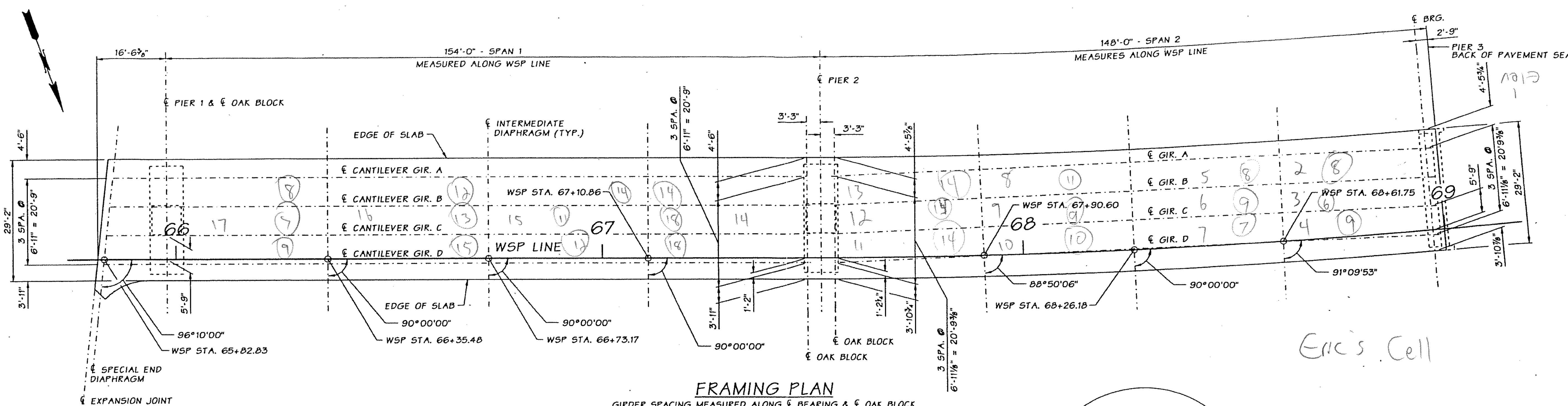
EXPIRES 12/03/08

Washington State Department of Transportation

I-5 / SR16
WB NALLEY VALLEY I/C
WSP LINE BRIDGE
LAYOUT

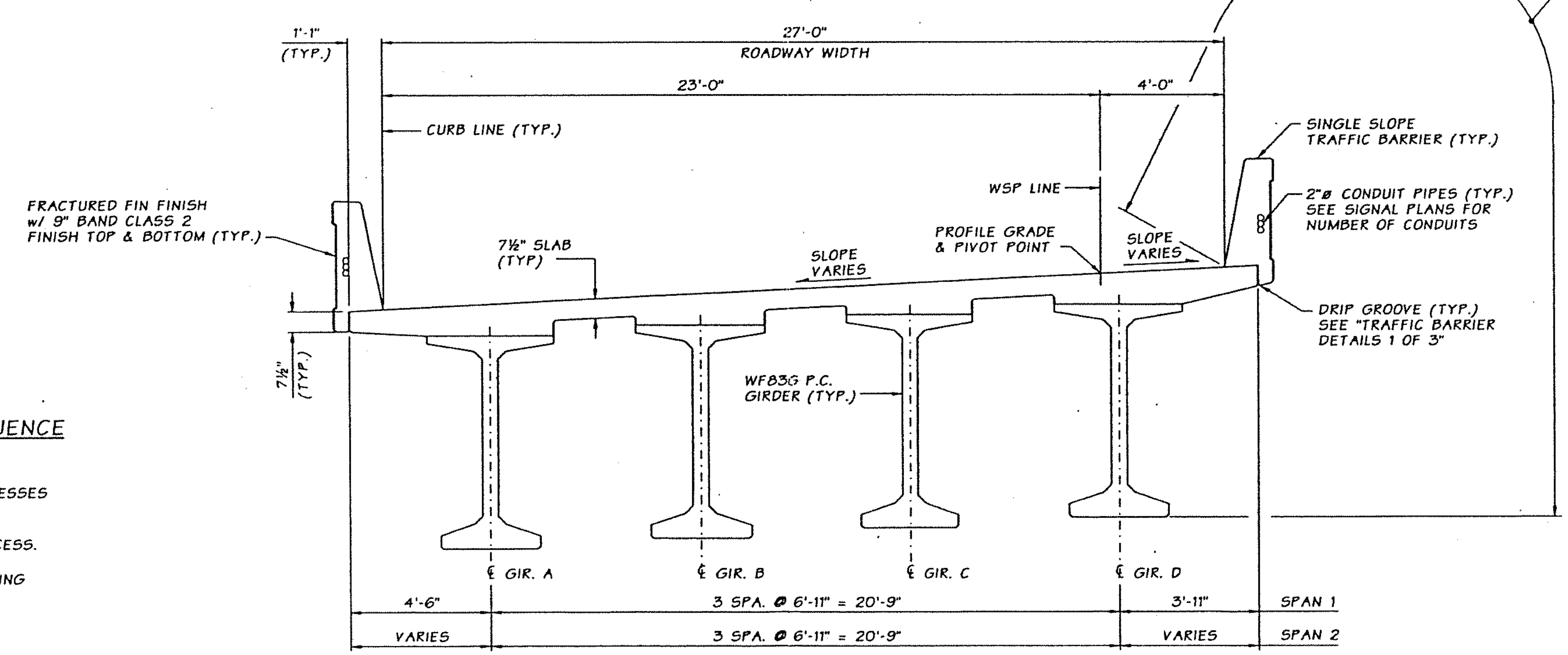
BRIDGE SHEET NO. K-2
SHEET 754 OF 1360 SHEETS

0005896 SR 16 JOB NO 7344 6/6/2008 3:24:28 PM SHEET 2 OF 40



FRAMING PLAN

GIRDER SPACING MEASURED ALONG ℄ BEARING & ℄ OAK BLOCK



TYPICAL SECTION

SPAN 1 SHOWN NEAR STA. 67+50.00± NORMAL TO WSP LINE. SPAN 2 SIMILAR
LOOKING AHEAD ON STATION

TEMPORARY STRAND CUTTING SEQUENCE

1. ERECT AND BRACE GIRDERS.
2. REMOVE EXPANDED POLYSTYRENE IN 2" x 2" RECESSES IN TOP FLANGE OF GIRDERS.
3. CUT STRAND AND PLASTIC SLEEVE IN 2" x 2" RECESS.
4. REMOVE ALL MOISTURE IN RECESS PRIOR TO FILLING RECESS WITH GROUT.
5. CAST INTERMEDIATE AND END DIAPHRAGMS.
6. PLACE DECK CONCRETE.

Bridge Design Engr.					
Supervisor					
Designed By:	E. HERZSTEIN				
Checked By:	W. ELKEY				
Detailed By:	J. GILMORE				
Bridge Proj Engr.					
Prelim. Plan By:					
Architect/Specialist		DATE	REVISION	BY	APPD

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REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH			
JOB NUMBER 07C546				

PARSONS

BRIDGE AND STRUCTURES OFFICE

EXPIRES 12/03/08

Washington State Department of Transportation

I-5 / SR16
WB NALLEY VALLEY I/C
WSP LINE BRIDGE

FRAMING PLAN & TYPICAL SECTION

BRIDGE SHEET NO. K-18

SHEET 770 OF 1360 SHEETS

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SR 16 JOB NO 7344 SHEET 18 OF 40

16/75-E

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	16/7S-E	Bridge Name	South Sprague Ramp	Structure ID	0017594E
Contract #	7594	Region	OR	Project Engineer	Jon Deffenbacher
Performance Deck Concrete?	No				
Contractor	Guy F. Atkinson Const.	Concrete Supplier		Deck Placement	≈ 2010
Bridge Description	2-Span (154' / 148'), 4-WF83G Girders (320' bridge length), 1-Lane (27' wide roadway)				

L = length between diaphragms (or length of "bay")

S = girder spacing

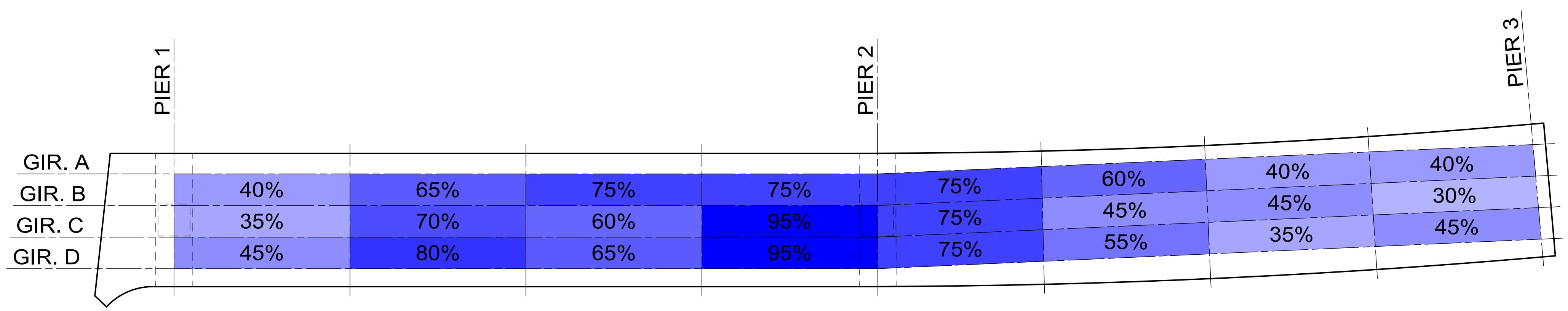
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	59%
Min. =	30%
Max. =	95%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	38.50	6.92	8	19	40%
1	1	B	C	38.50	6.92	7	19	35%
1	1	C	D	38.50	6.92	9	19	45%
1	2	A	B	38.50	6.92	12	19	65%
1	2	B	C	38.50	6.92	13	19	70%
1	2	C	D	38.50	6.92	15	19	80%
1	3	A	B	38.50	6.92	14	19	75%
1	3	B	C	38.50	6.92	11	19	60%
1	3	C	D	38.50	6.92	12	19	65%
1	4	A	B	38.50	6.92	14	19	75%
1	4	B	C	38.50	6.92	18	19	95%
1	4	C	D	38.50	6.92	18	19	95%
2	1	A	B	37.00	6.92	14	19	75%
2	1	B	C	37.00	6.92	14	19	75%
2	1	C	D	37.00	6.92	14	19	75%
2	2	A	B	37.00	6.92	11	19	60%
2	2	B	C	37.00	6.92	9	19	45%
2	2	C	D	37.00	6.92	10	19	55%
2	3	A	B	37.00	6.92	8	19	40%
2	3	B	C	37.00	6.92	9	19	45%
2	3	C	D	37.00	6.92	7	19	35%
2	4	A	B	37.00	6.92	8	19	40%
2	4	B	C	37.00	6.92	6	19	30%
2	4	C	D	37.00	6.92	9	19	45%



CRACKING INTENSITY ~ BRIDGE 16/7S-E

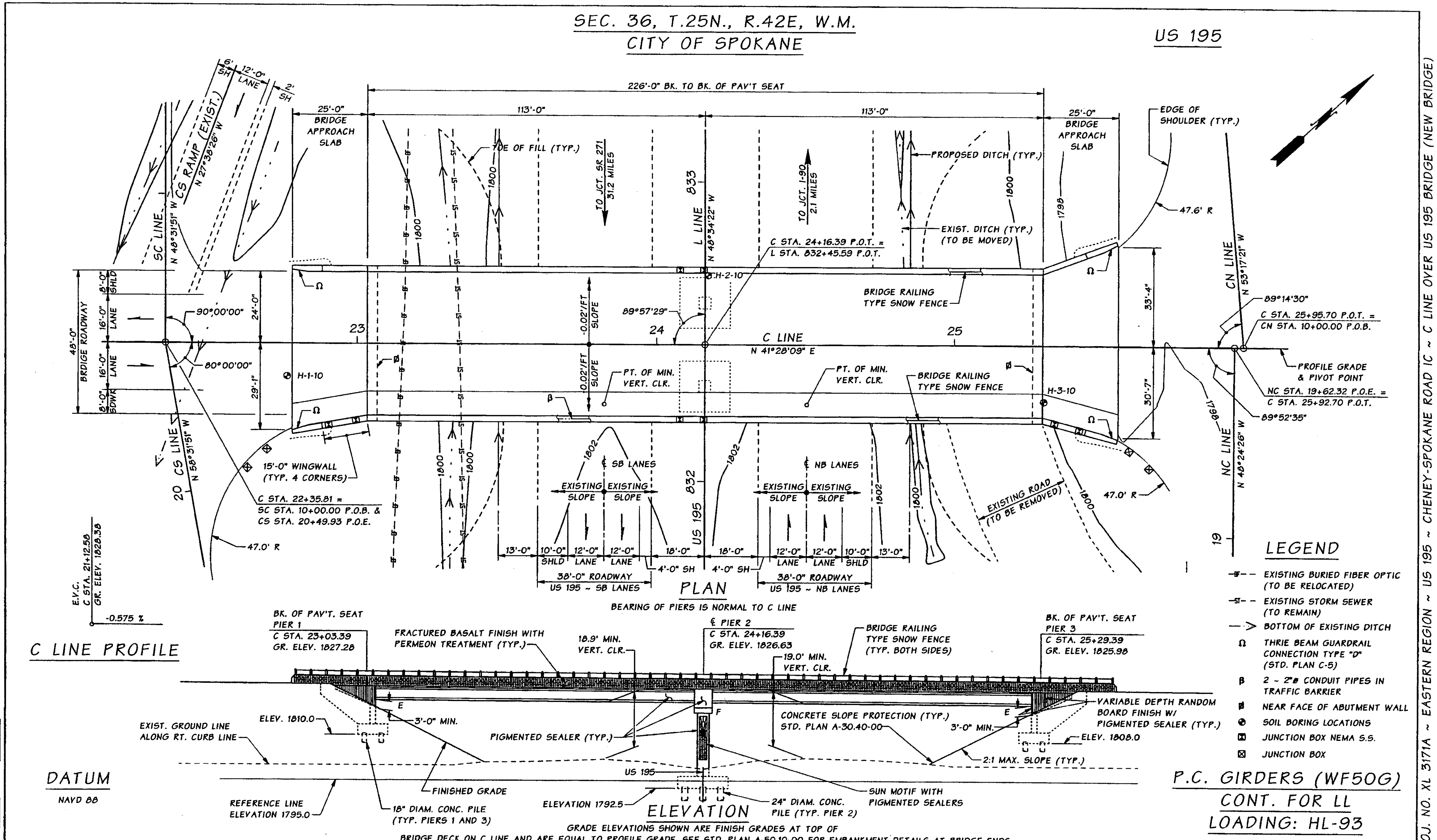
100% = CRACK EVERY 2 FT.

BRIDGE NUMBER	16/7S-E
BRIDGE NAME	SOUTH SPRAGUE RAMP
INSPECTION DATE	5/29/2015
DECK CONCRETE	TRADITIONAL

BRIDGE 195/117 (CHENEY-SPOKANE ROAD OVER US 195)

Bridge #	195/117	Bridge Name	Cheney-Spokane Road over US 195	Structure ID	0018378A
Contract #	8378	Region ER	Project Engineer Chad Simonson	Performance Deck Concrete?	Yes
Contractor	Selland Construction	Concrete Supplier		Deck Placement	≈ 2014
Bridge Description	2-Span (113' / 113"), 5-WF50G Girders (226' Bridge Length), 2-Lanes (48' wide roadway)				

CONTENTS



Bridge Design Engr.	Khaleghi, B	
Supervisor	Zeldenrust, RP	
Designed By	Hatch, M	04/10
Checked By	Gallagher, P	12/10
Detailed By	Lemcke, DR	12/11
Bridge Projects Engr.	Lewis, RA	
Prelim. Plan By	Bauer, M	
Architect/Specialist	Kinderman, P	

Wed Sep 12 16:27:54 2012

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DATE	REVISION	BY	APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER

BRIDGE AND STRUCTURES OFFICE

JUGESH KAPUR — STATE OF WASHINGTON — PROFESSIONAL ENGINEER

9/12/12

Washington State Department of Transportation

US 195
CHENEY-SPOKANE ROAD INTERCHANGE

C-LINE OVER US 195 BRIDGE

LAYOUT

BRIDGE SHEET NO. CL1

SHEET 135 OF 198 SHEETS

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	195/117	Bridge Name	Cheney-Spokane Road over US 195	Structure ID	0018378A
Contract #	8378	Region	ER	Project Engineer	Chad Simonson
Performance Deck Concrete?	Yes				
Contractor	Selland Construction	Concrete Supplier		Deck Placement	10/23/2013
Bridge Description	2-Span (113' / 113"), 5-WF50G Girders (226' Bridge Length), 2-Lanes (48' wide roadway)				

Mix Design Information Not Recieved

Mix Design (WSDOT Form 350-040)

Water (max) = lbs/cy w/c = max

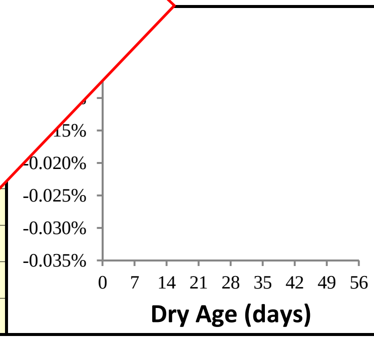
Cementitious Materials	Lbs/cy	Source	Type, Class or Grade
cement			
fly ash			
slag			
latex			
microsilica			

Concrete Admixtures	oz/cy	Manufacturer	
air entrainment			
water reducer			
HR water reduce			
set retarder			
shrink. reducer			

Concrete Test Results

co… …e strength @ 28 days		psi
…lulus of elasticity		psi
…y @ 56 days		coulombs
…n density		lb/cf

…esults

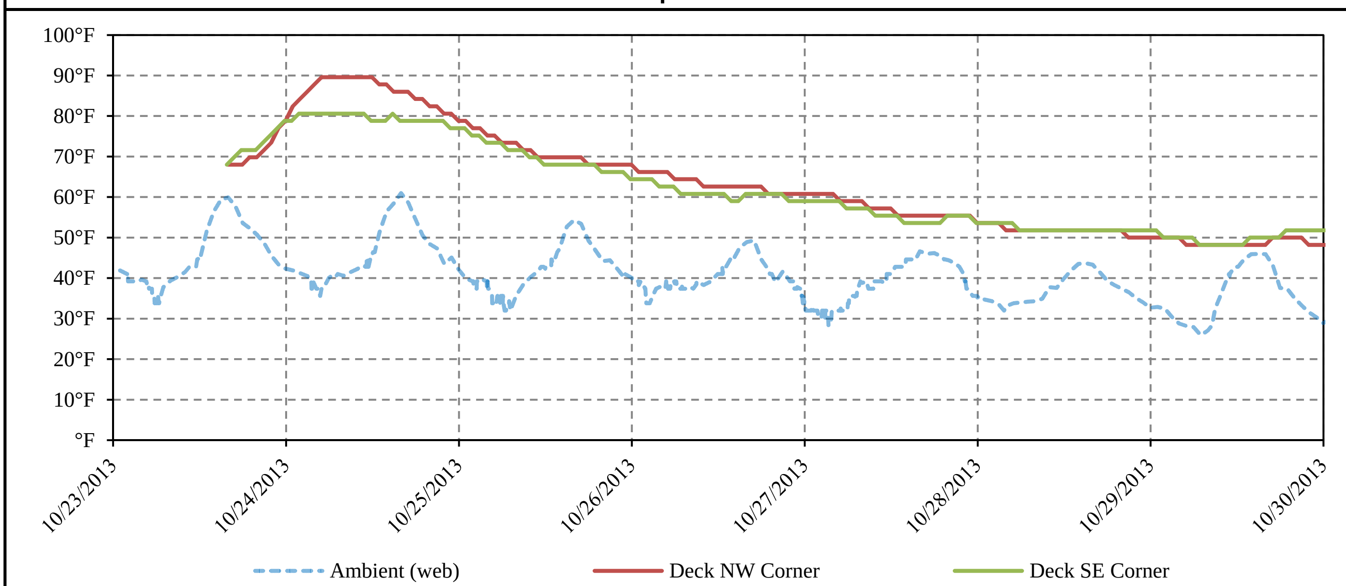


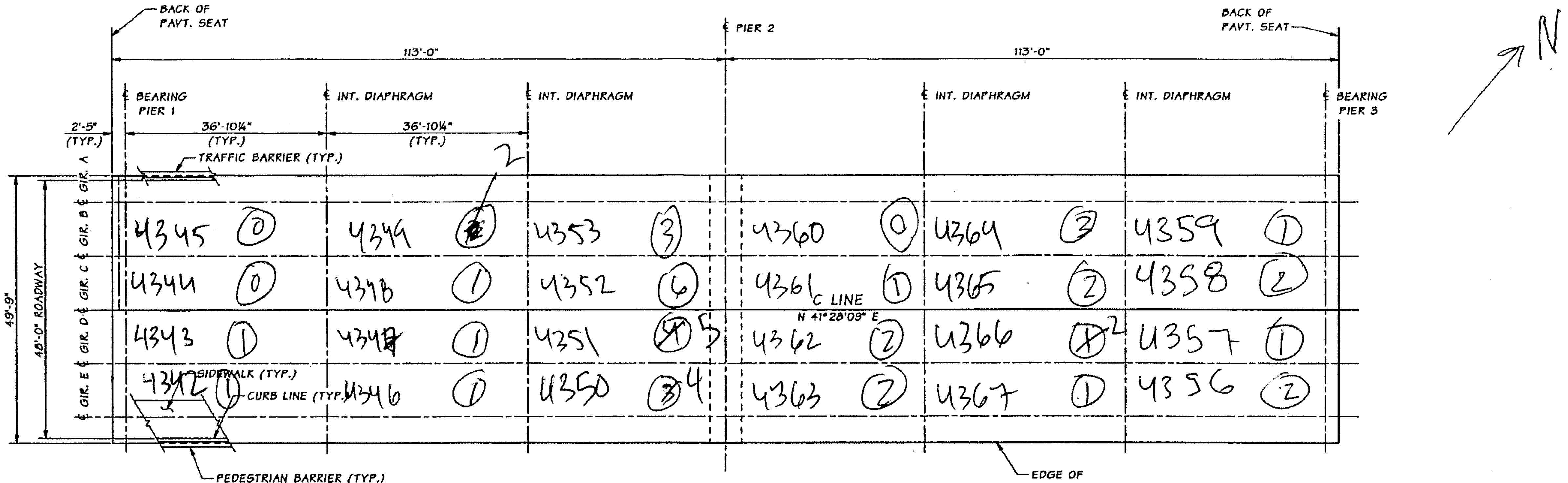
A…

	Comp. 1	C…			
WSDOT Pit #					
Grading					
% Total					
Lbs/cy					
ASR Mitigation					

Notes

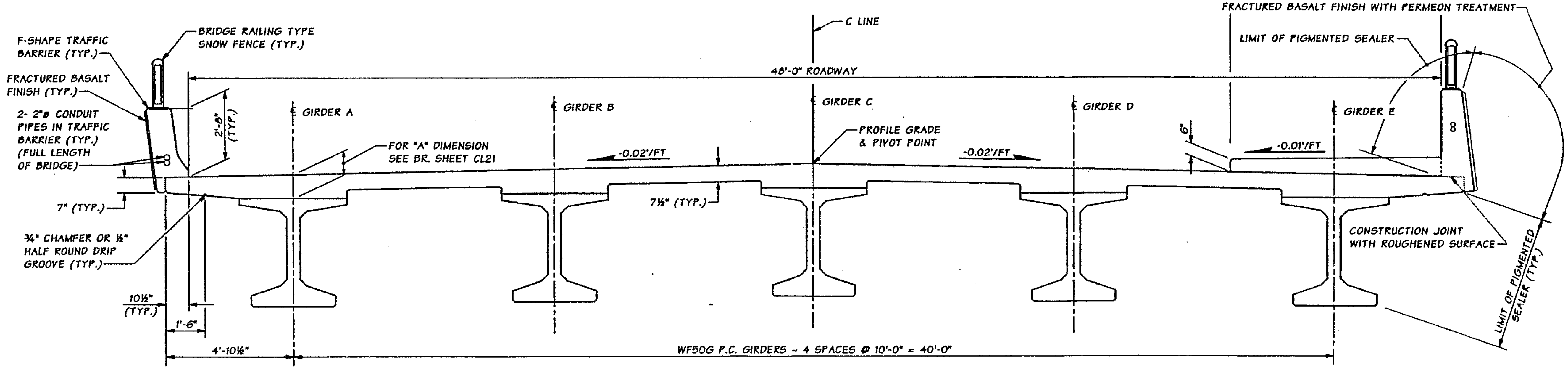
Temperature





FRAMING PLAN

BEARING OF ALL GIRDERS IS N 41°28'09" E.
BEARING OF ALL PIERS AND DIAPHRAGMS IS NORMAL TO C-LINE.



TYPICAL SECTION

Bridge Design Engr.	Khaleghi, B		
Supervisor	Zeldenrust, RP		
Designed By	Hatch, N	05/10	
Checked By	Gallagher, P	12/10	
Detailed By	Lemcke, DR	02/11	
Bridge Projects Engr.			
Prelim. Plan By			
Architect/Specialist			

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DATE	REVISION	BY	APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER

BRIDGE AND STRUCTURES OFFICE

9/12/12

9/12/12

Washington State Department of Transportation

US 195
CHENEY-SPOKANE ROAD INTERCHANGE

C-LINE OVER US 195 BRIDGE

FRAMING PLAN AND TYPICAL SECTION

BRIDGE SHEET NO. CL21

SHEET 155 OF 198 SHEETS

Wed Sep 12 07:56:28 2012

SR 195 FILE NO. 7006 SHEET CL21

Bridge Deck Concrete Study

Washington State Department of Transportation

Bridge #	195/117	Bridge Name	Cheney-Spokane Road over US 195	Structure ID	0018378A
Contract #	8378	Region: ER	Project Engineer: Chad Simonson	Performance Deck Concrete?	Yes
Contractor	Selland Construction	Concrete Supplier		Deck Placement	10/23/2013
Bridge Description	2-Span (113' / 113"), 5-WF50G Girders (226' Bridge Length), 2-Lanes (48' wide roadway)				

L = length between diaphragms (or length of "bay")

S = girder spacing

N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	10%
Min. =	0%
Max. =	35%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	36.85	10.00	0	18	0%
1	1	B	C	36.85	10.00	0	18	0%
1	1	C	D	36.85	10.00	1	18	5%
1	1	D	E	36.85	10.00	1	18	5%
1	2	A	B	36.85	10.00	2	18	10%
1	2	B	C	36.85	10.00	1	18	5%
1	2	C	D	36.85	10.00	1	18	5%
1	2	D	E	36.85	10.00	1	18	5%
1	3	A	B	36.85	10.00	3	18	15%
1	3	B	C	36.85	10.00	6	18	35%
1	3	C	D	36.85	10.00	5	18	30%
1	3	D	E	36.85	10.00	4	18	20%
2	1	A	B	36.85	10.00	0	18	0%
2	1	B	C	36.85	10.00	1	18	5%
2	1	C	D	36.85	10.00	2	18	10%
2	1	D	E	36.85	10.00	2	18	10%
2	2	A	B	36.85	10.00	3	18	15%
2	2	B	C	36.85	10.00	2	18	10%
2	2	C	D	36.85	10.00	2	18	10%
2	2	D	E	36.85	10.00	1	18	5%
2	3	A	B	36.85	10.00	1	18	5%
2	3	B	C	36.85	10.00	2	18	10%
2	3	C	D	36.85	10.00	1	18	5%
2	3	D	E	36.85	10.00	2	18	10%

	PIER 1 – PIER 2			PIER 2 – PIER 3		
GIR. A – GIR. B	0%	10%	15%	0%	15%	5%
GIR. B – GIR. C	0%	5%	35%	5%	10%	10%
GIR. C – GIR. D	5%	5%	30%	10%	10%	5%
GIR. D – GIR. E	5%	5%	20%	10%	5%	10%

CRACKING INTENSITY ~ BRIDGE 195/117

100% = CRACK EVERY 2 FT.

LESS CRACKING — MORE CRACKING

BRIDGE NUMBER	195/117
BRIDGE NAME	CHENEY-SPOKANE ROAD OVER US 195
INSPECTION DATE	5/20/2015
DECK CONCRETE	PERFORMANCE BASED

BRIDGE 395/442W (US 395 OVER US 2)

Bridge #	395/442W	Bridge Name	US 395 SB over US 2	Structure ID	0017610E
Contract #	7610	Region	ER	Project Engineer	Bob Hilmes
Performance Deck Concrete?	No	Contractor	Graham Construction	Concrete Supplier	
Deck Placement	≈ 2011	Bridge Description	2-Span (120' / 120"), 4-WF58G Girders (240' bridge length), 2-Lanes (38' wide roadway)		

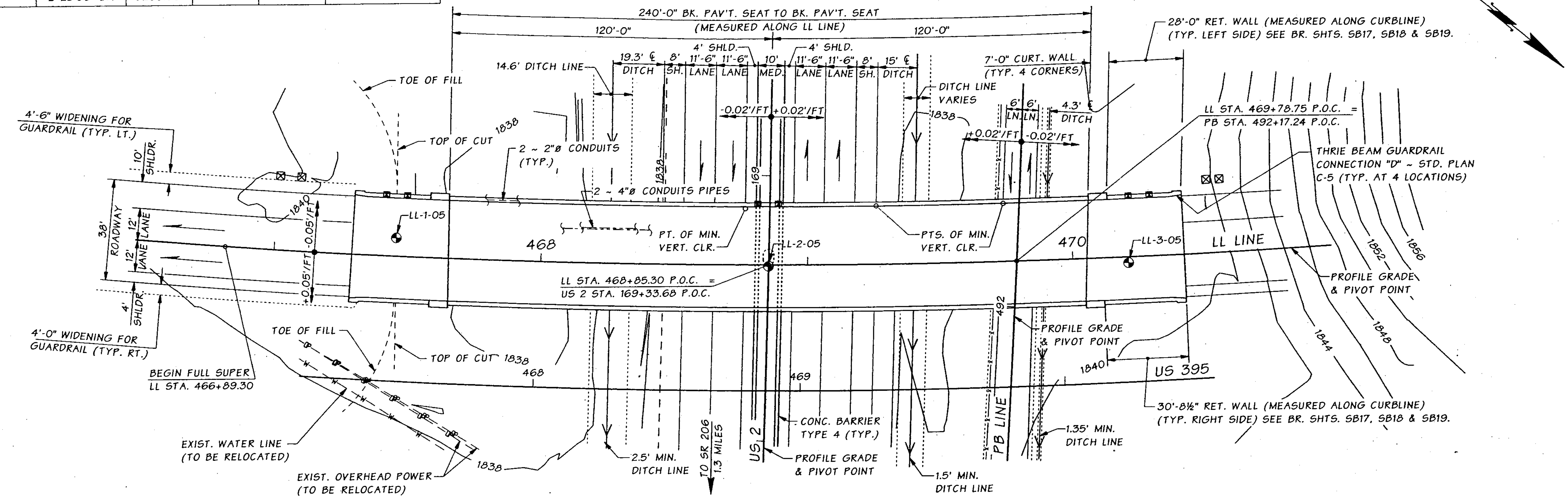
CONTENTS

1. Layout Plan Sheet
2. Field Notes
3. Crack Summary
4. Crack Intensity Diagram

CURVE DATA					
P.I. STATION	Δ	RADIUS	TANGENT	LENGTH	BK. TANGENT BRG.
LL 483+15.02	59°00'00" LT.	2953.00'	1670.73'	3040.83'	N 34°00'00" W
US 2 171+71.18	17°15'23" RT.	10399.43'	1578.00'	3132.11'	N 44°54'07" E
PB 491+72.40	2°25'00" LT.	8200.00'	172.96'	345.87'	S 55°03'50" W

SEC. 4, T.26N., R.43E., W.M.
SPOKANE COUNTY

US 395

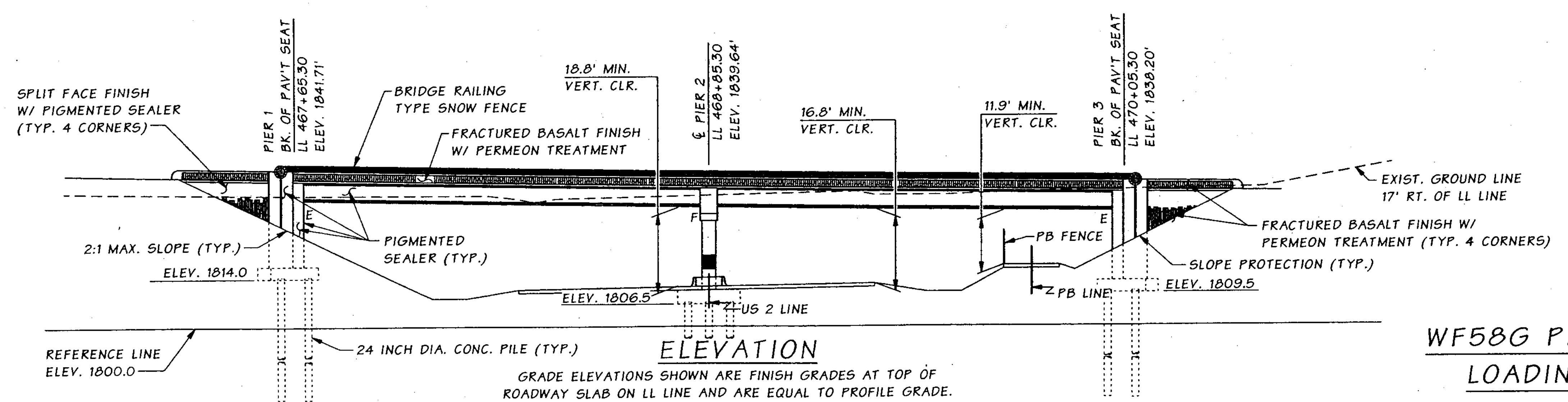


PLAN

BRG. OF ALL PIERS IS S 52°17'15" W
* LANE VARIES 15' TO 0' FROM US 2 168+00 TO US 2 171+25
** LANE VARIES 15' TO 0' FROM US 2 170+00 TO US 2 173+75

LEGEND

- TEST HOLE
- JUNCTION BOX NEMA 4X S.S.
- JUNCTION BOX



ELEVATION

GRADE ELEVATIONS SHOWN ARE FINISH GRADES AT TOP OF ROADWAY SLAB ON LL LINE AND ARE EQUAL TO PROFILE GRADE. SEE BR. SHT. SB2 FOR EMBANKMENT DETAILS AT BRIDGE ENDS.

WF58G P.C. GIRDERS

LOADING: HL-93

DATUM
N.A.V.D. OF 1988

Bridge Design Engr.	Khaleghi, B	
Supervisor	Zeldenrust, RP	
Designed By	Zhang, H	10/06
Checked By	Gallagher, P	06/08
Detailed By	Andreotti, L	11/06
Bridge Projects Engr.	Lewis, RA	01/07
Prelim. Plan By	Bennion, S	01/06
Architect/Specialist	PDK/GW/BK	

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DATE	REVISION	BY	APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 08Z011

BRIDGE AND STRUCTURES OFFICE

JUGESH KAPUR — STATE OF WASHINGTON — 25446 — PROFESSIONAL ENGINEER
8/7/08

Washington State Department of Transportation

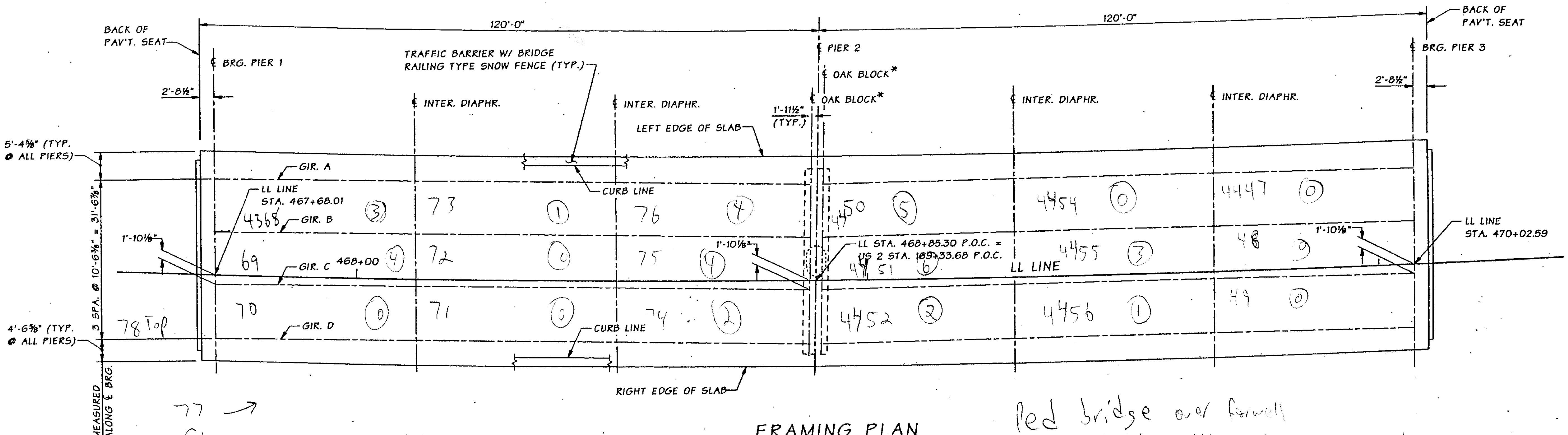
US 395
NSC - US 2 LOWERING
US 395 SB OVER US 2 BRIDGE
LAYOUT

BRIDGE SHEET NO. SB1
SHEET 277 OF 548 SHEETS

C.S. 3211~ PROJ. NO. XL2231E ~ EASTERN REGION ~ US 2 O'XING ~ US 395 ~ SB US 395 O'XING AT US 2

SR ___ JOB NO. ___ SHEET SB1

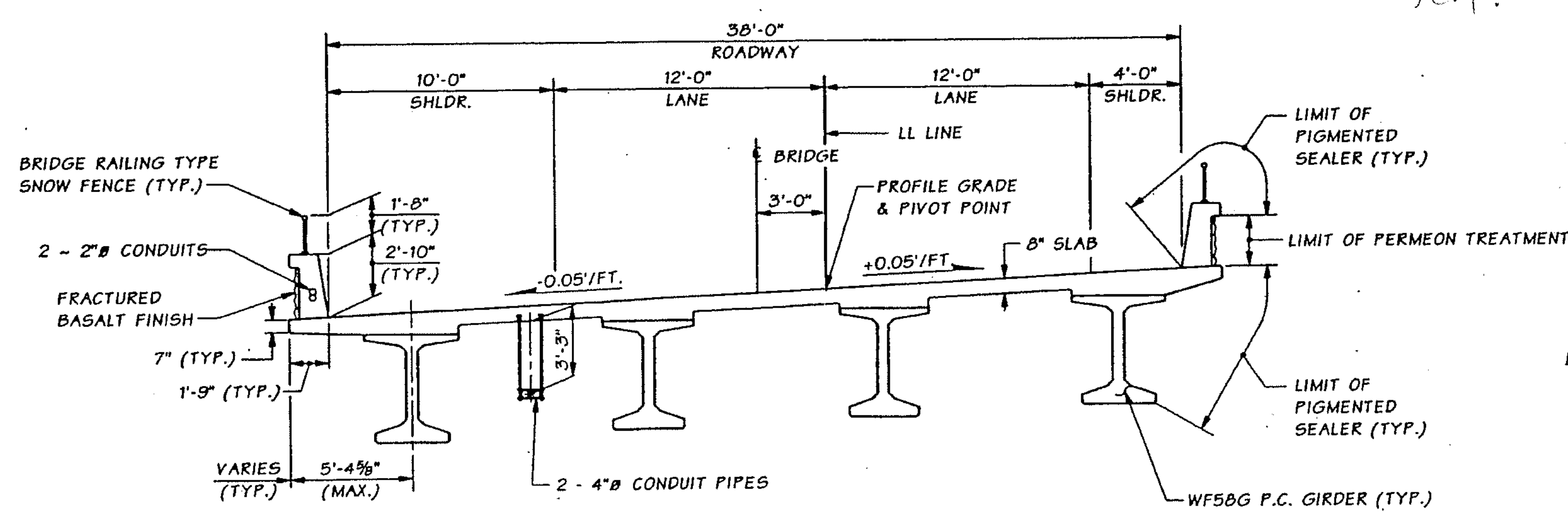
Tue Aug 05 10:05:36 2008



FRAMING PLAN

*SEE "OAK BLOCK DETAIL" BR. SHT. SB10

Ped bridge over Farwell
has asphalt settlement @ pavement
seat.



TYPICAL SECTION

NOTE: LIMIT OF PIGMENTED SEALER ON CROSSBEAM COLUMN AND END PIERS TO 1'-0" BELOW FINISHED GROUND LINE.

Bridge Design Engr.	Khaleghi, B
Supervisor	Zeldenrust, RP
Designed By	Zhang, H 05/07
Checked By	Gallagher, P 07/08
Detailed By	Andreotti, L 07/08
Bridge Projects Engr.	
Prelim. Plan By	
Architect/Specialist	

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DATE | REVISION | BY | APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 08Z011

BRIDGE AND STRUCTURES OFFICE

8/6/2008

8/7/08

Washington State Department of Transportation

US 395
NSC - US 2 LOWERING

US 395 SB OVER US 2 BRIDGE

FRAMING PLAN

BRIDGE SHEET NO. SB22

SHEET 298 OF 548 SHEETS

Tue Aug 05 10:06:23 2008

SR JOB NO. SHEET SB22

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	395/442W	Bridge Name	US 395 SB over US 2	Structure ID	0017610E
Contract #	7610	Region	ER	Project Engineer	Bob Hilmes
Performance Deck Concrete?	No				
Contractor	Graham Construction	Concrete Supplier		Deck Placement	≈ 2011
Bridge Description	2-Span (120' / 120"), 4-WF58G Girders (240' bridge length), 2-Lanes (38' wide roadway)				

L = length between diaphragms (or length of "bay")

S = girder spacing

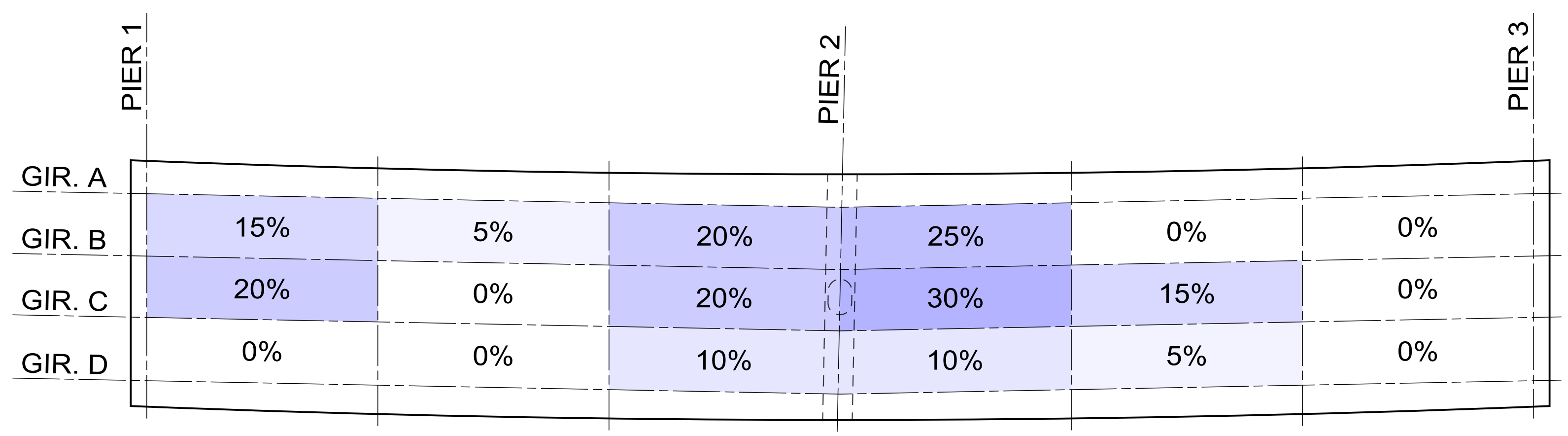
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	10%
Min. =	0%
Max. =	30%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	40.00	10.53	3	20	15%
1	1	B	C	40.00	10.53	4	20	20%
1	1	C	D	40.00	10.53	0	20	0%
1	2	A	B	40.00	10.53	1	20	5%
1	2	B	C	40.00	10.53	0	20	0%
1	2	C	D	40.00	10.53	0	20	0%
1	3	A	B	40.00	10.53	4	20	20%
1	3	B	C	40.00	10.53	4	20	20%
1	3	C	D	40.00	10.53	2	20	10%
2	1	A	B	40.00	10.53	5	20	25%
2	1	B	C	40.00	10.53	6	20	30%
2	1	C	D	40.00	10.53	2	20	10%
2	2	A	B	40.00	10.53	0	20	0%
2	2	B	C	40.00	10.53	3	20	15%
2	2	C	D	40.00	10.53	1	20	5%
2	3	A	B	40.00	10.53	0	20	0%
2	3	B	C	40.00	10.53	0	20	0%
2	3	C	D	40.00	10.53	0	20	0%



CRACKING INTENSITY ~ BRIDGE 395/442W

100% = CRACK EVERY 2 FT.

BRIDGE NUMBER	395/442W
BRIDGE NAME	US 395 OVER US 2
INSPECTION DATE	5/21/2015
DECK CONCRETE	TRADITIONAL

BRIDGE 16/3W (SR 16 OVER HOV)

Bridge #	16/3W	Bridge Name	SR 16 Over HOV			Structure ID	0018189A
Contract #	8189	Region	OR	Project Engineer	Neal Uhlmeyer	Performance Deck Concrete?	Yes
Contractor	Mowat Construction			Concrete Supplier	Holroyd	Deck Placement	≈ 2014
Bridge Description	2-Span (141' / 141'), 6-WF59G Girders (282' bridge length), 3-Lanes (55' wide roadway)						

CONTENTS

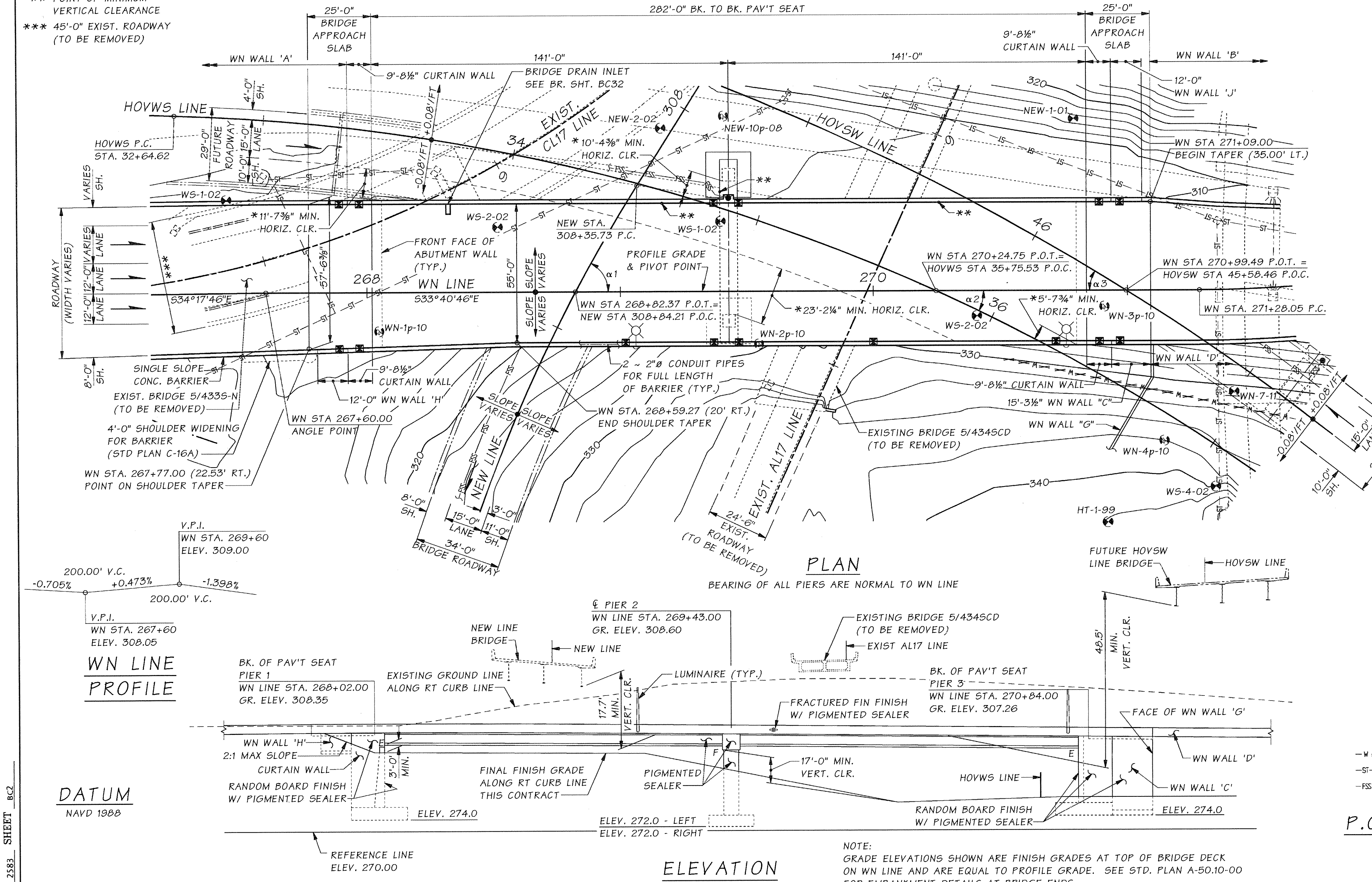
1. Layout Plan Sheet
2. Mix Design Summary
3. Concrete Mix Design Form
4. Concrete Test Results
5. Field Notes
6. Crack Summary
7. Crack Intensity Diagram

* MIN. HORIZ. CLR. IS MEASURED TO EDGE OF TRAVELED LANE
** POINT OF MINIMUM VERTICAL CLEARANCE
*** 45'-0" EXIST. ROADWAY (TO BE REMOVED)

SEC. 7, T. 20N., R. 3E., W.M.

CITY OF TACOMA

SR16



INTERSECTING ANGLES
α1 = 62°05'19"
α2 = 24°37'33"
α3 = 32°27'32"

LEGEND:

- FIRE SUPPRESSION SYSTEM HOSE OUTLET INCLUDING SIGN
- JUNCTION BOX
- EXIST. UNDERDECK LUMINAIRE
- LUMINAIRE
- EXIST. CATCH BASIN
- EXIST. GRATE INLET
- PIEZOMETER
- TEST HOLE
- —W— DEACTIVE WATER LINE
- —ST— EXIST. STORM SEWER LINE
- —FSS— FIRE SUPRESSION SYSTEM

DATUM
NAVD 1988

NOTE:
GRADE ELEVATIONS SHOWN ARE FINISH GRADES AT TOP OF BRIDGE DECK ON WN LINE AND ARE EQUAL TO PROFILE GRADE. SEE STD. PLAN A-50.10-00 FOR EMBANKMENT DETAILS AT BRIDGE ENDS.

P.C. GIRDERS (WF58G)
CONT. FOR L.L.
LOADING: HL-93

C.S. 270103 ~ PROJ. NO. XL3477 ~ OLYMPIC REGION ~ I-5 & SR16 INTERCHANGE ~ EASTBOUND NALLEY VALLEY ~ WN LINE BRIDGE

SR 16 FILE NO. 2583 SHEET BC2

Bridge Design Engr.	Khaleghi, B	
Supervisor	Zeldenrust, RP	
Designed By	Young/Brown	01/10
Checked By	Brown/Rochon	04/11
Detailed By	Plesha, GM	02/11
Bridge Projects Engr.	Lewis, RA	
Prelim. Plan By	CH2MHILL	
Architect/Specialist	Kinderman, P	

M:\Z-Team\SR16 EB NV\WN Line\Window files\TEMP Layout_Add1.WND

DATE	REVISION	BY	APP'D
7/14/11	REPLACEMENT SHEET	PG	RPZ

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 09C519

BRIDGE AND STRUCTURES OFFICE

JUGESH KAPUR STATE OF WASHINGTON 25400 PROFESSIONAL ENGINEER
7/7/11

Washington State Department of Transportation

I-5 / SR 16
EB NALLEY VALLEY - HOV

WN LINE BRIDGE

LAYOUT

BRIDGE SHEET NO. BC2

SHEET 772 OF 1341 SHEETS

Thu Jul 07 12:12:04 2011

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	16/3W	Bridge Name	SR 16 Over HOV	Structure ID	0018189A
Contract #	8189	Region	OR	Project Engineer	Neal Uhlmeyer
Performance Deck Concrete?	Yes	Contractor	Mowat Construction	Concrete Supplier	Holroyd
Deck Placement	≈ 2014				

Bridge Description: 2-Span (141' / 141'), 6-WF59G Girders (282' bridge length), 3-Lanes (55' wide roadway)

Mix Design (WSDOT Form 350-040)

Water (max) = 217 lbs/cy w/c = 0.38 max

Cementitious Materials	Lbs/cy	Source	Type, Class or Grade
cement	480	Lehigh Cement Co	Type I-II
fly ash	85	Lafarge	Type F
slag			
latex			
microsilica			

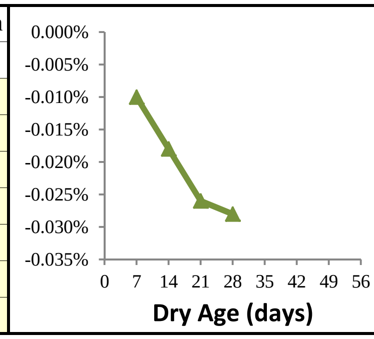
Concrete Admixtures	oz/cy	Manufacturer	Product
air entrainment	1 to 6	BASF	MB AE 90
water reducer			
HR water reduce	25 to 45	BASF	Glenium 3030 NS
set retarder			
shrink. reducer	30 to 45	BASF	Master Life SRA

Concrete Test Results

compressive strength @ 28 days	6,458	psi
modulus of elasticity	5,461,245	psi
permeability @ 56 days	1,463	coulombs
mix design density	146.8	lb/cf

Shrinkage Test Results

Dry Age (days)	% Length Change
0	
4	
7	-0.0100%
14	-0.0180%
21	-0.0260%
28	-0.0280%
56	



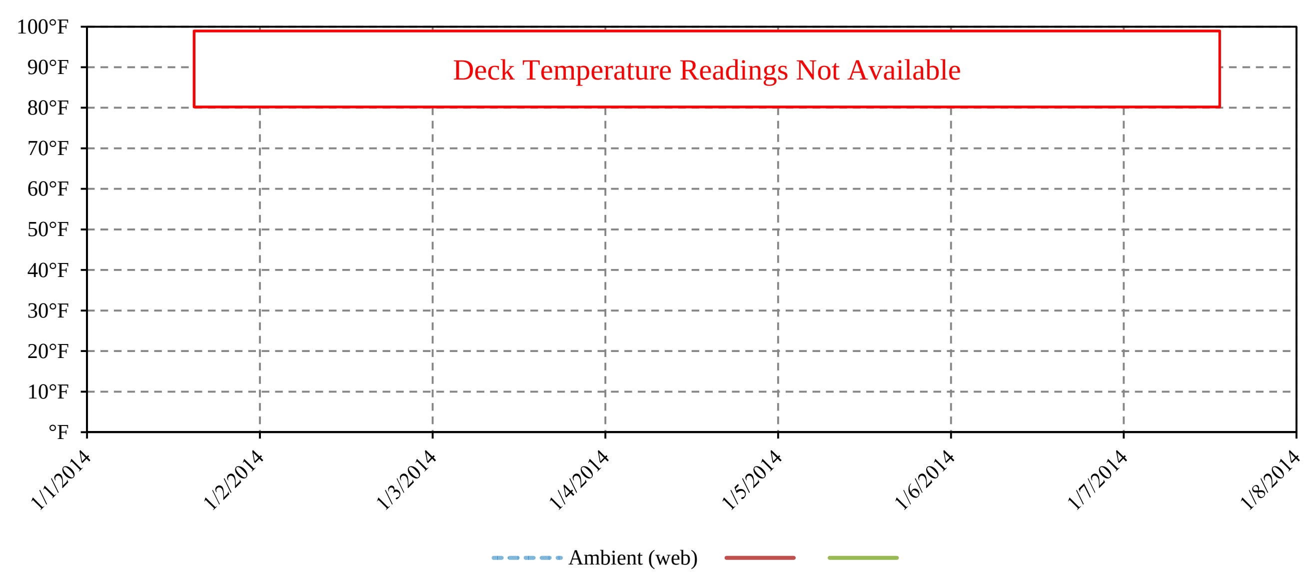
Aggregate

	Comp. 1	Comp. 2	Comp. 3	Comp. 4	Comp. 5
WSDOT Pit #	J-9	J-9	J-9		
Grading	Class 1	#67	#4		
% Total	39.6%	45.1%	15.3%		
Lbs/cy	1265	1440	490		
ASR Mitigation	Use of low alkali cement				

Notes

This is the same mix that was used for Br. 5/434SCD

Temperature



Washington State Department of Transportation

Concrete Mix Design

Contractor	Submitted By	Date
Mowat Construction Co	Greg Smith	12/15/2011

Concrete Supplier	Plant Location
Holroyd Co., Inc.	3131 29th Ave Sw Tumwater , WA

Contract Number	Contract Name
8189	Nalley Valley Eastbound

This mix is to be used in the following Bid Item No(s): 121, 122, 123, 124, 125, 126, 127

Concrete Class: *(check one only)*

☐ 3000 ☐ 4000 ☒ 4000D[a] ☐ 4000P[a] ☐ 4000W ☐ Concrete Overlay ☐ Cement Concrete Pavement[d]

☐ Other Shrinkage Reducer

Remarks:

Mix Design No. 6091FASD **Plant No.** Tacoma (3-4)

Cementitious Materials	Source	Type, Class or Grade	Sp. Gr.	Lbs/cy
Cement	Lehigh Cement Co	Type I-II	3.15	480
Fly Ash[a]	Lafarge	Type F	2.61	85
GGBFS (Slag)				
Latex				
Microsilica				

Concrete Admixtures	Manufacturer	Product	Type	Est. Range (oz/cy)
Air Entrainment	BASF Admixtures, Inc.	MB AE™ 90		1-6
Water Reducer				
High-Range Water Reducer	BASF Admixtures, Inc.	Glenium® 3030 NS	Type F	25-45
Set Retarder				
Other Shrinkage Reducer	BASF Admixtures, Inc.	MasterLIFE® SRA 20	Type S	30-45

Water (Maximum) 217 lbs/cy Is any of the water Recycled or Reclaimed? ☐ Yes[e] ☒ No

Water Cementitious Ratio (Maximum) 0.38 Mix Design Density 146.8 lbs/cf[d]

Design Performance	1	2	3	4	5	Average[f]
28 Day Compressive Strength (cylinders) psi	6,370	6,460	6,380	6,410	6,670	6,458
14 Day Flexural[d] Strength (beams) psi						

Agency Use Only (Check appropirate Box)

☒ **This Mix Design MEETS CONTRACT SPECIFICATIONS and may be used on the bid items noted above**

☐ **This Mix Design DOES NOT MEET CONTRACT SPECIFICATIONS and is being returned for corrections**

Reviewed By: [signature] PE Signature 11 Apr 2013 Date

DOT Form 350-040 EF Revised 6/06

Distribution: Original - Contractor
Copies To - State Materials Lab-Structural Materials Eng. ; Regional Materials Lab; Project Inspector

C8189 Submittal 562-066.3

Mix Design No. 6091FASD **Plant No.** Tacoma (3-4)

Aggregate Information

Concrete Aggregates	Component 1	Component 2	Component 3	Component 4	Component 5	Combined Gradation
WSDOT Pit No.	J-9	J-9	J-9			
WSDOT ASR 14-day Results (%) [b]	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	
Grading[c]	Class 1	#67	#4			
Percent of Total Aggregate	39.6	45.1	15.3			100%
Specific Gravity	2.63	2.69	2.69			
Lbs/cy (ssd)	1265	1440	490			3195

Percent Passing

2 inch			100.0			100
1-1/2 inch			100.0			100
1 inch		100.0	52.0			93.4
3/4 inch		99.0	12.0			87.3
1/2 inch						66.9
3/8 inch	100.0	36.0	0			50.3
No. 4	97.0	3.0				39.4
No. 8	81.0	1.0				31.9
No. 16	62.0					23.2
No. 30	36.0					13.9
No. 50	13.0					5.2
No. 100	5.0					1.9
No. 200	2.5					1.0

Fineness Modulus: ______________ (Required for Class 2 Sand)

ASR Mitigation Method Proposed [b]: Pit No. J-9 has ASR of 0.43 and is mitigated by the use of low alkali cement.

Notes:

a Required for Class 4000D and 4000P mixes.

b Alkali Silica Reactivity Mitigation is required for sources with expansions over 0.20% - Incidate method for ASR mitigation.
For expansion of 0.21% - o.45%, acceptable mitigation can be the use of low alkali cement or 25% type F fly ash.
Any other proposed mitigation method or for pits with greater than 0.45% expansion, proof of mitigating measure, either ASTM C1260 / AASHTO T303 test results must be attached.
If ASTM C 1293 testing has been submitted indicating 1-year expansion of 0.04% or less, mitigation is not required.

c AASHTO No. 467, 57, 67, 7, 8; WSDOT Class 1, Class 2; or combined gradation. See Standard Specification 9-03.1.

d Required for Cement Concrete Pavements.

e Attach test results indicating conformance to Standard Specification 9-25.1.

f Actual Average Strength as determined from testing or estimated from ACI 211.

Modulus of Elasticity

5,461,245 psi

ASTM C-672 Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals

Procudure: ASTM C-672

Result:	Cycles	Rating
	5	0
	10	0
	15	0
	25	0
	30	0

Robert G. Shogren

Rob Shogren, P.E.
Technical Service Engineer
Lafarge North America

Lafarge North America Concrete Lab
5400 W Marginal Way SW
Seattle, WA. 98106

Report To: **Holroyd** Date: September 30, 2011
Attention: **Quality Control Personnel**

Subject: Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration: ASTM C-1202

Tested Materials: Date Sampled: **August 2, 2011**
Mix Design: **Nalley Valley HPC**

Curing: ASTM C-1202 Standard Cure

Results:

Age	Coulombs
56 day	**1463**

*The ASTM C-1202 procedure was followed.

The test result is only valid if the aggregate(s) sample(s) is(are) representative of the current production and it is to be noted that Lafarge has no knowledge of the representatives of the sample received for testing. Also, material quality can vary with different locations in a quarry. It is recommended that testing be carried out on an annual basis or more frequently if a variation in stone quality is suspected.

Although the Lafarge North America Seattle Concrete Lab. applies state-of-the-art test methods, Lafarge North America. and its affiliates (Lafarge) can not guarantee the results shown above and shall assume no liability whatsoever for any errors in such results and for the consequence of such errors.

Robert G. Shogren

Rob Shogren, P.E.
Technical Service Engineer
Lafarge North America

Lafarge North America Concrete Lab
5400 W Marginal Way SW
Seattle, WA. 98106

Report To: **Holroyd** Date: September 30, 2011
Attention: **Quality Control Personnel**

Subject: Length Change of Hardened Hydraulic-Cement Concrete Using Procedures of ASTM C-157

Tested Materials: Date Sampled: **August 2, 2011**
Source of Aggregates: Holroyd

Mix Design: WSDOT HPC

Results:
Slump: 4.5”
Temp: 64F
Specimen Size: 4”x4”x10”
Consolidation: Rodding
Initial Cure: Lime water submersion (28 day initial cure)

Age (Days) After Initial Cure	Percent Length Change (Average of 3)
7	0.010
14	0.018
21	0.026
28 (final)	0.028

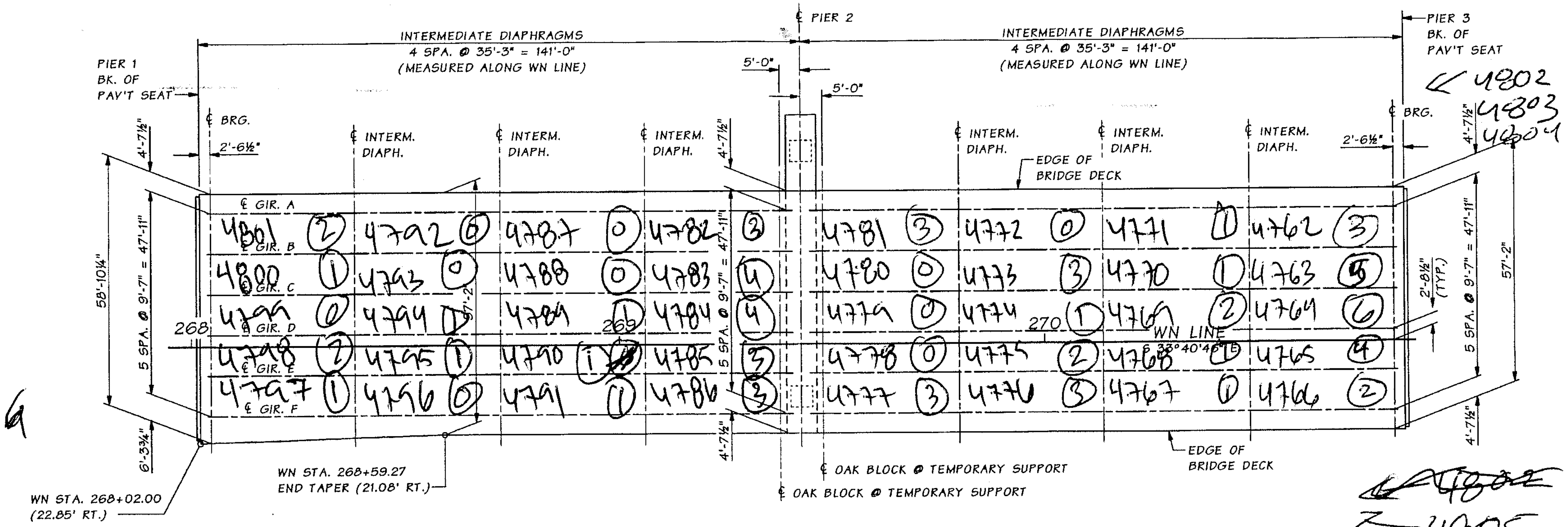
*The ASTM C-157 procedure was followed.

The test result is only valid if the aggregate(s) sample(s) is(are) representative of the current production and it is to be noted that Lafarge has no knowledge of the representatives of the sample received for testing. Also, material quality can vary with different locations in a quarry. It is recommended that testing be carried out on an annual basis or more frequently if a variation in stone quality is suspected.

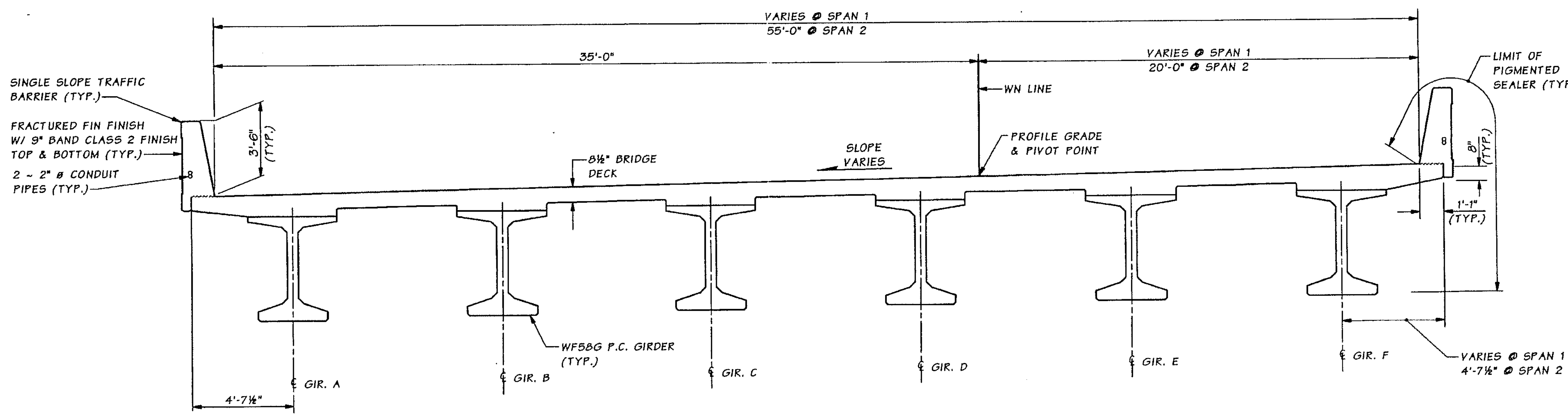
Although the Lafarge North America Seattle Concrete Lab. applies state-of-the-art test methods, Lafarge North America. and its affiliates (Lafarge) can not guarantee the results shown above and shall assume no liability whatsoever for any errors in such results and for the consequence of such errors.

Robert G. Shogren

Rob Shogren, P.E.
Technical Service Engineer
Lafarge North America



FRAMING PLAN



TYPICAL SECTION

Bridge Design Engr.	Khaleghi, B	
Supervisor	Zeldenrust, RP	
Designed By	Young, JL	02/10
Checked By	Brown, NS	04/11
Detailed By	Plesha, GM	03/10
Bridge Projects Engr.		
Prelim. Plan By		
Architect/Specialist		

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DATE | REVISION | BY | APP'D

REGION NO. 10 | STATE WASH. | FED. AID PROJ. NO. | SHEET NO. | TOTAL SHEETS

JOB NUMBER 09C519

BRIDGE AND STRUCTURES OFFICE

5/9/11

5/10/11

Washington State Department of Transportation

I-5 / SR 16
EB NALLEY VALLEY - HOV

WN LINE BRIDGE

FRAMING PLAN

BRIDGE SHEET NO. BC24

SHEET 794 OF 1341 SHEETS

SR 16 FILE NO. 2583 SHEET BC24

Mon May 09 14:16:30 2011

16/3W

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	16/3W	Bridge Name	SR 16 Over HOV	Structure ID	0018189A
Contract #	8189 Region OR	Project Engineer	Neal Uhlmeyer	Performance Deck Concrete?	Yes
Contractor	Mowat Construction	Concrete Supplier	Holroyd	Deck Placement	≈ 2014
Bridge Description	2-Span (141' / 141'), 6-WF59G Girders (282' bridge length), 3-Lanes (55' wide roadway)				

L = length between diaphragms (or length of "bay")
S = girder spacing
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)
N_{cr} = number of leaching cracks counted during visual inspection
% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	9%
Min. =	0%
Max. =	35%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	35.25	9.58	2	18	10%
1	1	B	C	35.25	9.58	1	18	5%
1	1	C	D	35.25	9.58	0	18	0%
1	1	D	E	35.25	9.58	2	18	10%
1	1	E	F	35.25	9.58	1	18	5%
1	2	A	B	35.25	9.58	0	18	0%
1	2	B	C	35.25	9.58	0	18	0%
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1	3	A	B	35.25	9.58	0	18	0%
1	3	B	C	35.25	9.58	0	18	0%
1	3	C	D	35.25	9.58	1	18	5%
1	3	D	E	35.25	9.58	1	18	5%
1	3	E	F	35.25	9.58	1	18	5%
1	4	A	B	35.25	9.58	3	18	15%
1	4	B	C	35.25	9.58	4	18	20%
1	4	C	D	35.25	9.58	4	18	20%
1	4	D	E	35.25	9.58	3	18	15%
1	4	E	F	35.25	9.58	3	18	15%
2	1	A	B	35.25	9.58	3	18	15%
2	1	B	C	35.25	9.58	0	18	0%
2	1	C	D	35.25	9.58	0	18	0%
2	1	D	E	35.25	9.58	0	18	0%
2	1	E	F	35.25	9.58	3	18	15%
2	2	A	B	35.25	9.58	0	18	0%
2	2	B	C	35.25	9.58	3	18	15%
2	2	C	D	35.25	9.58	1	18	5%
2	2	D	E	35.25	9.58	2	18	10%
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2	3	D	E	35.25	9.58	1	18	5%
2	3	E	F	35.25	9.58	1	18	5%
2	4	A	B	35.25	9.58	3	18	15%
2	4	B	C	35.25	9.58	5	18	30%
2	4	C	D	35.25	9.58	6	18	35%
2	4	D	E	35.25	9.58	4	18	20%
2	4	E	F	35.25	9.58	2	18	10%

PIER 1 | PIER 2 | PIER 3

GIR. A								
GIR. B	10%	0%	0%	15%	15%	0%	5%	15%
GIR. C	5%	0%	0%	20%	0%	15%	5%	30%
GIR. D	0%	5%	5%	20%	0%	5%	10%	35%
GIR. E	10%	5%	5%	15%	0%	10%	5%	20%
GIR. F	5%	0%	5%	15%	15%	15%	5%	10%

CRACKING INTENSITY ~ BRIDGE 16/3W

100% = CRACK EVERY 2 FT.

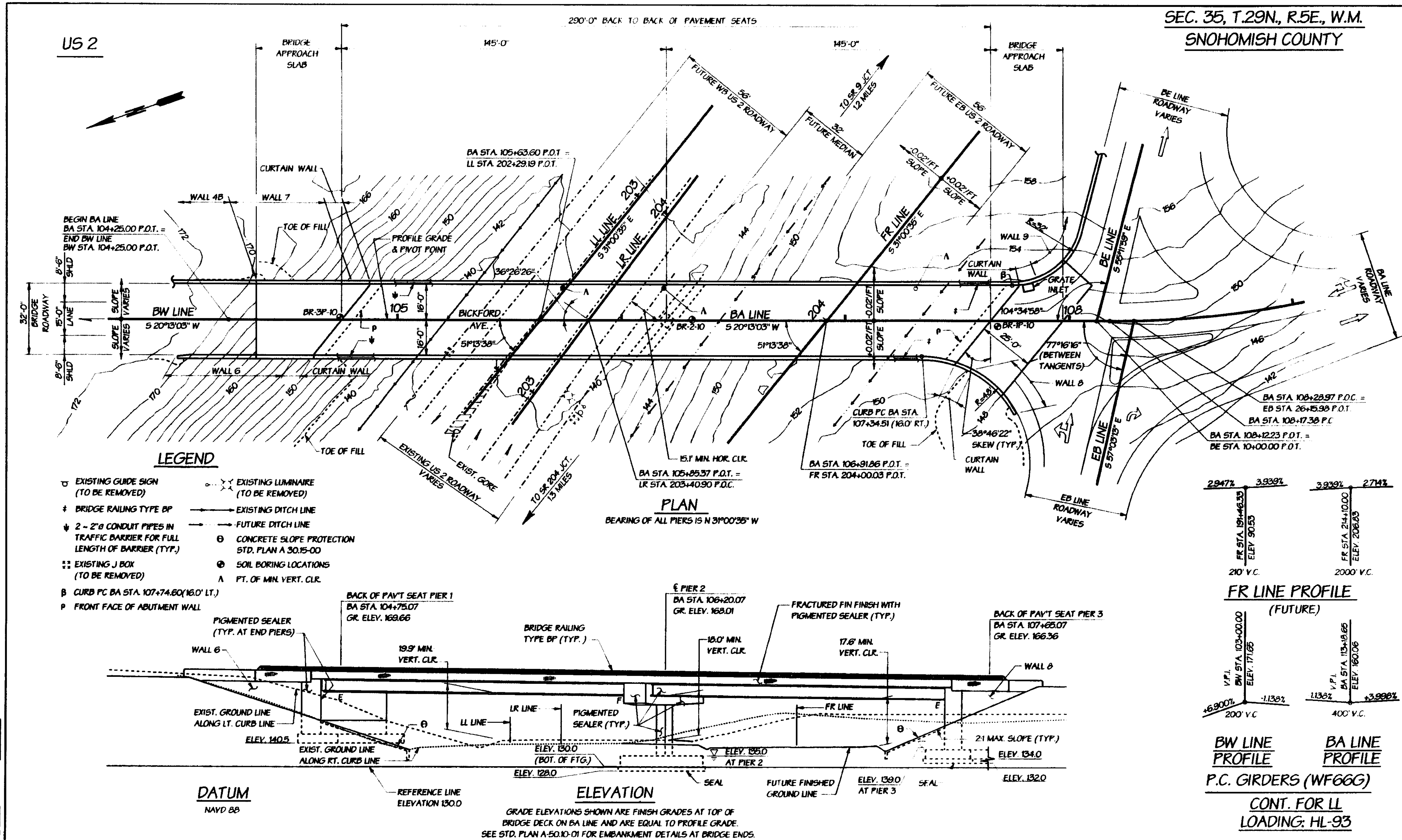
LESS CRACKING — MORE CRACKING

BRIDGE NUMBER	16/3W
BRIDGE NAME	SR 16 OVER HOV
INSPECTION DATE	5/29/2015
DECK CONCRETE	PERFORMANCE BASED

BRIDGE 2/8.5N-W (BICKFORD AVE OVER US 2)

Bridge #	2/8.5N-W	Bridge Name	N-W Ramp (Bickford Ave) over US 2	Structure ID	0018286A
Contract #	8286	Region NW	Project Engineer Mark Sawyer	Performance Deck Concrete?	Yes
Contractor	Granite Construction	Concrete Supplier	Concrete Nor'West	Deck Placement	4/3/2013
Bridge Description	2-Span (145' / 145'), 4-WF66G Girders (290' bridge length), 1-Lane (32' wide roadway)				

CONTENTS



Bridge Design Engr	Khaleghi, B		
Supervisor	Schettler, JG		
Designed By	Lu, M	9-11	
Checked By	Dusenberry, KT	9-11	
Detailed By	Prather, BL	9-11	
Bridge Projects Engr	Lewis, RA	4-11	
Prelim. Plan By	Wei, JS	4-11	
Architect/Specialist	PDK, BSA, GAW	4-11	

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DATE | REVISION | BY | APP'D

REGION NO. 10 | STATE WASH | FED. AID PROJ. NO. | SHEET NO. | TOTAL SHEETS

JOB NUMBER 11A015

Washington State Department of Transportation

JACOBS

US 2
BICKFORD AVENUE I/C
SAFETY AND CULVERT REPLACEMENT
BICKFORD AVENUE OVER US 2 BRIDGE

BRIDGE LAYOUT

BRIDGE SHEET NO. BG01

SHEET 279 OF 358 SHEETS

3/21/12

US 2 JOB NO. 11A015 SHEET BG01

9:02:14 AM 3/21/2012

C. S. 3106 ~ PROJ. NO. XL-3611 ~ NORTHWEST REGION ~ US 2 ~ MP 2.65 TO MP 4.51 ~ BICKFORD AVE. OVER US 2 (NEW BRIDGE)

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	2/8.5N-W	Bridge Name	N-W Ramp (Bickford Ave) over US 2	Structure ID	0018286A
Contract #	8286	Region NW	Project Engineer: Mark Sawyer	Performance Deck Concrete?	Yes
Contractor	Granite Construction	Concrete Supplier	Concrete Nor'West	Deck Placement	4/3/2013
Bridge Description	2-Span (145' / 145'), 4-WF66G Girders (290' bridge length), 1-Lane (32' wide roadway)				

Mix Design (WSDOT Form 350-040)

Water (max) = 230 lbs/cy w/c = 0.40 max

Cementitious Materials	Lbs/cy	Source	Type, Class or Grade
cement	480	Ash Grove	Type I/II Low Alkali
fly ash	90	Lafarge	Type F
slag			
latex			
microsilica	10	SF 100	

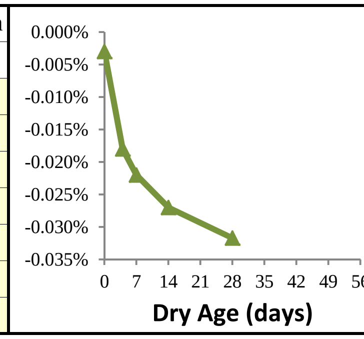
Concrete Admixtures	oz/cy	Manufacturer	Product
air entrainment	1-10	BASF	AE-90
water reducer			
HR water reduce	23	BASF	Glenium 7500
set retarder			
shrink. reducer	64	BASF	MasterLife SRA 20

Concrete Test Results

compressive strength @ 28 days	6,630	psi
modulus of elasticity		psi
permeability @ 56 days	1,548	coulombs
mix design density	147.0	lb/cf

Shrinkage Test Results

Dry Age (days)	% Length Change
0	-0.0030%
4	-0.0180%
7	-0.0220%
14	-0.0270%
21	
28	-0.0317%
56	



Aggregate

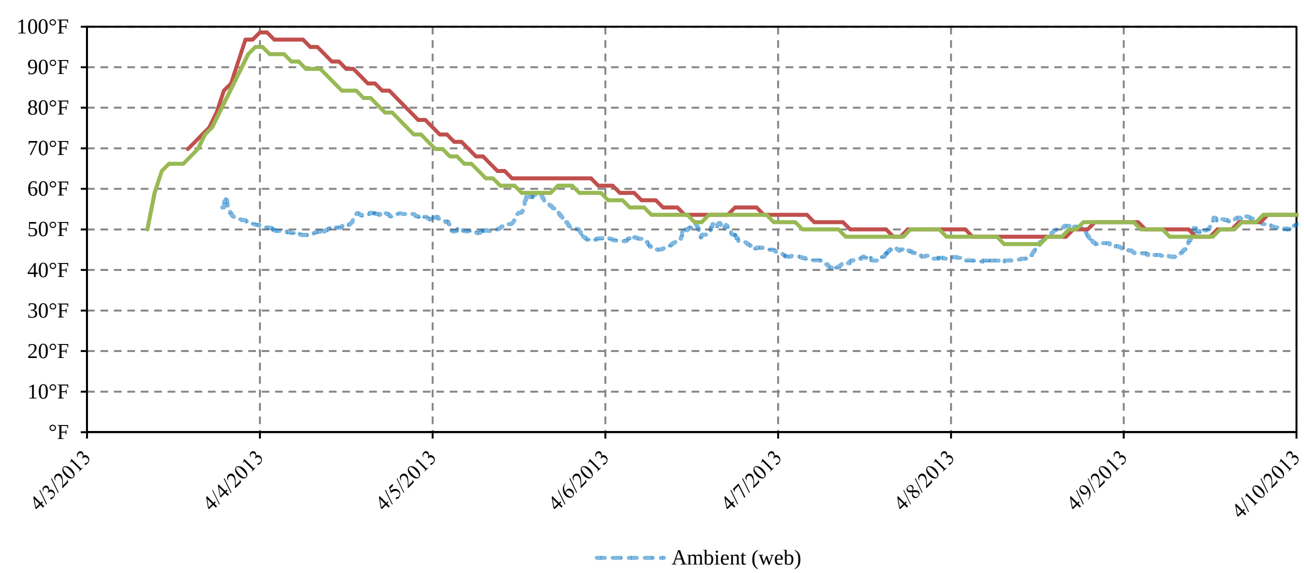
	Comp. 1	Comp. 2	Comp. 3	Comp. 4	Comp. 5
WSDOT Pit #	D-306	D-306	D-306		
Grading	#57	Class 2 Sand	#8		
% Total	48.5%	39.0%	9.5%		
Lbs/cy	1620	1238	300		

ASR Mitigation: Use of low Alkali cement

Notes

Shrinkage test was done with w/c ratio = 0.36

Temperature



Washington State Department of Transportation

Concrete Mix Design

Contractor		Submitted By	Date
Granite Construction		Concrete Nor'West	11/29/2012
Concrete Supplier		Plant Location	
Concrete Nor'West		15415 84th St NE, Lake Stevens WA	
Contract Number	Contract Name		
8286	Bickford Ave & US 2 Improvements		

This mix is to be used in the following Bid Item No(s): Class 4000D 68.18

Concrete Class: *(check one only)*

☐ 3000 ☐ 4000 ☒ 4000D[a] ☐ 4000P[a] ☐ 4000W ☐ Concrete Overlay ☐ Cement Concrete Pavement[d]
☐ Other

Remarks: Class 4000D with high range water reducer and shrink reducing admixture. Needs to be less than 2000 coulombs at 56 days per AASHTO 277

Mix Design No. 15BICK1 REV 1 **Plant No.** Getchell

Cementitious Materials	Source	Type, Class or Grade	Sp. Gr.	Lbs/cy
Cement	Ash Grove - Seattle	Type I/II Low Alkali	3.15	480
Fly Ash[a]	Lafarge	Type F	2.60	90
GGBFS (Slag)				
Latex				
Microsilica	BASF	SF 100	2.20	10

Concrete Admixtures	Manufacturer	Product	Type	Est. Range (oz/cy)
Air Entrainment	BASF	AE-90		1-10
Water Reducer				
High-Range Water Reducer	BASF	Glenium 7500	F	23
Set Retarder				
Other	BASF	MasterLIFE SRA 20	SRA	64

Water (Maximum) 230 lbs/cy Is any of the water Recycled or Reclaimed? ☐ Yes[e] ☒ No

Water Cementitious Ratio (Maximum) .40 Mix Design Density 147.0 lbs/cf[d]

Design Performance	1	2	3	4	5	Average[f]
28 Day Compressive Strength (cylinders) psi						SEE
14 Day Flexural[d] Strength (beams) psi						Attached

Agency Use Only (Check appropirate Box)

☒ **This Mix Design MEETS CONTRACT SPECIFICATIONS and may be used on the bid items noted above**
☐ **This Mix Design DOES NOT MEET CONTRACT SPECIFICATIONS and is being returned for corrections**

Reviewed By: Mark [signature] 3/19/2013
PE Signature Date

DOT Form 350-040 EF
Revised 6/05

Distribution: Original - Contractor
Copies To - State Materials Lab-Structural Materials Eng. ; Regional Materials Lab; Project Inspector

Mix Design No. 15BICK1 REV 1 Plant No. Getchell

Aggregate Information

Concrete Aggregates	Component 1	Component 2	Component 3	Component 4	Component 5	Combined Gradation
WSDOT Pit No.	D - 306	D - 306	D - 306			
WSDOT ASR 14-day Results (%) [b]	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	
Grading[c]	# 57	Class 2 Sand	#8			
Percent of Total Aggregate	48.5	39	9.5			100%
Specific Gravity	2.71	2.67	2.69			
Lbs/cy (ssd)	1620	1238	300			

Percent Passing

2 inch	100					
1-1/2 inch	100					100
1 inch	98					
3/4 inch	69					84
1/2 inch	38		100			
3/8 inch	11	100	99			54.1
No. 4	1	98.9	27			41.8
No. 8	1	85.8	1			34.1
No. 16		63.4	0			24.7
No. 30		43.1				16.8
No. 50		21.3				8.3
No. 100		5				2
No. 200		.8				.3

Fineness Modulus: 2.83 (Required for Class 2 Sand)

ASR Mitigation Method Proposed [b]: The use of low Alkali cement will mitigate the .44 ASR value at D - 306

Notes:

a Required for Class 4000D and 4000P mixes.

b Alkali Silica Reactivity Mitigation is required for sources with expansions over 0.20% - Incidate method for ASR mitigation. For expansion of 0.21% - o.45%, acceptable mitigation can be the use of low alkali cement or 25% type F fly ash. Any other proposed mitigation method or for pits with greater than 0.45% expansion, proof of mitigating measure, either ASTM C1260 / AASHTO T303 test results must be attached. If ASTM C 1293 testing has been submitted indicating 1-year expansion of 0.04% or less, mitigation is not required.

c AASHTO No. 467, 57, 67, 7, 8; WSDOT Class 1, Class 2; or combined gradation. See Standard Specification 9-03.1.

d Required for Cement Concrete Pavements.

e Attach test results indicating conformance to Standard Specification 9-25.1.

f Actual Average Strength as determined from testing or estimated from ACI 211.

DOT Form 350-040 EF
Revised 6/06

Ash Grove Technical Center

11011 Cody Street, Suite 125
Overland Park, Kan. 66210
January 3, 2013 – Preliminary Report
January 24, 2013 – Final Report

Report Number: **R18459**

Work Order Number: **WO-120607**

SUBJECT

On December 10, 2012 a request for technical service was issued on behalf of Dave Enders of Concrete Nor' West in Burlington, Washington. Mr. Dave Burg requested that the Technical Center conduct AASHTO T 277 testing on the submitted concrete cylinders at specified ages.

SAMPLE IDENTIFICATION

Sample No.	Sample Description	Date Received
S-122885	(4) 4 x 8 Concrete Cylinders, Cast 11-29-2012 Mix15 Bick1 (WSDOT 4000D)	12/05/2012

TEST RESULTS

AASHTO T 277 - Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
Accelerated Cure

Sample No.	Diameter, in.	Charge Passed, C	Corrected Charge, C	Qualitative Equivalent	Age, days
S-122885	4.00	1422	**1,250**	Low	28

AASHTO T 277 - Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
Standard Cure

Sample No.	Diameter, in.	Charge Passed, C	Corrected Charge, C	Qualitative Equivalent	Age, days
S-122885	4.00	2,882	**2,533**	Moderate	28
S-122885	4.00	1,762	**1,548**	Low	56
S-122885 *	4.00	---	---	---	56

* This sample's cell lost continuity midway through the test so the results are not reported.

Table 1. Chloride Ion Penetrability Based on Charge Passed (Excerpted from AASHTO T 277)

Charge Passed (coulombs)	Chloride Ion Penetrability
> 4,000	High
2,000 – 4,000	Moderate
1,000 – 2,000	Low
100 – 1,000	Very Low
< 100	Negligible

Materials Test_ng & Consulting, _nc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

AASHTO T-160, Length Change of Hardened Hydraulic-Cement Mortar and Concrete

Client: Concrete Nor'West
Project: Q.C. - Getchell Pit
Project #: 12B006-06

Mix Data

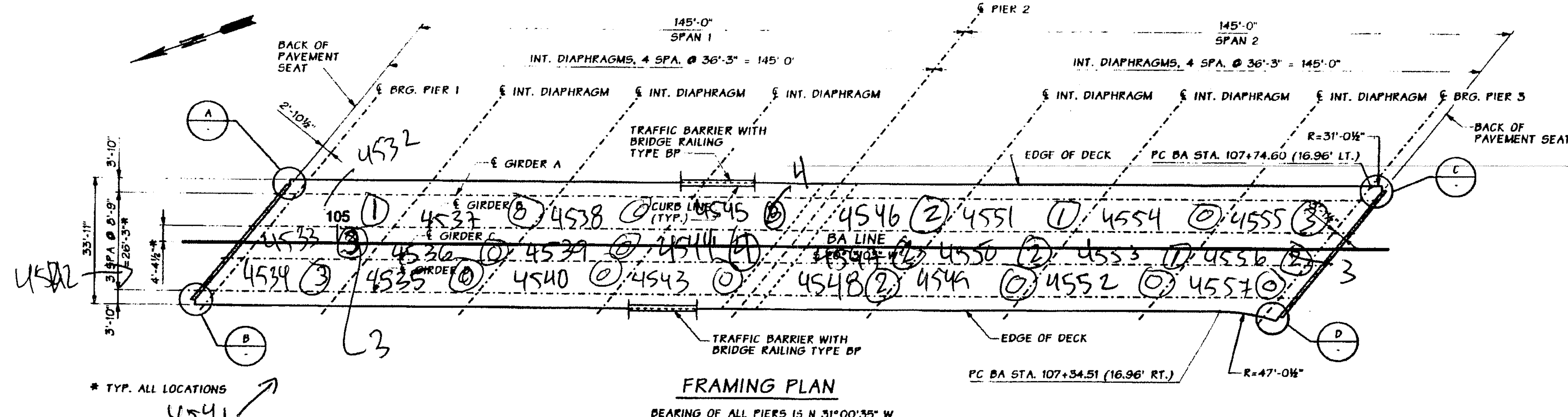
Supplier:	Concrete Nor'West	Mix #:	15BICK1
Date/Time Batched:	Nov 29, 12 8:55 AM	Cement, lbs.:	490
Date/Time Cast:	Nov 29, 12 10:35 AM	Flyash, lbs.:	90
Slump:	3.75"	Water, gals.:	19.6
Air Content:	6.50%	Fine Agg., lbs.:	1241
Concrete Temp:	58	Coarse Agg., lbs.:	1605 (7/8")
Ambient Temp:	63	Coarse Agg., lbs.:	312 (3/8")
W/C Ratio:	0.36	Admixture, oz./cwt	21.3 (Glenium)
Unit Weight:	NT	Admixture, oz./cwt	1.0 (MBAE-90)
Yield:		Admixture, oz./cwt	64.0 (BASF Masterlife SRA)
Storage Method:	Air Storage	Admixture, oz./cwt	

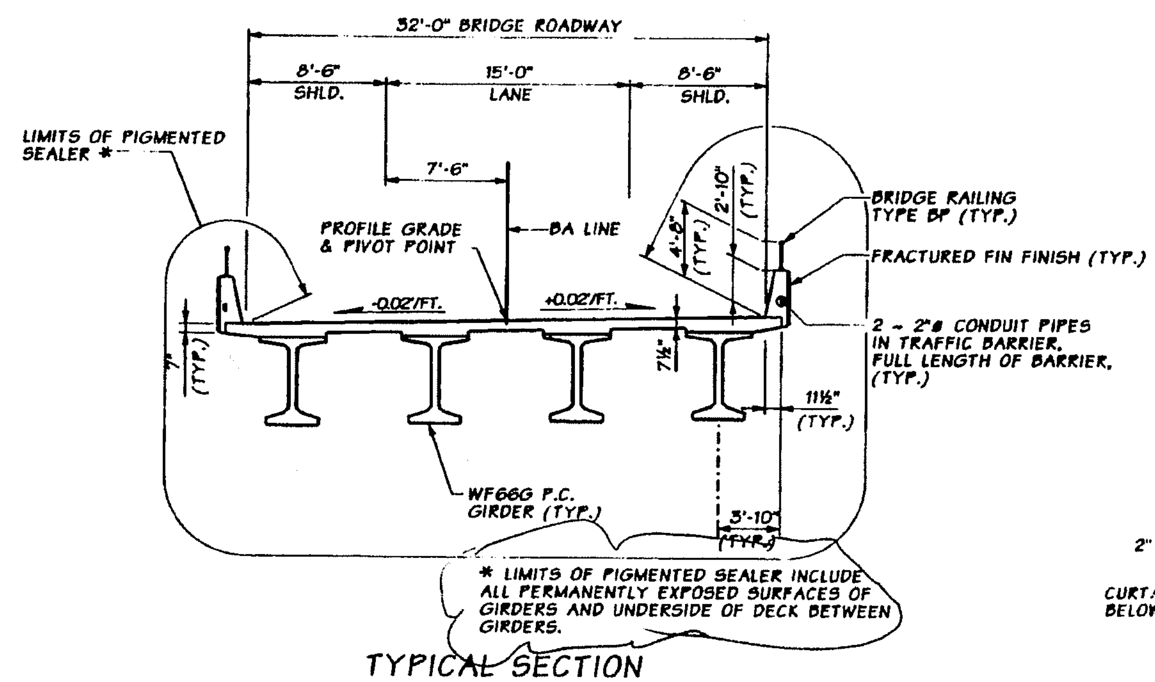
Sample I.D. #	Reference Bar Reading	Sample Reading	Date & Time	Age of Concrete	Gauge Length	% Change In Length
B5927	0.1635	0.0899	Nov 30, 12 10:19 AM	24 Hours	10	
B5928	0.1635	0.0783	Nov 30, 12 10:19 AM		10	
B5929	0.1635	0.1117	Nov 30, 12 10:19 AM		10	
B5927	0.1636	0.0896	Dec 27, 12 9:31 AM	28 day initial wet cure	10	- 0.0040 %
B5928	0.1636	0.0777	Dec 27, 12 9:31 AM		10	- 0.0070 %
B5929	0.1636	0.1120	Dec 27, 12 9:31 AM		10	0.0020 %
					Average:	**- 0.0030 %**
B5927	0.1631	0.0875	Dec 31, 12 9:10 AM	4 day air cure	10	- 0.0200 %
B5928	0.1631	0.0762	Dec 31, 12 9:10 AM		10	- 0.0170 %
B5929	0.1631	0.1096	Dec 31, 12 9:10 AM		10	- 0.0170 %
					Average:	**- 0.0180 %**
B5927	0.1650	0.0890	Jan 3, 13 9:19 AM	7 day air cure	10	- 0.0240 %
B5928	0.1650	0.0777	Jan 3, 13 9:19 AM		10	- 0.0210 %
B5929	0.1650	0.1111	Jan 3, 13 9:19 AM		10	- 0.0210 %
					Average:	**- 0.0220 %**
B5927	0.1651	0.0885	Jan 10, 13 9:00 AM	14 day air cure	10	- 0.0300 %
B5928	0.1651	0.0774	Jan 10, 13 9:00 AM		10	- 0.0250 %
B5929	0.1651	0.1107	Jan 10, 13 9:00 AM		10	- 0.0260 %
					Average:	**- 0.0270 %**
B5927	0.1653	0.0882	Jan 24, 13 2:45 PM	28 day air cure	10	- 0.0350 %
B5928	0.1653	0.0771	Jan 24, 13 2:45 PM		10	- 0.0300 %
B5929	0.1653	0.1105	Jan 24, 13 2:45 PM		10	- 0.0300 %
					Average:	**- 0.0317 %**

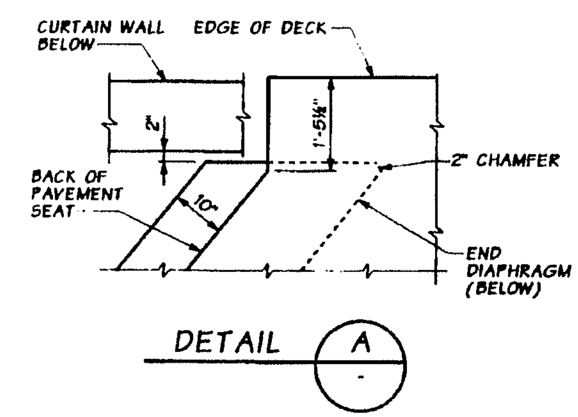
Remarks: 10 lbs. of Silica Fume added to mix. Average 28 compressive strength for this concrete was 6630 psi.

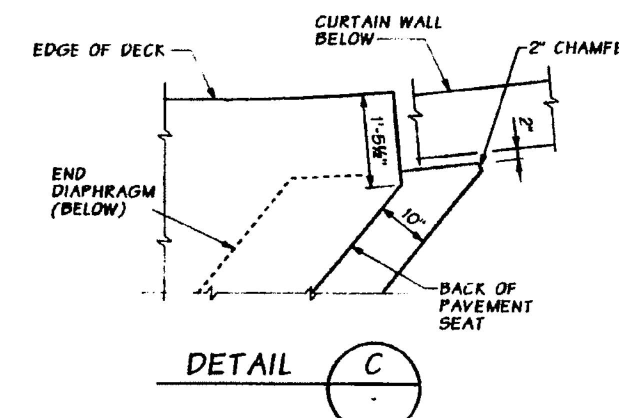
Reviewed By: C. Z

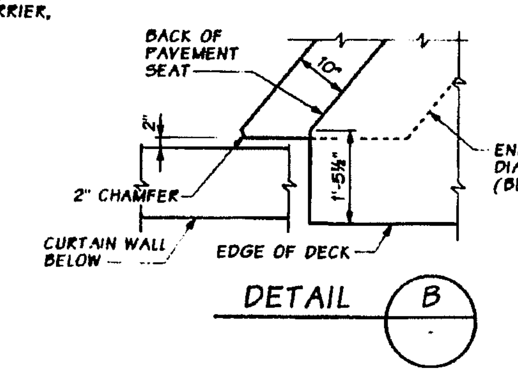
Corporate ~ 777 Chrysler Drive • Burlington, WA 98233 • Phone (360) 755-1990 • Fax (360) 755-1980
NW Region ~ 2126 East Bakerview Rd., Suite #101 • Bellingham, WA 98226 • Phone (360) 647-6061 • Fax (360) 647-8111
SW Region ~ 2118 Black Lake Blvd. • Olympia, WA 98512 • Phone (360) 534-9777 • Fax (360) 534-9779
Visit our website: www.mtc-inc.net

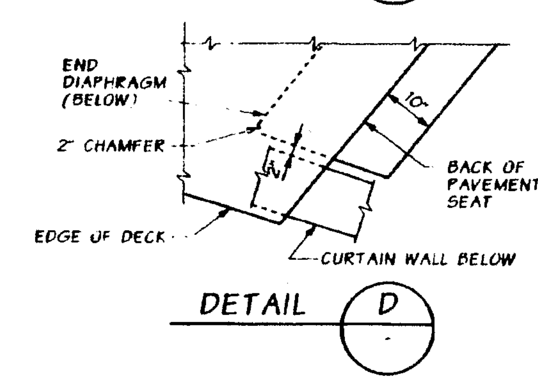












Bridge Design Engr	Khaleghi, B		
Supervisor	Schettler, JG		
Designed By	Lu, M	8-11	
Checked By	Dusenberry, KT	8-11	
Detailed By	Prather, BL	8-11	
Bridge Projects Engr			
Prelim. Plan By			
Architect/Specialist			

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REGION NO	STATE	FED AID PROJ NO.	SHEET NO	TOTAL SHEETS
10	WASH			

JOB NUMBER 11A015

DATE | REVISION | BY | APP'D

Washington State Department of Transportation

JACOBS

US 2
BICKFORD AVENUE I/C
SAFETY AND CULVERT REPLACEMENT
BICKFORD AVENUE OVER US 2 BRIDGE
FRAMING PLAN AND TYPICAL SECTION

BRIDGE SHEET NO BG18
SHEET 296 OF 358 SHEETS

JS 2 JOB NO 11A015 SHEET BG18
3/21/2012
9:04:11 AM

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	2/8.5N-W	Bridge Name	N-W Ramp (Bickford Ave) over US 2	Structure ID	0018286A
Contract #	8286 Region NW	Project Engineer	Mark Sawyer	Performance Deck Concrete?	Yes
Contractor	Granite Construction	Concrete Supplier	Concrete Nor'West	Deck Placement	4/3/2013
Bridge Description	2-Span (145' / 145'), 4-WF66G Girders (290' bridge length), 1-Lane (32' wide roadway)				

L = length between diaphragms (or length of "bay")
S = girder spacing
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)
N_{cr} = number of leaching cracks counted during visual inspection
% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	6%
Min. =	0%
Max. =	20%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	36.25	8.75	1	18	5%
1	1	B	C	36.25	8.75	3	18	15%
1	1	C	D	36.25	8.75	3	18	15%
1	2	A	B	36.25	8.75	0	18	0%
1	2	B	C	36.25	8.75	0	18	0%
1	2	C	D	36.25	8.75	0	18	0%
1	3	A	B	36.25	8.75	0	18	0%
1	3	B	C	36.25	8.75	0	18	0%
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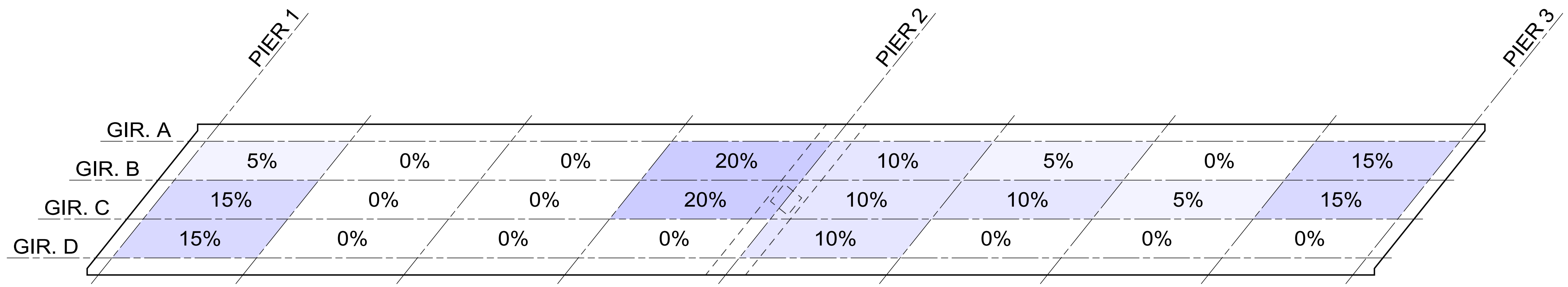
2	1	B	C	36.25	8.75	2	18	10%
2	1	C	D	36.25	8.75	2	18	10%
2	2	A	B	36.25	8.75	1	18	5%
2	2	B	C	36.25	8.75	2	18	10%
2	2	C	D	36.25	8.75	0	18	0%
2	3	A	B	36.25	8.75	0	18	0%
2	3	B	C	36.25	8.75	1	18	5%
2	3	C	D	36.25	8.75	0	18	0%
2	4	A	B	36.25	8.75	3	18	15%
2	4	B	C	36.25	8.75	3	18	15%
2	4	C	D	36.25	8.75	0	18	0%



CRACKING INTENSITY ~ BRIDGE 2/8.5N-W

100% = CRACK EVERY 2 FT.

BRIDGE NUMBER	2/8.5N-W
BRIDGE NAME	N-W RAMP (BICKFORD AVE) OVER US 2
INSPECTION DATE	5/21/2015
DECK CONCRETE	PERFORMANCE BASED

BRIDGE 395/441N-E (N-E RAMP OVER N-N RAMP)

Bridge #	395/441N-E	Bridge Name	N-E Ramp Over N-N Ramp	Structure ID	0017610E
Contract #	7610	Region	ER	Project Engineer	Bob Hilmes
Performance Deck Concrete?	Yes	Contractor	Graham Construction	Concrete Supplier	Central Pre-Mix Conc.
Deck Placement	7/29/2010	Bridge Description	2-Span (110' / 110"), 4-WF58G Girders (220' bridge length), 2-Lanes (37' wide roadway)		

CONTENTS

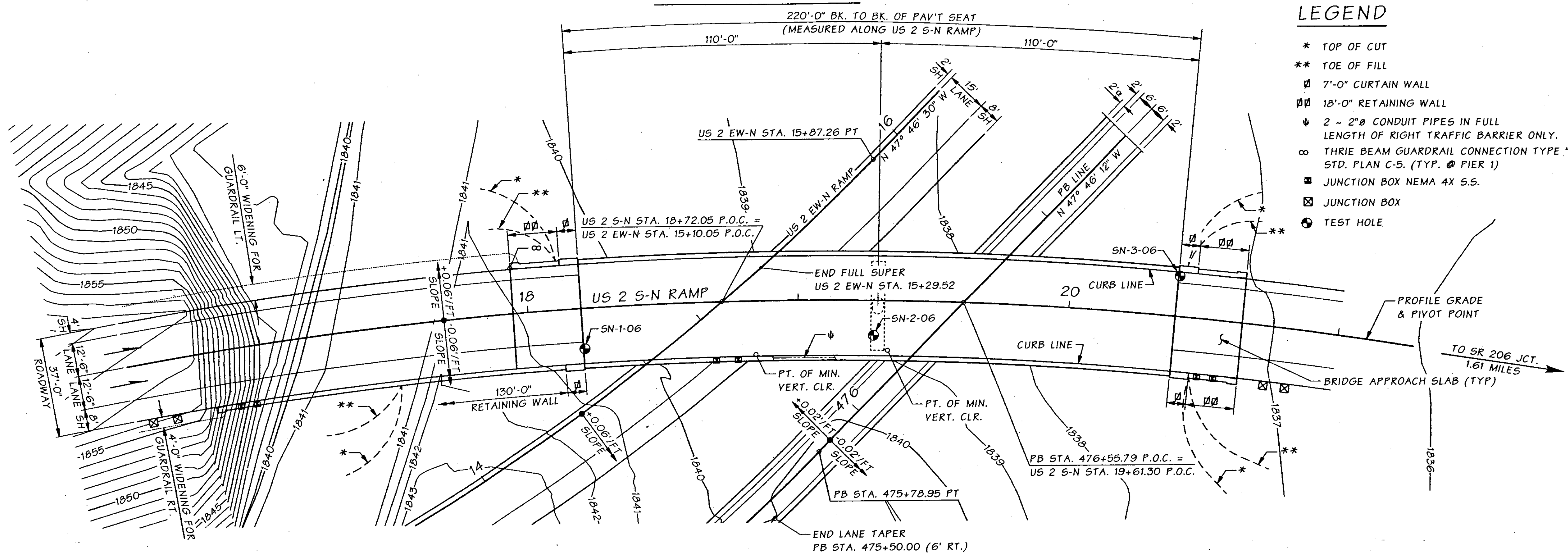
1. Layout Plan Sheet
2. Mix Design Summary
3. Concrete Mix Design Form
4. Concrete Test Results
5. Field Notes
6. Crack Summary
7. Crack Intensity Diagram

SEC. 4, T.26N., R.43E., W.M.
SPOKANE COUNTY

US 395

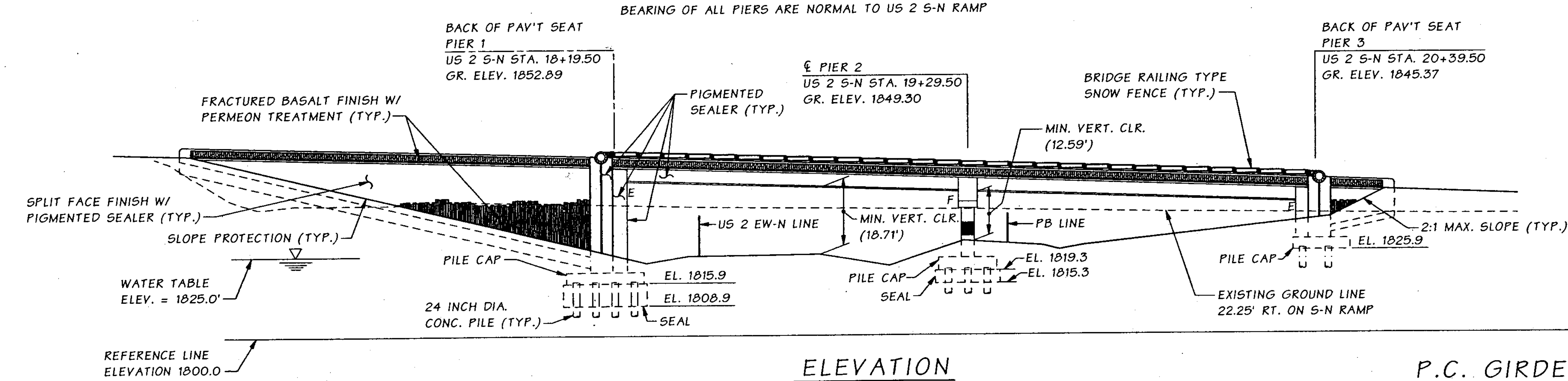
LEGEND

- * TOP OF CUT
- ** TOE OF FILL
- Ø 7'-0" CURTAIN WALL
- ØØ 18'-0" RETAINING WALL
- ψ 2 ~ 2"ø CONDUIT PIPES IN FULL LENGTH OF RIGHT TRAFFIC BARRIER ONLY.
- ∞ THRIE BEAM GUARDRAIL CONNECTION TYPE "D" STD. PLAN C-5. (TYP. @ PIER 1)
- ▣ JUNCTION BOX NEMA 4X S.S.
- ⊠ JUNCTION BOX
- ◓ TEST HOLE



PLAN

BEARING OF ALL PIERS ARE NORMAL TO US 2 S-N RAMP



DATUM
NAVD 1988

ELEVATION

GRADE ELEVATIONS SHOWN ARE FINISH GRADES AT TOP OF ROADWAY SLAB ON US 2 S-N RAMP AND ARE EQUAL TO PROFILE GRADE. SEE DETAIL FOR EMBANKMENT PLAN AT BRIDGE ENDS BR. SHT. SN2.

P.C. GIRDERS (WF58G)
LOADING: HL-93

C.S. 321105 ~ PROJ. NO. XL 2231 ~ EASTERN REGION ~ US 395 ~ US 2 LOWERING ~ NB S-N RAMP O'XING AT EW-N RAMP.

SR 395 FILE NO. ___ SHEET SN1

Bridge Design Engr.	Khaleghi, B	
Supervisor	Zeldenrust, RP	
Designed By	Bedi, G	05/07
Checked By	Rosa, M	03/08
Detailed By	Andreotti, L	05/07
Bridge Projects Engr.	Lewis, RA	01/07
Prelim. Plan By	Bennion, S	01/06
Architect/Specialist	PDK/GW/BK	

M:\Z-Team\NSC - SR 395\PS&E\NB S-N OXING\Window files\LAYOUT.WND

DATE | REVISION | BY | APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 08Z011

BRIDGE AND STRUCTURES OFFICE

JUGESH KAPUR, STATE OF WASHINGTON, 25400, PROFESSIONAL ENGINEER

8/7/08

Washington State Department of Transportation

US 395
NSC - US 2 LOWERING
S - N RAMP OVER EW - N RAMP BRIDGE
LAYOUT

BRIDGE SHEET NO. SN1
SHEET 427 OF 548 SHEETS

Wed Aug 06 08:28:36 2008

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	395/441N-E	Bridge Name	N-E Ramp Over N-N Ramp	Structure ID	0017610E
Contract #	7610	Region	ER	Project Engineer	Bob Hilmes
Performance Deck Concrete?	Yes	Contractor	Graham Construction	Concrete Supplier	Central Pre-Mix Conc.
Deck Placement	7/29/2010				

Bridge Description: 2-Span (110' / 110"), 4-WF58G Girders (220' bridge length), 2-Lanes (37' wide roadway)

Mix Design (WSDOT Form 350-040)

Water (max) = 220 lbs/cy w/c = 0.39 max

Cementitious Materials	Lbs/cy	Source	Type, Class or Grade
cement	435	Lafarge	Type I
fly ash	130	Wabamun/Sundance	Type F
slag			
latex			
microsilica			

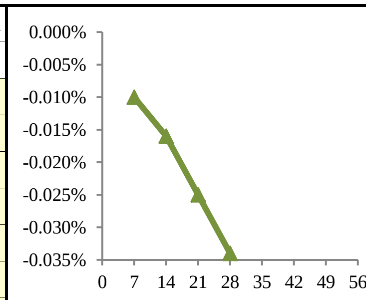
Concrete Admixtures	oz/cy	Manufacturer	Product
air entrainment	15 to 45	WR Grace	Daravair 1000
water reducer	15 to 40	WR Grace	WRDA 64
HR water reduce	11 to 25	WR Grace	Adva 190 or 195
set retarder			
shrink. reducer	128	WR Grace	Eclipse Plus

Concrete Test Results

compressive strength @ 28 days	5,660	psi
modulus of elasticity		psi
permeability @ 56 days	1,452	coulombs
mix design density	140.6	lb/cf

Shrinkage Test Results

Dry Age (days)	% Length Change
0	
4	
7	-0.0100%
14	-0.0160%
21	-0.0250%
28	-0.0340%
56	



Aggregate

	Comp. 1	Comp. 2	Comp. 3	Comp. 4	Comp. 5
WSDOT Pit #	PS C-173 PS C-107	PS C-173 PS C-108	PS C-173 PS C-109	PS C-173 PS C-110	PS C-297 PS C-120
Grading	1½ Round	3/4 Round	3/8 Round	Course Sand	Blend Sand
% Total	16.0%	36.0%	10.0%	24.0%	1400.0%
Lbs/cy	490	1090	300	710	420

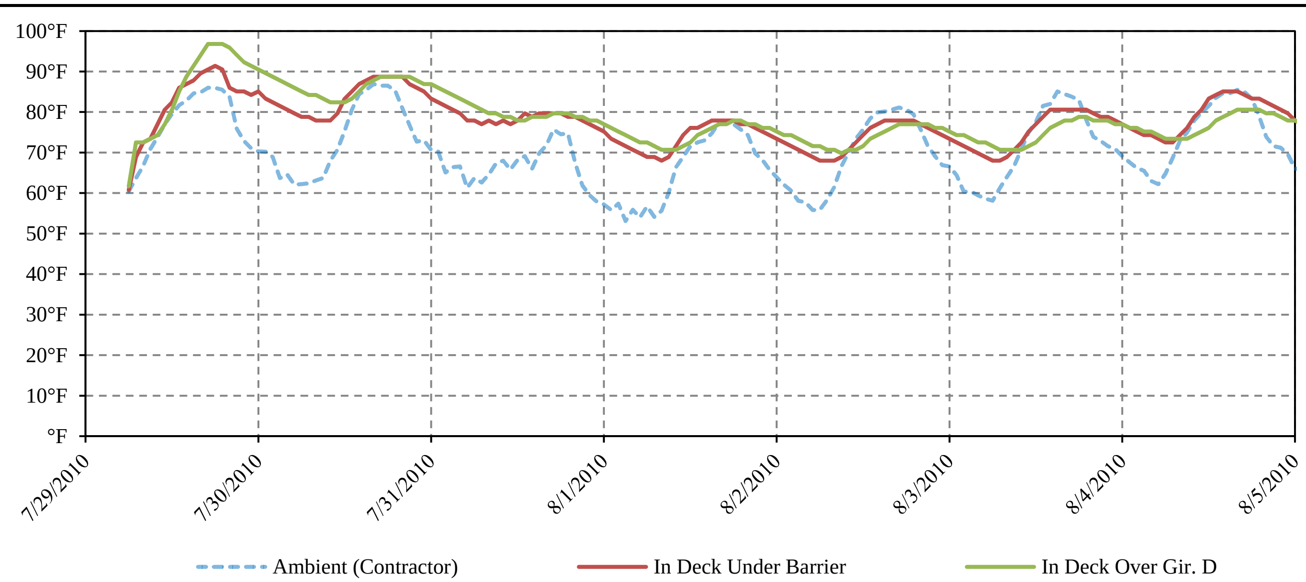
ASR Mitigation: Low Alkali Cement and Flyash

Notes

This was pilot bridge for performance based mix design

Original contract called for a different bridge to use the performance based specification, but schedule conflicts necessitated changing to this bridge.

Temperature



Washington State Department of Transportation

Concrete Mix Design

Contractor	Submitted By	Date
Graham Construction & Management, Inc.	Craig L. Matteson Central Pre-Mix Concrete Co.	2/6/2009

Concrete Supplier	Plant Location
Central Pre-Mix Concrete Co.	1901 N. Sullivan Rd. 302 N. Park Rd. or Crestline & Magnesium

Contract Number	Contract Name
7610	US 395 / NSC - US 2 Lowering

This mix is to be used in the following Bid Item No(s): 4000D Bridge Deck Project Specific Performance Mix

Concrete Class: *(check one only)* Item #74

☐ 3000 ☐ 4000 ☒ 4000D[a] ☐ 4000P[a] ☐ 4000W ☐ Concrete Overlay ☐ Cement Concrete Pavement[d]

☐ Other Eclipse Plus

Remarks: Bridge Deck Concrete for US 395 SB Over US 2 Bridge. **The Total Paste Volume is 6.75 cf or 25.0%**

Mix Design No. 320292 **Plant No.** 1, 3 or 4

Cementitious Materials	Source	Type, Class or Grade	Sp. Gr.	Lbs/cy
Cement	Lafarge Richmond, BC	AASHTO Type I	3.15	435
Fly Ash[a]	Wabamun or Sundance	Type F	2.01	130
GGBFS (Slag)				
Latex				
Microsilica				

Concrete Admixtures	Manufacturer	Product	Type	Est. Range (oz/cy)
Air Entrainment	WR Grace	Daravair 1000		15 to 45
Water Reducer	WR Grace	WRDA 64	A & D	15-40
High-Range Water Reducer	WR Grace	Adva 190 or 195	HRWRA	11-25
Set Retarder				
Other Eclipse Plus	WR Grace	Shrinkage Reducing	S	128

Water (Maximum) 220 lbs/cy Is any of the water Recycled or Reclaimed?[e] ☐ Yes ☒ No

Water Cementitious Ratio (Maximum) .39 Mix Design Density 140.6 +/- lbs/cf[d]

Design Performance	1	2	3	4	5	Average[f]
28 Day Compressive Strength (cylinders) psi	5,680	5,670	5,640	RECEIVED		5,660
14 Day Flexural[d] Strength (beams) psi				FEB 06 2009		

HILMES P.E.O.

Agency Use Only (Check approprirate Box)

☐ **This Mix Design MEETS CONTRACT SPECIFICATIONS and may be used on the bid items noted above**

☐ **This Mix Design DOES NOT MEET CONTRACT SPECIFICATIONS and is being returned for corrections**

Reviewed By: ______________________ PE Signature ______________________ Date

DOT Form 350-040 EF Revised 6/06

Distribution: Original - Contractor
Copies To - State Materials Lab-Structural Materials Eng. ; Regional Materials Lab; Project Inspector

Mix Design No. 320292 **Plant No.** 1, 3 or 4

Aggregate Information

Concrete Aggregates	Component 1	Component 2	Component 3	Component 4	Component 5	Combined Gradation
WSDOT Pit No.	PS C-173 or PS C-107	PS C-173 or PS C-107	PS C-173 or PS C-107	PS C-173 or PS C-107	PS C-297 & PS C-120	
WSDOT ASR 14-day Results (%) b	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	
Grading c	11/2" Round Combined	3/4" Round Combined	3/8" Round Combined	Course Sand Combined	Blend Sand Combined	
Percent of Total Aggregate	16	36	10	24	14	100%
Specific Gravity	2.69	2.68	2.67	2.64	2.64	
Lbs/cy (ssd)	490	1090	300	710	420	11/2" NMA Specification

Percent Passing

2 inch							
1-1/2 inch	100					100	100
1 inch	42.9	100				91.0	
3/4 inch	4.7	92.2				82.0	62-88
1/2 inch	1.0	55.1	100			67.9	
3/8 inch	.7	30.7	99.0	100	100	59.0	43-64
No. 4		2.6	32.9	96.2	99.4	41.2	29-47
No. 8		.8	4.9	58.1	97.1	28.3	19-34
No. 16		.5	1.2	18.9	87.9	17.1	12-25
No. 30		.4	.7	6.5	60.6	10.3	7-18
No. 50		.3	.6	2.8	26.4	4.5	3-14
No. 100		.3	.5	1.4	8.0	1.6	0-10
No. 200	.5	.3	.4	1.0	3.7	1.0	0-2.0

Fineness Modulus: N/A (Required for Class 2 Sand)

ASR Mitigation Method Proposed b: **Using Low Alkali Cement and Flyash**

Notes:

a Required for Class 4000D and 4000P mixes.

b Alkali Silica Reactivity Mitigation is required for sources with expansions over 0.20% - Incidate method for ASR mitigation.
For expansion of 0.21% - o.45%, acceptable mitigation can be the use of low alkali cement or 25% type F fly ash.
Any other proposed mitigation method or for pits with greater than 0.45% expansion, proof of mitigating measure, either ASTM C1260 / AASHTO T303 test results must be attached.
If ASTM C 1293 testing has been submitted indicating 1-year expansion of 0.04% or less, mitigation is not required.

c AASHTO No. 467, 57, 67, 7, 8; WSDOT Class 1, Class 2; or combined gradation. See Standard Specification 9-03.1.

d Required for Cement Concrete Pavements.

e Attach test results indicating conformance to Standard Specification 9-25.1.

f Actual Average Strength as determined from testing or estimated from ACI 211.

Should be test AASHTO T 277

LAFARGE
NORTH AMERICA

Lafarge North America Concrete Lab
5400 W Marginal Way SW
Seattle, WA. 98106

Report To: **Central Pre-Mix Concrete Co.**
Attention: **Quality Control Personnel**

Date: November 22, 2008

Subject: Rapid Chloride Ion Penetration ASTM C-1202

Date Sampled: September 2008

Mix Design: HPC #2

Results:

Age (Days)	Coulombs
56	**1452**

The test result is only valid if the aggregate(s) sample(s) is(are) representative of the current production and it is to be noted that Lafarge has no knowledge of the representatives of the sample received for testing. Also, material quality can vary with different locations in a quarry. It is recommended that testing be carried out on an annual basis or more frequently if a variation in stone quality is suspected.

Although the Lafarge North America Seattle Concrete Lab. applies state-of-the-art test methods, Lafarge North America, and its affiliates (Lafarge) can not guarantee the results shown above and shall assume no liability whatsoever for any errors in such results and for the consequence of such errors.

Sincerely,

Robert D. Shogren

RECEIVED
FEB 06 2009
HILMES P.E.O.

Rob Shogren, P.E.
Technical Service Engineer
Lafarge North America

LAFARGE
NORTH AMERICA

Lafarge North America Concrete Lab
5400 W Marginal Way SW
Seattle, WA. 98106

Report To: **CPM Spokane**
Attention: **Quality Control Personnel**

Date: October 30, 2008

Subject: ASTM C-157 Standard Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete

Tested Materials: Date Sampled: Sept 2008
Mix Design ID: Mix #2

ASTM C-157 Expansion: Three (3) test bars were prepared from each concrete mixture. Results are an average of the three (3) bars.

Age (Days)	Percent Length Change #1
7	0.010%
14	0.016%
21	0.025%
28 (final)	0.034%

* The test result is only valid if the aggregate(s) sample(s) is(are) representative of the current production and it is to be noted that Lafarge has no knowledge of the representatives of the sample received for testing. Also, material quality can vary with different locations in a quarry. It is recommended that testing be carried out on an annual basis or more frequently if a variation in stone quality is suspected.

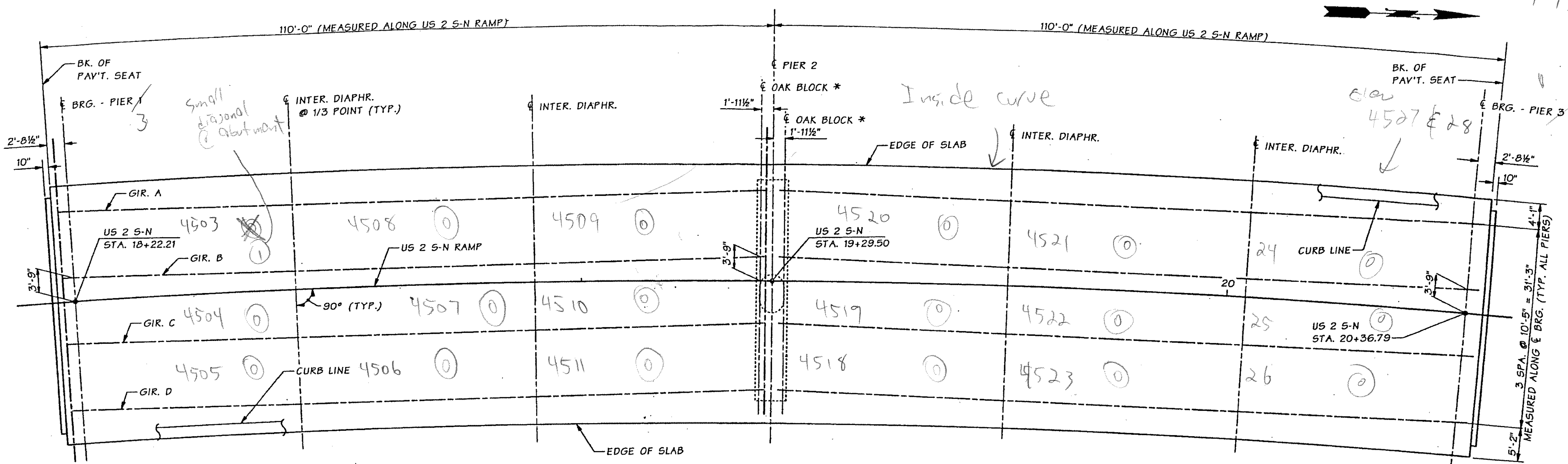
Although the Lafarge North America Seattle Concrete Lab. applies state-of-the-art test methods, Lafarge North America. and its affiliates (Lafarge) can not guarantee the results shown above and shall assume no liability whatsoever for any errors in such results and for the consequence of such errors.

Robert D. Shogren

Rob Shogren, P.E.
Technical Service Engineer
Lafarge North America

RECEIVED
FEB 06 2009
HILMES P.E.O.

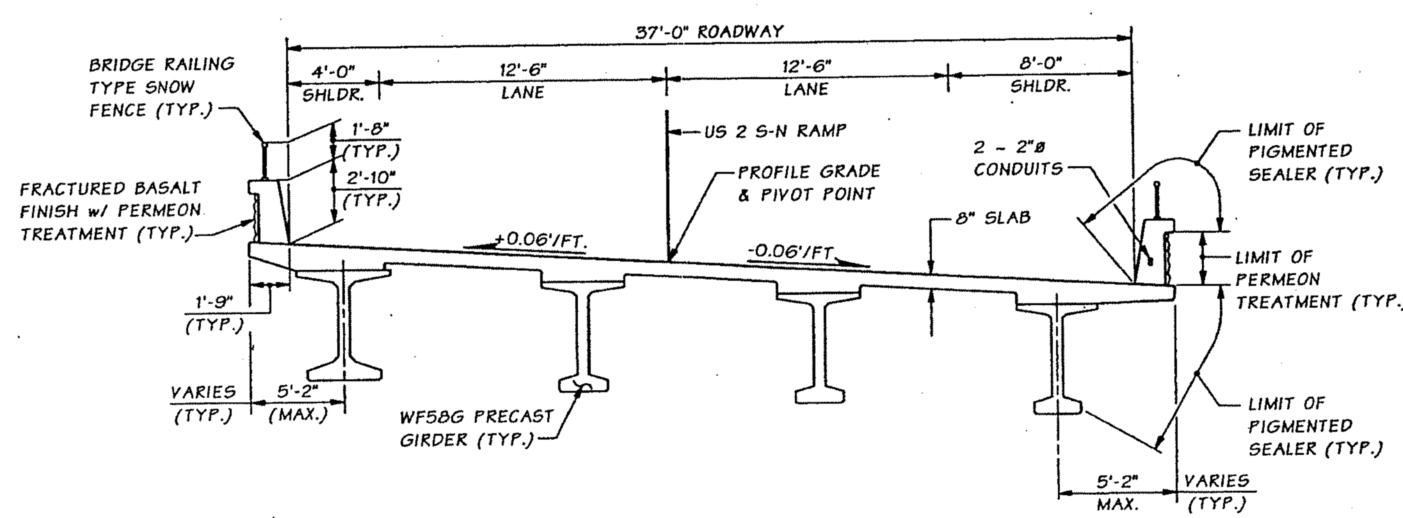
Should be test AASHTO T 160



Marked backwards

FRAMING PLAN

* SEE "OAK BLOCK DETAIL" BR. SHT. SN10



TYPICAL SECTION

Deck 29, 30, 31

SR 395 FILE NO. ____ SHEET SN22

Bridge Design Engr.	Khaleghi, B	
Supervisor	Zeldenrust, RP	
Designed By	Bedi, G	05/07
Checked By	Rosa, M	03/08
Detailed By	Andreotti, L	05/07
Bridge Projects Engr.		
Prelim. Plan By		
Architect/Specialist		

M:\Z-Team\NSC - SR 395\PS&E\NB S-N OXING\Window files\FRAMING PLAN.WND

DATE | REVISION | BY | APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			
JOB NUMBER 08Z011				

GURBACHAN S. BEDI — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER
G S Bedi 8/6/2008

BRIDGE AND STRUCTURES OFFICE

RICHARD P. ZELDENRUST — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER
8/7/08

Washington State Department of Transportation

US 395
NSC - US 2 LOWERING
S - N RAMP OVER EW - N RAMP BRIDGE
FRAMING PLAN

BRIDGE SHEET NO. SN22
SHEET 448 OF 548 SHEETS

Wed Aug 06 08:28:28 2008

395/441 N-E

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	395/441N-E	Bridge Name	N-E Ramp Over N-N Ramp	Structure ID	0017610E
Contract #	7610	Region	ER	Project Engineer	Bob Hilmes
Performance Deck Concrete?	Yes	Contractor	Graham Construction	Concrete Supplier	Central Pre-Mix Conc.
Deck Placement	7/29/2010				
Bridge Description	2-Span (110' / 110"), 4-WF58G Girders (220' bridge length), 2-Lanes (37' wide roadway)				

L = length between diaphragms (or length of "bay")

S = girder spacing

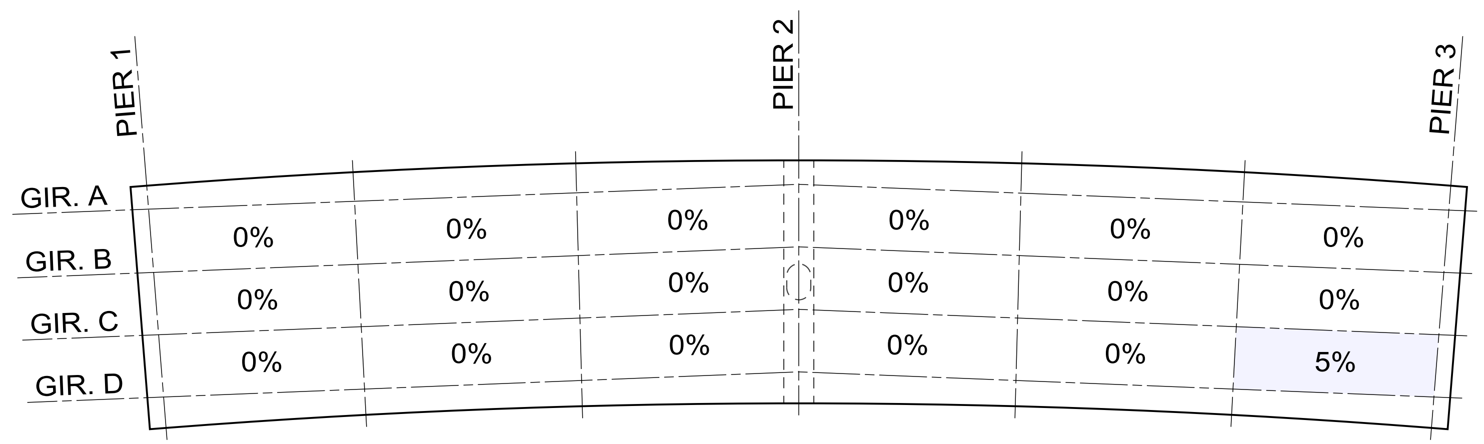
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	0%
Min. =	0%
Max. =	5%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	36.67	10.42	0	18	0%
1	1	B	C	36.67	10.42	0	18	0%
1	1	C	D	36.67	10.42	0	18	0%
1	2	A	B	36.67	10.42	0	18	0%
1	2	B	C	36.67	10.42	0	18	0%
1	2	C	D	36.67	10.42	0	18	0%
1	3	A	B	36.67	10.42	0	18	0%
1	3	B	C	36.67	10.42	0	18	0%
1	3	C	D	36.67	10.42	0	18	0%
2	1	A	B	36.67	10.42	0	18	0%
2	1	B	C	36.67	10.42	0	18	0%
2	1	C	D	36.67	10.42	0	18	0%
2	2	A	B	36.67	10.42	0	18	0%
2	2	B	C	36.67	10.42	0	18	0%
2	2	C	D	36.67	10.42	0	18	0%
2	3	A	B	36.67	10.42	0	18	0%
2	3	B	C	36.67	10.42	0	18	0%
2	3	C	D	36.67	10.42	1	18	5%



CRACKING INTENSITY ~ BRIDGE 395/441N-E

100% = CRACK EVERY 2 FT.

LESS CRACKING MORE CRACKING

BRIDGE NUMBER	395/441N-E
BRIDGE NAME	N-E RAMP OVER N-N RAMP
INSPECTION DATE	5/21/2015
DECK CONCRETE	PERFORMANCE BASED

APPENDIX C

MULTI-SPAN PRESTRESSED GIRDER BRIDGES

BRIDGE 3034A (MANETTE BRIDGE)

BRIDGE 90/106N (Gold CREEK WB)

6/115 (SOUTH FORK CHEHALIS RIVER)

BRIDGE 5/234W (I-5 OVER BLAKESLEE JUNCTION RAILROAD)

BRIDGE 105/4 (NORTH RIVER)

BRIDGE 105/3 (SMITH CREEK)

BRIDGE 6/8 (WILLAPA RIVER)

BRIDGE 5/232NCD (SKOOKUMCHUCK RIVER NBCD)

BRIDGE 5/232SCD (SKOOKUMCHUCK RIVER SBCD)

BRIDGE 101/44 (BONE RIVER)

BRIDGE 3034A (MANETTE BRIDGE)

Bridge #	303/4A	Bridge Name	Manette Bridge	Structure ID	0017926A
Contract #	7926	Region	OR	Project Engineer	Michele Britton
Performance Deck Concrete?	No	Contractor	Manson-Mowat, A J.V.	Concrete Supplier	
Deck Placement	≈ 2011				

Bridge Description: 7-Span (160' / 250' / 250' / 250' / 250' / 250' / 140'), 4-P.C./P.T. Girders (1550' bridge length), 2-Lanes (44' wide)

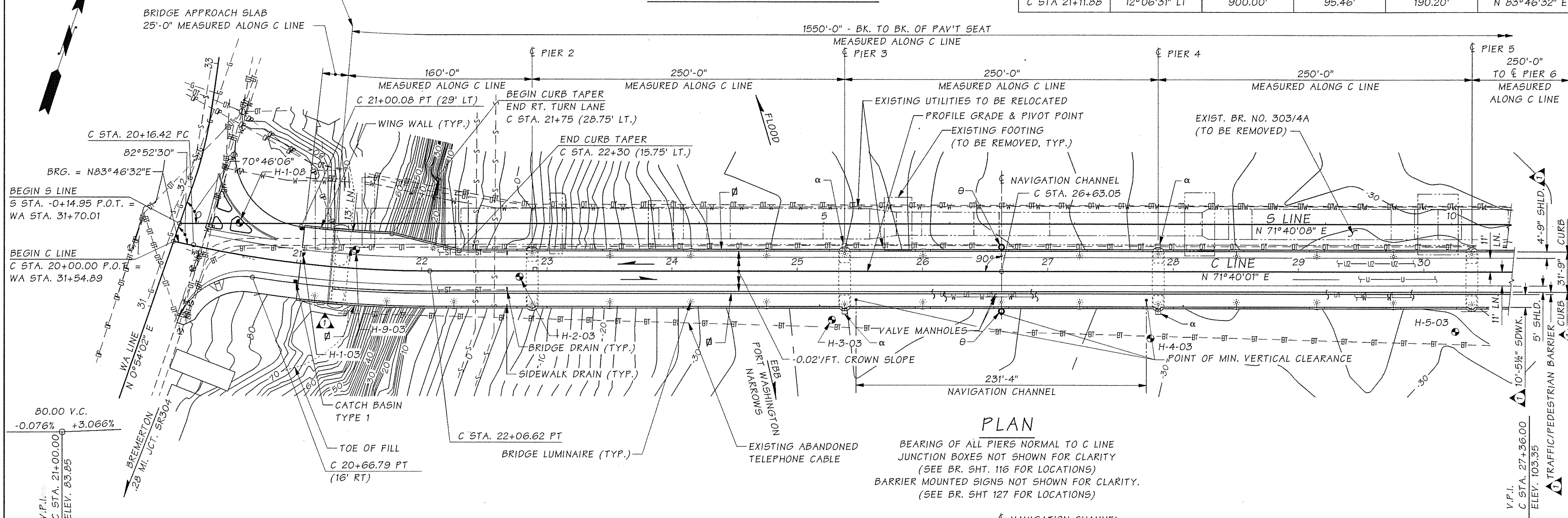
CONTENTS

1. Layout Plan Sheet
2. Field Notes
3. Crack Summary
4. Crack Intensity Diagram

SR 303

SEC. 13, T.24N., R.1E., W.M.
CITY OF BREMERTON

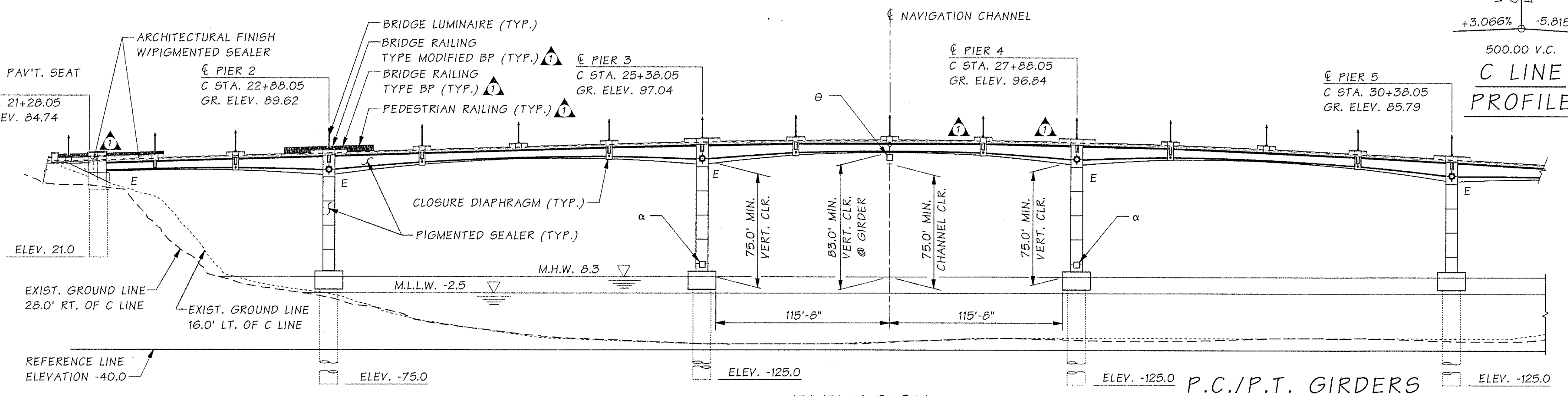
CURVE DATA					
P.I. STATION	△	RADIUS	TANGENT	LENGTH	BK. TANGENT BRG.
C STA 21+11.88	12°06'31" LT	900.00'	95.46'	190.20'	N 83°46'32" E



PLAN

BEARING OF ALL PIERS NORMAL TO C LINE
JUNCTION BOXES NOT SHOWN FOR CLARITY
(SEE BR. SHT. 116 FOR LOCATIONS)
BARRIER MOUNTED SIGNS NOT SHOWN FOR CLARITY.
(SEE BR. SHT 127 FOR LOCATIONS)

C LINE PROFILE



C LINE PROFILE

ELEVATION

GRADE ELEVATIONS SHOWN ARE FINISH GRADES AT TOP OF
ROADWAY ON C LINE AND ARE EQUAL TO PROFILE GRADE.
SEE GRADING PLANS FOR EMBANKMENT DETAILS AT ABUTMENT.

UTILITIES KEY

INFORMATION PROVIDED IN EXISTING UTILITIES SHEETS SHALL HAVE PRIORITY OVER EXISTING UTILITIES SHOWN ON THIS SHEET.

- —BT— —BT— — EXIST. BURIED TELEPHONE
- —G— —G— — EXIST. GAS PIPELINE
- —OP— —OP— — EXIST. OVERHEAD POWER
- —W— —W— — EXIST. WATER PIPE
- —S— —S— — EXIST. SAN. SEWER
- —OT— —OT— — EXIST. OVERHEAD TELEPHONE
- —ST——ST—— PROPOSED 8"ø STORM DRAIN
- —U——U—— PROPOSED 3 ~ 4"ø CONDUIT
- —U2—U2—U2— FUTURE 4 ~ 4"ø CONDUIT
- —W——W—— PROPOSED 12"ø WATER PIPE
- —U1—U1—U1— FUTURE 12"ø WATER PIPE

α - "RED" NAVIGATION LIGHT

θ - "GREEN" NAVIGATION LIGHT

ø - CONDUIT PIPES IN TRAFFIC, TRAFFIC/PEDESTRIAN, & PEDESTRIAN BARRIERS NUMBER & SIZE VARY ALONG LENGTH OF BRIDGE.

DATUM
N.A.V.D. OF 1988

P.C./P.T. GIRDERS
CONT. FOR LL
LOADING: HL-93

Bridge Design Engr.	Khaleghi, B		
Supervisor	Clarke, PT		
Designed By	ADM, EJF	03/10	
Checked By	EJF, ADM		
Detailed By	Puryear, D	03/10	
Bridge Projects Engr.	Lewis, RA		
Prelim. Plan By	Messmer, A		
Architect/Specialist	Kinderman, P		

M:\W-Team\MANETTE SR303\window files\NB-LAYOUT1.wnd

DATE	REVISION	BY	APP'D
06/2011	1 REV. SHT. FOR C.O. #30	EJF	
04/10	REV. DIMS & SHAFT TIP EL.ADD NOTE	PFS	

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 09C526

JUGESH KAPUR · STATE OF WASHINGTON · 25400 · PROFESSIONAL ENGINEER

6/9/11

Washington State Department of Transportation

BRIDGE AND STRUCTURES OFFICE

MANETTE BRIDGE 303/4A
BRIDGE REPLACEMENT

LAYOUT
1 OF 2

BRIDGE SHEET NO. 1

SHEET 161 OF 303 SHEETS

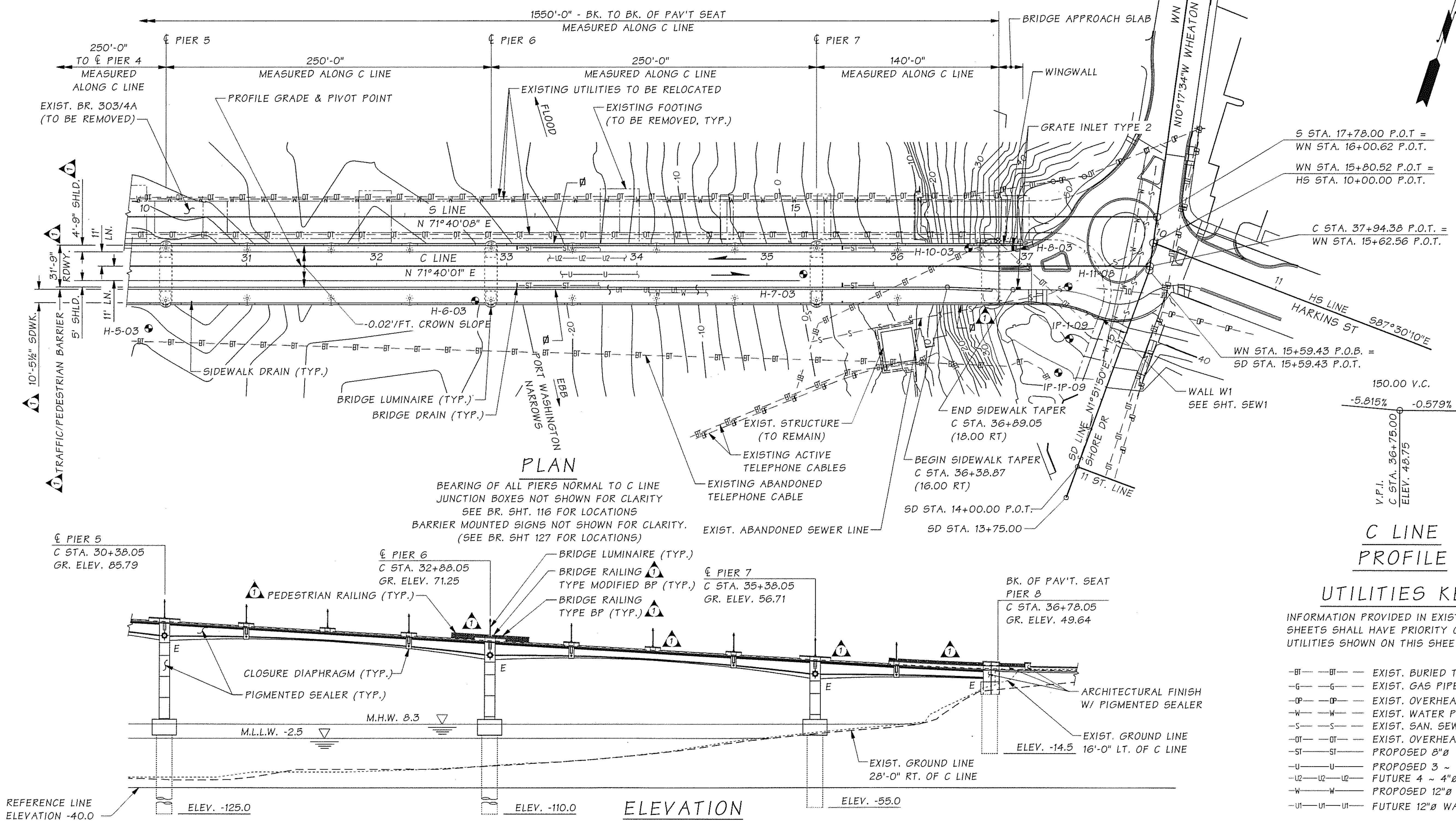
SR 303 FILE NO. 7004 SHEET 1

C.S. 1841 ~ PROJ. NO. OL2829 ~ OLYMPIC REGION ~ MANETTE BR. BREMERTON VIC BR. REPLACEMENT~ SR 303 SPUR

Thu Jun 09 14:41:50 2011

SEC. 13, T.24N., R.1E., W.M.
CITY OF BREMERTON

SR 303



GRADE ELEVATIONS SHOWN ARE FINISH GRADES AT TOP OF ROADWAY ON C LINE AND ARE EQUAL TO PROFILE GRADE. SEE GRADING PLANS FOR EMBANKMENT DETAILS AT ABUTMENT.

UTILITIES KEY

INFORMATION PROVIDED IN EXISTING UTILITIES SHEETS SHALL HAVE PRIORITY OVER EXISTING UTILITIES SHOWN ON THIS SHEET.

—BT— —BT— —	EXIST. BURIED TELEPHONE
—G— —G— —	EXIST. GAS PIPELINE
—OP— —OP— —	EXIST. OVERHEAD POWER
—W— —W— —	EXIST. WATER PIPE
—S— —S— —	EXIST. SAN. SEWER
—OT— —OT— —	EXIST. OVERHEAD TELEPHONE
—ST——ST——	PROPOSED 8"ø STORM DRAIN
—U——U——	PROPOSED 3 ~ 4"ø CONDUIT
—U2—U2—U2—	FUTURE 4 ~ 4"ø CONDUIT
—W——W——	PROPOSED 12"ø WATER PIPE
—U1—U1—U1—	FUTURE 12"ø WATER PIPE

ø - CONDUIT PIPES IN TRAFFIC, TRAFFIC/PEDESTRIAN, & PEDESTRIAN BARRIERS NUMBER & SIZE VARY ALONG LENGTH OF BRIDGE.

C.S. 1841 ~ PROJ. NO. OL2829 ~ OLYMPIC REGION ~ MP 2.98 TO 3.27 ~ SR 303 SPUR ~ MANETTE BR. NO. 303/4A REPL.

SR ____ FILE NO. ____ SHEET 2

Bridge Design Engr.	Khaleghi, B		M:\W-Team\MANETTE SR303\window files\NB-LAYOUT2.wnd		
Supervisor	Clarke, PT				
Designed By	ADM, EJF	03/10			
Checked By	EJF, ADM				
Detailed By	Puryear, D	03/10			
Bridge Projects Engr.	Lewis, RA		06/2011	1 REV. SHT. FOR C.O. #30	EJF
Prelim. Plan By	Messmer, A		03/10	CORRECT STA. CALLOUT, ADD NOTE	ADM
Architect/Specialist	Kinderman, P		DATE	REVISION	BY / APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 09C526

JUGESH KAPUR, STATE OF WASHINGTON, PROFESSIONAL ENGINEER

6/9/11

Washington State Department of Transportation

BRIDGE AND STRUCTURES OFFICE

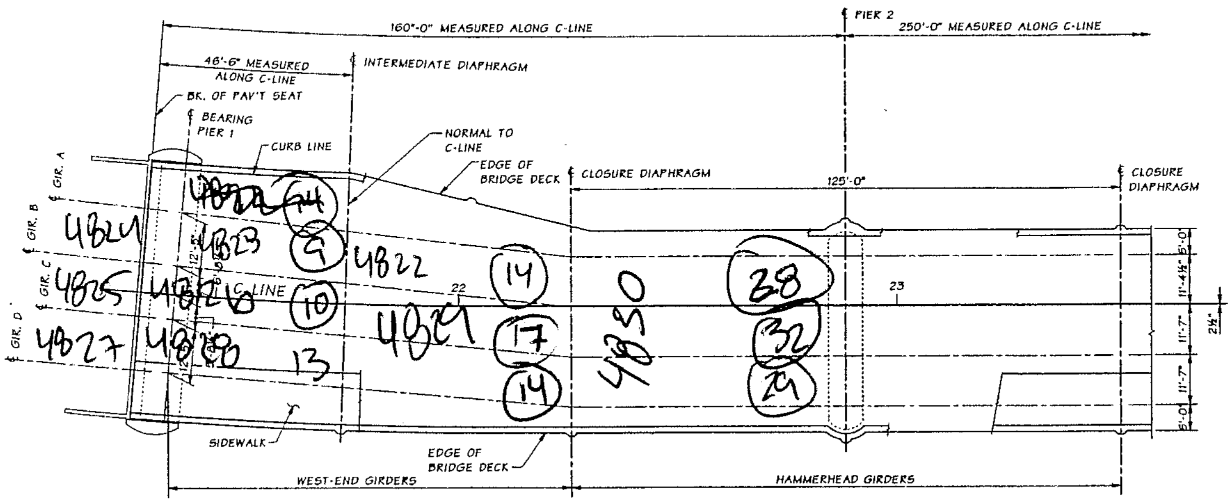
MANETTE BRIDGE 303/4A
BRIDGE REPLACEMENT

LAYOUT 2 OF 2

BRIDGE SHEET NO. 2

SHEET 162 OF 303 SHEETS

Thu Jun 09 14:41:58 2011



FRAMING PLAN

℄ BEARING PIER 1 IS PARALLEL TO BACK OF PAV'T SEAT.

SR ___ FILE NO. ___ SHEET 60

Bridge Design Engr.	Khaleghi, B		M:\W-Team\MANETTE SR303\Window files\41-FRAMING PLAN1.WND								
Supervisor	Clarke, PT						REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
Designed By	Messner, A	03/10					10	WASH.			
Checked By	Spitznas, P										
Detailed By	Puryear, D	03/10					JOB NUMBER 09C526				
Bridge Projects Engr.											
Prelim. Plan By											
Architect/Specialist			DATE	REVISION	BY	APP'D					

Wed Mar 17 15:38:18 2010

3/17/10

3/17/10

Washington State Department of Transportation

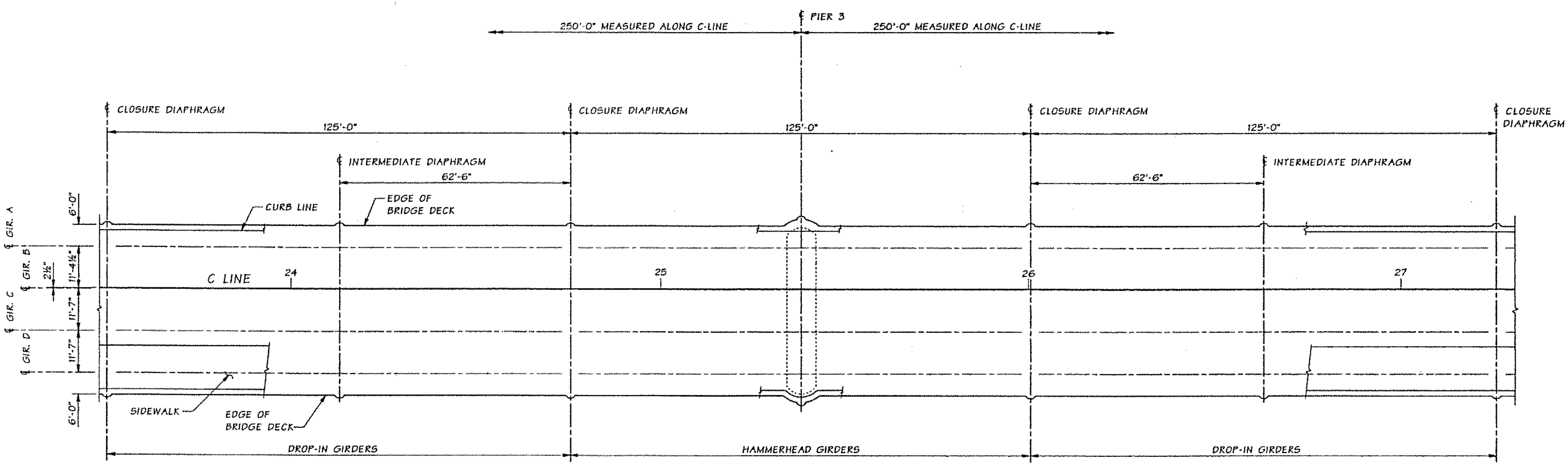
BRIDGE AND STRUCTURES OFFICE

MANETTE BRIDGE 303/4A
BRIDGE REPLACEMENT

FRAMING PLAN
1 OF 5

BRIDGE SHEET NO. 60

SHEET 220 OF 303 SHEETS



FRAMING PLAN

SR ____ FILE NO. ____ SHEET 61

Bridge Design Engr.	Khaleghi, B		M:\W-Team\MANETTE SR303\Window files\42-FRAMING PLAN2.WND			
Supervisor	Clarke, PT					
Designed By	Messmer, A	03/10				
Checked By	Spitznas, P					
Detailed By	Gunis, E	03/10				
Bridge Projects Engr.						
Prelim. Plan By						
Architect/Specialist			DATE	REVISION	BY	APP'D

Wed Mar 17 15:39:22 2010

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			
JOB NUMBER 09C526				

3/17/10

3/17/10

Washington State Department of Transportation

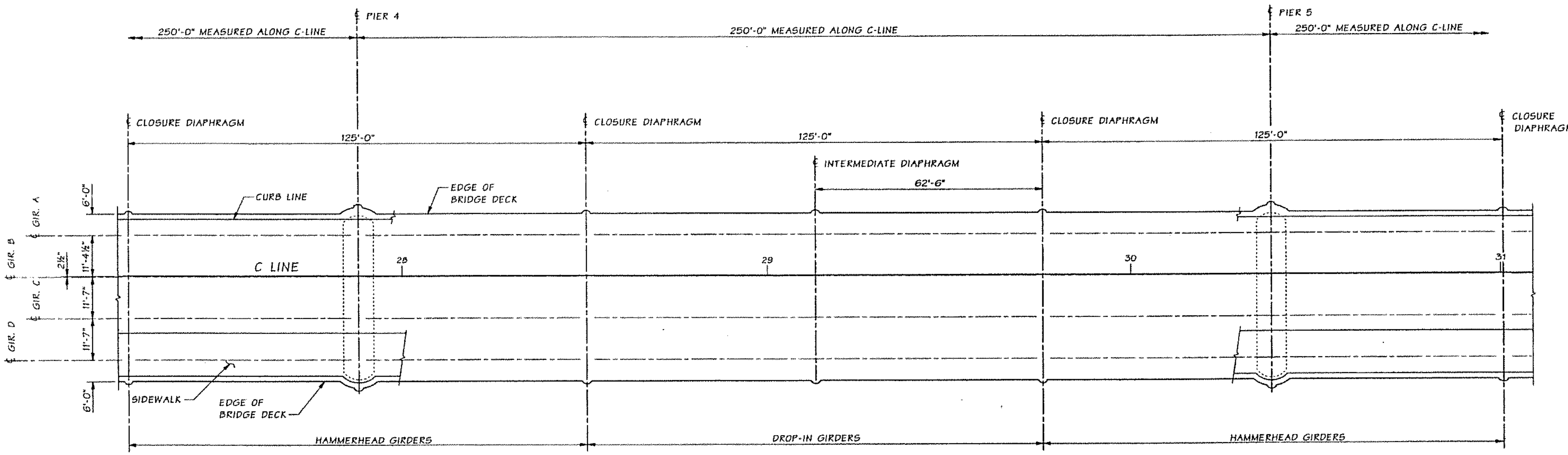
BRIDGE AND STRUCTURES OFFICE

MANETTE BRIDGE 303/4A
BRIDGE REPLACEMENT

FRAMING PLAN
2 OF 5

BRIDGE SHEET NO. 61

SHEET 221 OF 303 SHEETS



FRAMING PLAN

- Bridge Design Engr. Khaleghi, B
- Supervisor Clarke, PT
- Designed By Messmer, A 03/10
- Checked By Spitznas, P
- Detailed By Gunis, E 03/10
- Bridge Projects Engr.
- Prelim. Plan By
- Architect/Specialist

M:\W-Team\MANETTE SR303\Window files\43-FRAMING PLAN3.WND

DATE	REVISION	BY	APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 09C526

Wed Mar 17 15:39:25 2010

3/17/10

3/17/10

Washington State Department of Transportation

BRIDGE AND STRUCTURES OFFICE

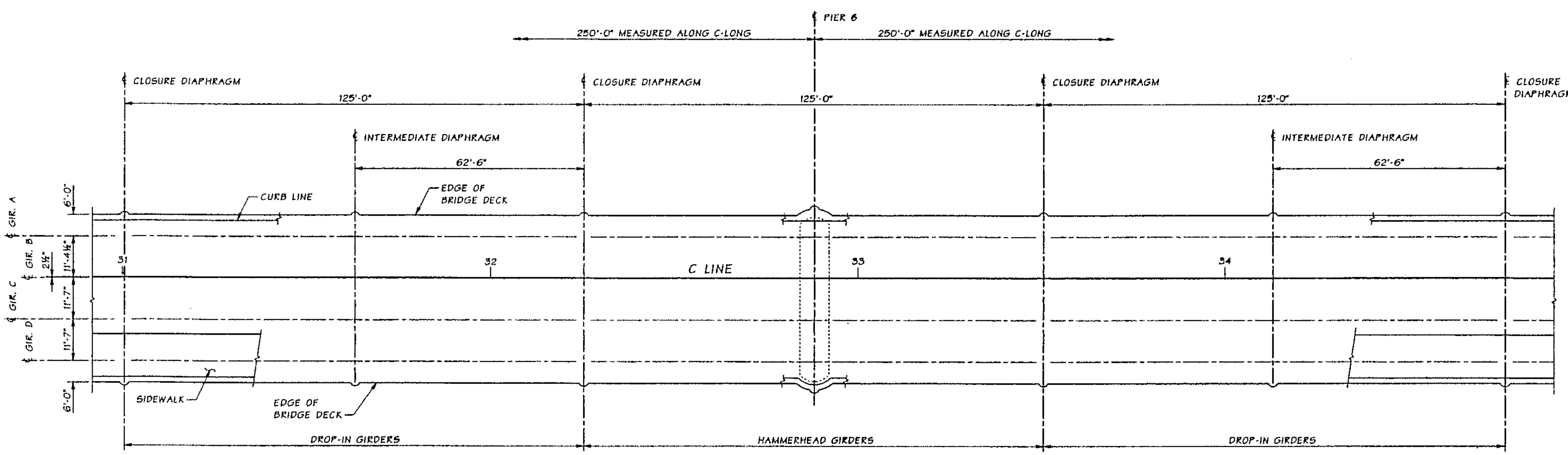
MANETTE BRIDGE 303/4A
BRIDGE REPLACEMENT

FRAMING PLAN
3 OF 5

BRIDGE SHEET NO. 62

SHEET 222 OF 303 SHEETS

SR ____ FILE NO. ____ SHEET 62



FRAMING PLAN

SR ___ FILE NO. ___ SHEET 63

Bridge Design Engr.	Khaleghi, B		M:\W-Team\MANETTE SR303\Window files\44-FRAMING PLAN4.WND								
Supervisor	Clarke, PT						REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
Designed By	Ferluga, E	03/10					10	WASH.			
Checked By	Spitznas, P										
Detailed By	Gunis, E	03/10					JOB NUMBER 09C526				
Bridge Projects Engr.											
Prelim. Plan By											
Architect/Specialist			DATE	REVISION	BY	APP'D					

Wed Mar 17 15:39:29 2010

3/17/10

3/17/10

Washington State Department of Transportation

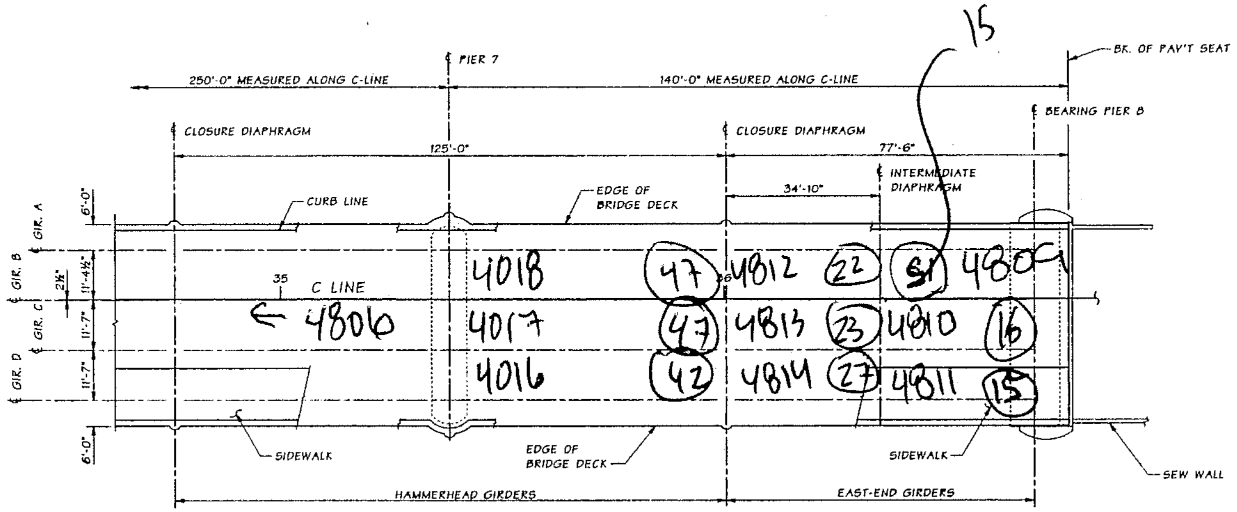
BRIDGE AND STRUCTURES OFFICE

MANETTE BRIDGE 303/4A
BRIDGE REPLACEMENT

FRAMING PLAN
4 OF 5

BRIDGE SHEET NO. 63

SHEET 223 OF 303 SHEETS



FRAMING PLAN

SR ___ FILE NO. ___ SHEET 64

Bridge Design Engr.	Khaleghi, B		M:\W-Team\MANETTE SR303\Window files\45-FRAMING PLANS.WND
Supervisor	Clarke, PT		
Designed By	Messmer, A	03/10	
Checked By	Spitznas, P		
Detailed By	Gunis, E	03/10	
Bridge Projects Engr.			
Prelim. Plan By			
Architect/Specialist			DATE / REVISION / BY / APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 00C526

Wed Mar 17 15:38:33 2010

3/17/10

3/17/10

Washington State Department of Transportation

BRIDGE AND STRUCTURES OFFICE

MANETTE BRIDGE 303/4A
BRIDGE REPLACEMENT

FRAMING PLAN
5 OF 5

BRIDGE SHEET NO. 64

SHEET 224 OF 303 SHEETS

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	303/4A	Bridge Name	Manette Bridge	Structure ID	0017926A
Contract #	7926	Region	OR	Project Engineer	Michele Britton
Performance Deck Concrete?	No				
Contractor	Manson-Mowat, A J.V.	Concrete Supplier		Deck Placement	≈ 2011
Bridge Description	7-Span (160' / 250' / 250' / 250' / 250' / 250' / 140'), 4-P.C./P.T. Girders (1550' bridge length), 2-Lanes (44' wide)				

L = length between diaphragms (or length of "bay")

S = girder spacing

N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	73%
Min. =	45%
Max. =	100%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	38.67	12.24	9	19	45%
1	1	B	C	38.67	12.24	10	19	55%
1	1	C	D	38.67	12.24	13	19	70%
1	2	A	B	51.00	11.82	14	26	55%
1	2	B	C	51.00	11.82	17	26	65%
1	2	C	D	51.00	11.82	14	26	55%
1	3	A	B	62.50	11.58	28	31	90%
1	3	B	C	62.50	11.58	32	31	100%
1	3	C	D	62.50	11.58	29	31	95%
2	1	A	B	62.50	11.58	#N/A	31	#N/A
2	1	B	C	62.50	11.58	#N/A	31	#N/A
2	1	C	D	62.50	11.58	#N/A	31	#N/A
2	2	A	B	62.50	11.58	#N/A	31	#N/A
2	2	B	C	62.50	11.58	#N/A	31	#N/A
2	2	C	D	62.50	11.58	#N/A	31	#N/A
2	3	A	B	62.50	11.58	#N/A	31	#N/A
2	3	B	C	62.50	11.58	#N/A	31	#N/A
2	3	C	D	62.50	11.58	#N/A	31	#N/A
2	4	A	B	62.50	11.58	#N/A	31	#N/A
2	4	B	C	62.50	11.58	#N/A	31	#N/A
2	4	C	D	62.50	11.58	#N/A	31	#N/A
3	1	A	B	62.50	11.58	#N/A	31	#N/A
3	1	B	C	62.50	11.58	#N/A	31	#N/A
3	1	C	D	62.50	11.58	#N/A	31	#N/A
3	2	A	B	62.50	11.58	#N/A	31	#N/A
3	2	B	C	62.50	11.58	#N/A	31	#N/A
3	2	C	D	62.50	11.58	#N/A	31	#N/A
3	3	A	B	62.50	11.58	#N/A	31	#N/A
3	3	B	C	62.50	11.58	#N/A	31	#N/A
3	3	C	D	62.50	11.58	#N/A	31	#N/A
3	4	A	B	62.50	11.58	#N/A	31	#N/A
3	4	B	C	62.50	11.58	#N/A	31	#N/A
3	4	C	D	62.50	11.58	#N/A	31	#N/A
4	1	A	B	62.50	11.58	#N/A	31	#N/A
4	1	B	C	62.50	11.58	#N/A	31	#N/A
4	1	C	D	62.50	11.58	#N/A	31	#N/A
4	2	A	B	62.50	11.58	#N/A	31	#N/A
4	2	B	C	62.50	11.58	#N/A	31	#N/A
4	2	C	D	62.50	11.58	#N/A	31	#N/A
4	3	A	B	62.50	11.58	#N/A	31	#N/A
4	3	B	C	62.50	11.58	#N/A	31	#N/A

Bridge #	303/4A	Bridge Name	Manette Bridge	Structure ID	0017926A
Contract #	7926	Region	OR	Project Engineer	Michele Britton
Performance Deck Concrete?	No				
Contractor	Manson-Mowat, A J.V.	Concrete Supplier		Deck Placement	≈ 2011
Bridge Description	7-Span (160' / 250' / 250' / 250' / 250' / 250' / 140'), 4-P.C./P.T. Girders (1550' bridge length), 2-Lanes (44' wide)				

L = length between diaphragms (or length of "bay")

S = girder spacing

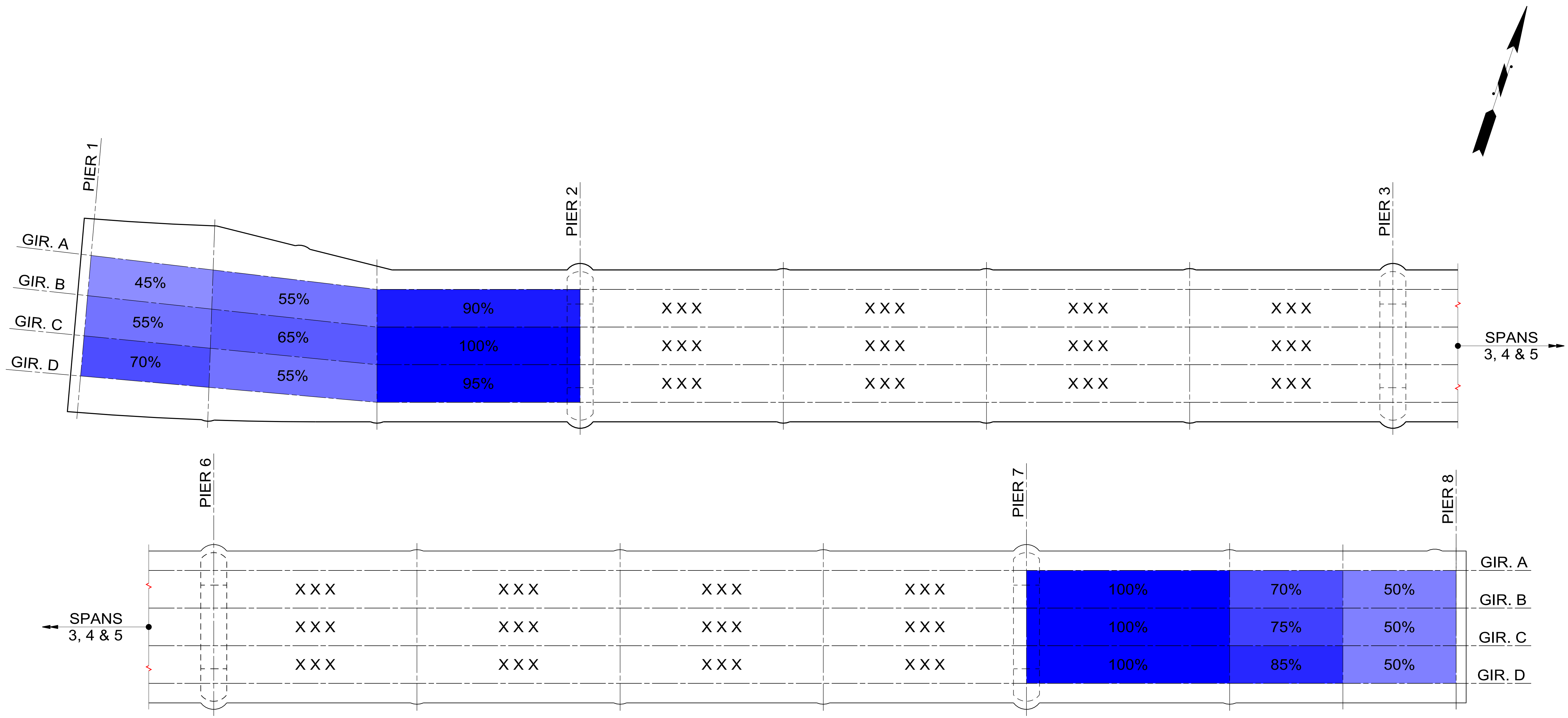
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	73%
Min. =	45%
Max. =	100%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
4	3	C	D	62.50	11.58	#N/A	31	#N/A
4	4	A	B	62.50	11.58	#N/A	31	#N/A
4	4	B	C	62.50	11.58	#N/A	31	#N/A
4	4	C	D	62.50	11.58	#N/A	31	#N/A
5	1	A	B	62.50	11.58	#N/A	31	#N/A
5	1	B	C	62.50	11.58	#N/A	31	#N/A
5	1	C	D	62.50	11.58	#N/A	31	#N/A
5	2	A	B	62.50	11.58	#N/A	31	#N/A
5	2	B	C	62.50	11.58	#N/A	31	#N/A
5	2	C	D	62.50	11.58	#N/A	31	#N/A
5	3	A	B	62.50	11.58	#N/A	31	#N/A
5	3	B	C	62.50	11.58	#N/A	31	#N/A
5	3	C	D	62.50	11.58	#N/A	31	#N/A
5	4	A	B	62.50	11.58	#N/A	31	#N/A
5	4	B	C	62.50	11.58	#N/A	31	#N/A
5	4	C	D	62.50	11.58	#N/A	31	#N/A
6	1	A	B	62.50	11.58	#N/A	31	#N/A
6	1	B	C	62.50	11.58	#N/A	31	#N/A
6	1	C	D	62.50	11.58	#N/A	31	#N/A
6	2	A	B	62.50	11.58	#N/A	31	#N/A
6	2	B	C	62.50	11.58	#N/A	31	#N/A
6	2	C	D	62.50	11.58	#N/A	31	#N/A
6	3	A	B	62.50	11.58	#N/A	31	#N/A
6	3	B	C	62.50	11.58	#N/A	31	#N/A
6	3	C	D	62.50	11.58	#N/A	31	#N/A
6	4	A	B	62.50	11.58	#N/A	31	#N/A
6	4	B	C	62.50	11.58	#N/A	31	#N/A
6	4	C	D	62.50	11.58	#N/A	31	#N/A
7	1	A	B	62.50	11.58	47	31	100%
7	1	B	C	62.50	11.58	47	31	100%
7	1	C	D	62.50	11.58	42	31	100%
7	2	A	B	62.50	34.83	22	31	70%
7	2	B	C	62.50	34.83	23	31	75%
7	2	C	D	62.50	34.83	27	31	85%
7	3	A	B	62.50	34.83	15	31	50%
7	3	B	C	62.50	34.83	16	31	50%
7	3	C	D	62.50	34.83	15	31	50%



CRACKING INTENSITY ~ BRIDGE 16/7S-E

100% = CRACK EVERY 2 FT.

X X X = CRACKS NOT COUNTED DUE TO LIMITED ACCESS

SPANS 3, 4 AND 5 NOT SHOWN FOR CLARITY

LESS CRACKING MORE CRACKING

BRIDGE NUMBER	303/4A
BRIDGE NAME	MANETTE BRIDGE
INSPECTION DATE	5/29/2015
DECK CONCRETE	TRADITIONAL

BRIDGE 90/106N (GOLD CREEK WB)

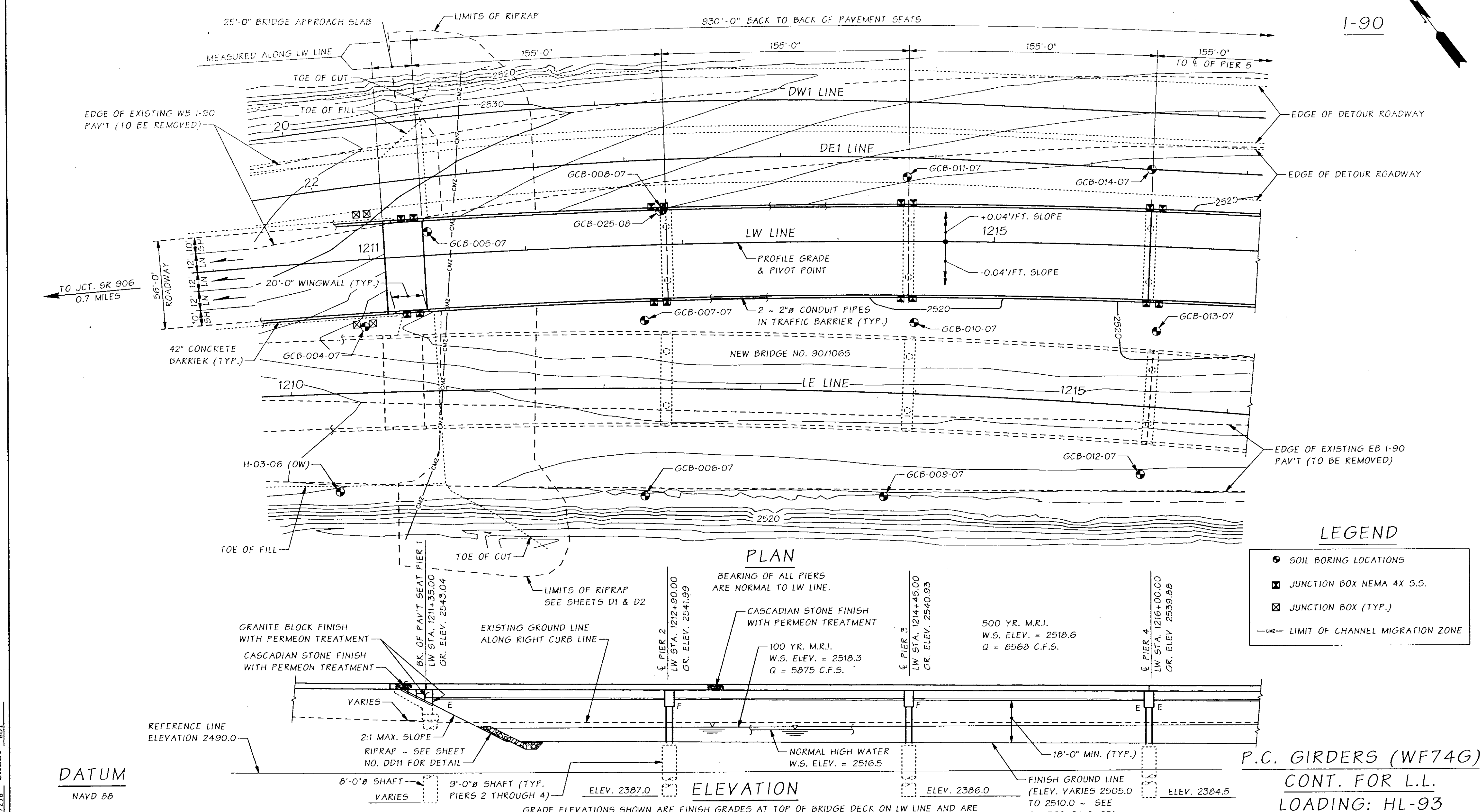
Bridge #	90/106N	Bridge Name	Gold Creek WB			Structure ID	0017852D
Contract #	7852	Region	SC	Project Engineer	Will Smith	Performance Deck Concrete?	No
Contractor	Max J. Kuney Company			Concrete Supplier		Deck Placement	≈ 2012
Bridge Description	6-Span (155' / 155' / 155' / 155' / 155' / 155'), 7-WF74G Girders (930' bridge length), 3-Lanes (56' wide roadway)						

CONTENTS

1. Layout Plan Sheet
2. Field Notes
3. Crack Summary
4. Crack Intensity Diagram

LW LINE CURVE DATA					
P.I. STA.	Δ	RADIUS	TANGENT	LENGTH	BACK TANGENT BEARING
1214+45.27	18°38'51" RT.	4685.00'	769.19'	1524.78'	S 61°50'12" E

SEC. 15, T.22N., R.11E., W.M.
KITTITAS COUNTY



GRADE ELEVATIONS SHOWN ARE FINISH GRADES AT TOP OF BRIDGE DECK ON LW LINE AND ARE EQUAL TO PROFILE GRADE. SEE STD. PLAN A-50.10-00 FOR EMBANKMENT DETAILS AT BRIDGE ENDS.

LEGEND

- SOIL BORING LOCATIONS
- JUNCTION BOX NEMA 4X S.S.
- JUNCTION BOX (TYP.)
- LIMIT OF CHANNEL MIGRATION ZONE

DATUM
NAVD 88

P.C. GIRDERS (WF74G)
CONT. FOR L.L.
LOADING: HL-93

Bridge Design Engr.	Khaleghi, B	
Supervisor	Stoddard, RB	
Designed By	Chu, A	11/08
Checked By	JB/RC/PRG/PMN	10/09
Detailed By	McCarthy, DJ	09/09
Bridge Projects Engr.	Lewis, RA	08/08
Prelim. Plan By	Wei, J	06/08
Architect/Specialist	PDK, BSA, GAW	08/08

M:\X-Team\I-90 HYAK - SS VIC\BR 90-106N\window files\001 LAYOUT 1.WND

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER C9Y019

DATE	REVISION	BY	APP'D

BRIDGE AND STRUCTURES OFFICE

BRIAN KHALEGHI STATE OF WASHINGTON 37085 REGISTERED PROFESSIONAL ENGINEER

10/19/09

Washington State Department of Transportation

I-90
HYAK TO SNOWSHED VICINITY PHASE 1B - ADD LANES AND BRIDGES
GOLD CR BR. NO. 90/106N REPLACEMENT

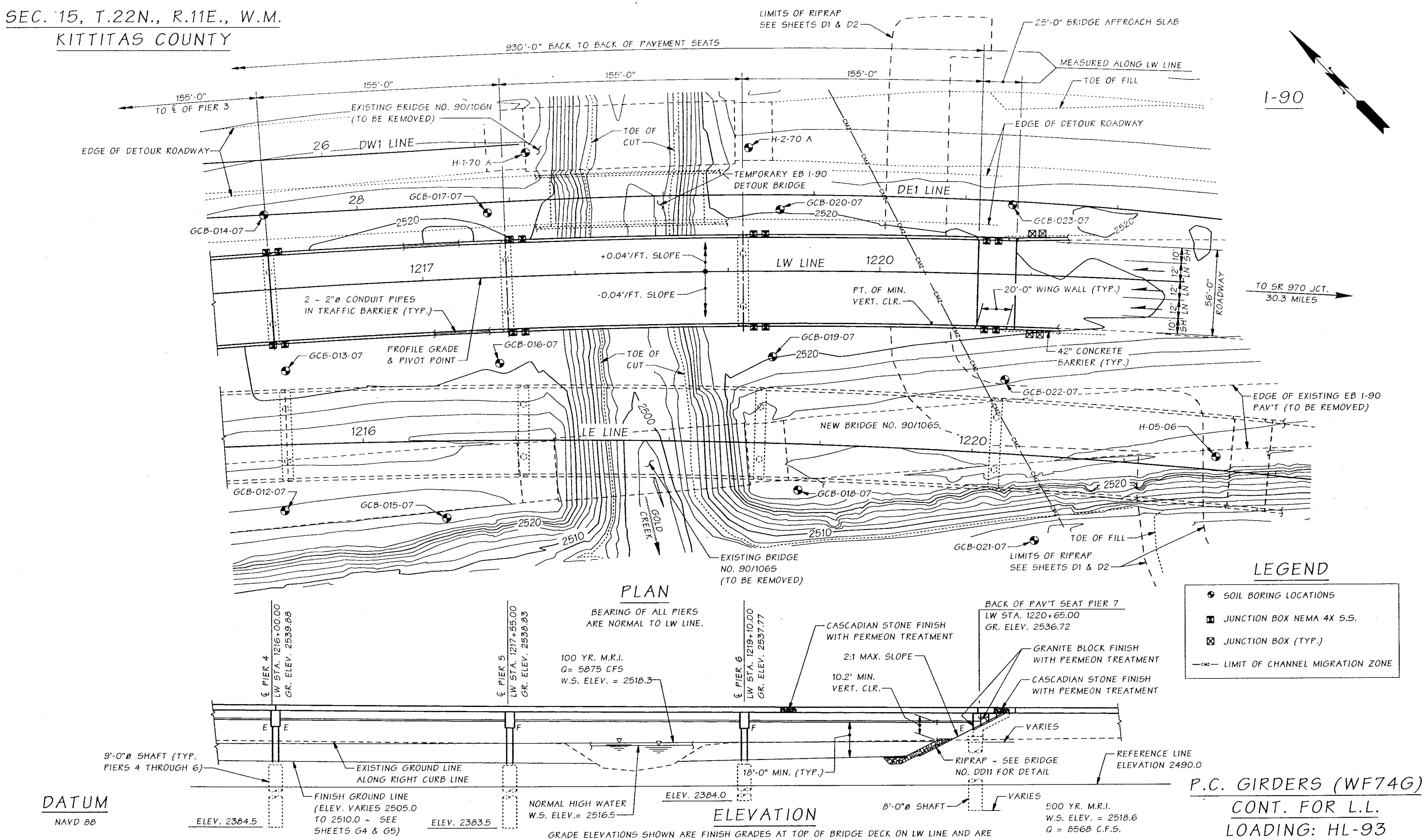
LAYOUT 1 OF 2

BRIDGE SHEET NO. BD1
SHEET 622 OF 808 SHEETS

Mon Oct 19 07:14:56 2009

SR 90 FILE NO. 7258 SHEET BD1

C.S. 190115 ~ PROJ. NO. XL2779F ~ SOUTH CENTRAL REGION ~ I-90 ~ MP 55.37 TO MP 55.55 ~ GOLD CR BR. NO. 90/106N REPLACEMENT



GRADE ELEVATIONS SHOWN ARE FINISH GRADES AT TOP OF BRIDGE DECK ON LW LINE AND ARE EQUAL TO PROFILE GRADE. SEE STD. PLAN A-50.10-00 FOR EMBANKMENT DETAILS AT BRIDGE ENDS.

Bridge Design Engr.	Khaleghi, B	
Supervisor	Stoddard, RB	
Designed By	Chu, A	11/08
Checked By	JB/RC/PRG/PMN	10/09
Detailed By	McCarthy, DJ	09/09
Bridge Projects Engr.	Lewis, RA	06/08
Prelim. Plan By	Wei, J	08/08
Architect/Specialist	PDK, BSA, GAW	08/08

M:\X-Team\I-90 HYAK - SS VIC\BR 90-106N\window files\002 LAYOUT 2.WND

DATE | REVISION | BY | APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 09Y019

BRIDGE AND STRUCTURES OFFICE

BRIAN KHALEGHI STATE OF WASHINGTON PROFESSIONAL ENGINEER 10/19/09

Washington State Department of Transportation

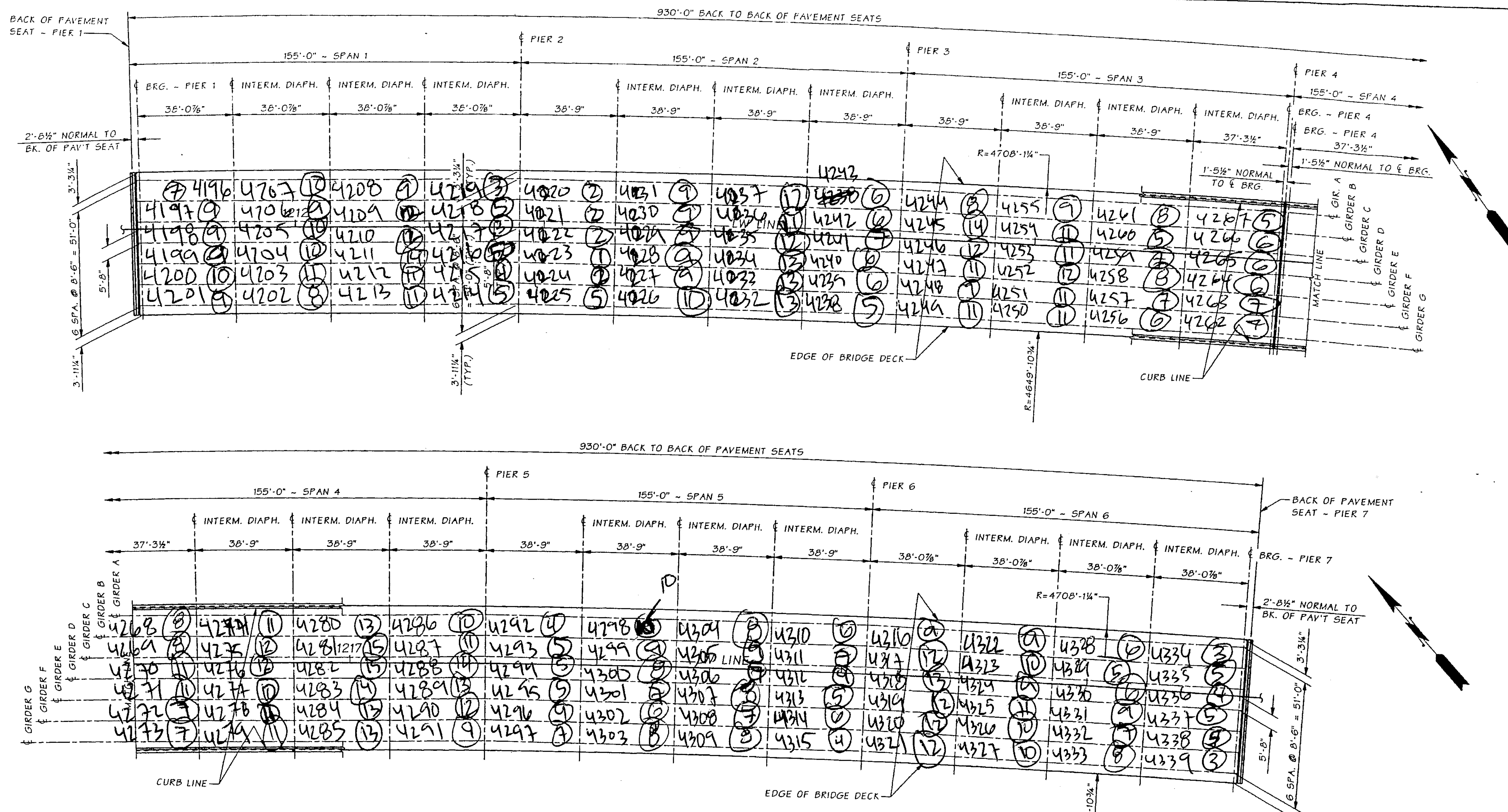
I-90
HYAK TO SNOWSHED VICINITY PHASE 1B - ADD LANES AND BRIDGES
GOLD CR BR. NO. 90/106N REPLACEMENT
LAYOUT 2 OF 2

BRIDGE SHEET NO. BD2
SHEET 623 OF 808 SHEETS

SR 90 FILE NO. 7258 SHEET BD2

C.S. 190115 ~ PROJ. NO. XL2779F ~ SOUTH CENTRAL REGION ~ I-90 ~ MP 55.37 TO MP 55.55 ~ GOLD CR BR. NO. 90/106N REPLACEMENT

Mon Oct 19 07:15:24 2009



FRAMING PLAN

ALL LONGITUDINAL DIMENSIONS ARE ALONG LW LINE UNLESS OTHERWISE SHOWN.

Bridge Design Engr.	Khaleghi, B	
Supervisor	Stoddard, RB	
Designed By	Chu, A	11/08
Checked By	PMN/PRG	10/09
Detailed By	McCarthy, DJ	09/09
Bridge Projects Engr.		
Prelim. Plan By		
Architect/Specialist		

Sun Oct 18 08:41:32 2009

M:\X-Team\I-90 HYAK - SS VIC\BR 90-106N\Window files\FRAMING PLAN.WND

DATE | REVISION | BY | APP'D

REGION NO. 10 | STATE WASH. | FED. AID PROJ. NO. | SHEET NO. | TOTAL SHEETS

JOB NUMBER 09Y019

ARTHUR CHU — STATE OF WASHINGTON — PROFESSIONAL ENGINEER — 10/19/09

BRIDGE AND STRUCTURES OFFICE

RICHARD B. STODDARD — STATE OF WASHINGTON — PROFESSIONAL ENGINEER — 10/19/09

Washington State Department of Transportation

I-90
HYAK TO SNOWSHED VICINITY PHASE 1B - ADD LANES AND BRIDGES
GOLD CR BR. NO. 90/106N REPLACEMENT

FRAMING PLAN

BRIDGE SHEET NO. BD28

SHEET 649 OF 808 SHEETS

SR 90 FILE NO. 7258 SHEET BD28

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	90/106N	Bridge Name	Gold Creek WB	Structure ID	0017852D
Contract #	7852	Region	SC	Project Engineer	Will Smith
Performance Deck Concrete?	No	Contractor	Max J. Kuney Company	Concrete Supplier	
Deck Placement	≈ 2012				

Bridge Description: 6-Span (155' / 155' / 155' / 155' / 155' / 155'), 7-WF74G Girders (930' bridge length), 3-Lanes (56' wide roadway)

L = length between diaphragms (or length of "bay")

S = girder spacing

N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	44%
Min. =	5%
Max. =	80%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	38.07	8.50	7	19	35%
1	1	B	C	38.07	8.50	9	19	45%
1	1	C	D	38.07	8.50	9	19	45%
1	1	D	E	38.07	8.50	9	19	45%
1	1	E	F	38.07	8.50	10	19	55%
1	1	F	G	38.07	8.50	9	19	45%
1	2	A	B	38.07	8.50	10	19	55%
1	2	B	C	38.07	8.50	9	19	45%
1	2	C	D	38.07	8.50	10	19	55%
1	2	D	E	38.07	8.50	10	19	55%
1	2	E	F	38.07	8.50	11	19	60%
1	2	F	G	38.07	8.50	8	19	40%
1	3	A	B	38.07	8.50	9	19	45%
1	3	B	C	38.07	8.50	12	19	65%
1	3	C	D	38.07	8.50	12	19	65%
1	3	D	E	38.07	8.50	14	19	75%
1	3	E	F	38.07	8.50	11	19	60%
1	3	F	G	38.07	8.50	11	19	60%
1	4	A	B	38.07	8.50	3	19	15%
1	4	B	C	38.07	8.50	5	19	25%
1	4	C	D	38.07	8.50	3	19	15%
1	4	D	E	38.07	8.50	5	19	25%
1	4	E	F	38.07	8.50	4	19	20%
1	4	F	G	38.07	8.50	5	19	25%
2	1	A	B	38.75	8.50	2	19	10%
2	1	B	C	38.75	8.50	2	19	10%
2	1	C	D	38.75	8.50	2	19	10%
2	1	D	E	38.75	8.50	1	19	5%
2	1	E	F	38.75	8.50	2	19	10%
2	1	F	G	38.75	8.50	5	19	25%
2	2	A	B	38.75	8.50	9	19	45%
2	2	B	C	38.75	8.50	9	19	45%
2	2	C	D	38.75	8.50	9	19	45%
2	2	D	E	38.75	8.50	9	19	45%
2	2	E	F	38.75	8.50	9	19	45%
2	2	F	G	38.75	8.50	10	19	55%
2	3	A	B	38.75	8.50	12	19	65%
2	3	B	C	38.75	8.50	11	19	60%
2	3	C	D	38.75	8.50	12	19	65%
2	3	D	E	38.75	8.50	13	19	70%
2	3	E	F	38.75	8.50	13	19	70%

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	90/106N	Bridge Name	Gold Creek WB	Structure ID	0017852D
Contract #	7852	Region	SC	Project Engineer	Will Smith
Performance Deck Concrete?	No	Contractor	Max J. Kuney Company	Concrete Supplier	
Deck Placement	≈ 2012				

Bridge Description: 6-Span (155' / 155' / 155' / 155' / 155' / 155'), 7-WF74G Girders (930' bridge length), 3-Lanes (56' wide roadway)

L = length between diaphragms (or length of "bay")
S = girder spacing
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)
N_{cr} = number of leaching cracks counted during visual inspection
% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	44%
Min. =	5%
Max. =	80%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
2	3	F	G	38.75	8.50	13	19	70%
2	4	A	B	38.75	8.50	6	19	30%
2	4	B	C	38.75	8.50	6	19	30%
2	4	C	D	38.75	8.50	7	19	35%
2	4	D	E	38.75	8.50	6	19	30%
2	4	E	F	38.75	8.50	6	19	30%
2	4	F	G	38.75	8.50	5	19	25%
3	1	A	B	38.75	8.50	8	19	40%
3	1	B	C	38.75	8.50	14	19	75%
3	1	C	D	38.75	8.50	12	19	65%
3	1	D	E	38.75	8.50	11	19	60%
3	1	E	F	38.75	8.50	9	19	45%
3	1	F	G	38.75	8.50	11	19	60%
3	2	A	B	38.75	8.50	9	19	45%
3	2	B	C	38.75	8.50	11	19	60%
3	2	C	D	38.75	8.50	11	19	60%
3	2	D	E	38.75	8.50	12	19	65%
3	2	E	F	38.75	8.50	11	19	60%
3	2	F	G	38.75	8.50	11	19	60%
3	3	A	B	38.75	8.50	8	19	40%
3	3	B	C	38.75	8.50	5	19	25%
3	3	C	D	38.75	8.50	7	19	35%
3	3	D	E	38.75	8.50	8	19	40%
3	3	E	F	38.75	8.50	7	19	35%
3	3	F	G	38.75	8.50	6	19	30%
3	4	A	B	38.75	8.50	5	19	25%
3	4	B	C	38.75	8.50	6	19	30%
3	4	C	D	38.75	8.50	6	19	30%
3	4	D	E	38.75	8.50	6	19	30%
3	4	E	F	38.75	8.50	7	19	35%
3	4	F	G	38.75	8.50	7	19	35%
4	1	A	B	38.75	8.50	8	19	40%
4	1	B	C	38.75	8.50	8	19	40%
4	1	C	D	38.75	8.50	11	19	60%
4	1	D	E	38.75	8.50	11	19	60%
4	1	E	F	38.75	8.50	7	19	35%
4	1	F	G	38.75	8.50	7	19	35%
4	2	A	B	38.75	8.50	11	19	60%
4	2	B	C	38.75	8.50	12	19	65%
4	2	C	D	38.75	8.50	12	19	65%
4	2	D	E	38.75	8.50	10	19	55%

Bridge Deck Concrete Study

Washington State Department of Transportation

Bridge #	90/106N	Bridge Name	Gold Creek WB	Structure ID	0017852D
Contract #	7852	Region	SC	Project Engineer	Will Smith
Performance Deck Concrete?	No	Contractor	Max J. Kuney Company	Concrete Supplier	
Deck Placement	≈ 2012	Bridge Description	6-Span (155' / 155' / 155' / 155' / 155' / 155'), 7-WF74G Girders (930' bridge length), 3-Lanes (56' wide roadway)		

L = length between diaphragms (or length of "bay")

S = girder spacing

N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. = 44%
Min. = 5%
Max. = 80%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
4	2	E	F	38.75	8.50	11	19	60%
4	2	F	G	38.75	8.50	11	19	60%
4	3	A	B	38.75	8.50	13	19	70%
4	3	B	C	38.75	8.50	15	19	80%
4	3	C	D	38.75	8.50	15	19	80%
4	3	D	E	38.75	8.50	14	19	75%
4	3	E	F	38.75	8.50	13	19	70%
4	3	F	G	38.75	8.50	13	19	70%
4	4	A	B	38.75	8.50	10	19	55%
4	4	B	C	38.75	8.50	11	19	60%
4	4	C	D	38.75	8.50	14	19	75%
4	4	D	E	38.75	8.50	13	19	70%
4	4	E	F	38.75	8.50	12	19	65%
4	4	F	G	38.75	8.50	9	19	45%
5	1	A	B	38.75	8.50	4	19	20%
5	1	B	C	38.75	8.50	5	19	25%
5	1	C	D	38.75	8.50	5	19	25%
5	1	D	E	38.75	8.50	5	19	25%
5	1	E	F	38.75	8.50	4	19	20%
5	1	F	G	38.75	8.50	7	19	35%
5	2	A	B	38.75	8.50	10	19	55%
5	2	B	C	38.75	8.50	9	19	45%
5	2	C	D	38.75	8.50	8	19	40%
5	2	D	E	38.75	8.50	7	19	35%
5	2	E	F	38.75	8.50	6	19	30%
5	2	F	G	38.75	8.50	8	19	40%
5	3	A	B	38.75	8.50	8	19	40%
5	3	B	C	38.75	8.50	9	19	45%
5	3	C	D	38.75	8.50	7	19	35%
5	3	D	E	38.75	8.50	8	19	40%
5	3	E	F	38.75	8.50	7	19	35%
5	3	F	G	38.75	8.50	8	19	40%
5	4	A	B	38.75	8.50	6	19	30%
5	4	B	C	38.75	8.50	7	19	35%
5	4	C	D	38.75	8.50	9	19	45%
5	4	D	E	38.75	8.50	5	19	25%
5	4	E	F	38.75	8.50	6	19	30%
5	4	F	G	38.75	8.50	4	19	20%
6	1	A	B	38.07	8.50	9	19	45%
6	1	B	C	38.07	8.50	12	19	65%
6	1	C	D	38.07	8.50	13	19	70%

Bridge Deck Concrete Study

Bridge #	90/106N	Bridge Name	Gold Creek WB	Structure ID	0017852D
Contract #	7852	Region	SC	Project Engineer	Will Smith
Performance Deck Concrete?	No	Contractor	Max J. Kuney Company	Concrete Supplier	
Deck Placement	≈ 2012				

Bridge Description: 6-Span (155' / 155' / 155' / 155' / 155' / 155'), 7-WF74G Girders (930' bridge length), 3-Lanes (56' wide roadway)

L = length between diaphragms (or length of "bay")

S = girder spacing

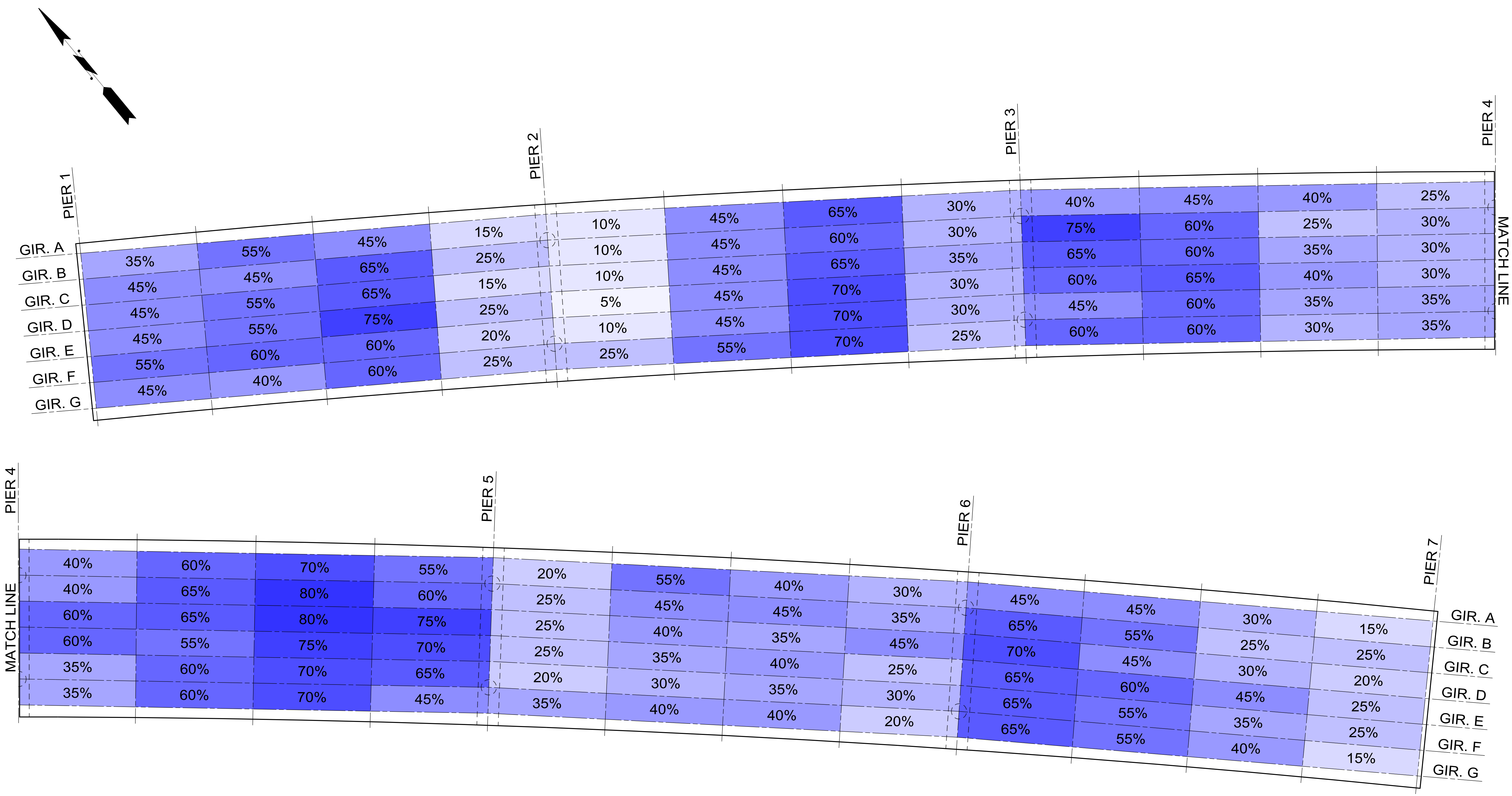
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	44%
Min. =	5%
Max. =	80%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
6	1	D	E	38.07	8.50	12	19	65%
6	1	E	F	38.07	8.50	12	19	65%
6	1	F	G	38.07	8.50	12	19	65%
6	2	A	B	38.07	8.50	9	19	45%
6	2	B	C	38.07	8.50	10	19	55%
6	2	C	D	38.07	8.50	9	19	45%
6	2	D	E	38.07	8.50	11	19	60%
6	2	E	F	38.07	8.50	10	19	55%
6	2	F	G	38.07	8.50	10	19	55%
6	3	A	B	38.07	8.50	6	19	30%
6	3	B	C	38.07	8.50	5	19	25%
6	3	C	D	38.07	8.50	6	19	30%
6	3	D	E	38.07	8.50	9	19	45%
6	3	E	F	38.07	8.50	7	19	35%
6	3	F	G	38.07	8.50	8	19	40%
6	4	A	B	38.07	8.50	3	19	15%
6	4	B	C	38.07	8.50	5	19	25%
6	4	C	D	38.07	8.50	4	19	20%
6	4	D	E	38.07	8.50	5	19	25%
6	4	E	F	38.07	8.50	5	19	25%
6	4	F	G	38.07	8.50	3	19	15%



CRACKING INTENSITY ~ BRIDGE 90/106N

100% = CRACK EVERY 2 FT.

LESS CRACKING MORE CRACKING

BRIDGE NUMBER	90/106N
BRIDGE NAME	GOLD CREEK WB
INSPECTION DATE	5/20/2015
DECK CONCRETE	TRADITIONAL

6/115 (SOUTH FORK CHEHALIS RIVER)

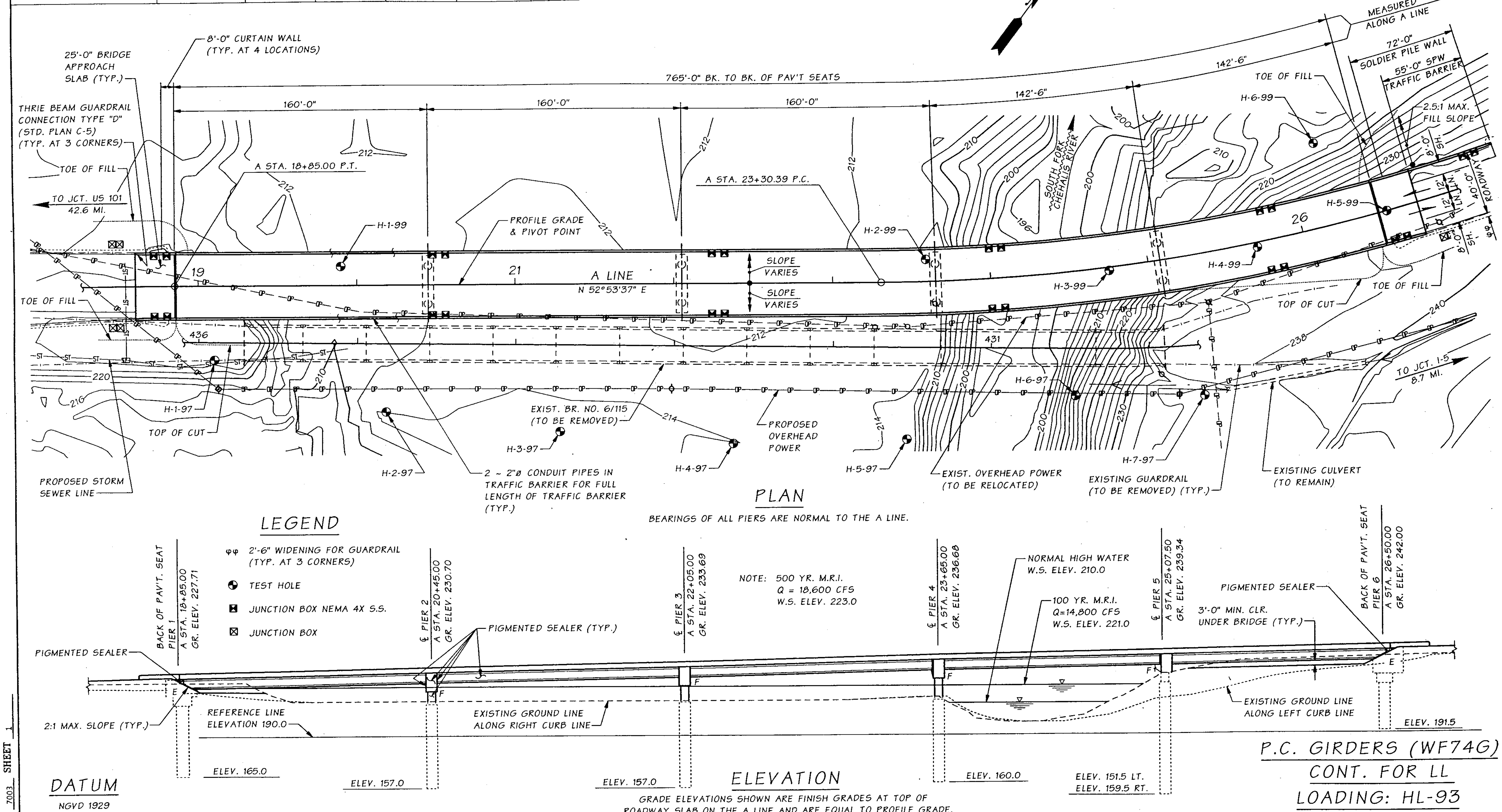
Bridge #	6/115	Bridge Name	South Fork Chehalis River	Structure ID	0017587A
Contract #	7587	Region	SW	Project Engineer	Collin Newell
Performance Deck Concrete?	No				
Contractor	Scarsella Bros.	Concrete Supplier	Unknown	Deck Placement	≈ 2009
Bridge Description	5-Span (160' / 160' / 160' / 142.5' / 142.5'), 5-WF74G Girders (765' bridge length), 2-Lanes (40' wide roadway)				

CONTENTS

A LINE CURVE DATA					
P.I. STATION	Δ	RADIUS	TANGENT	LENGTH	BK. TANGENT BRG.
A STA. 27+35.93	36°57'15" LT.	1213.65'	405.54'	782.77'	N 52°53'37" E
A STA. 16+25.04	2°33'07" RT.	11675.00'	260.04'	520.00'	N 50°20'30" E

SEC. 24, T. 13 N., R. 4 W., W.M.
LEWIS COUNTY

SR 6



P.C. GIRDERS (WF74G)
CONT. FOR LL
LOADING: HL-93

Bridge Design Engr.	Khaleghi, B	
Supervisor	Anderson, MW	
Designed By	AAB/SLL/PRG	05/07
Checked By	AAB/SLL/PRG	03/08
Detailed By	McCarthy, DJ	10/07
Bridge Projects Engr.	Lewis, RA	05/07
Prelim. Plan By	Bushnaq, AA	05/07
Architect/Specialist	PDK/BK/GAW	05/07

M:\X-Team\S FORK CHEHALIS R\Window files\LAYOUT.WND

DATE | REVISION | BY | APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 08X309

BRIDGE AND STRUCTURES OFFICE

JUGESH KAPUR — STATE OF WASHINGTON — 33400 — REGISTERED PROFESSIONAL ENGINEER — EXPIRES 5/19/10

6/19/08

Washington State Department of Transportation

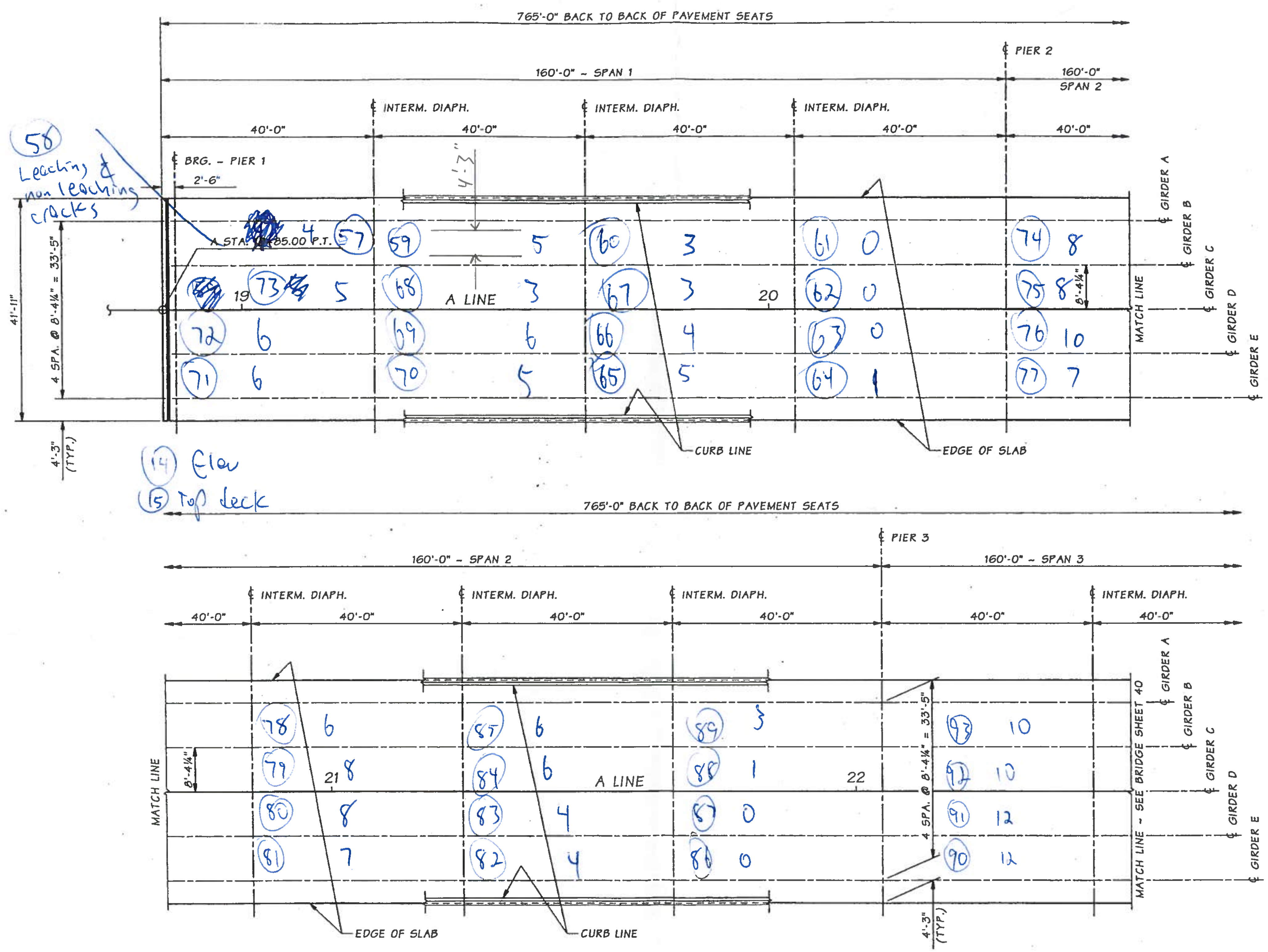
SR 6
SO. FORK
CHEHALIS RIVER BRIDGE
SOUTH FORK CHEHALIS RIVER BR. 6/115 REPLACEMENT
LAYOUT

BRIDGE SHEET NO. 1
SHEET 61 OF 149 SHEETS

SR 6 JOB NO. 7003 SHEET 1

C.S. 2105 ~ PROJ. NO. 0L0911 ~ SOUTHWEST REGION ~ M.P. 42.48 TO M.P. 42.91 ~ SR 6 ~ SOUTH FORK CHEHALIS RIVER BR. NO. 6/115 REPL.

Tue Jun 17 16:07:10 2008



FRAMING PLAN SPANS 1 THROUGH PARTIAL SPAN 3

ALL DIMENSIONS ARE NORMAL TO OR ALONG THE A LINE, ℄ BEARING & ℄ PIER UNLESS OTHERWISE SHOWN. BEARING OF ALL PIERS IS NORMAL TO THE A LINE.

Bridge Design Engr.	Khaleghi, B		
Supervisor	Anderson, MW		
Designed By	Lowry, S	05/07	
Checked By	Bushnaq, AA	03/08	
Detailed By	McCarthy, DJ	05/07	
Bridge Projects Engr.			
Prelim. Plan By			
Architect/Specialist			

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DATE	REVISION	BY	APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 08X309

BRIDGE AND STRUCTURES OFFICE

6/18/08 6/18/08

Washington State Department of Transportation

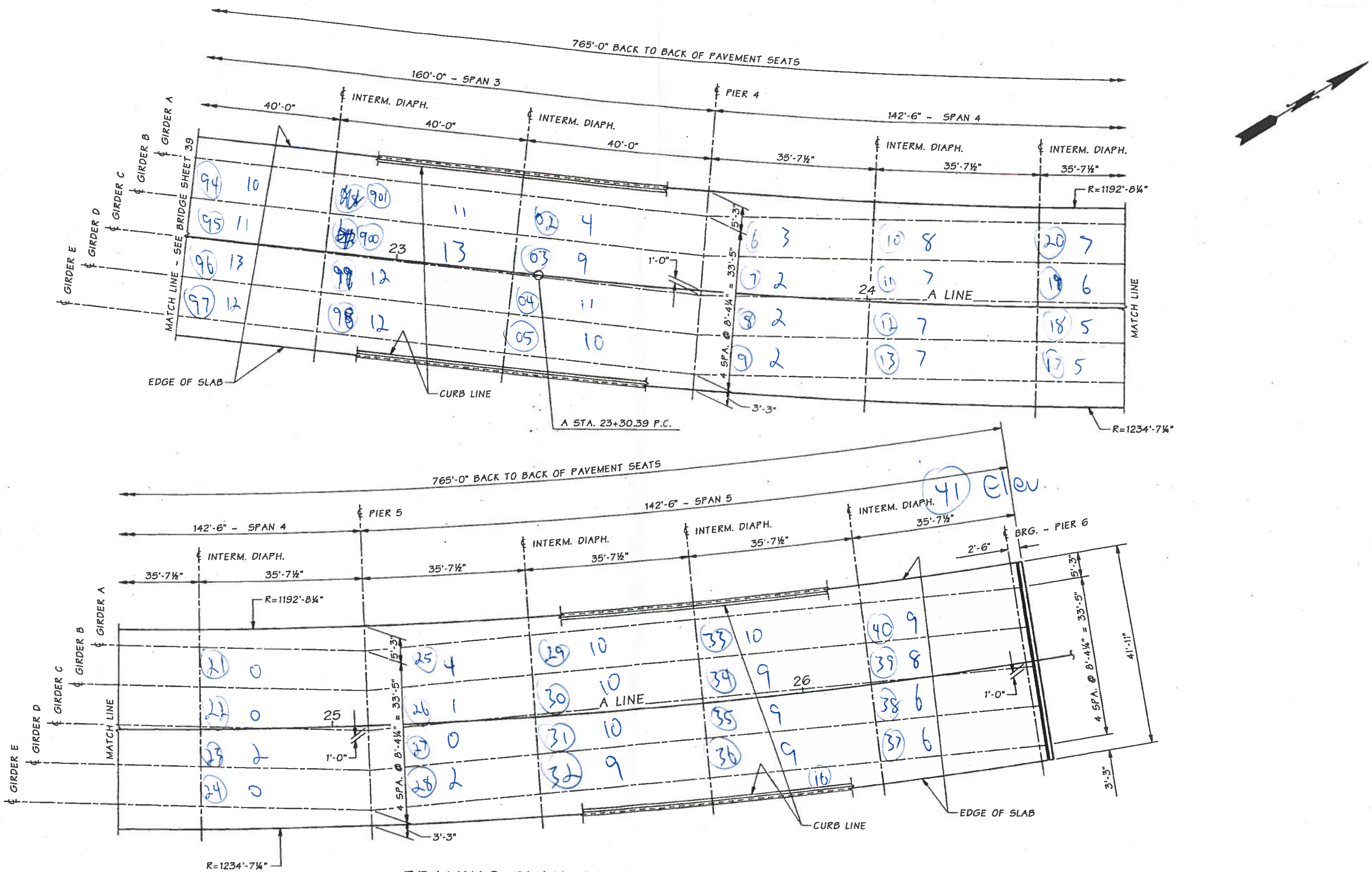
SR 6
SO. FORK
CHEHALIS RIVER BRIDGE
SOUTH FORK CHEHALIS RIVER BR. 6/115 REPLACEMENT

FRAMING PLAN 1 OF 2

BRIDGE SHEET NO. 39
SHEET 99 OF 149 SHEETS

SR 6 JOB NO. 7003 SHEET 39

Tue Jun 17 16:08:07 2008



FRAMING PLAN PARTIAL SPAN 3 THROUGH SPAN 5

ALL DIMENSIONS ARE NORMAL TO OR ALONG THE A LINE, ℄ BEARING & ℄ PIER UNLESS OTHERWISE SHOWN. BEARING OF ALL PIERS IS NORMAL TO THE A LINE.

Bridge Design Engr.	Khaleghi, B	
Supervisor	Anderson, MW	
Designed By	Lowry, S	05/07
Checked By	Bushnaq, AA	03/08
Detailed By	McCarthy, DJ	05/07
Bridge Projects Engr.		
Prelim. Plan By		
Architect/Specialist		

Tue Jun 17 16:08:08 2008

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DATE | REVISION | BY | APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 08X309

BRIDGE AND STRUCTURES OFFICE

6/18/08

6/18/08

EXPIRES 9/30/08

EXPIRES 8/23/08

Washington State Department of Transportation

SR 6
SO. FORK
CHEHALIS RIVER BRIDGE
SOUTH FORK CHEHALIS RIVER BR. 6/115 REPLACEMENT

FRAMING PLAN 2 OF 2

BRIDGE SHEET NO. 40

SHEET 100 of 149 SHEETS

SR 6 JOB NO. 7003 SHEET 40

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	6/115	Bridge Name	South Fork Chehalis River	Structure ID	0017587A
Contract #	7587 Region SW	Project Engineer	Collin Newell	Performance Deck Concrete?	No
Contractor	Scarsella Bros.	Concrete Supplier		Deck Placement	≈ 2009
Bridge Description	5-Span (160' / 160' / 160' / 142.5' / 142.5'), 5-WF74G Girders (765' bridge length), 2-Lanes (40' wide roadway)				

L = length between diaphragms (or length of "bay")

S = girder spacing

N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	32%
Min. =	0%
Max. =	65%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	40.00	8.35	4	20	20%
1	1	B	C	40.00	8.35	5	20	25%
1	1	C	D	40.00	8.35	6	20	30%
1	1	D	E	40.00	8.35	6	20	30%
1	2	A	B	40.00	8.35	5	20	25%
1	2	B	C	40.00	8.35	3	20	15%
1	2	C	D	40.00	8.35	6	20	30%
1	2	D	E	40.00	8.35	5	20	25%
1	3	A	B	40.00	8.35	3	20	15%
1	3	B	C	40.00	8.35	3	20	15%
1	3	C	D	40.00	8.35	4	20	20%
1	3	D	E	40.00	8.35	5	20	25%
1	4	A	B	40.00	8.35	0	20	0%
1	4	B	C	40.00	8.35	0	20	0%
1	4	C	D	40.00	8.35	0	20	0%
1	4	D	E	40.00	8.35	1	20	5%
2	1	A	B	40.00	8.35	8	20	40%
2	1	B	C	40.00	8.35	8	20	40%
2	1	C	D	40.00	8.35	10	20	50%
2	1	D	E	40.00	8.35	7	20	35%
2	2	A	B	40.00	8.35	6	20	30%
2	2	B	C	40.00	8.35	8	20	40%
2	2	C	D	40.00	8.35	8	20	40%
2	2	D	E	40.00	8.35	7	20	35%
2	3	A	B	40.00	8.35	6	20	30%
2	3	B	C	40.00	8.35	6	20	30%
2	3	C	D	40.00	8.35	4	20	20%
2	3	D	E	40.00	8.35	4	20	20%
2	4	A	B	40.00	8.35	3	20	15%
2	4	B	C	40.00	8.35	1	20	5%
2	4	C	D	40.00	8.35	0	20	0%
2	4	D	E	40.00	8.35	0	20	0%
3	1	A	B	40.00	8.35	10	20	50%
3	1	B	C	40.00	8.35	10	20	50%
3	1	C	D	40.00	8.35	12	20	60%
3	1	D	E	40.00	8.35	12	20	60%
3	2	A	B	40.00	8.35	10	20	50%
3	2	B	C	40.00	8.35	11	20	55%
3	2	C	D	40.00	8.35	13	20	65%
3	2	D	E	40.00	8.35	12	20	60%
3	3	A	B	40.00	8.35	11	20	55%

Bridge #	6/115	Bridge Name	South Fork Chehalis River	Structure ID	0017587A
Contract #	7587 Region SW	Project Engineer	Collin Newell	Performance Deck Concrete?	No
Contractor	Scarsella Bros.	Concrete Supplier		Deck Placement	≈ 2009
Bridge Description	5-Span (160' / 160' / 160' / 142.5' / 142.5'), 5-WF74G Girders (765' bridge length), 2-Lanes (40' wide roadway)				

L = length between diaphragms (or length of "bay")

S = girder spacing

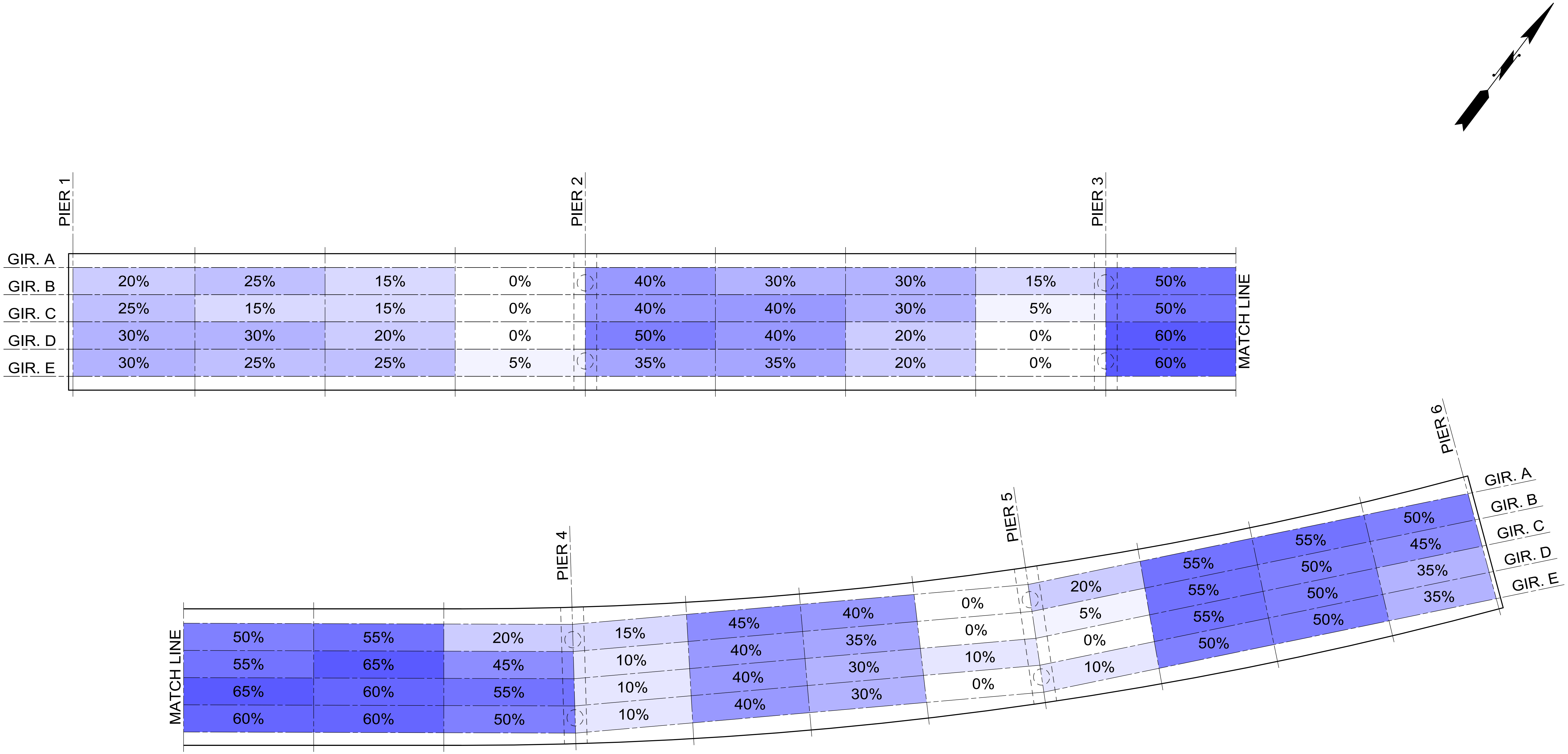
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	32%
Min. =	0%
Max. =	65%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
3	3	B	C	40.00	8.35	13	20	65%
3	3	C	D	40.00	8.35	12	20	60%
3	3	D	E	40.00	8.35	12	20	60%
3	4	A	B	40.00	8.35	4	20	20%
3	4	B	C	40.00	8.35	9	20	45%
3	4	C	D	40.00	8.35	11	20	55%
3	4	D	E	40.00	8.35	10	20	50%
4	1	A	B	35.63	8.35	3	18	15%
4	1	B	C	35.63	8.35	2	18	10%
4	1	C	D	35.63	8.35	2	18	10%
4	1	D	E	35.63	8.35	2	18	10%
4	2	A	B	35.63	8.35	8	18	45%
4	2	B	C	35.63	8.35	7	18	40%
4	2	C	D	35.63	8.35	7	18	40%
4	2	D	E	35.63	8.35	7	18	40%
4	3	A	B	35.63	8.35	7	18	40%
4	3	B	C	35.63	8.35	6	18	35%
4	3	C	D	35.63	8.35	5	18	30%
4	3	D	E	35.63	8.35	5	18	30%
4	4	A	B	35.63	8.35	0	18	0%
4	4	B	C	35.63	8.35	0	18	0%
4	4	C	D	35.63	8.35	2	18	10%
4	4	D	E	35.63	8.35	0	18	0%
5	1	A	B	35.63	8.35	4	18	20%
5	1	B	C	35.63	8.35	1	18	5%
5	1	C	D	35.63	8.35	0	18	0%
5	1	D	E	35.63	8.35	2	18	10%
5	2	A	B	35.63	8.35	10	18	55%
5	2	B	C	35.63	8.35	10	18	55%
5	2	C	D	35.63	8.35	10	18	55%
5	2	D	E	35.63	8.35	9	18	50%
5	3	A	B	35.63	8.35	10	18	55%
5	3	B	C	35.63	8.35	9	18	50%
5	3	C	D	35.63	8.35	9	18	50%
5	3	D	E	35.63	8.35	9	18	50%
5	4	A	B	35.63	8.35	9	18	50%
5	4	B	C	35.63	8.35	8	18	45%
5	4	C	D	35.63	8.35	6	18	35%
5	4	D	E	35.63	8.35	6	18	35%



CRACKING INTENSITY ~ BRIDGE 6/115

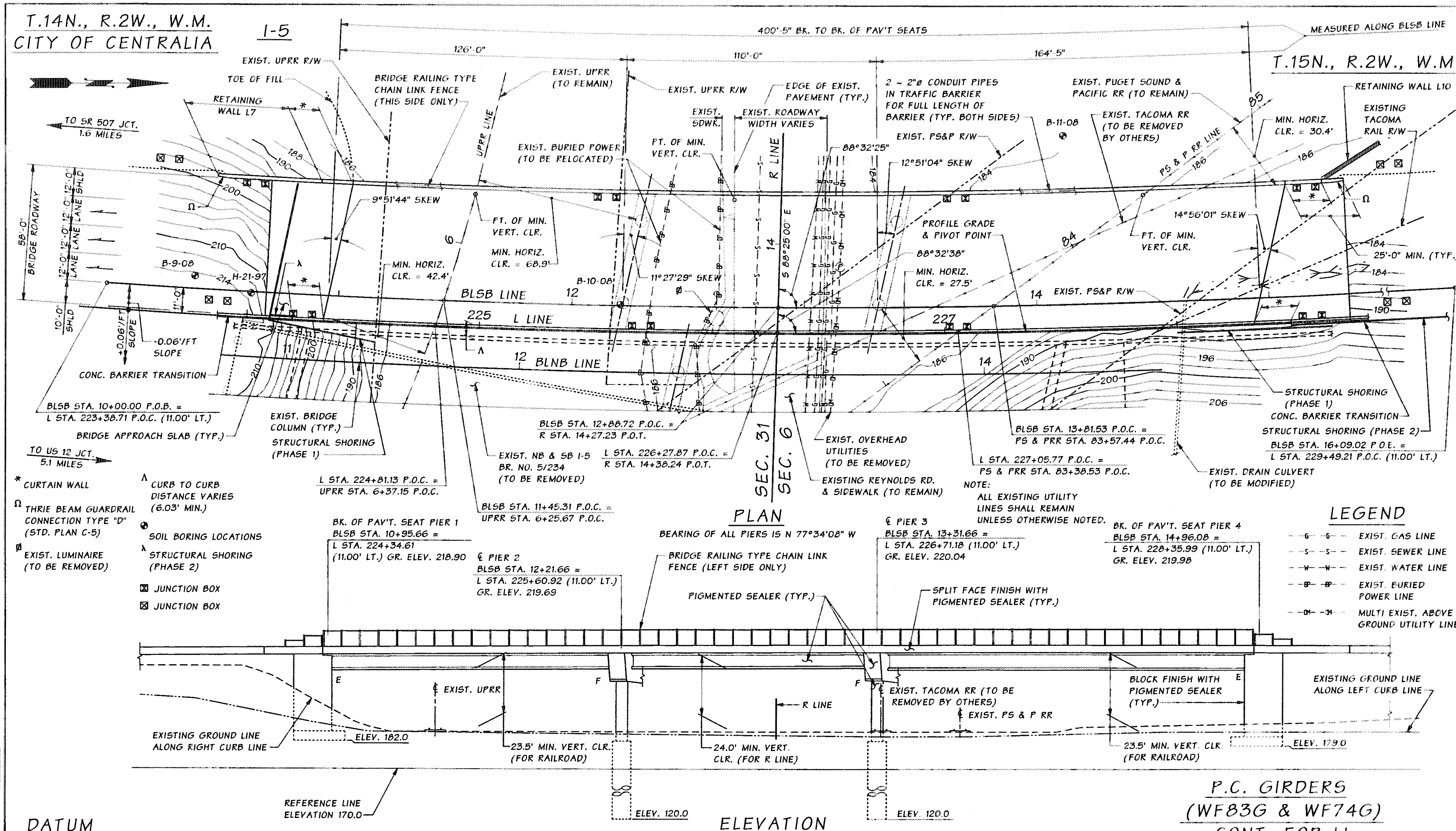
100% = CRACK EVERY 2 FT.

BRIDGE NUMBER	6/115
BRIDGE NAME	SOUTH FORK CHEHALIS RIVER
INSPECTION DATE	4/8/2015
DECK CONCRETE	TRADITIONAL

BRIDGE 5/234W (I-5 OVER BLAKESLEE JUNCTION RAILROAD)

Bridge #	5/234W	Bridge Name	I-5 Over Blakeslee Jct RR	Structure ID	0018272C
Contract #	8272 Region SW	Project Engineer	Colin Newell	Performance Deck Concrete?	YES
Contractor	Cascade Bridge	Concrete Supplier	Miles Sand & Gravel	Deck Placement	3/25/2013
Bridge Description	3-Span (126' / 110' / 164.5'), 6-WF83G & WF74G Girders (400.5' bridge length), 3-Lanes (58' wide roadway)				

CONTENTS



DATUM

NAVD 88

GRADE ELEVATIONS SHOWN ARE FINISH GRADES AT TOP OF BRIDGE DECK ON BLSB LINE AND ARE EQUAL TO PROFILE GRADE ON L LINE ADJUSTED BY SUPERELEVATION & OFFSET DISTANCE. SEE STD. PLAN A-50.20-01 FOR EMBANKMENT DETAILS AT BRIDGE ENDS.

P.C. GIRDERS (WF83G & WF74G) CONT. FOR LL

LOADING: HL-93

Bridge Design Engr.	Khaleghi, B	
Supervisor	Stoddard, RB	
Designed By	Collins, R	08/11
Checked By	Zhang/Bedi	02/12
Detailed By	Plesha, GM	08/11
Bridge Projects Engr.	Lewis, R	06/10
Prelim. Plan By	Wei, J	02/10
Architect/Specialist	PDK/BSA/GAW	04/10

M:\X-Team\MELLEN TO BLAKESLEE JCT\5-234W\window files\LAYOUT.WND

DATE	REVISION	BY	APP'D
4/19/12	REMOVE RETAINING WALL	RC	KBS

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 12X304

BRIDGE AND STRUCTURES OFFICE

JUGESH KAPUR — STATE OF WASHINGTON — PROFESSIONAL ENGINEER

4/30/12

Washington State Department of Transportation

I-5
MELLEN STREET TO BLAKESLEE JUNCTION - STAGE 1
I-5 OVER BLAKESLEE JCT RR BRIDGE NO. 5/234W REPL.

LAYOUT

BRIDGE SHEET NO. BW1

SHEET 294 OF 472 SHEETS

SR 5 FILE NO. 7477 SHEET BW1

C.S. 2101 ~ PROJ. NO. TA4572B ~ SOUTHWEST REGION ~ I-5 ~ MELLEN TO BLAKESLEE JCT. ~ BRIDGE NO. 5/234W ~ NEW STRUCTURE

Mon Apr 30 11:27:32 2012

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	5/234W	Bridge Name	I-5 Over Blakeslee Jct RR	Structure ID	0018272C
Contract #	8272	Region SW	Project Engineer: Colin Newell	Performance Deck Concrete?	YES
Contractor	Cascade Bridge	Concrete Supplier	Miles Sand & Gravel	Deck Placement	3/25/2013

Bridge Description: 3-Span (126' / 110' / 164.5'), 6-WF83G & WF74G Girders (400.5' bridge length), 3-Lanes (58' wide roadway)

Mix Design (WSDOT Form 350-040)

Water (max) = 223 lbs/cy w/c = 0.40 max

Cementitious Materials	Lbs/cy	Source	Type, Class or Grade
cement	464	Lafarge	Type I-II
fly ash	116	Lafarge	Type F
slag			
latex			
microsilica			

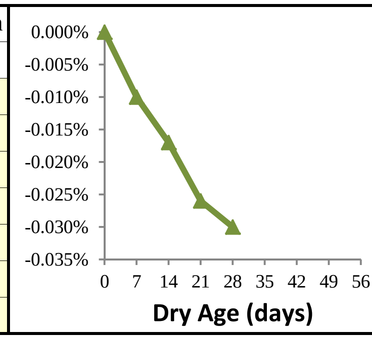
Concrete Admixtures	oz/cy	Manufacturer	Product
air entrainment	1-15	BASF	MB-AE-90
water reducer			
HR water reduce	23-40	BASF	Glenium 7500
set retarder			
shrink. reducer	32	BASF	MasterLife SRA

Concrete Test Results

compressive strength @ 28 days	5,507	psi
modulus of elasticity		psi
permeability @ 56 days	1,350	coulombs
mix design density	145.5	lb/cf

Shrinkage Test Results

Dry Age (days)	% Length Change
0	0.0000%
4	
7	-0.0100%
14	-0.0170%
21	-0.0260%
28	-0.0300%
56	



Aggregate

	Comp. 1	Comp. 2	Comp. 3	Comp. 4	Comp. 5
WSDOT Pit #	B-329	B-329	B-329	B-333	
Grading	No. 4	No. 57	No. 8	Class 2	
% Total	15.4%	33.3%	16.0%	35.3%	
Lbs/cy	480	1040	500	1100	

ASR Mitigation: None Required

Notes

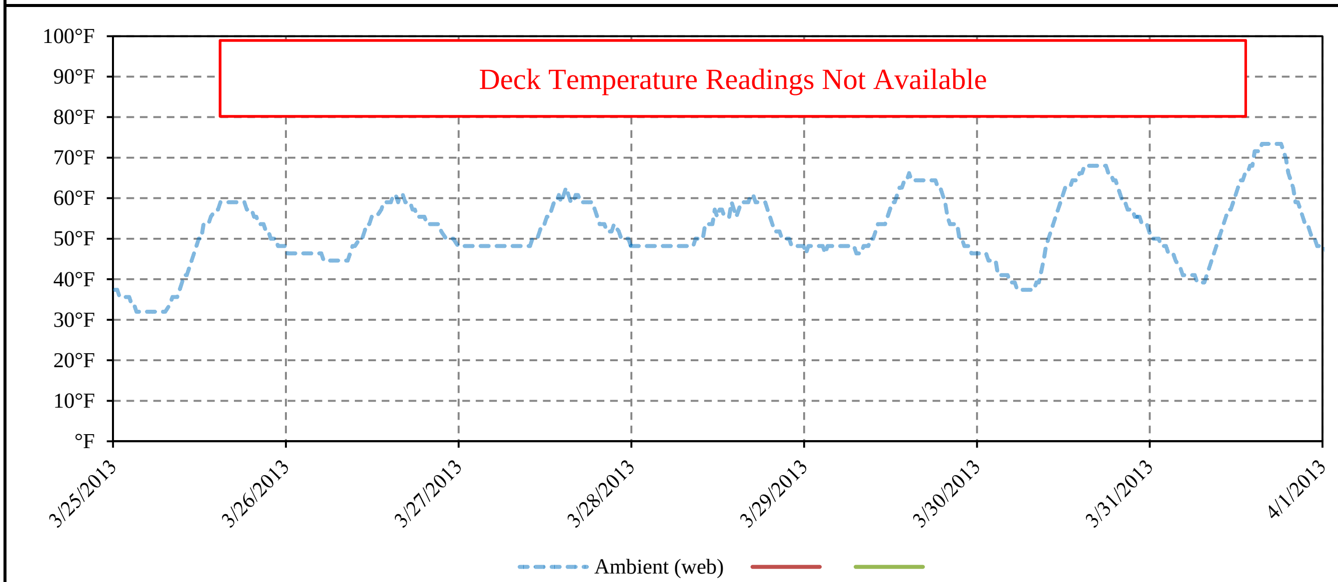
Same Mix Design as:

* Bridge 5/232NCD
* Bridge 5/232SCD

Very Similar Mix Design as:

* Bridge 5/229

Temperature



Washington State Department of Transportation

Concrete Mix Design

Contractor	Submitted By	Date
Cascade Bridge		1-28-2013

Concrete Supplier	Plant Location
Miles Sand & Gravel	Rochester

Contract Number	Contract Name
8272	Blakeslee Jct to Mellen St

This mix is to be used in the following Bid Item No(s): 92.18.01, 93.16.01, 94.17.01

Concrete Class: *(check one only)*

☐ 3000 ☐ 4000 ☒ 4000D[a] ☐ 4000P[a] ☐ 4000W ☐ Concrete Overlay ☐ Cement Concrete Pavement[d]

☐ Other Shrinkage Reducer

Remarks:

Mix Design No. 0444AFL2 **Plant No.** 222

Cementitious Materials	Source	Type, Class or Grade	Sp. Gr.	Lbs/cy
Cement	Lafarge	I-II	3.15	464
Fly Ash[a]	Lafarge	F	2.54	116
GGBFS (Slag)				
Latex				
Microsilica				

Concrete Admixtures	Manufacturer	Product	Type	Est. Range (oz/cy)
Air Entrainment	BASF	MB-AE-90		1-15
Water Reducer				
High-Range Water Reducer	BASF	Glenium 7500	F	23-40
Set Retarder				
Other Shrinkage Reducer	BASF	MasterLife SRA		32

Water (Maximum) 233 lbs/cy Is any of the water Recycled or Reclaimed? ☐ Yes[e] ☒ No

Water Cementitious Ratio (Maximum) 0.40 Mix Design Density 145.5 lbs/cf[d]

Design Performance	1	2	3	4	5	Average[f]
28 Day Compressive Strength (cylinders) psi						5,507
14 Day Flexural[d] Strength (beams) psi						

Agency Use Only (Check appropriate Box)

☐ **This Mix Design MEETS CONTRACT SPECIFICATIONS and may be used on the bid items noted above**

☐ **This Mix Design DOES NOT MEET CONTRACT SPECIFICATIONS and is being returned for corrections**

Reviewed By: ______________________ PE Signature

RECEIVED
JAN 29 2013
DEPT. OF TRANSPORTATION CHEHALIS ENGINEERING

Distribution: Original - Contractor
Copies To - State Materials Lab-Structural Materials Eng. ; Regional Materials Lab; Project Inspector

Mix Design No. 0444AFL2 **Plant No.** 222

Aggregate Information

Concrete Aggregates	Component 1	Component 2	Component 3	Component 4	Component 5	Combined Gradation
WSDOT Pit No.	B-329	B-329	B-329	B-333		
WSDOT ASR 14-day Results (%) [b]	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☐ No	
Grading[c]	4	57	8	Class 2		
Percent of Total Aggregate						100%
Specific Gravity	2.71	2.69	2.68	2.65		
Lbs/cy (ssd)	480	1040	500	1100		

Percent Passing

2 inch	100	100	100	100		100
1-1/2 inch	100	100	100	100		100
1 inch	32.6	100	100	100		89.6
3/4 inch	1.6	80.0	100	100		78.2
1/2 inch	0.4	30.1	100	100		61.4
3/8 inch	0.2	7.8	88.6	100		52.1
No. 4	0.1	0.3	22.4	99.4		38.8
No. 8	0.1	0.2	1.4	90.2		32.1
No. 16	0.1	0.1	0.2	70		24.8
No. 30	0.1	0.1	0.2	44.1		15.6
No. 50	0.1	0.1	0.2	20		7.1
No. 100	0.1	0.1	0.2	6		2.2
No. 200	0.1	0.1	0.2	1.7		0.7

Fineness Modulus: 2.70 (Required for Class 2 Sand)

ASR Mitigation Method Proposed [b] : ______

Notes:

a Required for Class 4000D and 4000P mixes.

b Alkali Silica Reactivity Mitigation is required for sources with expansions over 0.20% - Incidate method for ASR mitigation.
For expansion of 0.21% - o.45%, acceptable mitigation can be the use of low alkali cement or 25% type F fly ash.
Any other proposed mitigation method or for pits with greater than 0.45% expansion, proof of mitigating measure, either ASTM C1260 / AASHTO T303 test results must be attached.
If ASTM C 1293 testing has been submitted indicating 1-year expansion of 0.04% or less, mitigation is not required.

c AASHTO No. 467, 57, 67, 7, 8; WSDOT Class 1, Class 2; or combined gradation. See Standard Specification 9-03.1.

d Required for Cement Concrete Pavements.

e Attach test results indicating conformance to Standard Specification 9-25.1.

f Actual Average Strength as determined from testing or estimated from ACI 211.

RECEIVED

JAN 2 9 2012

DEPT. OF TRANSPORTATION CHEHALIS ENGINEERING

DOT Form 350-040 EF
Revised 6/06

LAFARGE NORTH AMERICA

Lafarge North America Concrete Lab
5400 W Marginal Way SW
Seattle, WA. 98106

Report To: **Miles Sand & Gravel**
Attention: **Quality Control Personnel**

Date: May 25, 2012

Subject: Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration: ASTM C-1202

Tested Materials: Date Sampled: **March 2012**
Mix Design: **WSDOT Valley HPC**

Curing: ASTM C-1202 Standard Cure

Results:

Age	Coulombs
56 day	**1350**
90 day	920

*The ASTM C-1202 procedure was followed.

The test result is only valid if the aggregate(s) sample(s) is(are) representative of the current production and it is to be noted that Lafarge has no knowledge of the representatives of the sample received for testing. Also, material quality can vary with different locations in a quarry. It is recommended that testing be carried out on an annual basis or more frequently if a variation in stone quality is suspected.

Although the Lafarge North America Seattle Concrete Lab. applies state-of-the-art test methods, Lafarge North America, and its affiliates (Lafarge) can not guarantee the results shown above and shall assume no liability whatsoever for any errors in such results and for the consequence of such errors.

Robert G. Shogren

Rob Shogren, P.E.
Technical Service Engineer
Lafarge North America

Lafarge North America Concrete Lab
5400 W Marginal Way SW
Seattle, WA. 98106

Report To: **Miles Sand & Gravel**
Attention: **Quality Control Personnel**

Date: May 25, 2012

Subject: Length Change of Hardened Hydraulic-Cement Concrete Using Procedures of ASTM C-157

Tested Materials: Date Sampled: March, 2012
Source of Aggregates: Miles Sand & Gravel

Mix Design: WSDOT HPC

Results: Slump: 4.5"
Temp: 64F

Specimen Size: 4"x4"x10"
Consolidation: Rodding
Initial Cure: Lime water submersion (28 day initial cure)

Age (Days) After Initial Cure	Percent Length Change (Average of 3)
7	0.010
14	0.017
21	0.026
28 (final)	0.030

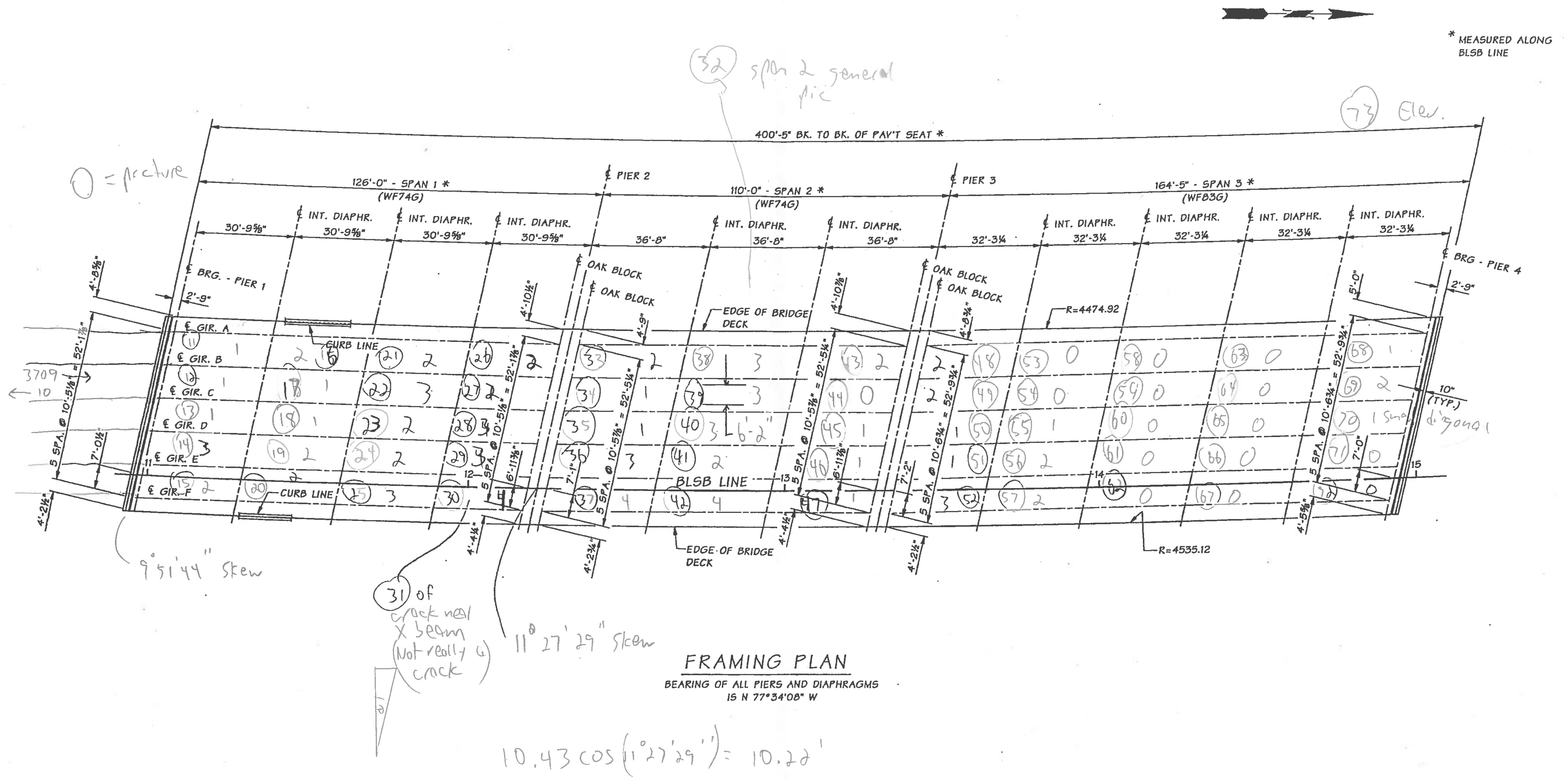
*The ASTM C-157 procedure was followed.

The test result is only valid if the aggregate(s) sample(s) is(are) representative of the current production and it is to be noted that Lafarge has no knowledge of the representatives of the sample received for testing. Also, material quality can vary with different locations in a quarry. It is recommended that testing be carried out on an annual basis or more frequently if a variation in stone quality is suspected.

Although the Lafarge North America Seattle Concrete Lab. applies state-of-the-art test methods, Lafarge North America. and its affiliates (Lafarge) can not guarantee the results shown above and shall assume no liability whatsoever for any errors in such results and for the consequence of such errors.

Robert D. Shogren

Rob Shogren, P.E.
Technical Service Engineer
Lafarge North America



FRAMING PLAN

BEARING OF ALL PIERS AND DIAPHRAGMS IS N 77°34'08" W

$10.43\cos(11°27'29") = 10.22'$

Bridge Design Engr.	Khaleghi, B	
Supervisor	Stoddard, RB	
Designed By	Collins, R	05/11
Checked By	Bedi, G	02/12
Detailed By	Plesha, GN	05/11
Bridge Projects Engr.		
Prelim. Plan By		
Architect/Specialist		

M:\X-Team\MELLEN TO BLAKESLEE JCT\5-234W\window files\FRAMING PLAN 1.wnd

DATE	REVISION	BY	APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 12X304

BRIDGE AND STRUCTURES OFFICE

RYAN SHEA COLLINS — PROFESSIONAL ENGINEER 3/7/12

RICHARD B. STODDARD — PROFESSIONAL ENGINEER 3/7/12

Washington State Department of Transportation

I-5
MELLEN STREET TO BLAKESLEE JUNCTION - STAGE 1
I-5 OVER BLAKESLEE JCT RR BRIDGE NO. 5/234W REPL.

FRAMING PLAN

BRIDGE SHEET NO. BW32

SHEET 325 OF 472 SHEETS

SR 5 FILE NO. 7477 SHEET BW32

Wed Mar 07 07:30:40 2012

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	5/234W	Bridge Name	I-5 Over Blakeslee Jct RR	Structure ID	0018272C
Contract #	8272 Region SW	Project Engineer	Colin Newell	Performance Deck Concrete?	YES
Contractor	Cascade Bridge	Concrete Supplier	Miles Sand & Gravel	Deck Placement	3/25/2013
Bridge Description	3-Span (126' / 110' / 164.5'), 6-WF83G & WF74G Girders (400.5' bridge length), 3-Lanes (58' wide roadway)				

L = length between diaphragms (or length of "bay")
S = girder spacing
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)
N_{cr} = number of leaching cracks counted during visual inspection
% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	9%
Min. =	0%
Max. =	25%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	30.80	10.43	1	15	5%
1	1	B	C	30.80	10.43	1	15	5%
1	1	C	D	30.80	10.43	1	15	5%
1	1	D	E	30.80	10.43	3	15	20%
1	1	E	F	30.80	10.43	2	15	15%
1	2	A	B	30.80	10.43	2	15	15%
1	2	B	C	30.80	10.43	1	15	5%
1	2	C	D	30.80	10.43	1	15	5%
1	2	D	E	30.80	10.43	2	15	15%
1	2	E	F	30.80	10.43	2	15	15%
1	3	A	B	30.80	10.43	2	15	15%
1	3	B	C	30.80	10.43	3	15	20%
1	3	C	D	30.80	10.43	2	15	15%
1	3	D	E	30.80	10.43	2	15	15%
1	3	E	F	30.80	10.43	3	15	20%
1	4	A	B	30.80	10.43	2	15	15%
1	4	B	C	30.80	10.43	2	15	15%
1	4	C	D	30.80	10.43	3	15	20%
1	4	D	E	30.80	10.43	3	15	20%
1	4	E	F	30.80	10.43	4	15	25%
2	1	A	B	36.67	10.43	2	18	10%
2	1	B	C	36.67	10.43	1	18	5%
2	1	C	D	36.67	10.43	1	18	5%
2	1	D	E	36.67	10.43	3	18	15%
2	1	E	F	36.67	10.43	4	18	20%
2	2	A	B	36.67	10.43	3	18	15%
2	2	B	C	36.67	10.43	3	18	15%
2	2	C	D	36.67	10.43	3	18	15%
2	2	D	E	36.67	10.43	2	18	10%
2	2	E	F	36.67	10.43	4	18	20%
2	3	A	B	36.67	10.43	2	18	10%
2	3	B	C	36.67	10.43	0	18	0%
2	3	C	D	36.67	10.43	1	18	5%
2	3	D	E	36.67	10.43	1	18	5%
2	3	E	F	36.67	10.43	1	18	5%
3	1	A	B	32.27	10.43	2	16	15%
3	1	B	C	32.27	10.43	2	16	15%
3	1	C	D	32.27	10.43	1	16	5%
3	1	D	E	32.27	10.43	1	16	5%
3	1	E	F	32.27	10.43	3	16	20%

Bridge Deck Concrete Study

Washington State Department of Transportation

Bridge #	5/234W	Bridge Name	I-5 Over Blakeslee Jct RR	Structure ID	0018272C
Contract #	8272 Region SW	Project Engineer	Colin Newell	Performance Deck Concrete?	YES
Contractor	Cascade Bridge	Concrete Supplier	Miles Sand & Gravel	Deck Placement	3/25/2013
Bridge Description	3-Span (126' / 110' / 164.5'), 6-WF83G & WF74G Girders (400.5' bridge length), 3-Lanes (58' wide roadway)				

L = length between diaphragms (or length of "bay")

S = girder spacing

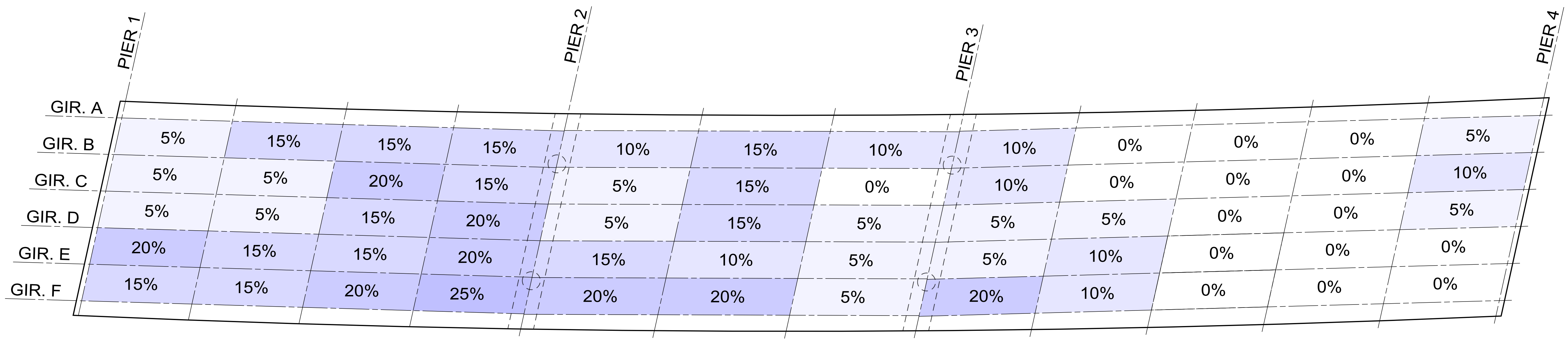
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	9%
Min. =	0%
Max. =	25%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
3	2	A	B	32.27	10.43	0	16	0%
3	2	B	C	32.27	10.43	0	16	0%
3	2	C	D	32.27	10.43	1	16	5%
3	2	D	E	32.27	10.43	2	16	15%
3	2	E	F	32.27	10.43	2	16	15%
3	3	A	B	32.27	10.43	0	16	0%
3	3	B	C	32.27	10.43	0	16	0%
3	3	C	D	32.27	10.43	0	16	0%
3	3	D	E	32.27	10.43	0	16	0%
3	3	E	F	32.27	10.43	0	16	0%
3	4	A	B	32.27	10.43	0	16	0%
3	4	B	C	32.27	10.43	0	16	0%
3	4	C	D	32.27	10.43	0	16	0%
3	4	D	E	32.27	10.43	0	16	0%
3	4	E	F	32.27	10.43	0	16	0%
3	5	A	B	32.27	10.43	1	16	5%
3	5	B	C	32.27	10.43	2	16	15%
3	5	C	D	32.27	10.43	1	16	5%
3	5	D	E	32.27	10.43	0	16	0%
3	5	E	F	32.27	10.43	0	16	0%



CRACKING INTENSITY ~ BRIDGE 5/234W

100% = CRACK EVERY 2 FT.

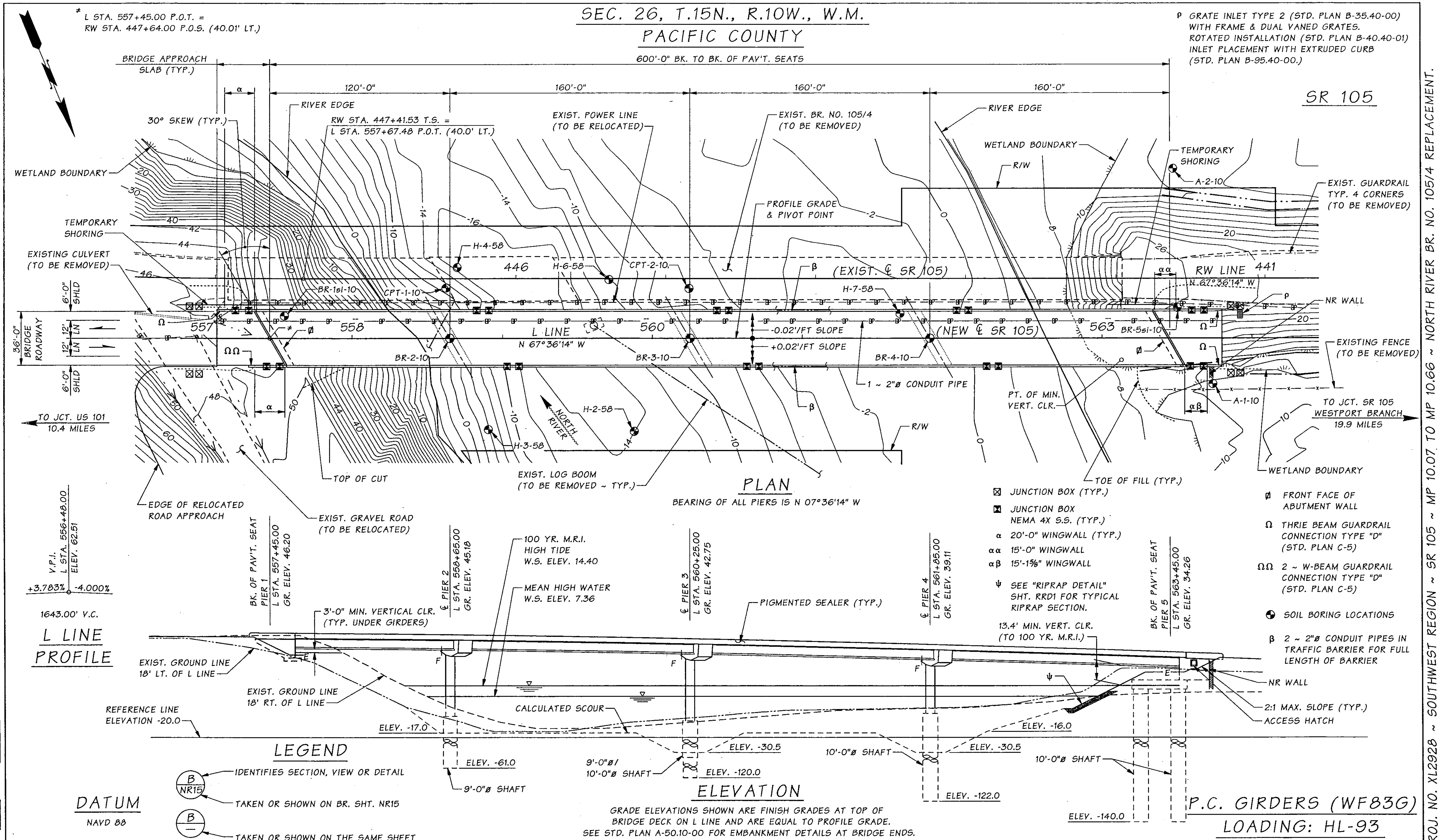
LESS CRACKING — MORE CRACKING

BRIDGE NUMBER	5/234W
BRIDGE NAME	I-5 OVER BLAKESLEE JCT RR
INSPECTION DATE	4/8/2015
DECK CONCRETE	PERFORMANCE BASED

BRIDGE 105/4 (NORTH RIVER)

Bridge #	105/4	Bridge Name	North River			Structure ID	0018345B
Contract #	8345	Region	SW	Project Engineer	Lori Figone	Performance Deck Concrete?	YES
Contractor	Scarsella Bros.			Concrete Supplier	Bayview Redi Mix, Inc	Deck Placement	1/31/2014
Bridge Description	4-Span (120' / 160' / 160' / 160'), 4-WF83G Girders (600' bridge length), 2-Lanes (36' wide roadway)						

CONTENTS



Bridge Design Engr.	Khaleghi, B	
Supervisor	Anderson, MW	
Designed By	Frymoyer, ML	01/12
Checked By	Lee, CS	05/12
Detailed By	Bontemps, W	01/12
Bridge Projects Engr.	Lewis, RA	12/09
Prelim. Plan By	Wei, J	11/09
Architect/Specialist	PDK/BSA/GAW	

M:\Y-Team\SR 105 BRIDGES\NORTH RIVER BR_NO_105-4 REPLACEMENT\window files\LAYOUT.WND

DATE	REVISION	BY	APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 12X311

BRIDGE AND STRUCTURES OFFICE

JUGESH KAPUR — STATE OF WASHINGTON — PROFESSIONAL ENGINEER

6/19/12

Washington State Department of Transportation

SR 105
SMITH CREEK AND NORTH RIVER REPLACE BRIDGES
NORTH RIVER BR. NO. 105/4

LAYOUT

BRIDGE SHEET NO. NR1

SHEET 133 OF 210 SHEETS

SR 105 FILE NO. 7008 SHEET NR1

Tue Jun 19 14:07:35 2012

Bridge Deck Concrete Study

Washington State Department of Transportation

Bridge #	105/4	Bridge Name	North River	Structure ID	0018345B
Contract #	8345	Region	SW	Project Engineer	Lori Figone
Performance Deck Concrete?	YES				
Contractor	Scarsella Bros.	Concrete Supplier	Bayview Redi Mix, Inc	Deck Placement	1/31/2014
Bridge Description	4-Span (120' / 160' / 160' / 160'), 4-WF83G Girders (600' bridge length), 2-Lanes (36' wide roadway)				

Mix Design (WSDOT Form 350-040)

Water (max) = 230 lbs/cy w/c = 0.38 max

Cementitious Materials	Lbs/cy	Source	Type, Class or Grade
cement	460	Ashgrove	Type I-II
fly ash	150	Lafarge	Type F
slag			
latex			
microsilica			

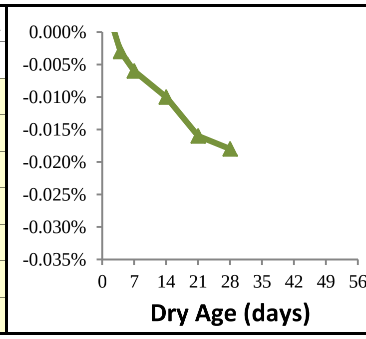
Concrete Admixtures	oz/cy	Manufacturer	Product
air entrainment	1-15	BASF	Micro Air
water reducer			
HR water reduce	20-30	BASF	Glenium 7500
set retarder			
shrink. reducer	120-140	BASF	Masterlife

Concrete Test Results

compressive strength @ 28 days	5,691	psi
modulus of elasticity	4,012,122	psi
permeability @ 56 days	1,677	coulombs
mix design density	150.1	lb/cf

Shrinkage Test Results

Dry Age (days)	% Length Change
0	0.0060%
4	-0.0030%
7	-0.0060%
14	-0.0100%
21	-0.0160%
28	-0.0180%
56	



Aggregate

	Comp. 1	Comp. 2	Comp. 3	Comp. 4	Comp. 5
WSDOT Pit #	PS-X-130	PS-X-130	PS-X-130		
Grading	#67	#4	Class II		
% Total	42.0%	20.0%	38.0%		
Lbs/cy	1350	650	1213		
ASR Mitigation	None Required				

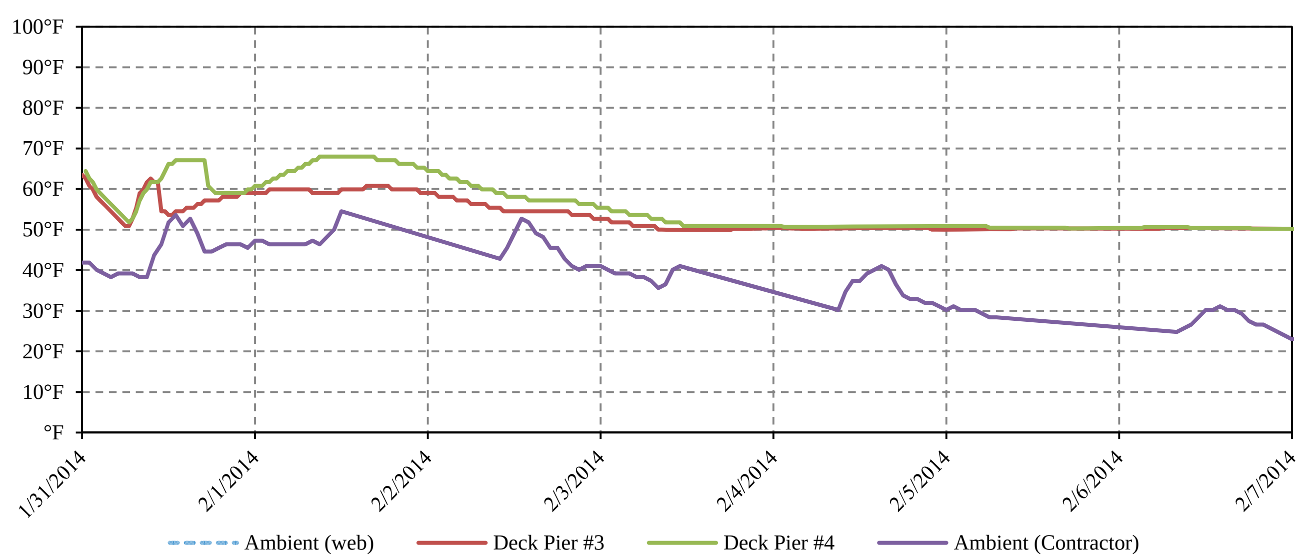
Notes

Same Mix Design as:

* Bridge 6/8
* Bridge 101/31
* Bridge 101/44
* Bridge 105/3

if swell of concrete speciman is included, total change in length at 28 days drying is 240 microstrain (0.0060% + 0.0180%)

Temperature



CMD-008

Washington State Department of Transportation

Concrete Mix Design

Contractor	Submitted By	Date
SB Structures	Bayview Redi-Mix, Inc	07/22/2013

Concrete Supplier	Plant Location
Bayview Redi Mix, Inc	Raymond 041, Aberdeen 011

Contract Number	Contract Name
~~8344~~ 8345	SMITH CREEK AND NORTH RIVER REPLACE BRIDGES ~~Middle Nemah River Bridge Replacement Bridge~~

This mix is to be used in the following Bid Item No(s): 48 & 49

Concrete Class: *(check one only)* Conc. Cl. 4000D

☐ 3000 ☐ 4000 ☒ 4000D[a] ☐ 4000P[a] ☐ 4000W ☐ Concrete Overlay ☐ Cement Concrete Pavement[d]

☐ Other Shrinkage

Remarks:

Mix Design No. WSDT4DS130 **Plant No.** 041, 011

Cementitious Materials	Source	Type, Class or Grade	Sp. Gr.	Lbs/cy
Cement	Ashgrove, Seattle, WA	Type I-II	3.15	460
Fly Ash[a]	Lafarge, Centralia, WA	Type F	2.58	150
GGBFS (Slag)				
Latex				
Microsilica				

no standard TRIAL

Concrete Admixtures	Manufacturer	Product	Type	Est. Range (oz/cy)
Air Entrainment	BASF Cleveland, OH	Micro Air		1-15 ✓ 0.7625-9.15 CY
Water Reducer				
High-Range Water Reducer	BASF Cleveland, OH	Glenium 7500	F	20-30 ✓ 12.2-91.5 oz CY
Set Retarder				
Other Shrinkage	BASF Cleveland, OH	Masterlife		120-140 ✓ 64-192 oz CY

Water (Maximum) 230 lbs/cy $\frac{230}{610} = 0.377$ Is any of the water Recycled or Reclaimed? ☐ Yes[e] ☒ No

Water Cementitious Ratio (Maximum) .38 Mix Design Density 150.1 lbs/cf[d]

Design Performance	1	2	3	4	5	Average[f]
28 Day Compressive Strength (cylinders) psi	5,775	5,766	5,623	5,561	5,730	5,691
14 Day Flexural[d] Strength (beams) psi						

Agency Use Only (Check appropirate Box)

☒ **This Mix Design MEETS CONTRACT SPECIFICATIONS and may be used on the bid items noted above**

☐ **This Mix Design DOES NOT MEET CONTRACT SPECIFICATIONS and is being returned for corrections**

Reviewed By: [signature] 12/3/13

PE Signature Date

DOT Form 350-040 EF Revised 6/06

Distribution: Original - Contractor

Copies To - State Materials Lab-Structural Materials Eng. ; Regional Materials Lab; Project Inspector

Mix Design No. WSDT4DS130 **Plant No.** 041, 011

Aggregate Information

Concrete Aggregates	Component 1	Component 2	Component 3	Component 4	Component 5	Combined Gradation
WSDOT Pit No.	PS-X-130	PS-X130	PS-X-130			
WSDOT ASR 14-day Results (%) [b]	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	
Grading[c]	AAASHTO #67	AAASHTO #4	Class II			
Percent of Total Aggregate	42	20	38			100%
Specific Gravity	2.825	2.825	2.747			
Lbs/cy (ssd)	1350	650	1213			

Percent Passing

2 inch	100	100	100			100	
1-1/2 inch	100	100	100			100	
1 inch	100	52	100			90	90.4
3/4 inch	93	1	100			77	77.3
1/2 inch	58	1	100			63	62.6
3/8 inch	30	1	100			51	50.8
No. 4	7	0	99			41	40.6
No. 8	0	0	78			30	29.6
No. 16	0	0	58			22	✓
No. 30	0	0	35			13	13.3
No. 50	0	0	14			5	5.3
No. 100	0	0	3			1	1.1
No. 200	0	.1	1.1			0.5	0.4

Fineness Modulus: 3.14 (Required for Class 2 Sand)

ASR Mitigation Method Proposed [b]: Not Required for this Source

Notes:

a Required for Class 4000D and 4000P mixes.

b Alkali Silica Reactivity Mitigation is required for sources with expansions over 0.20% - Incidate method for ASR mitigation.
For expansion of 0.21% - o.45%, acceptable mitigation can be the use of low alkali cement or 25% type F fly ash.
Any other proposed mitigation method or for pits with greater than 0.45% expansion, proof of mitigating measure, either ASTM C1260 / AASHTO T303 test results must be attached.
If ASTM C 1293 testing has been submitted indicating 1-year expansion of 0.04% or less, mitigation is not required.

c AASHTO No. 467, 57, 67, 7, 8; WSDOT Class 1, Class 2; or combined gradation. See Standard Specification 9-03.1.

d Required for Cement Concrete Pavements.

e Attach test results indicating conformance to Standard Specification 9-25.1.

f Actual Average Strength as determined from testing or estimated from ACI 211.

TEST RESULTS

ASTM C 192 - Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory

Concrete Mixture Proportions		**4,000 PSI Mix**		
Trial Mix Results Calculated to 1yd³		**D-101112-01**		
S-Number	Description	SpG	Mass, lbs	Vol. Cuft
S-121541	AG Seattle Type I/II	3.15	462	2.35
S-120817	Lafarge Centralia Class F	2.58	151	0.94
S-122202	Pit X-130 Fine Agg.	2.75	1,217	7.09
S-122204	Pit X-130 1.5 to 3/4 Agg.	2.83	652	3.69
S-122203	Pit X-130 3/4 to No. 4 Agg.	2.83	1,357	7.68
---	Overland Park Municipal	1.00	233	3.73
-	Air	-	5.6%	1.51
		Totals:	4,072	27.00

Admixtures

S-Number	Description	Dosage, oz/cwt
S-122303	BASF Micro-Air	1.0
S-122302	BASF Glenium 7500	4.0
S-122225	BASF Master Life SRA 20	21.0

Plastic Properties	D-101112-01	
Slump, in:	6.75	
Unit Weight, lbs/cuft:	150.8	
Air Content (Calculated), %:	5.6	between 4.5 and 7.5 per AD5 p8
w/cm ratio:	0.38	
Concrete Temperature, F:	74°	

AASHTO T 277 - Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
Accelerated Cure

Sample No.	Diameter, in.	Charge Passed, C	Corrected Charge, C	Qualitative Equivalent	Age, days
D-101112-01	4.00	739	650	Very Low	28

AASHTO T 277 - Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
Standard Cure

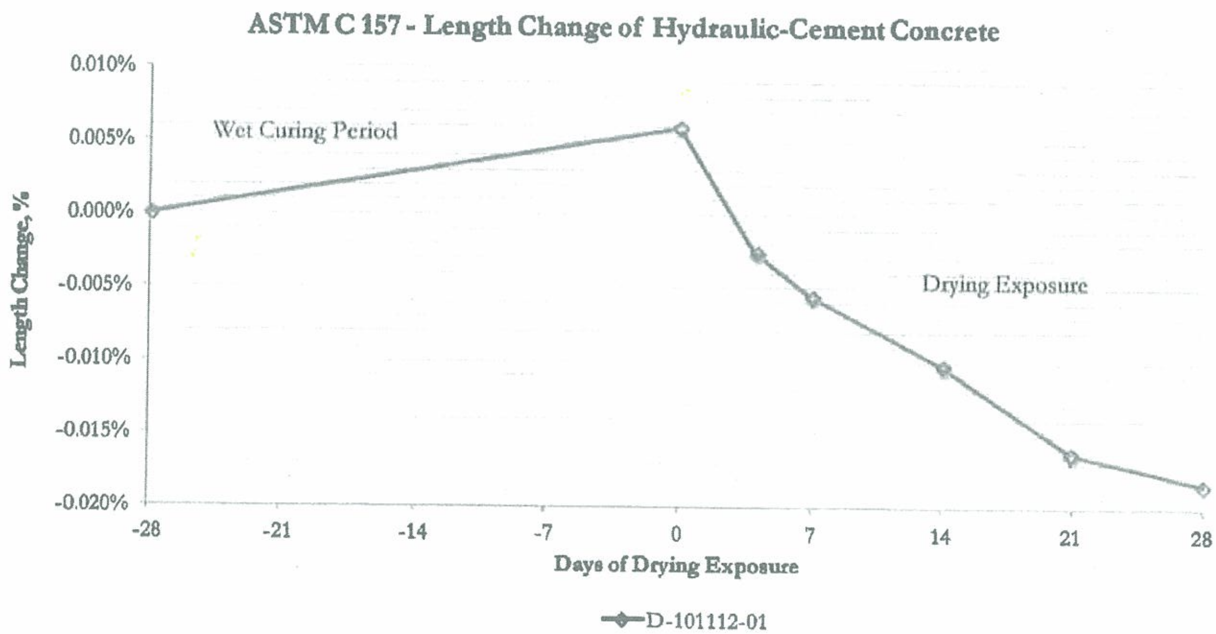
Sample No.	Diameter, in.	Charge Passed, C	Corrected Charge, C	Qualitative Equivalent	Age, days
D-101112-01	4.00	1,902	1,672	Low	28
	4.00	1,750	1,538	Low	56
	4.00	1,908	1,677	Low	56

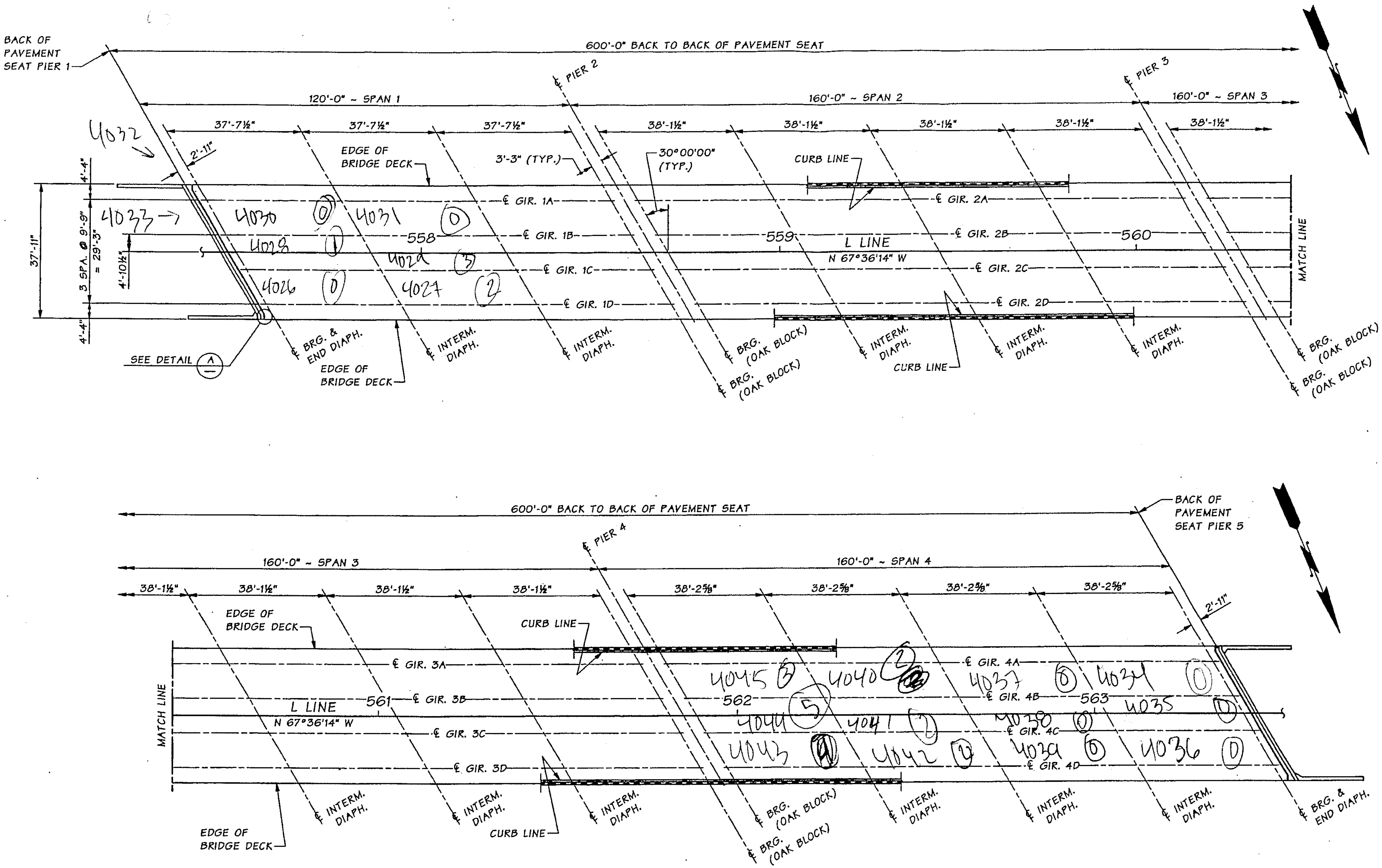
ASTM C 157 Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete

Material:		Concrete
Number of Specimens per Mixture:		4
Size of Specimens, in.:	Length:	10.0
	Width:	4.0
	Height:	4.0
Method of Consolidation:		4
Period of Moist Curing:		28-days
Drying Exposure Conditions:		23°C, 50% RH

Length Change

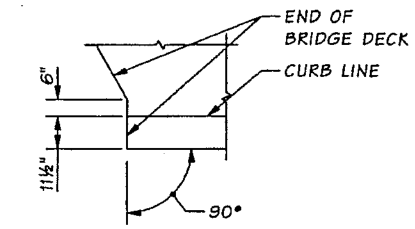
Reading	D-101112-01
Initial	0.000%
0-days dry	0.006%
4-days dry	-0.003%
7-days dry	-0.006%
14-days dry	-0.010%
21-days dry	-0.016%
28-days dry	-0.018%





FRAMING PLAN

ALL LONGITUDINAL DIMENSIONS ARE ALONG L LINE UNLESS OTHERWISE SHOWN.



DETAIL A

PIER 1 RIGHT CORNER AS SHOWN. ALL OTHER CORNERS SIMILAR.

Bridge Design Engr.	Khaleghi, B	
Supervisor	Anderson, MW	
Designed By	Lee, CS	01/12
Checked By	Olson, DE	04/12
Detailed By	Bontemps, W	01/12
Bridge Projects Engr.		
Prelim. Plan By		
Architect/Specialist		

Tue Jun 05 09:05:26 2012

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DATE	REVISION	BY	APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 12X311

BRIDGE AND STRUCTURES OFFICE

6/5/12

6/13/12

Washington State Department of Transportation

SR 105
SMITH CREEK AND NORTH RIVER
REPLACE BRIDGES
NORTH RIVER BR. NO. 105/4

FRAMING PLAN

BRIDGE SHEET NO. NR36

SHEET 168 OF 210 SHEETS

SR 105 FILE NO. 7008 SHEET NR36

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	105/4	Bridge Name	North River	Structure ID	0018345B
Contract #	8345	Region	SW	Project Engineer	Lori Figone
Performance Deck Concrete?	YES				
Contractor	Scarsella Bros.	Concrete Supplier	Bayview Redi Mix, Inc	Deck Placement	1/31/2014
Bridge Description	4-Span (120' / 160' / 160' / 160'), 4-WF83G Girders (600' bridge length), 2-Lanes (36' wide roadway)				

L = length between diaphragms (or length of "bay")

S = girder spacing

N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	7%
Min. =	0%
Max. =	25%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	37.63	9.75	0	19	0%
1	1	B	C	37.63	9.75	1	19	5%
1	1	C	D	37.63	9.75	0	19	0%
1	2	A	B	37.63	9.75	0	19	0%
1	2	B	C	37.63	9.75	3	19	15%
1	2	C	D	37.63	9.75	2	19	10%
1	3	A	B	37.63	9.75	#N/A	19	#N/A
1	3	B	C	37.63	9.75	#N/A	19	#N/A
1	3	C	D	37.63	9.75	#N/A	19	#N/A
2	1	A	B	38.13	9.75	#N/A	19	#N/A
2	1	B	C	38.13	9.75	#N/A	19	#N/A
2	1	C	D	38.13	9.75	#N/A	19	#N/A
2	2	A	B	38.13	9.75	#N/A	19	#N/A
2	2	B	C	38.13	9.75	#N/A	19	#N/A
2	2	C	D	38.13	9.75	#N/A	19	#N/A
2	3	A	B	38.13	9.75	#N/A	19	#N/A
2	3	B	C	38.13	9.75	#N/A	19	#N/A
2	3	C	D	38.13	9.75	#N/A	19	#N/A
2	4	A	B	38.13	9.75	#N/A	19	#N/A
2	4	B	C	38.13	9.75	#N/A	19	#N/A
2	4	C	D	38.13	9.75	#N/A	19	#N/A

Bridge Deck Concrete Study

Washington State Department of Transportation

Bridge #	105/4	Bridge Name	North River	Structure ID	0018345B
Contract #	8345	Region	SW	Project Engineer	Lori Figone
Performance Deck Concrete?	YES				
Contractor	Scarsella Bros.	Concrete Supplier	Bayview Redi Mix, Inc	Deck Placement	1/31/2014
Bridge Description	4-Span (120' / 160' / 160' / 160'), 4-WF83G Girders (600' bridge length), 2-Lanes (36' wide roadway)				

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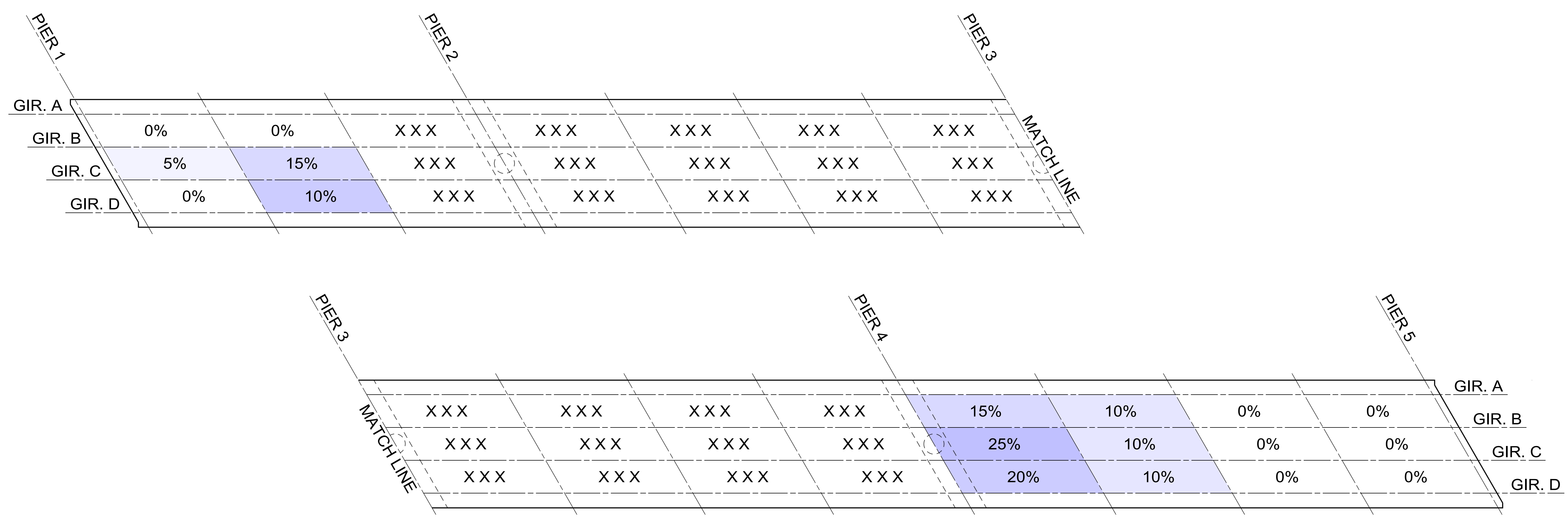
% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	7%
Min. =	0%
Max. =	25%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
3	1	A	B	38.13	9.75	#N/A	19	#N/A
3	1	B	C	38.13	9.75	#N/A	19	#N/A
3	1	C	D	38.13	9.75	#N/A	19	#N/A
3	2	A	B	38.13	9.75	#N/A	19	#N/A
3	2	B	C	38.13	9.75	#N/A	19	#N/A
3	2	C	D	38.13	9.75	#N/A	19	#N/A
3	3	A	B	38.13	9.75	#N/A	19	#N/A
3	3	B	C	38.13	9.75	#N/A	19	#N/A
3	3	C	D	38.13	9.75	#N/A	19	#N/A
3	4	A	B	38.13	9.75	#N/A	19	#N/A
3	4	B	C	38.13	9.75	#N/A	19	#N/A
3	4	C	D	38.13	9.75	#N/A	19	#N/A
4	1	A	B	38.22	9.75	3	19	15%
4	1	B	C	38.22	9.75	5	19	25%
4	1	C	D	38.22	9.75	4	19	20%
4	2	A	B	38.22	9.75	2	19	10%
4	2	B	C	38.22	9.75	2	19	10%
4	2	C	D	38.22	9.75	2	19	10%
4	3	A	B	38.22	9.75	0	19	0%
4	3	B	C	38.22	9.75	0	19	0%
4	3	C	D	38.22	9.75	0	19	0%
4	4	A	B	38.22	9.75	0	19	0%
4	4	B	C	38.22	9.75	0	19	0%
4	4	C	D	38.22	9.75	0	19	0%



CRACKING INTENSITY ~ BRIDGE 105/4

100% = CRACK EVERY 2 FT.

X X X = CRACKS NOT COUNTED DUE TO LIMITED ACCESS

LESS CRACKING — MORE CRACKING

BRIDGE NUMBER	105/4
BRIDGE NAME	NORTH RIVER
INSPECTION DATE	5/7/2015
DECK CONCRETE	PERFORMANCE BASED

BRIDGE 105/3 (SMITH CREEK)

Bridge #	105/3	Bridge Name	Smith Creek			Structure ID	0018345A
Contract #	8345	Region	SW	Project Engineer	Lori Figone	Performance Deck Concrete?	YES
Contractor	Scarsella Bros.			Concrete Supplier	Bayview Redi Mix, Inc	Deck Placement	12/17/2013
Bridge Description	3-Span (105' / 110' / 105'), 5-WF42G Girders (320' bridge length), 2-Lanes (36' wide roadway)						

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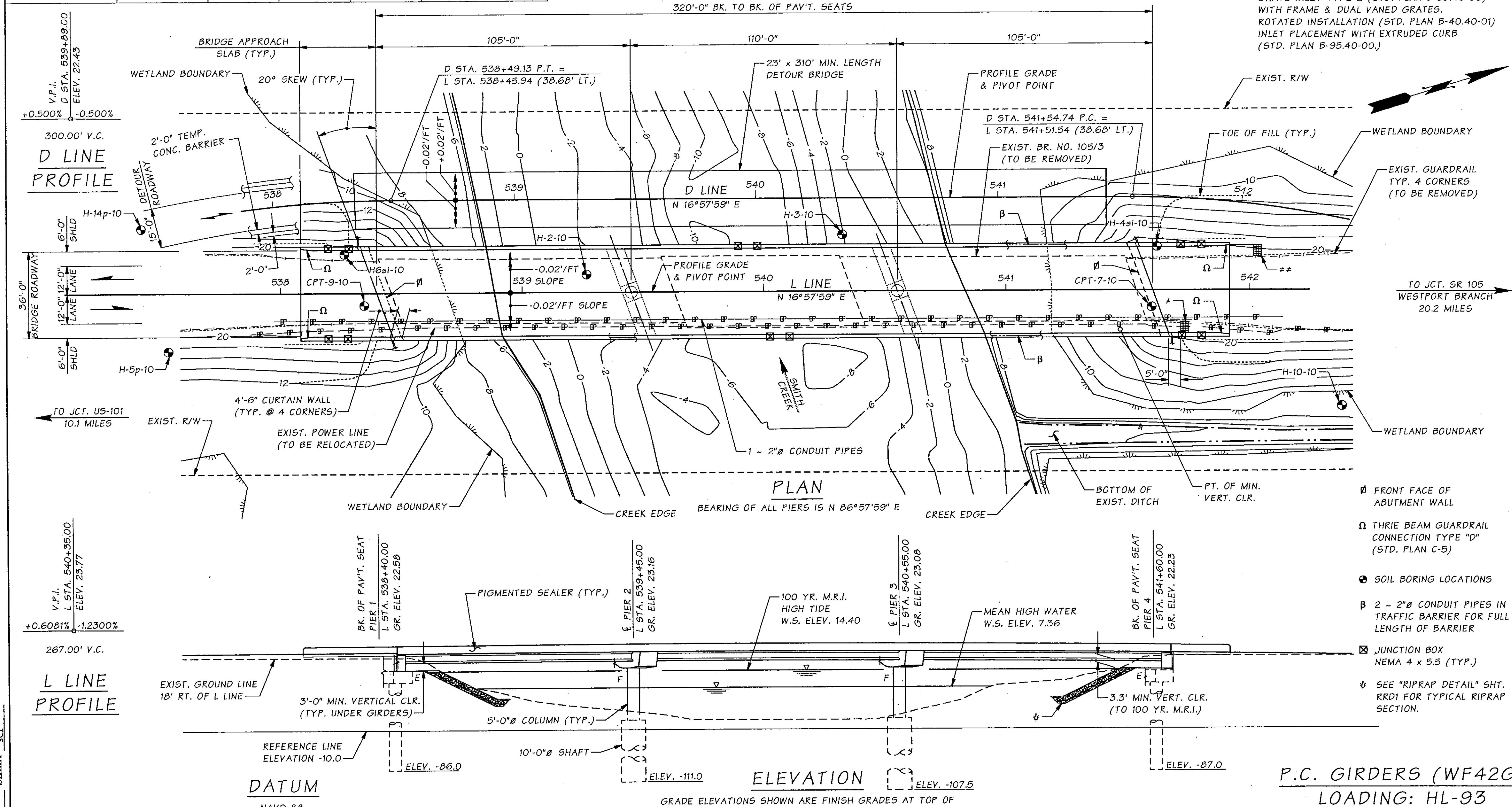
1. Layout Plan Sheet
2. Mix Design Summary
3. Concrete Mix Design Form
4. Concrete Test Results
5. Field Notes
6. Crack Summary
7. Crack Intensity Diagram

CURVE DATA					
P.I. STATION	Δ	RADIUS	TANGENT	LENGTH	BK. TANGENT BRG.
D STA. 537+92.85	14°05'30" RT.	460.00'	56.85'	113.14'	N 2°52'29" E
D STA. 542+05.15	14°01'11" RT.	410.00'	50.41'	100.32'	N 16°57'59" E

SEC. 26, T.15N., R.10W., W.M.
PACIFIC COUNTY

SR 105



GRADE ELEVATIONS SHOWN ARE FINISH GRADES AT TOP OF BRIDGE DECK ON L LINE AND ARE EQUAL TO PROFILE GRADE.
SEE STD. PLAN A-50.10-00 FOR EMBANKMENT DETAILS AT BRIDGE ENDS.

P.C. GIRDERS (WF42G)

LOADING: HL-93

Bridge Design Engr.	Khaleghi, B	
Supervisor	Anderson, MW	
Designed By	Glassford, P	11/12
Checked By	Burnham, B	05/12
Detailed By	Nettle, J	11/12
Bridge Projects Engr.	Lewis, RA	12/09
Prelim. Plan By	Wei, J	11/09
Architect/Specialist	PDK/BSA/GAW	

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DATE	REVISION	BY	APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 12X311

BRIDGE AND STRUCTURES OFFICE

JUGESH KAPUR, STATE OF WASHINGTON, PROFESSIONAL ENGINEER

6/14/12

Washington State Department of Transportation

SR 105
SMITH CREEK AND NORTH RIVER REPLACE BRIDGES
SMITH CREEK BR. NO. 105-3

LAYOUT

BRIDGE SHEET NO. SC1

SHEET 87 OF 210 SHEETS

SR 105 FILE NO. ____ SHEET SC1

Wed Jun 13 13:05:43 2012

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	105/3	Bridge Name	Smith Creek	Structure ID	0018345A
Contract #	8345	Region	SW	Project Engineer	Lori Figone
Performance Deck Concrete?	YES	Contractor	Scarsella Bros.	Concrete Supplier	Bayview Redi Mix, Inc
Deck Placement	12/17/2013				

Bridge Description: 3-Span (105' / 110' / 105'), 5-WF42G Girders (320' bridge length), 2-Lanes (36' wide roadway)

Mix Design (WSDOT Form 350-040)

Water (max) = 230 lbs/cy w/c = 0.38 max

Cementitious Materials	Lbs/cy	Source	Type, Class or Grade
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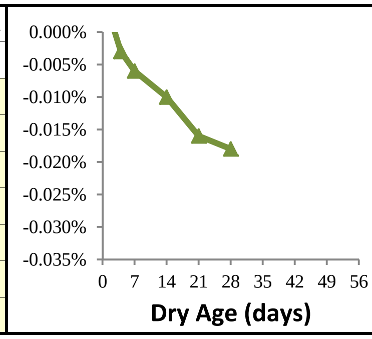

Aggregate

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Grading	#67	#4	Class II		
% Total	42.0%	20.0%	38.0%		
Lbs/cy	1350	650	1213		

ASR Mitigation: None Required

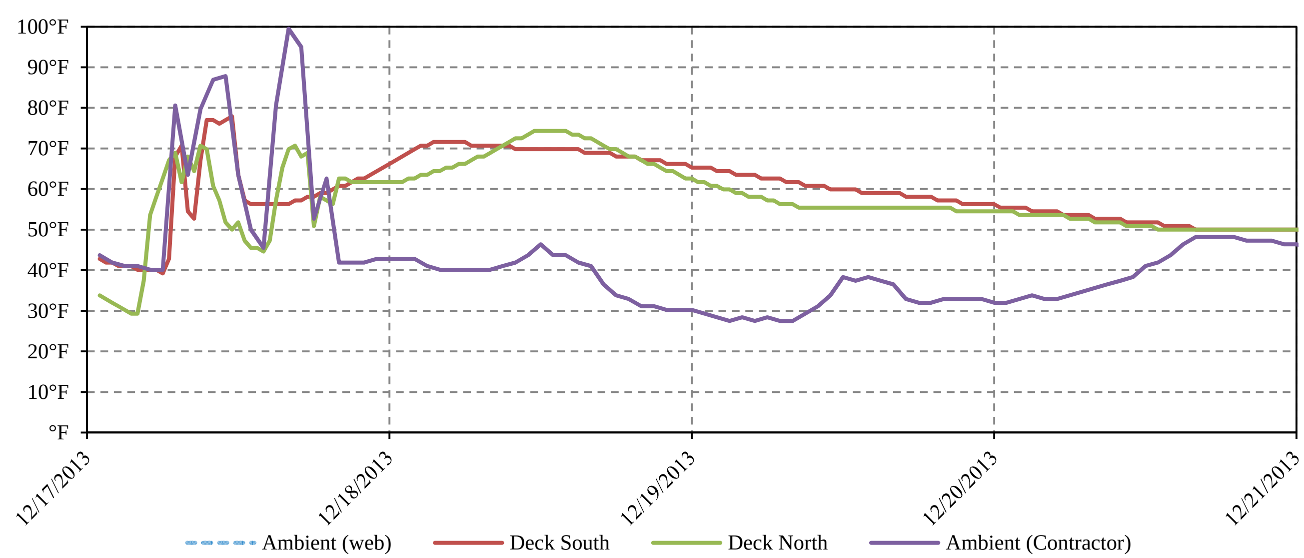
Notes

Same Mix Design as:

* Bridge 6/8
* Bridge 101/31
* Bridge 101/44
* Bridge 105/4

if swell of concrete speciman is included, total change in length at 28 days drying is 240 microstrain (0.0060% + 0.0180%)

Temperature



CMD-008

Washington State Department of Transportation

Concrete Mix Design

Contractor	Submitted By	Date
SB Structures	Bayview Redi-Mix, Inc	07/22/2013

Concrete Supplier	Plant Location
Bayview Redi Mix, Inc	Raymond 041, Aberdeen 011

Contract Number	Contract Name
~~8344~~ 8345	SMITH CREEK AND NORTH RIVER REPLACE BRIDGES ~~Middle Nemah River Bridge Replacement Bridge~~

This mix is to be used in the following Bid Item No(s): 48 & 49

Concrete Class: *(check one only)* Conc. Cl. 4000D

☐ 3000 ☐ 4000 ☒ 4000D[a] ☐ 4000P[a] ☐ 4000W ☐ Concrete Overlay ☐ Cement Concrete Pavement[d]

☐ Other Shrinkage

Remarks:

Mix Design No. WSDT4DS130 **Plant No.** 041, 011

Cementitious Materials	Source	Type, Class or Grade	Sp. Gr.	Lbs/cy
Cement	Ashgrove, Seattle, WA	Type I-II	3.15	460
Fly Ash[a]	Lafarge, Centralia, WA	Type F	2.58	150
GGBFS (Slag)				
Latex				
Microsilica				

Concrete Admixtures	Manufacturer	Product	Type	Est. Range (oz/cy)	
Air Entrainment	BASF Cleveland, OH	Micro Air		1-15	✓ 0.7625-9.15 CY (no standard TRIAL)
Water Reducer					
High-Range Water Reducer	BASF Cleveland, OH	Glenium 7500	F	20-30	✓ 12.2-91.5 oz CY
Set Retarder					
Other Shrinkage	BASF Cleveland, OH	Masterlife		120-140	✓ 64-192 oz CY

Water (Maximum) 230 lbs/cy $\frac{230}{610} = 0.377$ Is any of the water Recycled or Reclaimed? ☐ Yes[e] ☒ No

Water Cementitious Ratio (Maximum) .38 Mix Design Density 150.1 lbs/cf[d]

Design Performance	1	2	3	4	5	Average[f]
28 Day Compressive Strength (cylinders) psi	5,775	5,766	5,623	5,561	5,730	5,691
14 Day Flexural[d] Strength (beams) psi						

Agency Use Only (Check appropirate Box)

☒ **This Mix Design MEETS CONTRACT SPECIFICATIONS and may be used on the bid items noted above**

☐ **This Mix Design DOES NOT MEET CONTRACT SPECIFICATIONS and is being returned for corrections**

Reviewed By: [signature] PE Signature 12/3/13 Date

DOT Form 350-040 EF Revised 6/06 Distribution: Original - Contractor
Copies To - State Materials Lab-Structural Materials Eng. ; Regional Materials Lab; Project Inspector

Mix Design No. WSDT4DS130 **Plant No.** 041, 011

Aggregate Information

Concrete Aggregates	Component 1	Component 2	Component 3	Component 4	Component 5	Combined Gradation
WSDOT Pit No.	PS-X-130	PS-X130	PS-X-130			
WSDOT ASR 14-day Results (%) [b]	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	
Grading[c]	AAASHTO #67	AAASHTO #4	Class II			
Percent of Total Aggregate	42	20	38			100%
Specific Gravity	2.825	2.825	2.747			
Lbs/cy (ssd)	1350	650	1213			

Percent Passing

2 inch	100	100	100			100	
1-1/2 inch	100	100	100			100	
1 inch	100	52	100			90	90.4
3/4 inch	93	1	100			77	77.3
1/2 inch	58	1	100			63	62.6
3/8 inch	30	1	100			51	50.8
No. 4	7	0	99			41	40.6
No. 8	0	0	78			30	29.6
No. 16	0	0	58			22	✓
No. 30	0	0	35			13	13.3
No. 50	0	0	14			5	5.3
No. 100	0	0	3			1	1.1
No. 200	0	.1	1.1			0.5	0.4

Fineness Modulus: 3.14 (Required for Class 2 Sand)

ASR Mitigation Method Proposed [b]: Not Required for this Source

Notes:

a Required for Class 4000D and 4000P mixes.

b Alkali Silica Reactivity Mitigation is required for sources with expansions over 0.20% - Incidate method for ASR mitigation.
For expansion of 0.21% - o.45%, acceptable mitigation can be the use of low alkali cement or 25% type F fly ash.
Any other proposed mitigation method or for pits with greater than 0.45% expansion, proof of mitigating measure, either ASTM C1260 / AASHTO T303 test results must be attached.
If ASTM C 1293 testing has been submitted indicating 1-year expansion of 0.04% or less, mitigation is not required.

c AASHTO No. 467, 57, 67, 7, 8; WSDOT Class 1, Class 2; or combined gradation. See Standard Specification 9-03.1.

d Required for Cement Concrete Pavements.

e Attach test results indicating conformance to Standard Specification 9-25.1.

f Actual Average Strength as determined from testing or estimated from ACI 211.

TEST RESULTS

ASTM C 192 - Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory

Concrete Mixture Proportions — **4,000 PSI Mix**

Trial Mix Results Calculated to 1yd³ — **D-101112-01**

S-Number	Description	SpG	Mass, lbs	Vol. Cuft
S-121541	AG Seattle Type I/II	3.15	462	2.35
S-120817	Lafarge Centralia Class F	2.58	151	0.94
S-122202	Pit X-130 Fine Agg.	2.75	1,217	7.09
S-122204	Pit X-130 1.5 to 3/4 Agg.	2.83	652	3.69
S-122203	Pit X-130 3/4 to No. 4 Agg.	2.83	1,357	7.68
---	Overland Park Municipal	1.00	233	3.73
-	Air	-	5.6%	1.51
		Totals:	4,072	27.00

Admixtures

S-Number	Description	Dosage, oz/cwt
S-122303	BASF Micro-Air	1.0
S-122302	BASF Glenium 7500	4.0
S-122225	BASF Master Life SRA 20	21.0

Plastic Properties	D-101112-01	
Slump, in:	6.75	
Unit Weight, lbs/cuft:	150.8	
Air Content (Calculated), %:	5.6	between 4.5 and 7.5 per AD5 p8
w/cm ratio:	0.38	
Concrete Temperature, F:	74°	

AASHTO T 277 - Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
Accelerated Cure

Sample No.	Diameter, in.	Charge Passed, C	Corrected Charge, C	Qualitative Equivalent	Age, days
D-101112-01	4.00	739	650	Very Low	28

AASHTO T 277 - Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
Standard Cure

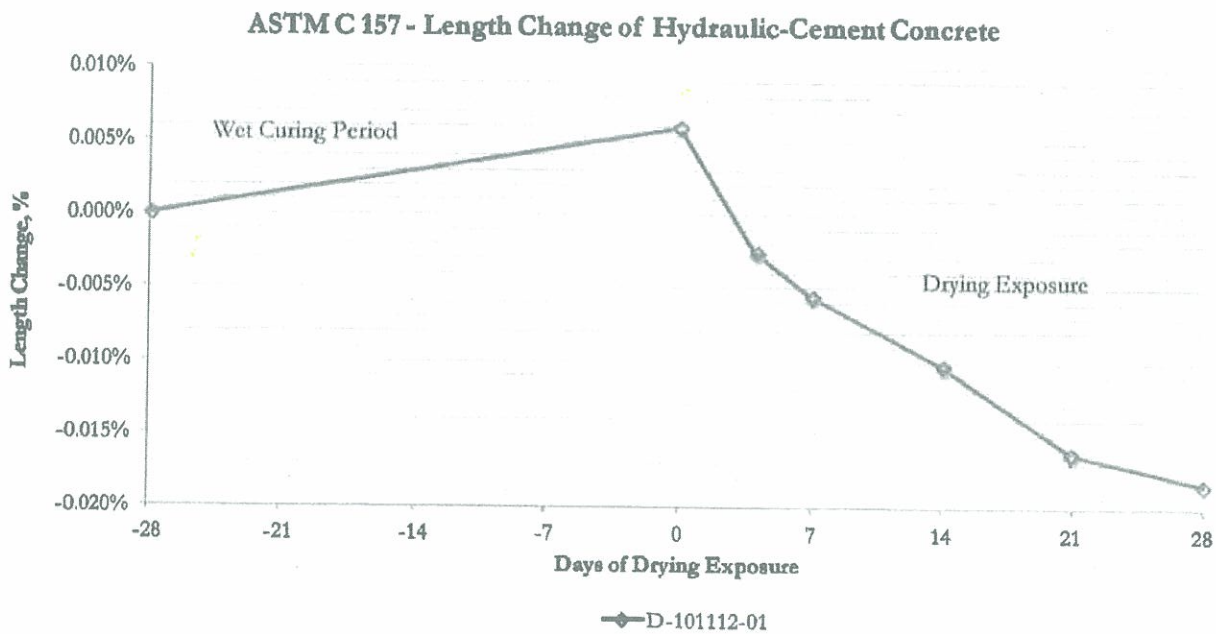
Sample No.	Diameter, in.	Charge Passed, C	Corrected Charge, C	Qualitative Equivalent	Age, days
D-101112-01	4.00	1,902	1,672	Low	28
	4.00	1,750	1,538	Low	56
	4.00	1,908	1,677	Low	56

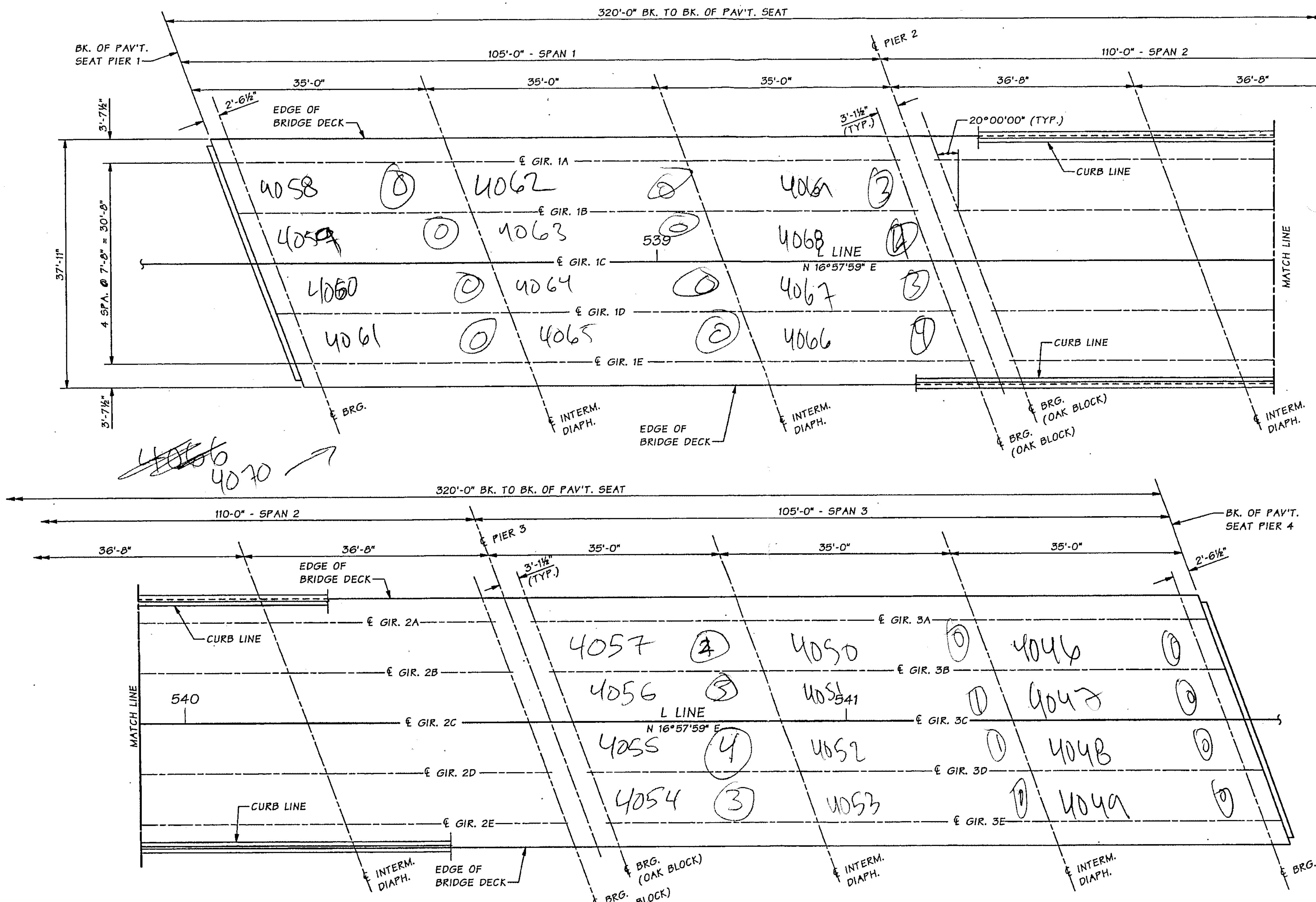
ASTM C 157 Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete

Material:		Concrete
Number of Specimens per Mixture:		4
Size of Specimens, in.:	Length:	10.0
	Width:	4.0
	Height:	4.0
Method of Consolidation:		4
Period of Moist Curing:		28-days
Drying Exposure Conditions:		23°C, 50% RH

Length Change

Reading	D-101112-01
Initial	0.000%
0-days dry	0.006%
4-days dry	-0.003%
7-days dry	-0.006%
14-days dry	-0.010%
21-days dry	-0.016%
28-days dry	-0.018%





FRAMING PLAN

ALL LONGITUDINAL DIMENSIONS ARE ALONG L LINE UNLESS OTHERWISE SHOWN.

Bridge Design Engr.	Khaleghi, B	
Supervisor	Anderson, MW	
Designed By	Glassford, P	01/12
Checked By	Burnham, B	05/12
Detailed By	Nettle, J	01/12
Bridge Projects Engr.		
Prelim. Plan By		
Architect/Specialist		

M:\Y-Team\SR 105 BRIDGES\SMITH CREEK BR_NO_105-3 REPLACEMENT\window files\FRAMING PLAN.wnd

DATE | REVISION | BY | APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 12X311

BRIDGE AND STRUCTURES OFFICE

6/13/12

6/14/12

Washington State Department of Transportation

SR 105
SMITH CREEK AND NORTH RIVER
REPLACE BRIDGES
SMITH CREEK BR. NO. 105-3

FRAMING PLAN

BRIDGE SHEET NO. SC28

SHEET 114 OF 210 SHEETS

SR 105 FILE NO. ____ SHEET SC28

Wed Jun 13 13:07:18 2012

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	105/3	Bridge Name	Smith Creek	Structure ID	0018345A
Contract #	8345 Region SW	Project Engineer	Lori Figone	Performance Deck Concrete?	YES
Contractor	Scarsella Bros.	Concrete Supplier	Bayview Redi Mix, Inc	Deck Placement	12/17/2013
Bridge Description	3-Span (105' / 110' / 105'), 5-WF42G Girders (320' bridge length), 2-Lanes (36' wide roadway)				

L = length between diaphragms (or length of "bay")

S = girder spacing

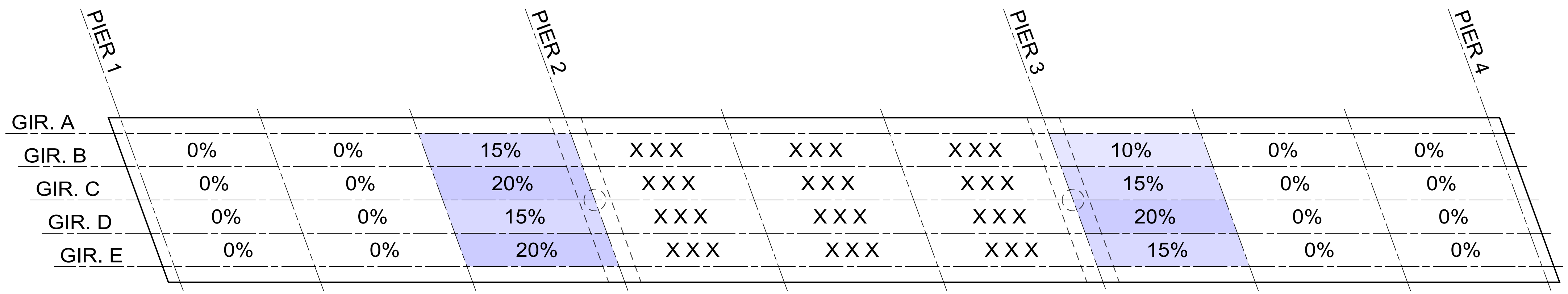
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	6%
Min. =	0%
Max. =	20%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	35.00	7.67	0	18	0%
1	1	B	C	35.00	7.67	0	18	0%
1	1	C	D	35.00	7.67	0	18	0%
1	1	D	E	35.00	7.67	0	18	0%
1	2	A	B	35.00	7.67	0	18	0%
1	2	B	C	35.00	7.67	0	18	0%
1	2	C	D	35.00	7.67	0	18	0%
1	2	D	E	35.00	7.67	0	18	0%
1	3	A	B	35.00	7.67	3	18	15%
1	3	B	C	35.00	7.67	4	18	20%
1	3	C	D	35.00	7.67	3	18	15%
1	3	D	E	35.00	7.67	4	18	20%
2	1	A	B	35.00	7.67	#N/A	18	#N/A
2	1	B	C	35.00	7.67	#N/A	18	#N/A
2	1	C	D	35.00	7.67	#N/A	18	#N/A
2	1	D	E	35.00	7.67	#N/A	18	#N/A
2	2	A	B	35.00	7.67	#N/A	18	#N/A
2	2	B	C	35.00	7.67	#N/A	18	#N/A
2	2	C	D	35.00	7.67	#N/A	18	#N/A
2	2	D	E	35.00	7.67	#N/A	18	#N/A
2	3	A	B	35.00	7.67	#N/A	18	#N/A
2	3	B	C	35.00	7.67	#N/A	18	#N/A
2	3	C	D	35.00	7.67	#N/A	18	#N/A
2	3	D	E	35.00	7.67	#N/A	18	#N/A
3	1	A	B	35.00	7.67	2	18	10%
3	1	B	C	35.00	7.67	3	18	15%
3	1	C	D	35.00	7.67	4	18	20%
3	1	D	E	35.00	7.67	3	18	15%
3	2	A	B	35.00	7.67	0	18	0%
3	2	B	C	35.00	7.67	1	18	5%
3	2	C	D	35.00	7.67	1	18	5%
3	2	D	E	35.00	7.67	0	18	0%
3	3	A	B	35.00	7.67	0	18	0%
3	3	B	C	35.00	7.67	0	18	0%
3	3	C	D	35.00	7.67	0	18	0%
3	3	D	E	35.00	7.67	0	18	0%



CRACKING INTENSITY ~ BRIDGE 105/3

100% = CRACK EVERY 2 FT.

X X X = CRACKS NOT COUNTED DUE TO LIMITED ACCESS

BRIDGE NUMBER	105/3
BRIDGE NAME	SMITH CREEK
INSPECTION DATE	5/7/2015
DECK CONCRETE	PERFORMANCE BASED

BRIDGE 6/8 (WILLAPA RIVER)

Bridge #	6/8	Bridge Name	Willapa River Bridge			Structure ID	0018464A
Contract #	8464	Region	SW	Project Engineer	Colin Newell	Performance Deck Concrete?	YES
Contractor	Rotschy, Inc.			Concrete Supplier	Bayview Redi Mix, Inc	Deck Placement	12/24/13 & 12/30/13
Bridge Description	3-Span (75' / 125' / 75'), 4-WF58G Girders (275' bridge length), 2-Lanes (36' wide roadway)						

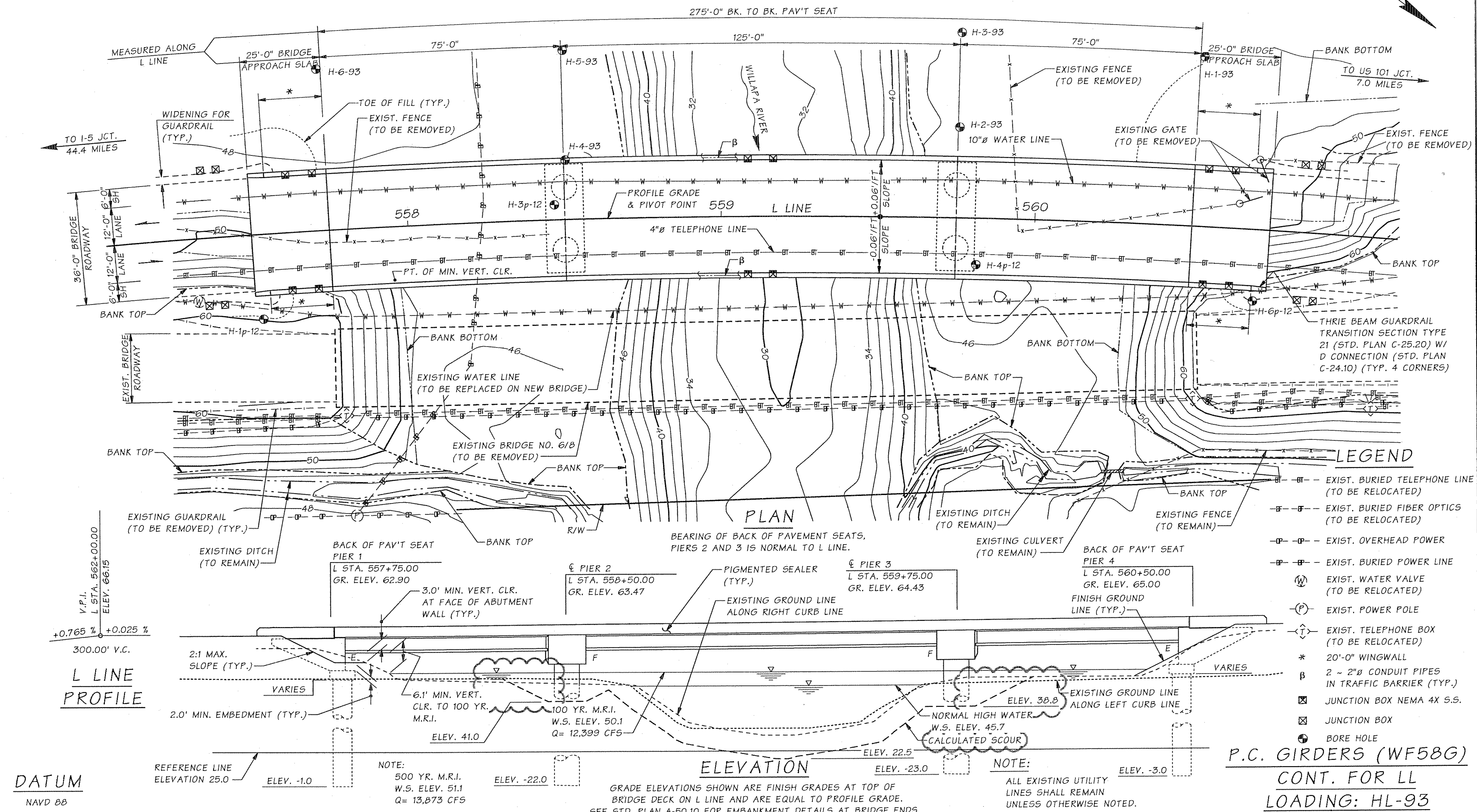
CONTENTS

1. Layout Plan Sheet
2. Mix Design Summary
3. Concrete Mix Design Form
4. Concrete Test Results
5. Field Notes
6. Crack Summary
7. Crack Intensity Diagram

CURVE DATA					
P.I. STATION	Δ	RADIUS	TANGENT	LENGTH	BK. TANGENT BRG.
L STA. 559+26.39	21°10'03" RT.	2400.00'	448.45'	886.67'	N 47°45'40" W

SEC. 14, T.13N., R.8W., W.M.
PACIFIC COUNTY

SR 6



GRADE ELEVATIONS SHOWN ARE FINISH GRADES AT TOP OF BRIDGE DECK ON L LINE AND ARE EQUAL TO PROFILE GRADE. SEE STD. PLAN A-50.10 FOR EMBANKMENT DETAILS AT BRIDGE ENDS.

NOTE:
ALL EXISTING UTILITY LINES SHALL REMAIN UNLESS OTHERWISE NOTED.

P.C. GIRDERS (WF58G)
CONT. FOR LL
LOADING: HL-93

Bridge Design Engr.	Khaleghi, B	
Supervisor	Khaleghi, B	
Designed By	Hsieh, JC	04/12
Checked By	Sawahata, D	03/13
Detailed By	McCarthy, DJ	04/12
Bridge Projects Engr.	MHB FOR RAL	11/11
Prelim. Plan By	Wei, J	07/11
Architect/Specialist	PDK, GAW, BSA	09/11

M:\X-Team\SR6 WILLAPA RIVER BR 6-8 REPL\window files\LAYOUT.WND

DATE	REVISION	BY	APP'D
4/10/13	REVISED NOTE & SCOUR	JCH	BK

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 13X307

BRIDGE AND STRUCTURES OFFICE

BRIAN KHALEGHI, STATE OF WASHINGTON, 27055, PROFESSIONAL ENGINEER
4/9/13

Washington State Department of Transportation

SR 6
WILLAPA RIVER BRIDGE
REPLACE BRIDGE
WILLAPA RIVER (LILLY WHEATON) BR NO 6/8 REPLACEMENT
LAYOUT

BRIDGE SHEET NO. 1
SHEET 73 OF 122 SHEETS

SR 6 FILE NO. 7008 SHEET 1

Tue Apr 09 13:34:43 2013

Bridge Deck Concrete Study

Washington State Department of Transportation

Bridge #	6/8	Bridge Name	Willapa River Bridge	Structure ID	0018464A
Contract #	8464	Region SW	Project Engineer: Colin Newell	Performance Deck Concrete?	YES
Contractor	Rotschy, Inc.	Concrete Supplier	Bayview Redi Mix, Inc	Deck Placement	12/24/13 & 12/30/13
Bridge Description	3-Span (75' / 125' / 75'), 4-WF58G Girders (275' bridge length), 2-Lanes (36' wide roadway)				

Mix Design (WSDOT Form 350-040)

Water (max) = 230 lbs/cy w/c = 0.38 max

Cementitious Materials	Lbs/cy	Source	Type, Class or Grade
cement	460	Ashgrove	Type I-II
fly ash	150	Laafarge	Type F
slag			
latex			
microsilica			

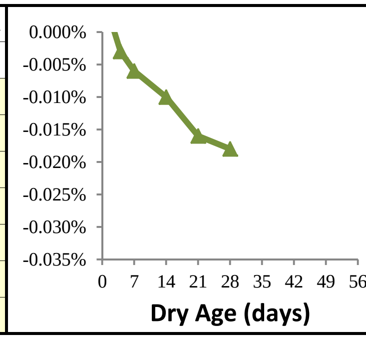
Concrete Admixtures	oz/cy	Manufacturer	Product
air entrainment	1-15	BASF	Micro Air
water reducer			
HR water reduce	20-30	BASF	Glenium 7500
set retarder			
shrink. reducer	120-140	BASF	Masterlife

Concrete Test Results

compressive strength @ 28 days	5,691	psi
modulus of elasticity	4,012,122	psi
permeability @ 56 days	1,677	coulombs
mix design density	150.1	lb/cf

Shrinkage Test Results

Dry Age (days)	% Length Change
0	0.0060%
4	-0.0030%
7	-0.0060%
14	-0.0100%
21	-0.0160%
28	-0.0180%
56	



Aggregate

	Comp. 1	Comp. 2	Comp. 3	Comp. 4	Comp. 5
WSDOT Pit #	PS-X-130	PS-X-130	PS-X-130		
Grading	#67	#4	Class II		
% Total	42.0%	20.0%	38.0%		
Lbs/cy	1350	650	1213		

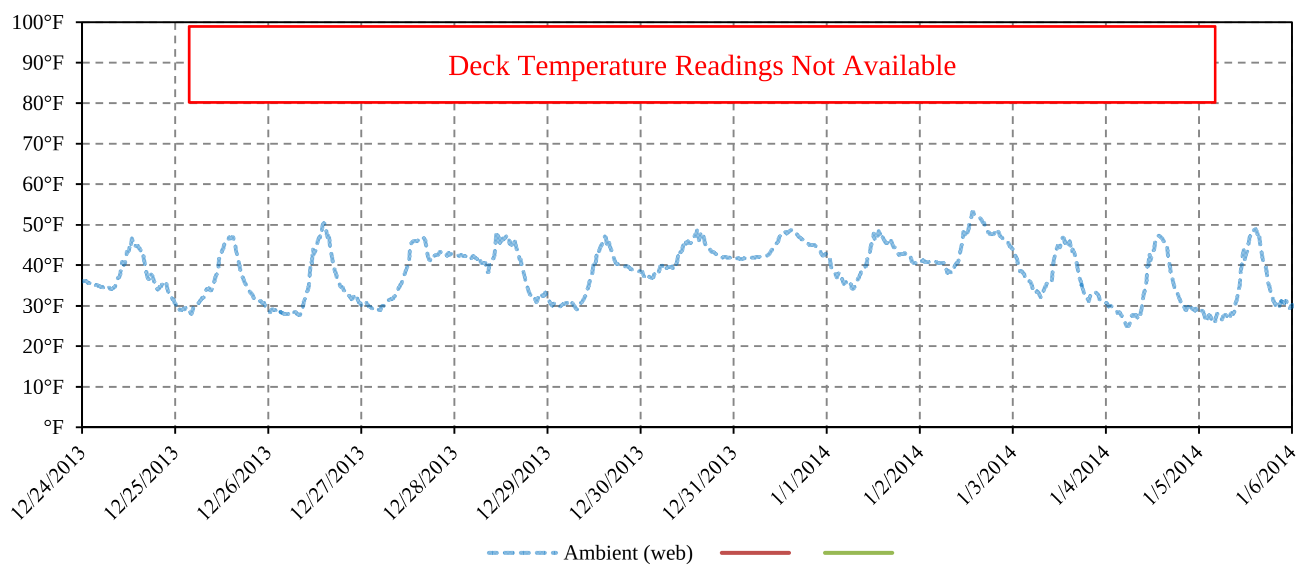
ASR Mitigation: None Required

Notes

Same Mix Design as:
* Bridge 101/31
* Bridge 101/44
* Bridge 105/4
* Bridge 105/3

if swell of concrete speciman is included, total change in length at 28 days drying is 240 microstrain (0.0060% + 0.0180%)

Temperature



Washington State Department of Transportation

CMO #4

Concrete Mix Design

Contractor	Submitted By	Date
Rotschy Inc	Bayview Redi-Mix, Inc	05/24/2013

Concrete Supplier	Plant Location
Bayview Redi Mix, Inc	Raymond 041, Aberdeen 011

Contract Number	Contract Name
13X307	SR 6 Willapa River Bridge Replace Bridge 8464

This mix is to be used in the following Bid Item No(s): 42, 18

Concrete Class: ***(check one only)***

☐ 3000 ☐ 4000 ☒ 4000D[a] ☐ 4000P[a] ☐ 4000W ☐ Concrete Overlay ☐ Cement Concrete Pavement[d]

☐ Other Shrinkage

Remarks:

Raymond Aberdeen

Mix Design No. WSDT4DS130 **Plant No.** 041, 011

Cementitious Materials	Source	Type, Class or Grade	Sp. Gr.	Lbs/cy
Cement	Ashgrove, Seattle, WA	Type I-II	3.15	460
Fly Ash[a]	Lafarge, Centralia, WA	Type F	2.58	150
GGBFS (Slag)				
Latex				
Microsilica				

Concrete Admixtures	Manufacturer	Product	Type	Est. Range (oz/cy)
Air Entrainment	BASF Cleveland, OH	Micro Air		1-15
Water Reducer				
High-Range Water Reducer	BASF Cleveland, OH	Glenium 7500	F	20-30
Set Retarder				
Other Shrinkage	BASF Cleveland, OH	Masterlife		120-140

Water (Maximum) 230 lbs/cy Is any of the water Recycled or Reclaimed? ☐ Yes[e] ☒ No

Water Cementitious Ratio (Maximum) .38 Mix Design Density 150.1 lbs/cf[d]

Design Performance	1	2	3	4	5	Average[f]
28 Day Compressive Strength (cylinders) psi	5,775	5,766	5,623	5,561	5,730	5,691
14 Day Flexural[d] Strength (beams) psi						

Agency Use Only (Check appropirate Box)

☒ **This Mix Design MEETS CONTRACT SPECIFICATIONS and may be used on the bid items noted above**

☐ **This Mix Design DOES NOT MEET CONTRACT SPECIFICATIONS and is being returned for corrections**

Reviewed By: Flock / Cooper 8/15/2013

~~PE Signature~~ DOC Date

DOT Form 350-040 EF Revised 6/06

Distribution: Original - Contractor
Copies To - State Materials Lab-Structural Materials Eng. ; Regional Materials Lab; Project Inspector

CMO #4 6/6/2013

Mix Design No. WSDT4DS130 **Plant No.** 041, 011

Aggregate Information

Concrete Aggregates	Component 1	Component 2	Component 3	Component 4	Component 5	Combined Gradation
WSDOT Pit No.	PS-X-130	PS-X130	PS-X-130			
WSDOT ASR 14-day Results (%) [b]	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	
Grading[c]	AASHTO #67	AASHTO #4	Class II			
Percent of Total Aggregate	42	20	38			100%
Specific Gravity	2.825	2.825	2.747			
Lbs/cy (ssd)	1350	650	1213			

Percent Passing

2 inch	100	100	100			100
1-1/2 inch	100	100	100			100
1 inch	100	52	100			90 90.4 ✓
3/4 inch	93	1	100			77 72.3 ✓
1/2 inch	58	1	100			63 62.6 ✓
3/8 inch	30	1	100			51 51.8 ✓
No. 4	7	0	99			41 40.6 ✓
No. 8	0	0	78			30 29.6 ✓
No. 16	0	0	58			22 22.0 ✓
No. 30	0	0	35			13 13.3 ✓
No. 50	0	0	14			5 5.3 ✓
No. 100	0	0	3			1 1.1 ✓
No. 200	0	.1	1.1			0.5 .4 ✓

Fineness Modulus: 3.14 (Required for Class 2 Sand)

ASR Mitigation Method Proposed [b] : Not Required for this Source

Notes:

a Required for Class 4000D and 4000P mixes.

b Alkali Silica Reactivity Mitigation is required for sources with expansions over 0.20% - Incidate method for ASR mitigation.
For expansion of 0.21% - o.45%, acceptable mitigation can be the use of low alkali cement or 25% type F fly ash.
Any other proposed mitigation method or for pits with greater than 0.45% expansion, proof of mitigating measure, either ASTM C1260 / AASHTO T303 test results must be attached.
If ASTM C 1293 testing has been submitted indicating 1-year expansion of 0.04% or less, mitigation is not required.

c AASHTO No. 467, 57, 67, 7, 8; WSDOT Class 1, Class 2; or combined gradation. See Standard Specification 9-03.1.

d Required for Cement Concrete Pavements.

e Attach test results indicating conformance to Standard Specification 9-25.1.

f Actual Average Strength as determined from testing or estimated from ACI 211.

TEST RESULTS

ASTM C 192 - Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory

Concrete Mixture Proportions — **4,000 PSI Mix**

Trial Mix Results Calculated to 1yd³ — **D-101112-01**

S-Number	Description	SpG	Mass, lbs	Vol. Cuft
S-121541	AG Seattle Type I/II	3.15	462	2.35
S-120817	Lafarge Centralia Class F	2.58	151	0.94
S-122202	Pit X-130 Fine Agg.	2.75	1,217	7.09
S-122204	Pit X-130 1.5 to 3/4 Agg.	2.83	652	3.69
S-122203	Pit X-130 3/4 to No. 4 Agg.	2.83	1,357	7.68
---	Overland Park Municipal	1.00	233	3.73
-	Air	-	5.6%	1.51
		Totals:	4,072	27.00

Admixtures

S-Number	Description	Dosage, oz/cwt
S-122303	BASF Micro-Air	1.0
S-122302	BASF Glenium 7500	4.0
S-122225	BASF Master Life SRA 20	21.0

Plastic Properties	D-101112-01
Slump, in:	6.75
Unit Weight, lbs/cuft:	150.8
Air Content (Calculated), %:	5.6
w/cm ratio:	0.38
Concrete Temperature, F:	74°

AASHTO T 277 - Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
Accelerated Cure

Sample No.	Diameter, in.	Charge Passed, C	Corrected Charge, C	Qualitative Equivalent	Age, days
D-101112-01	4.00	739	650	Very Low	28

AASHTO T 277 - Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
Standard Cure

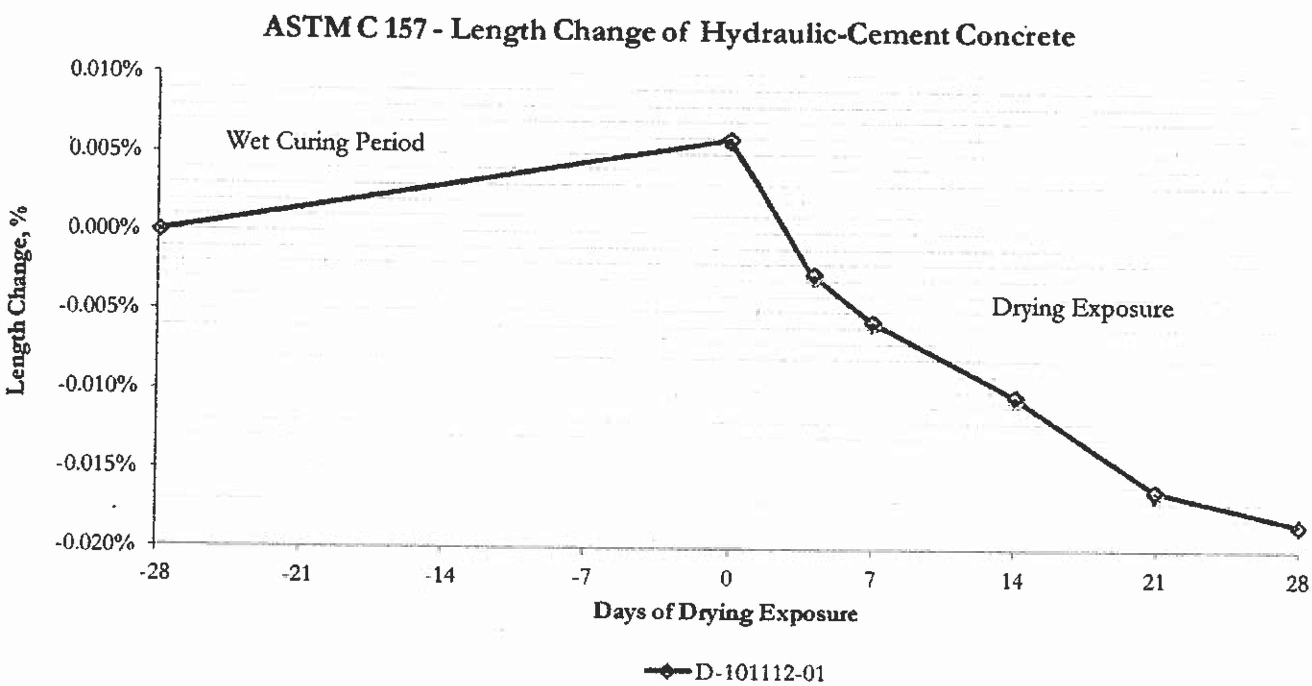
Sample No.	Diameter, in.	Charge Passed, C	Corrected Charge, C	Qualitative Equivalent	Age, days
D-101112-01	4.00	1,902	1,672	Low	28
	4.00	1,750	1,538	Low	56
	4.00	1,908	1,677	Low	56

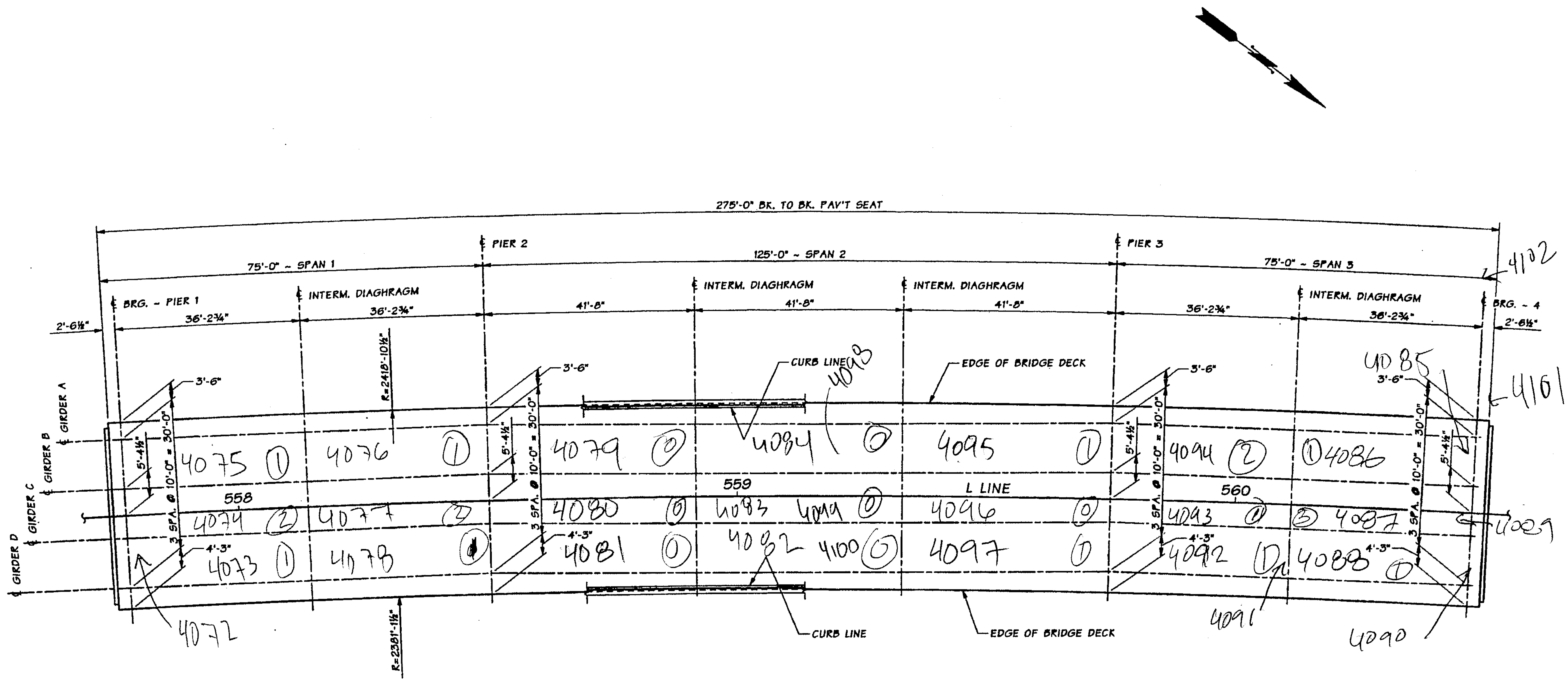
ASTM C 157 Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete

Material:		Concrete
Number of Specimens per Mixture:		4
Size of Specimens, in.:	Length:	10.0
	Width:	4.0
	Height:	4.0
Method of Consolidation:		4
Period of Moist Curing:		28-days
Drying Exposure Conditions:		23°C, 50% RH

Length Change

Reading	D-101112-01
Initial	0.000%
0-days dry	0.006%
4-days dry	-0.003%
7-days dry	-0.006%
14-days dry	-0.010%
21-days dry	-0.016%
28-days dry	-0.018%





FRAMING PLAN

ALL DIMENSIONS ARE NORMAL TO OR ALONG THE L LINE, BACK OF PAVEMENT SEAT & ℄ PIER UNLESS OTHERWISE SHOWN.

SR 6 FILE NO. 7008 SHEET 23

Bridge Design Engr.	Khaleghi, B		M:\X-Team\SR6 WILLAPA RIVER BR 6-8 REPL\window files\FRAMING PLAN.wnd			
Supervisor	Khaleghi, B					
Designed By	Hsieh, JC	04/12				
Checked By	Sawahata, D	03/13				
Detailed By	McCarthy, DJ	04/12				
Bridge Projects Engr.						
Prelim. Plan By						
Architect/Specialist			DATE	REVISION	BY	APP'D

Tue Mar 05 16:26:44 2013

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			
JOB NUMBER 13X307				

BRIDGE AND STRUCTURES OFFICE

3/7/13 3/7/13

Washington State Department of Transportation

SR 6
WILLAPA RIVER BRIDGE
REPLACE BRIDGE
WILLAPA RIVER (LILLY WHEATON) BR NO 6/8 REPLACEMENT

FRAMING PLAN

BRIDGE SHEET NO. 23

SHEET 95 OF 122 SHEETS

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	6/8	Bridge Name	Willapa River Bridge	Structure ID	0018464A
Contract #	8464	Region	SW	Project Engineer	Colin Newell
Performance Deck Concrete?	YES				
Contractor	Rotschy, Inc.	Concrete Supplier	Bayview Redi Mix, Inc	Deck Placement	12/24/13 & 12/30/13

Bridge Description: 3-Span (75' / 125' / 75'), 4-WF58G Girders (275' bridge length), 2-Lanes (36' wide roadway)

L = length between diaphragms (or length of "bay")

S = girder spacing

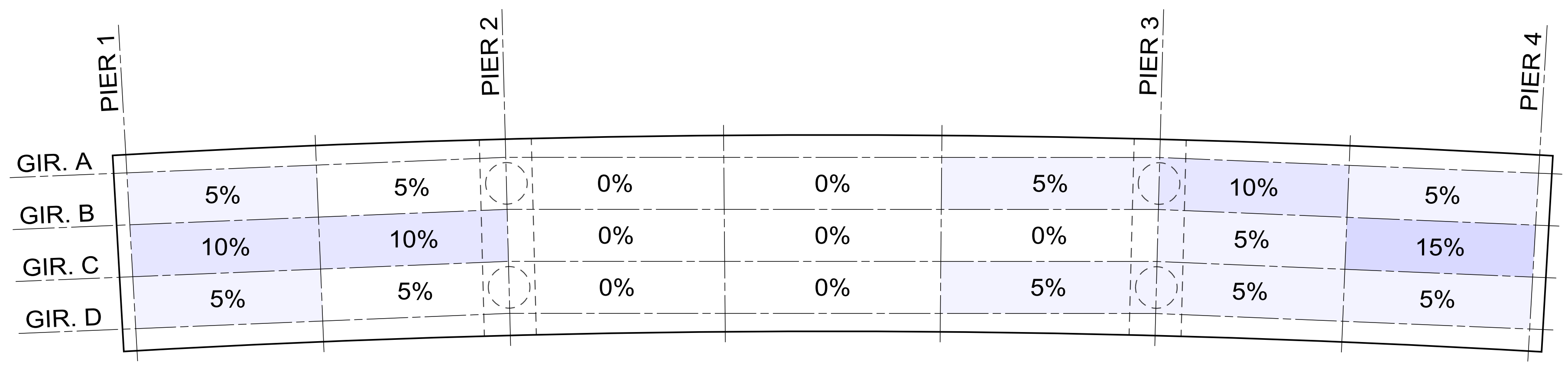
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	5%
Min. =	0%
Max. =	15%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	36.23	10.00	1	18	5%
1	1	B	C	36.23	10.00	2	18	10%
1	1	C	D	36.23	10.00	1	18	5%
1	2	A	B	36.23	10.00	1	18	5%
1	2	B	C	36.23	10.00	2	18	10%
1	2	C	D	36.23	10.00	1	18	5%
2	1	A	B	41.67	10.00	0	21	0%
2	1	B	C	41.67	10.00	0	21	0%
2	1	C	D	41.67	10.00	0	21	0%
2	2	A	B	41.67	10.00	0	21	0%
2	2	B	C	41.67	10.00	0	21	0%
2	2	C	D	41.67	10.00	0	21	0%
2	3	A	B	41.67	10.00	1	21	5%
2	3	B	C	41.67	10.00	0	21	0%
2	3	C	D	41.67	10.00	1	21	5%
2	4	A	B	36.23	10.00	2	18	10%
2	4	B	C	36.23	10.00	1	18	5%
2	4	C	D	36.23	10.00	1	18	5%
2	5	A	B	36.23	10.00	1	18	5%
2	5	B	C	36.23	10.00	3	18	15%
2	5	C	D	36.23	10.00	1	18	5%



CRACKING INTENSITY ~ BRIDGE 6/8

100% = CRACK EVERY 2 FT.

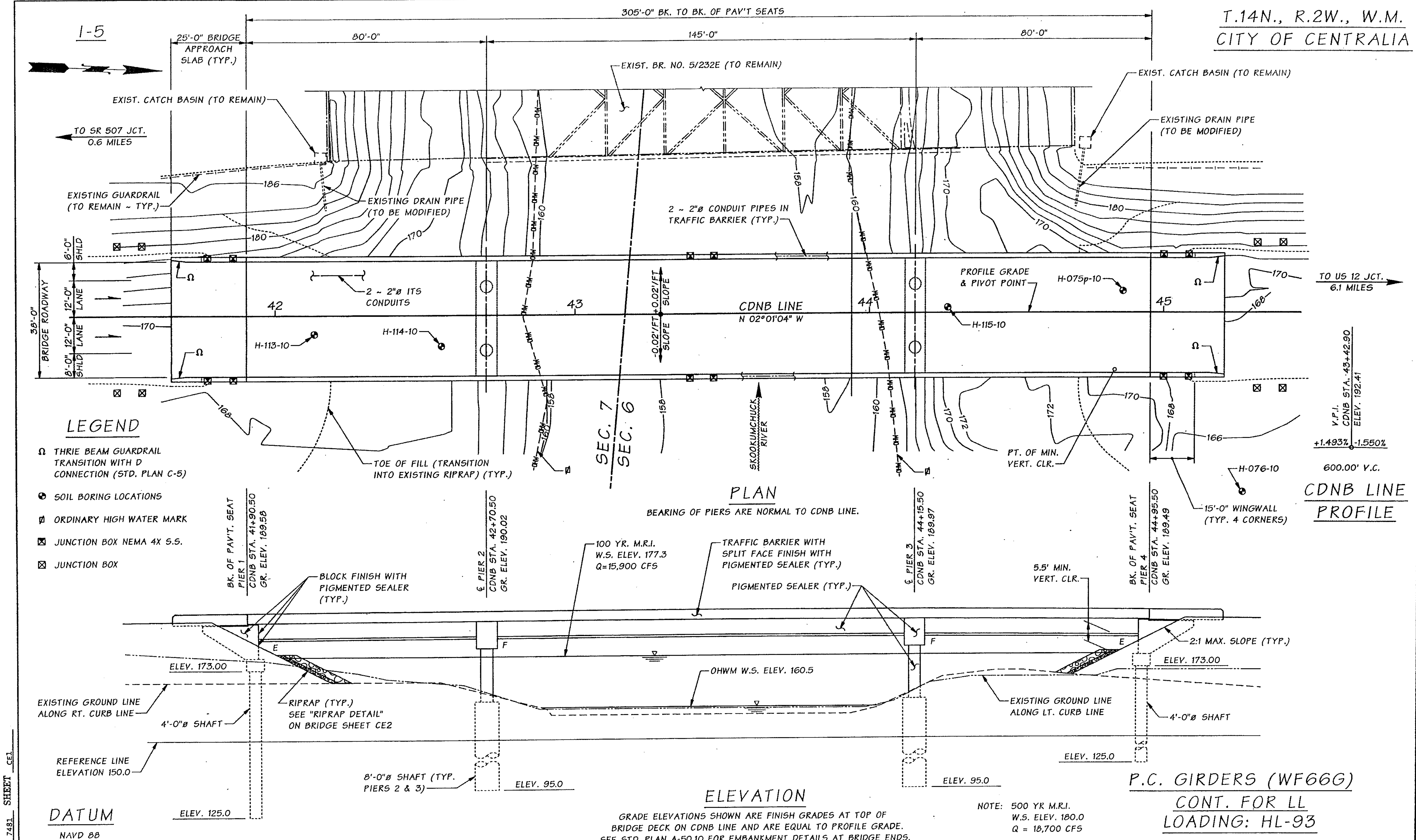
LESS CRACKING MORE CRACKING

BRIDGE NUMBER	6/8
BRIDGE NAME	WILLAPA RIVER
INSPECTION DATE	5/7/2015
DECK CONCRETE	PERFORMANCE BASED

BRIDGE 5/232NCD (SKOOKUMCHUCK RIVER NBCD)

Bridge #	5/232NCD	Bridge Name	Skookumchuck River NBCD	Structure ID	0018272A
Contract #	8272 Region SW	Project Engineer	Colin Newell	Performance Deck Concrete?	YES
Contractor	Cascade Bridge	Concrete Supplier	Miles Sand & Gravel	Deck Placement	2/14/2013
Bridge Description	3-Span (80' / 145' / 80'), 5-WF66G Girders (305' bridge length), 2-Lanes (38' wide roadway)				

CONTENTS



Bridge Design Engr.	Khaleghi, B	
Supervisor	Stoddard, RB	
Designed By	PMN/MCF	03/12
Checked By	JCH/LHT	03/12
Detailed By	McCarthy, DJ	10/11
Bridge Projects Engr.	Lewis, RA	06/10
Prelim. Plan By	Wei, J	03/10
Architect/Specialist	PDK/BSA/GAW	04/10

M:\X-Team\MELLEN TO BLAKESLEE JCT\CDNB BR\window files\LAYOUT.WND

DATE | REVISION | BY | APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 12X304

BRIDGE AND STRUCTURES OFFICE

JUGESH KAPUR — STATE OF WASHINGTON — 36400 — PROFESSIONAL ENGINEER

3/7/12

Washington State Department of Transportation

I-5
MELLEN STREET TO BLAKESLEE JUNCTION - STAGE 1
SKOOKUMCHUCK RIVER BRIDGE NO. 5/232NCD
LAYOUT

BRIDGE SHEET NO. CE1
SHEET 220 of 472 SHEETS

Tue Mar 06 14:03:31 2012

SR 5 FILE NO. 7481 SHEET CE1

C.S. 2101 ~ PROJ. NO. TA4572D ~ SOUTHWEST REGION ~ I-5 ~ MELLEN TO BLAKESLEE JCT. ~ NORTHBOUND CD BRIDGE ~ NEW STRUCTURE

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	5/232NCD	Bridge Name	Skookumchuck River NBCD	Structure ID	0018272A
Contract #	8272	Region	SW	Project Engineer	Colin Newell
Performance Deck Concrete?	YES				
Contractor	Cascade Bridge	Concrete Supplier	Miles Sand & Gravel	Deck Placement	2/14/2013
Bridge Description	3-Span (80' / 145' / 80'), 5-WF66G Girders (305' bridge length), 2-Lanes (38' wide roadway)				

Mix Design (WSDOT Form 350-040)

Water (max) = 223 lbs/cy w/c = 0.40 max

Cementitious Materials	Lbs/cy	Source	Type, Class or Grade
cement	464	Lafarge	Type I-II
fly ash	116	Lafarge	Type F
slag			
latex			
microsilica			

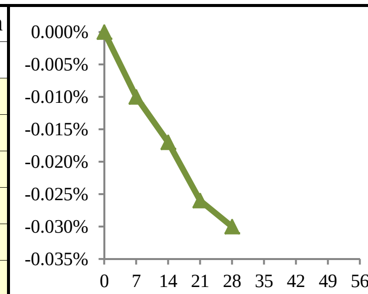
Concrete Admixtures	oz/cy	Manufacturer	Product
air entrainment	1-15	BASF	MB-AE-90
water reducer			
HR water reduce	23-40	BASF	Glenium 7500
set retarder			
shrink. reducer	32	BASF	MasterLife SRA

Concrete Test Results

compressive strength @ 28 days	5,507	psi
modulus of elasticity		psi
permeability @ 56 days	1,350	coulombs
mix design density	145.5	lb/cf

Shrinkage Test Results

Dry Age (days)	% Length Change
0	0.0000%
4	
7	-0.0100%
14	-0.0170%
21	-0.0260%
28	-0.0300%
56	



Aggregate

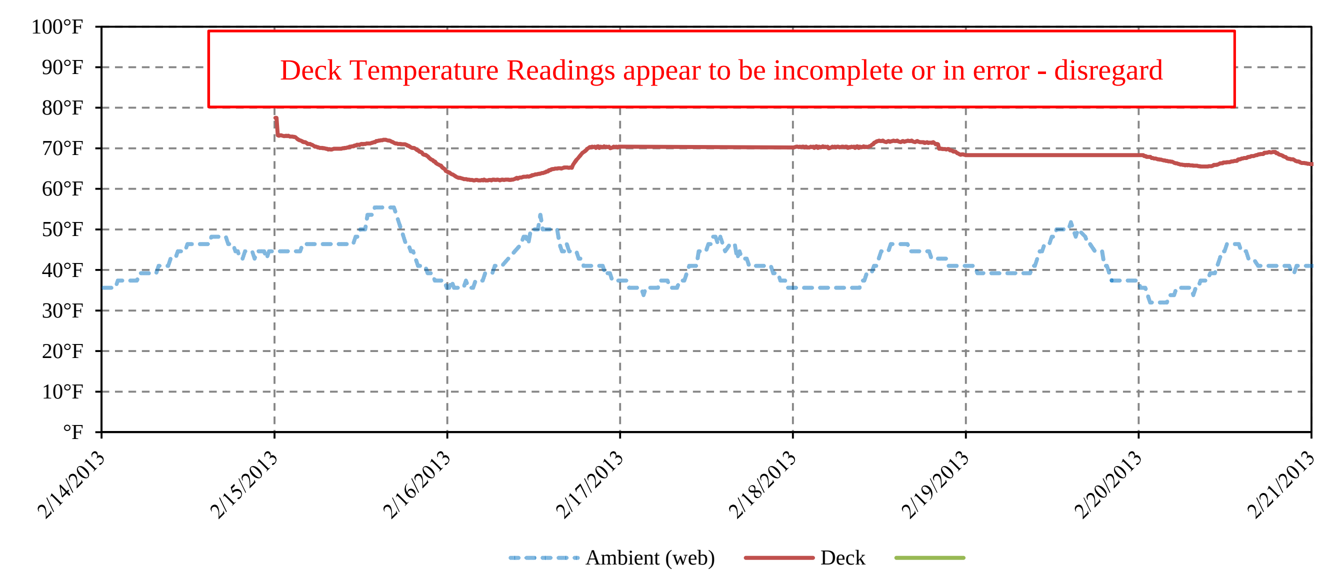
	Comp. 1	Comp. 2	Comp. 3	Comp. 4	Comp. 5
WSDOT Pit #	B-329	B-329	B-329	B-333	
Grading	No. 4	No. 57	No. 8	Class 2	
% Total	15.4%	33.3%	16.0%	35.3%	
Lbs/cy	480	1040	500	1100	
ASR Mitigation	None Required				

Notes

Same Mix Design as:
- * Bridge 5/232SCD
- * Bridge 5/234W

Very Similar Mix Design as:
- * Bridge 5/229

Temperature



Washington State Department of Transportation

Concrete Mix Design

Contractor: Cascade Bridge	Submitted By:	Date: 1-28-2013
Concrete Supplier: Miles Sand & Gravel	Plant Location: Rochester	
Contract Number: 8272	Contract Name: Blakeslee Jct to Mellen St	

This mix is to be used in the following Bid Item No(s): 92.18.01, 93.16.01, 94.17.01

Concrete Class: *(check one only)*

☐ 3000 ☐ 4000 ☒ 4000D[a] ☐ 4000P[a] ☐ 4000W ☐ Concrete Overlay ☐ Cement Concrete Pavement[d]

☐ Other Shrinkage Reducer

Remarks:

Mix Design No. 0444AFL2 **Plant No.** 222

Cementitious Materials	Source	Type, Class or Grade	Sp. Gr.	Lbs/cy
Cement	Lafarge	I-II	3.15	464
Fly Ash[a]	Lafarge	F	2.54	116
GGBFS (Slag)				
Latex				
Microsilica				

Concrete Admixtures	Manufacturer	Product	Type	Est. Range (oz/cy)
Air Entrainment	BASF	MB-AE-90		1-15
Water Reducer				
High-Range Water Reducer	BASF	Glenium 7500	F	23-40
Set Retarder				
Other Shrinkage Reducer	BASF	MasterLife SRA		32

Water (Maximum) 233 lbs/cy Is any of the water Recycled or Reclaimed? ☐ Yes[e] ☒ No

Water Cementitious Ratio (Maximum) 0.40 Mix Design Density 145.5 lbs/cf[d]

Design Performance	1	2	3	4	5	Average[f]
28 Day Compressive Strength (cylinders) psi						5,507
14 Day Flexural[d] Strength (beams) psi						

Agency Use Only (Check appropriate Box)

☐ **This Mix Design MEETS CONTRACT SPECIFICATIONS and may be used on the bid items noted above**

☐ **This Mix Design DOES NOT MEET CONTRACT SPECIFICATIONS and is being returned for corrections**

Reviewed By: ______________________ ______________________

PE Signature

RECEIVED

JAN 29 2013

DEPT. OF TRANSPORTATION CHEHALIS ENGINEERING

DOT Form 350-040 EF
Revised 6/06

Distribution: Original - Contractor
Copies To - State Materials Lab-Structural Materials Eng. ; Regional Materials Lab; Project Inspector

Mix Design No. 0444AFL2 **Plant No.** 222

Aggregate Information

Concrete Aggregates	Component 1	Component 2	Component 3	Component 4	Component 5	Combined Gradation
WSDOT Pit No.	B-329	B-329	B-329	B-333		
WSDOT ASR 14-day Results (%) b	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☐ No	
Grading[c]	4	57	8	Class 2		
Percent of Total Aggregate						100%
Specific Gravity	2.71	2.69	2.68	2.65		
Lbs/cy (ssd)	480	1040	500	1100		

Percent Passing

2 inch	100	100	100	100		100
1-1/2 inch	100	100	100	100		100
1 inch	32.6	100	100	100		89.6
3/4 inch	1.6	80.0	100	100		78.2
1/2 inch	0.4	30.1	100	100		61.4
3/8 inch	0.2	7.8	88.6	100		52.1
No. 4	0.1	0.3	22.4	99.4		38.8
No. 8	0.1	0.2	1.4	90.2		32.1
No. 16	0.1	0.1	0.2	70		24.8
No. 30	0.1	0.1	0.2	44.1		15.6
No. 50	0.1	0.1	0.2	20		7.1
No. 100	0.1	0.1	0.2	6		2.2
No. 200	0.1	0.1	0.2	1.7		0.7

Fineness Modulus: 2.70 (Required for Class 2 Sand)

ASR Mitigation Method Proposed [b] : ______

Notes:

a Required for Class 4000D and 4000P mixes.

b Alkali Silica Reactivity Mitigation is required for sources with expansions over 0.20% - Incidate method for ASR mitigation.
For expansion of 0.21% - 0.45%, acceptable mitigation can be the use of low alkali cement or 25% type F fly ash.
Any other proposed mitigation method or for pits with greater than 0.45% expansion, proof of mitigating measure, either ASTM C1260 / AASHTO T303 test results must be attached.
If ASTM C 1293 testing has been submitted indicating 1-year expansion of 0.04% or less, mitigation is not required.

c AASHTO No. 467, 57, 67, 7, 8; WSDOT Class 1, Class 2; or combined gradation. See Standard Specification 9-03.1.

d Required for Cement Concrete Pavements.

e Attach test results indicating conformance to Standard Specification 9-25.1.

f Actual Average Strength as determined from testing or estimated from ACI 211.

DOT Form 350-040 EF
Revised 6/06

RECEIVED
JAN 29 2012
DEPT. OF TRANSPORTATION CHEHALIS ENGINEERING

LAFARGE NORTH AMERICA

Lafarge North America Concrete Lab
5400 W Marginal Way SW
Seattle, WA. 98106

Report To: **Miles Sand & Gravel**
Attention: **Quality Control Personnel**

Date: May 25, 2012

Subject: Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration: ASTM C-1202

Tested Materials: Date Sampled: **March 2012**
Mix Design: **WSDOT Valley HPC**

Curing: ASTM C-1202 Standard Cure

Results:

Age	Coulombs
56 day	**1350**
90 day	920

*The ASTM C-1202 procedure was followed.

The test result is only valid if the aggregate(s) sample(s) is(are) representative of the current production and it is to be noted that Lafarge has no knowledge of the representatives of the sample received for testing. Also, material quality can vary with different locations in a quarry. It is recommended that testing be carried out on an annual basis or more frequently if a variation in stone quality is suspected.

Although the Lafarge North America Seattle Concrete Lab. applies state-of-the-art test methods, Lafarge North America. and its affiliates (Lafarge) can not guarantee the results shown above and shall assume no liability whatsoever for any errors in such results and for the consequence of such errors.

Robert G. Shogren

Rob Shogren, P.E.
Technical Service Engineer
Lafarge North America

LAFARGE
NORTH AMERICA

Lafarge North America Concrete Lab
5400 W Marginal Way SW
Seattle, WA. 98106

Report To: **Miles Sand & Gravel** Date: May 25, 2012
Attention: **Quality Control Personnel**

Subject: Length Change of Hardened Hydraulic-Cement Concrete Using Procedures of ASTM C-157

Tested Materials: Date Sampled: March, 2012
Source of Aggregates: Miles Sand & Gravel

Mix Design: WSDOT HPC

Results:
Slump: 4.5"
Temp: 64F
Specimen Size: 4"x4"x10"
Consolidation: Rodding
Initial Cure: Lime water submersion (28 day initial cure)

Age (Days) After Initial Cure	Percent Length Change (Average of 3)
7	0.010
14	0.017
21	0.026
28 (final)	0.030

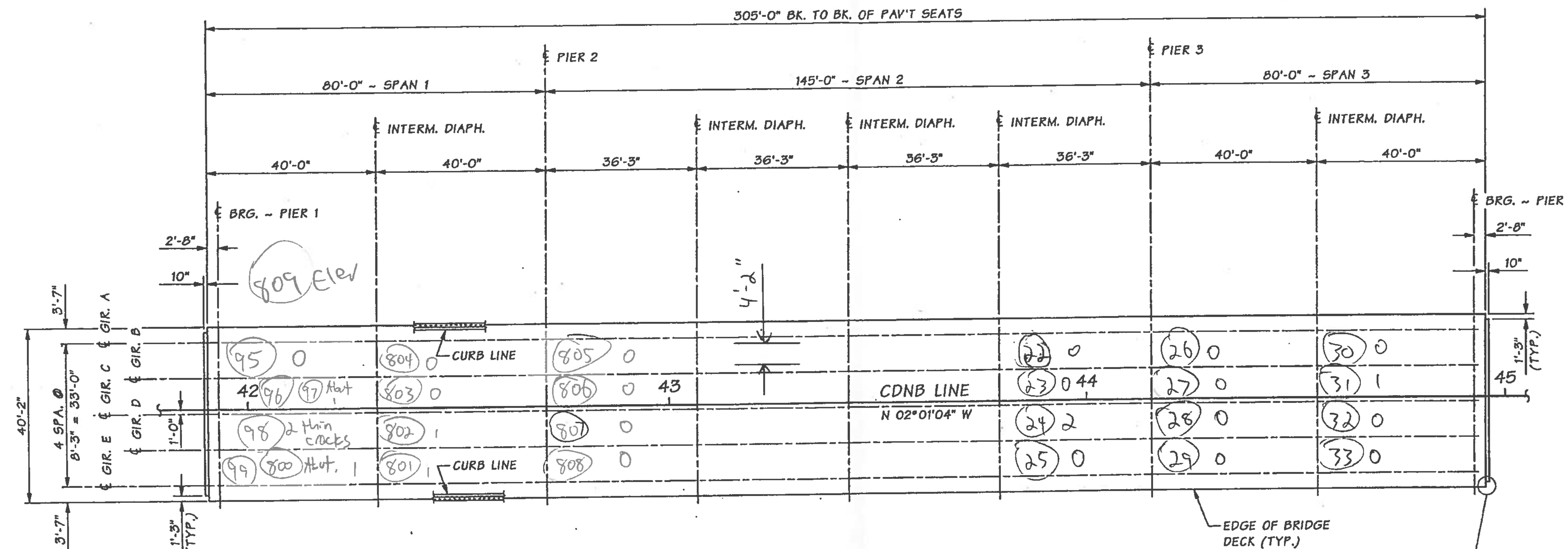
*The ASTM C-157 procedure was followed.

The test result is only valid if the aggregate(s) sample(s) is(are) representative of the current production and it is to be noted that Lafarge has no knowledge of the representatives of the sample received for testing. Also, material quality can vary with different locations in a quarry. It is recommended that testing be carried out on an annual basis or more frequently if a variation in stone quality is suspected.

Although the Lafarge North America Seattle Concrete Lab. applies state-of-the-art test methods, Lafarge North America. and its affiliates (Lafarge) can not guarantee the results shown above and shall assume no liability whatsoever for any errors in such results and for the consequence of such errors.

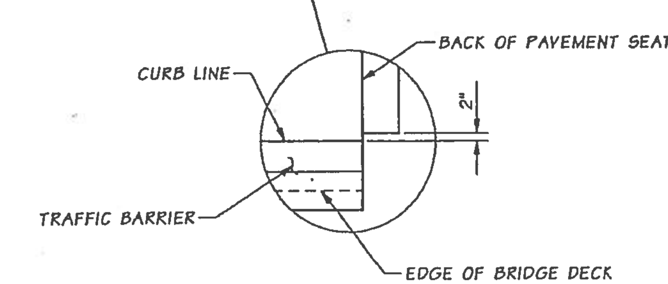
Robert D. Shogren
Rob Shogren, P.E.
Technical Service Engineer
Lafarge North America

3795 - 3809
3822 - 3833



FRAMING PLAN

BEARING OF PIERS ARE NORMAL TO CDNB LINE.



NOTE:
OTHERS CORNERS SIMILAR.

SR 5 FILE NO. 7481 SHEET CE20

Bridge Design Engr.	Khaleghi, B		
Supervisor	Stoddard, RB		
Designed By	Nash, PM	05/11	
Checked By	Hsieh, JC	03/12	
Detailed By	McCarthy, DJ	10/11	
Bridge Projects Engr.			
Prelim. Plan By			
Architect/Specialist			

M:\X-Team\MELLEN TO BLAKESLEE JCT\CDNB BR\window files\FRAMING PLAN.WND

DATE | REVISION | BY | APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			
JOB NUMBER 12X504				

PHILLIP M. NASH PROFESSIONAL ENGINEER 3/5/12

BRIDGE AND STRUCTURES OFFICE

RICHARD B. ... PROFESSIONAL ENGINEER 3/5/12

Washington State Department of Transportation

I-5
MELLEN STREET TO BLAKESLEE JUNCTION - STAGE 1
SKOOKUMCHUCK RIVER BRIDGE NO. 5/232NCD

FRAMING PLAN

BRIDGE SHEET NO. CE20
SHEET 239 OF 472 SHEETS

Mon Mar 05 11:20:02 2012

Bridge Deck Concrete Study

Washington State Department of Transportation

Bridge #	5/232NCD	Bridge Name	Skookumchuck River NBCD	Structure ID	0018272A
Contract #	8272	Region	SW	Project Engineer	Colin Newell
Performance Deck Concrete?	YES				
Contractor	Cascade Bridge	Concrete Supplier	Miles Sand & Gravel	Deck Placement	2/14/2013
Bridge Description	3-Span (80' / 145' / 80'), 5-WF66G Girders (305' bridge length), 2-Lanes (38' wide roadway)				

L = length between diaphragms (or length of "bay")
S = girder spacing
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)
N_{cr} = number of leaching cracks counted during visual inspection
% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg =	2%
Min. =	0%
Max. =	10%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	40.00	8.25	0	20	0%
1	1	B	C	40.00	8.25	1	20	5%
1	1	C	D	40.00	8.25	2	20	10%
1	1	D	E	40.00	8.25	1	20	5%
1	2	A	B	40.00	8.25	0	20	0%
1	2	B	C	40.00	8.25	0	20	0%
1	2	C	D	40.00	8.25	1	20	5%
1	2	D	E	40.00	8.25	1	20	5%
2	1	D	E	36.25	8.25	0	18	0%
2	1	D	E	36.25	8.25	0	18	0%
2	1	D	E	36.25	8.25	0	18	0%
2	1	D	E	36.25	8.25	0	18	0%
2	2	D	E	36.25	8.25	#N/A	18	#N/A
2	2	D	E	36.25	8.25	#N/A	18	#N/A
2	2	D	E	36.25	8.25	#N/A	18	#N/A
2	2	D	E	36.25	8.25	#N/A	18	#N/A
2	3	D	E	36.25	8.25	#N/A	18	#N/A
2	3	D	E	36.25	8.25	#N/A	18	#N/A
2	3	D	E	36.25	8.25	#N/A	18	#N/A
2	3	D	E	36.25	8.25	#N/A	18	#N/A
2	4	D	E	36.25	8.25	0	18	0%
2	4	D	E	36.25	8.25	0	18	0%
2	4	D	E	36.25	8.25	2	18	10%
2	4	D	E	36.25	8.25	0	18	0%
3	1	D	E	40.00	8.25	0	20	0%
3	1	D	E	40.00	8.25	0	20	0%
3	1	D	E	40.00	8.25	0	20	0%
3	1	D	E	40.00	8.25	0	20	0%
3	2	D	E	40.00	8.25	0	20	0%
3	2	D	E	40.00	8.25	1	20	5%
3	2	D	E	40.00	8.25	0	20	0%

PIER 1 PIER 2 PIER 3 PIER 4

GIR. A
GIR. B
GIR. C
GIR. D
GIR. E

0%	0%	0%	X X X	X X X	0%	0%	0%
5%	0%	0%	X X X	X X X	0%	0%	5%
10%	5%	0%	X X X	X X X	10%	0%	0%
5%	5%	0%	X X X	X X X	0%	0%	0%

CRACKING INTENSITY ~ BRIDGE 5/232NCD

100% = CRACK EVERY 2 FT.

X X X = CRACKS NOT COUNTED DUE TO LIMITED ACCESS

LESS CRACKING MORE CRACKING

BRIDGE NUMBER	5/232NCD
BRIDGE NAME	SKOOKUMCHUCK RIVER NBCD
INSPECTION DATE	4/8/2015
DECK CONCRETE	PERFORMANCE BASED

BRIDGE 5/232SCD (SKOOKUMCHUCK RIVER SBCD)

Bridge #	5/232SCD	Bridge Name	Skookumchuck River SBCD	Structure ID	0018272A
Contract #	8272	Region	SW	Project Engineer	Colin Newell
Performance Deck Concrete?	YES				
Contractor	Cascade Bridge	Concrete Supplier	Miles Sand & Gravel	Deck Placement	3/2/2013
Bridge Description	3-Span (80' / 145' / 80'), 5-WF66G Girders (305' bridge length), 2-Lanes (38' wide roadway)				

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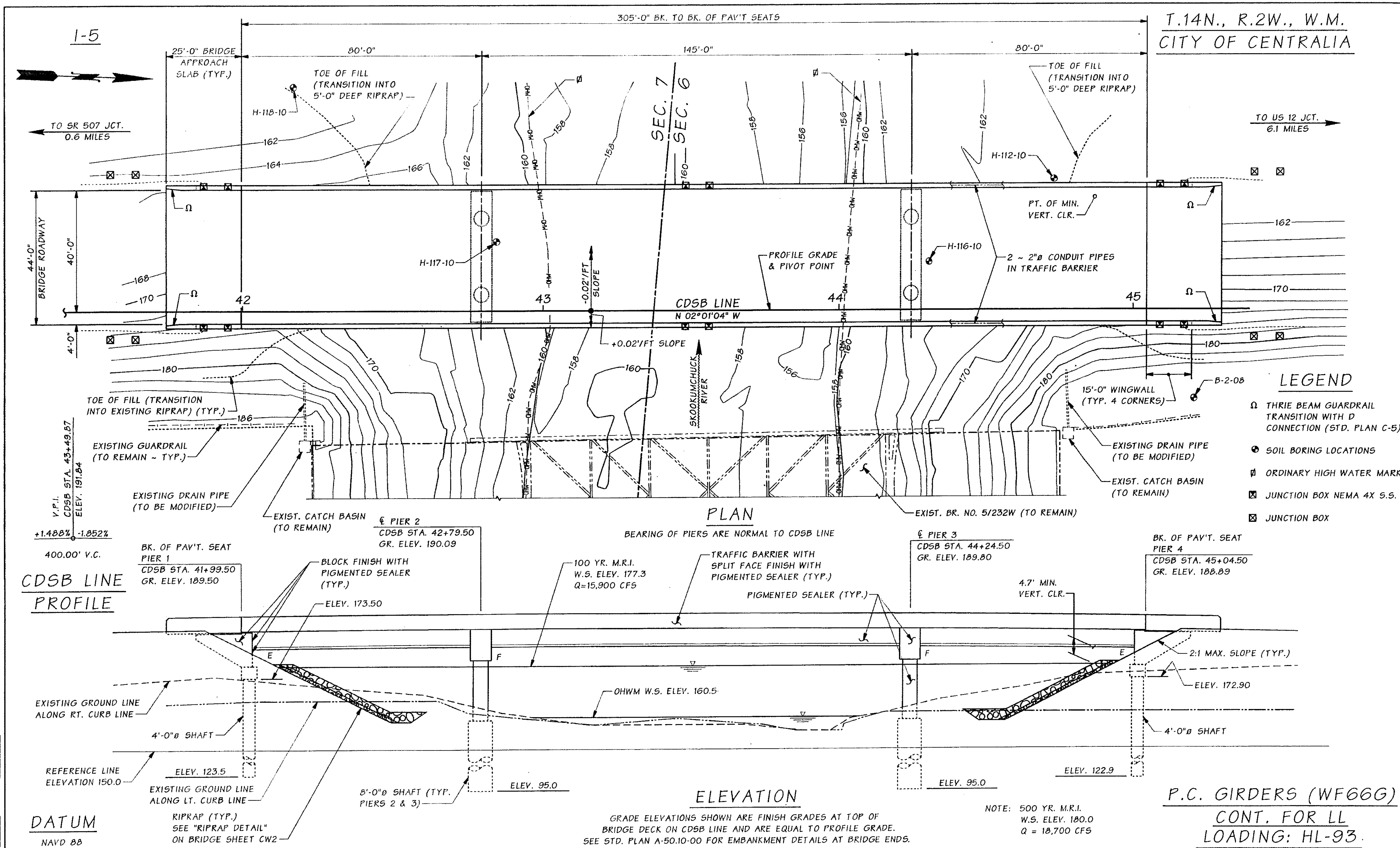
1. Layout Plan Sheet
2. Mix Design Summary
3. Concrete Mix Design Form
4. Concrete Test Results
5. Field Notes
6. Crack Summary
7. Crack Intensity Diagram



Bridge Design Engr.		
Supervisor	Elkey, WE	
Designed By	Herzstein, Eric	10/11
Checked By	Kotsonis, A	03/12
Detailed By	McCarthy, DJ	10/11
Bridge Projects Engr.	Lewis, RA	06/10
Prelim. Plan By	Wei, J	03/10
Architect/Specialist	PDK/BSA/GAW	04/10

N:\X-Team\MELLEN TO BLAKESLEE JCT\CDSB BR\window files\LAYOUT.WND

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 12X304

DATE	REVISION	BY	APP'D

PARSONS

WILLIAM E. ELKEY — STATE OF WASHINGTON — PROFESSIONAL ENGINEER

3/6/12

Washington State Department of Transportation

I-5
MELLEN STREET TO BLAKESLEE JUNCTION - STAGE 1
SKOOKUMCHUCK RIVER BRIDGE NO. 5/232SCD
LAYOUT

BRIDGE SHEET NO. CW1
SHEET 258 OF 472 SHEETS

SR 5 FILE NO. 7480 SHEET CW1

C.S. 2101 ~ PROJ. NO. TA 4572E ~ SOUTHWEST REGION ~ I-5 ~ MELLEN TO BLAKESLEE JCT. ~ SOUTHBOUND CD BRIDGE ~ NEW STRUCTURE

Fri Mar 02 12:51:24 2012

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	5/232SCD	Bridge Name	Skookumchuck River SBCD	Structure ID	0018272A
Contract #	8272	Region	SW	Project Engineer	Colin Newell
Performance Deck Concrete?	YES	Contractor	Cascade Bridge	Concrete Supplier	Miles Sand & Gravel
Deck Placement	3/2/2013				

Bridge Description: 3-Span (80' / 145' / 80'), 5-WF66G Girders (305' bridge length), 2-Lanes (38' wide roadway)

Mix Design (WSDOT Form 350-040)

Water (max) = 223 lbs/cy w/c = 0.40 max

Cementitious Materials	Lbs/cy	Source	Type, Class or Grade
cement	464	Lafarge	Type I-II
fly ash	116	Lafarge	Type F
slag			
latex			
microsilica			

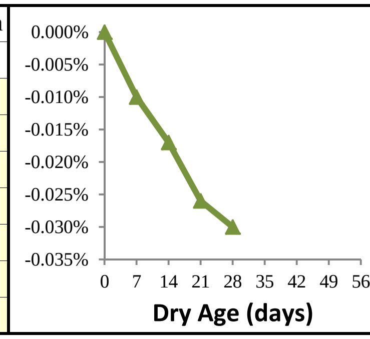
Concrete Admixtures	oz/cy	Manufacturer	Product
air entrainment	1-15	BASF	MB-AE-90
water reducer			
HR water reduce	23-40	BASF	Glenium 7500
set retarder			
shrink. reducer	32	BASF	MasterLife SRA

Concrete Test Results

compressive strength @ 28 days	5,507	psi
modulus of elasticity		psi
permeability @ 56 days	1,350	coulombs
mix design density	145.5	lb/cf

Shrinkage Test Results

Dry Age (days)	% Length Change
0	0.0000%
4	
7	-0.0100%
14	-0.0170%
21	-0.0260%
28	-0.0300%
56	



Aggregate

	Comp. 1	Comp. 2	Comp. 3	Comp. 4	Comp. 5
WSDOT Pit #	B-329	B-329	B-329	B-333	
Grading	No. 4	No. 57	No. 8	Class 2	
% Total	15.4%	33.3%	16.0%	35.3%	
Lbs/cy	480	1040	500	1100	

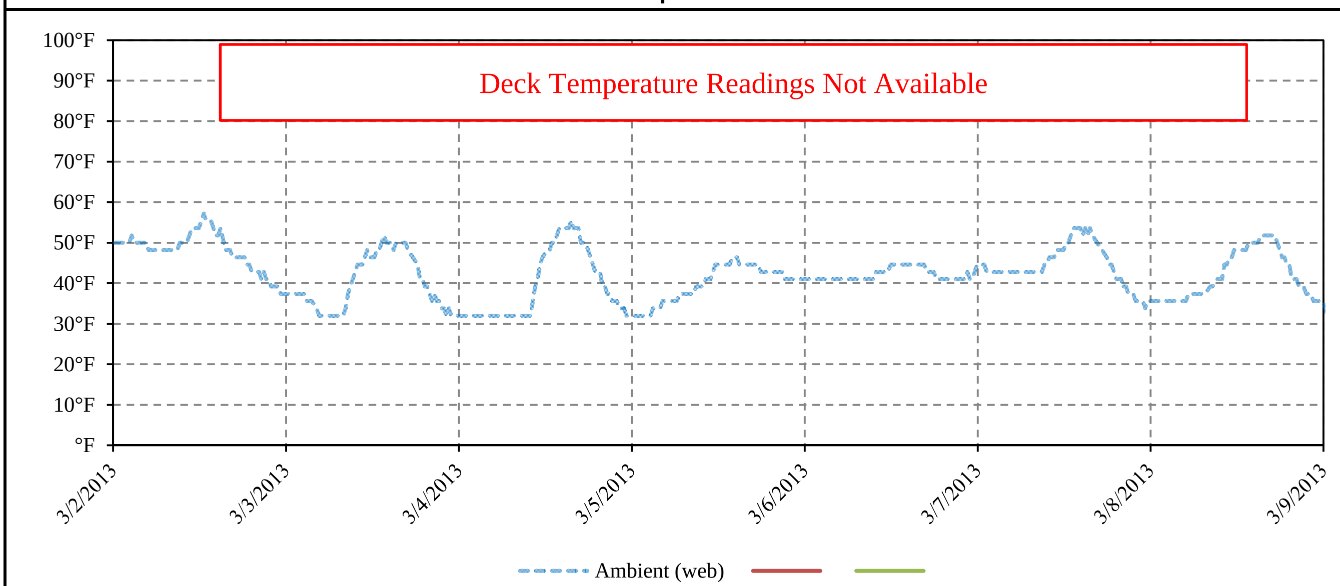
ASR Mitigation: None Required

Notes

Same Mix Design as:
* Bridge 5/232NCD
* Bridge 5/234W

Very Similar Mix Design as:
* Bridge 5/229

Temperature



Washington State Department of Transportation

Concrete Mix Design

Contractor	Submitted By	Date
Cascade Bridge		1-28-2013

Concrete Supplier	Plant Location
Miles Sand & Gravel	Rochester

Contract Number	Contract Name
8272	Blakeslee Jct to Mellen St

This mix is to be used in the following Bid Item No(s): 92.18.01, 93.16.01, 94.17.01

Concrete Class: *(check one only)*

☐ 3000 ☐ 4000 ☒ 4000D[a] ☐ 4000P[a] ☐ 4000W ☐ Concrete Overlay ☐ Cement Concrete Pavement[d]

☐ Other Shrinkage Reducer

Remarks:

Mix Design No. 0444AFL2 **Plant No.** 222

Cementitious Materials	Source	Type, Class or Grade	Sp. Gr.	Lbs/cy
Cement	Lafarge	I-II	3.15	464
Fly Ash[a]	Lafarge	F	2.54	116
GGBFS (Slag)				
Latex				
Microsilica				

Concrete Admixtures	Manufacturer	Product	Type	Est. Range (oz/cy)
Air Entrainment	BASF	MB-AE-90		1-15
Water Reducer				
High-Range Water Reducer	BASF	Glenium 7500	F	23-40
Set Retarder				
Other Shrinkage Reducer	BASF	MasterLife SRA		32

Water (Maximum) 233 lbs/cy Is any of the water Recycled or Reclaimed? ☐ Yes[e] ☒ No

Water Cementitious Ratio (Maximum) 0.40 Mix Design Density 145.5 lbs/cf[d]

Design Performance	1	2	3	4	5	Average[f]
28 Day Compressive Strength (cylinders) psi						5,507
14 Day Flexural[d] Strength (beams) psi						

Agency Use Only (Check appropriate Box)

☐ This Mix Design MEETS CONTRACT SPECIFICATIONS and may be used on the bid items noted above

☐ This Mix Design DOES NOT MEET CONTRACT SPECIFICATIONS and is being returned for corrections

Reviewed By: ______________________
PE Signature

RECEIVED
JAN 29 2013
DEPT. OF TRANSPORTATION CHEHALIS ENGINEERING

DOT Form 350-040 EF
Revised 6/06

Distribution: Original - Contractor
Copies To - State Materials Lab-Structural Materials Eng. ; Regional Materials Lab; Project Inspector

Mix Design No. 0444AFL2 **Plant No.** 222

Aggregate Information

Concrete Aggregates	Component 1	Component 2	Component 3	Component 4	Component 5	Combined Gradation
WSDOT Pit No.	B-329	B-329	B-329	B-333		
WSDOT ASR 14-day Results (%) [b]	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☐ No	
Grading[c]	4	57	8	Class 2		
Percent of Total Aggregate						100%
Specific Gravity	2.71	2.69	2.68	2.65		
Lbs/cy (ssd)	480	1040	500	1100		

Percent Passing

2 inch	100	100	100	100		100
1-1/2 inch	100	100	100	100		100
1 inch	32.6	100	100	100		89.6
3/4 inch	1.6	80.0	100	100		78.2
1/2 inch	0.4	30.1	100	100		61.4
3/8 inch	0.2	7.8	88.6	100		52.1
No. 4	0.1	0.3	22.4	99.4		38.8
No. 8	0.1	0.2	1.4	90.2		32.1
No. 16	0.1	0.1	0.2	70		24.8
No. 30	0.1	0.1	0.2	44.1		15.6
No. 50	0.1	0.1	0.2	20		7.1
No. 100	0.1	0.1	0.2	6		2.2
No. 200	0.1	0.1	0.2	1.7		0.7

Fineness Modulus: 2.70 (Required for Class 2 Sand)

ASR Mitigation Method Proposed [b]: ______

Notes:

a Required for Class 4000D and 4000P mixes.

b Alkali Silica Reactivity Mitigation is required for sources with expansions over 0.20% - Incidate method for ASR mitigation.
For expansion of 0.21% - o.45%, acceptable mitigation can be the use of low alkali cement or 25% type F fly ash.
Any other proposed mitigation method or for pits with greater than 0.45% expansion, proof of mitigating measure, either ASTM C1260 / AASHTO T303 test results must be attached.
If ASTM C 1293 testing has been submitted indicating 1-year expansion of 0.04% or less, mitigation is not required.

c AASHTO No. 467, 57, 67, 7, 8; WSDOT Class 1, Class 2; or combined gradation. See Standard Specification 9-03.1.

d Required for Cement Concrete Pavements.

e Attach test results indicating conformance to Standard Specification 9-25.1.

f Actual Average Strength as determined from testing or estimated from ACI 211.

DOT Form 350-040 EF
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LAFARGE NORTH AMERICA

Lafarge North America Concrete Lab
5400 W Marginal Way SW
Seattle, WA. 98106

Report To: **Miles Sand & Gravel**
Attention: **Quality Control Personnel**

Date: May 25, 2012

Subject: Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration: ASTM C-1202

Tested Materials: Date Sampled: **March 2012**
Mix Design: **WSDOT Valley HPC**

Curing: ASTM C-1202 Standard Cure

Results:

Age	Coulombs
56 day	**1350**
90 day	920

*The ASTM C-1202 procedure was followed.

The test result is only valid if the aggregate(s) sample(s) is(are) representative of the current production and it is to be noted that Lafarge has no knowledge of the representatives of the sample received for testing. Also, material quality can vary with different locations in a quarry. It is recommended that testing be carried out on an annual basis or more frequently if a variation in stone quality is suspected.

Although the Lafarge North America Seattle Concrete Lab. applies state-of-the-art test methods, Lafarge North America. and its affiliates (Lafarge) can not guarantee the results shown above and shall assume no liability whatsoever for any errors in such results and for the consequence of such errors.

Robert G. Shogren

Rob Shogren, P.E.
Technical Service Engineer
Lafarge North America

Lafarge North America Concrete Lab
5400 W Marginal Way SW
Seattle, WA. 98106

Report To: **Miles Sand & Gravel**
Attention: **Quality Control Personnel**

Date: May 25, 2012

Subject: Length Change of Hardened Hydraulic-Cement Concrete Using Procedures of ASTM C-157

Tested Materials: Date Sampled: **March, 2012**
Source of Aggregates: Miles Sand & Gravel

Mix Design: WSDOT HPC

Results: Slump: 4.5"
Temp: 64F

Specimen Size: 4"x4"x10"
Consolidation: Rodding
Initial Cure: Lime water submersion (28 day initial cure)

Age (Days) After Initial Cure	Percent Length Change (Average of 3)
7	0.010
14	0.017
21	0.026
28 (final)	0.030

*The ASTM C-157 procedure was followed.

The test result is only valid if the aggregate(s) sample(s) is(are) representative of the current production and it is to be noted that Lafarge has no knowledge of the representatives of the sample received for testing. Also, material quality can vary with different locations in a quarry. It is recommended that testing be carried out on an annual basis or more frequently if a variation in stone quality is suspected.

Although the Lafarge North America Seattle Concrete Lab. applies state-of-the-art test methods, Lafarge North America. and its affiliates (Lafarge) can not guarantee the results shown above and shall assume no liability whatsoever for any errors in such results and for the consequence of such errors.

Robert D. Shogren

Rob Shogren, P.E.
Technical Service Engineer
Lafarge North America

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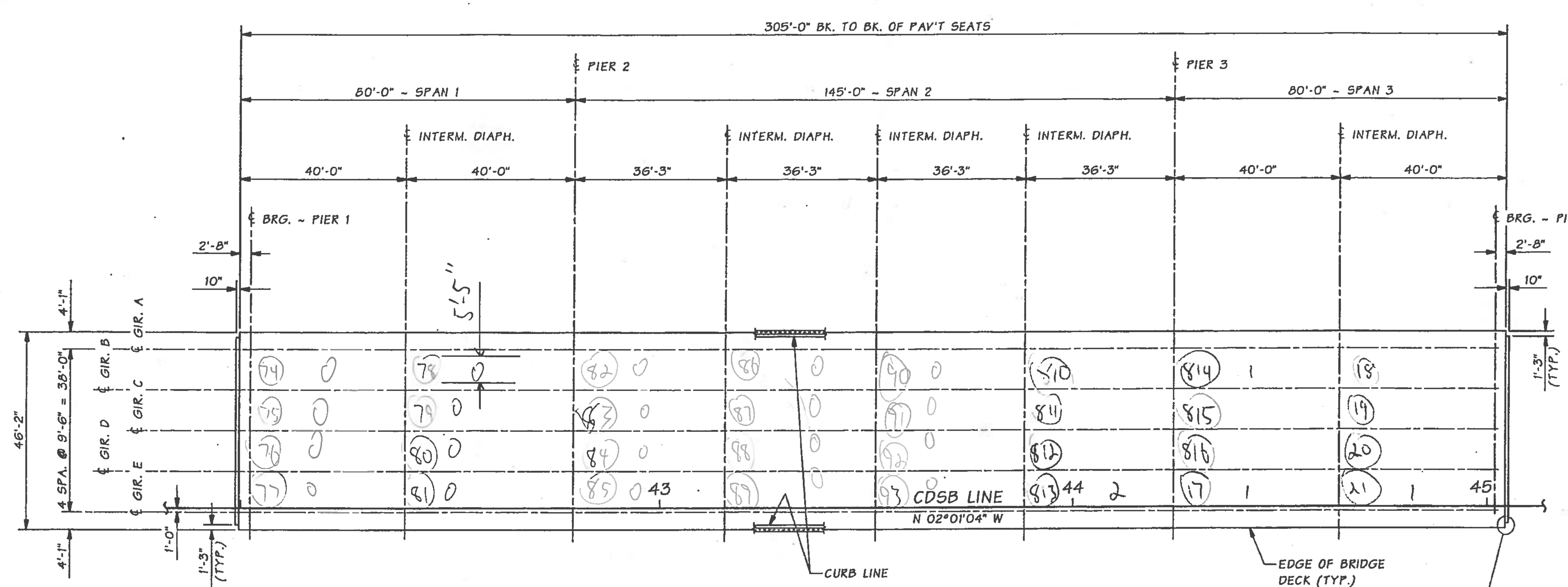
JAN 2 9 2012

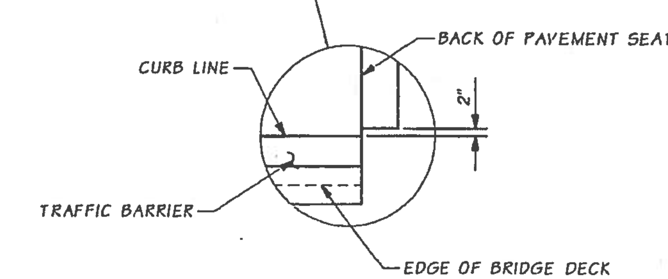
DEPT. OF TRANSPORTATION CHEHALIS ENGINEERING



94 General Elev.

FRAMING PLAN

BEARING OF PIERS ARE NORMAL TO CDSB LINE.



NOTE:
OTHERS CORNERS SIMILAR.

SR 5 FILE NO. 7480 SHEET CW20

Bridge Design Engr.	
Supervisor	Elkey, WE
Designed By	Herzstein, Eric 10/11
Checked By	Kotsonis, A 03/12
Detailed By	McCarthy, DJ 10/11
Bridge Projects Engr.	
Prelim. Plan By	
Architect/Specialist	

M:\X-Team\MELLEN TO BLAKESLEE JCT\CDSB BR\window files\FRAMING PLAN.wnd

DATE	REVISION	BY	APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 12X304

PARSONS

WILLIAM E. ELKEY — STATE OF WASHINGTON — PROFESSIONAL ENGINEER — 3/6/12

Washington State Department of Transportation

I-5
MELLEN STREET TO BLAKESLEE JUNCTION - STAGE 1
SKOOKUMCHUCK RIVER BRIDGE NO. 5/232SCD

FRAMING PLAN

BRIDGE SHEET NO. CW20

SHEET 277 OF 472 SHEETS

Fri Mar 02 12:51:29 2012

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	5/232SCD	Bridge Name	Skookumchuck River SBCD	Structure ID	0018272A
Contract #	8272	Region SW	Project Engineer Colin Newell	Performance Deck Concrete?	YES
Contractor	Cascade Bridge	Concrete Supplier	Miles Sand & Gravel	Deck Placement	3/2/2013
Bridge Description	3-Span (80' / 145' / 80'), 5-WF66G Girders (305' bridge length), 2-Lanes (38' wide roadway)				

L = length between diaphragms (or length of "bay")

S = girder spacing

N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	1%
Min. =	0%
Max. =	10%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	40.00	9.50	0	20	0%
1	1	B	C	40.00	9.50	0	20	0%
1	1	C	D	40.00	9.50	0	20	0%
1	1	D	E	40.00	9.50	0	20	0%
1	2	A	B	40.00	9.50	0	20	0%
1	2	B	C	40.00	9.50	0	20	0%
1	2	C	D	40.00	9.50	0	20	0%
1	2	D	E	40.00	9.50	0	20	0%
2	1	A	B	36.25	9.50	0	18	0%
2	1	B	C	36.25	9.50	0	18	0%
2	1	C	D	36.25	9.50	0	18	0%
2	1	D	E	36.25	9.50	0	18	0%
2	2	A	B	36.25	9.50	0	18	0%
2	2	B	C	36.25	9.50	0	18	0%
2	2	C	D	36.25	9.50	0	18	0%
2	2	D	E	36.25	9.50	0	18	0%
2	3	A	B	36.25	9.50	0	18	0%
2	3	B	C	36.25	9.50	0	18	0%
2	3	C	D	36.25	9.50	0	18	0%
2	3	D	E	36.25	9.50	0	18	0%
2	4	A	B	36.25	9.50	0	18	0%
2	4	B	C	36.25	9.50	0	18	0%
2	4	C	D	36.25	9.50	0	18	0%
2	4	D	E	36.25	9.50	2	18	10%
3	1	A	B	40.00	9.50	1	20	5%
3	1	B	C	40.00	9.50	0	20	0%
3	1	C	D	40.00	9.50	0	20	0%
3	1	D	E	40.00	9.50	1	20	5%
3	2	A	B	40.00	9.50	0	20	0%
3	2	B	C	40.00	9.50	0	20	0%
3	2	C	D	40.00	9.50	0	20	0%
3	2	D	E	40.00	9.50	1	20	5%

	PIER 1		PIER 2				PIER 3		PIER 4
GIR. A									
GIR. B	0%	0%	0%	0%	0%	0%	5%	0%	
GIR. C	0%	0%	0%	0%	0%	0%	0%	0%	
GIR. D	0%	0%	0%	0%	0%	0%	0%	0%	
GIR. E	0%	0%	0%	0%	0%	10%	5%	5%	

CRACKING INTENSITY ~ BRIDGE 5/232SCD

100% = CRACK EVERY 2 FT.

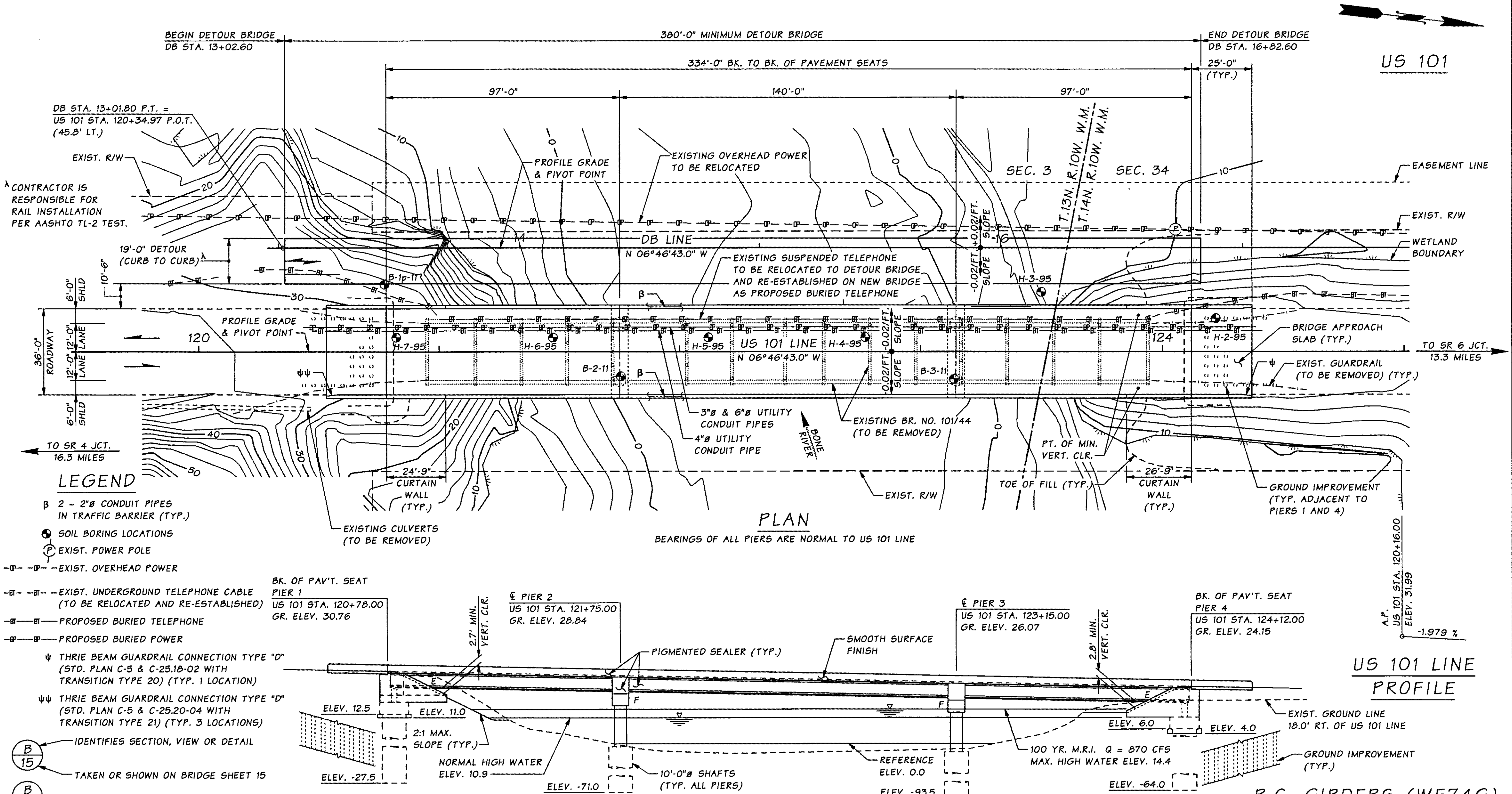
LESS CRACKING MORE CRACKING

BRIDGE NUMBER	5/232SCD
BRIDGE NAME	SKOOKUMCHUCK RIVER SBCD
INSPECTION DATE	4/8/2015
DECK CONCRETE	PERFORMANCE BASED

BRIDGE 101/44 (BONE RIVER)

Bridge #	101/44	Bridge Name	Bone River	Structure ID	0018292A
Contract #	8292	Region	SW	Project Engineer	Lori Figone
Performance Deck Concrete?	YES				
Contractor	Cascade Bridge	Concrete Supplier	Bayview Redi Mix, Inc	Deck Placement	4/24/2013
Bridge Description	3-Span (97' / 140' / 97'), 4-WF74G Girders (334" bridge length), 2-Lanes (36' wide roadway)				

CONTENTS



LEGEND

- β 2 ~ 2"ø CONDUIT PIPES IN TRAFFIC BARRIER (TYP.)
- SOIL BORING LOCATIONS
- Ⓟ EXIST. POWER POLE
- —OP— —OP— EXIST. OVERHEAD POWER
- —BT— —BT— EXIST. UNDERGROUND TELEPHONE CABLE (TO BE RELOCATED AND RE-ESTABLISHED)
- —BT——BT— PROPOSED BURIED TELEPHONE
- —BP——BP— PROPOSED BURIED POWER
- ψ THRIE BEAM GUARDRAIL CONNECTION TYPE "D" (STD. PLAN C-5 & C-25.18-02 WITH TRANSITION TYPE 20) (TYP. 1 LOCATION)
- ψψ THRIE BEAM GUARDRAIL CONNECTION TYPE "D" (STD. PLAN C-5 & C-25.20-04 WITH TRANSITION TYPE 21) (TYP. 3 LOCATIONS)
- B/15 IDENTIFIES SECTION, VIEW OR DETAIL — TAKEN OR SHOWN ON BRIDGE SHEET 15
- B/— TAKEN OR SHOWN ON THE SAME SHEET

DATUM

N.A.V.D. OF 1988

GRADE ELEVATIONS SHOWN ARE FINISH GRADES AT TOP OF BRIDGE DECK ON US 101 LINE AND ARE EQUAL TO PROFILE GRADE. SEE STD. PLAN A-50.30-00 FOR EMBANKMENT DETAILS AT BRIDGE ENDS.

500 YR. M.R.I. Q = 1090 CFS
ELEV. 15.0

P.C. GIRDERS (WF74G)
CONT. FOR LL
LOADING: HL-93

Bridge Design Engr.	Khaleghi, B	06/10
Supervisor	Zeldenrust, RP	
Designed By	PRG / HZ	05/11
Checked By	HZ / PRG	12/11
Detailed By	Foote, N	05/11
Bridge Projects Engr.	Lewis, RA	06/10
Prelim. Plan By	Bauer, M	06/10
Architect/Specialist	GAW, PDK, BSA	06/10

M:\Z-Team\US 101 Bone Rv. Bridge\window files\Layout.WND

DATE	REVISION	BY	APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 12X300

BRIDGE AND STRUCTURES OFFICE

JUGESH KAUR — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER

3/13/12

Washington State Department of Transportation

US 101
BONE RIVER BRIDGE
REPLACE BRIDGE
BR. NO. 101/44

LAYOUT

BRIDGE SHEET NO. BR1
SHEET 42 OF 94 SHEETS

Tue Mar 13 08:42:38 2012

SR 101 FILE NO. 7021 SHEET BR1

C.S. 2501 ~ PROJ. NO. XL3345 ~ SOUTHWEST REGION ~ US 101 ~ MP 45.09 TO MP 45.27 ~ BONE RIVER BRIDGE NO. 101/44 REPLACEMENT (NEW STRUCTURE)

Bridge Deck Concrete Study

Washington State Department of Transportation

Bridge #	101/44	Bridge Name	Bone River	Structure ID	0018292A
Contract #	8292	Region SW	Project Engineer: Lori Figone	Performance Deck Concrete?	YES
Contractor	Cascade Bridge	Concrete Supplier	Bayview Redi Mix, Inc	Deck Placement	4/24/2013

Bridge Description: 3-Span (97' / 140' / 97'), 4-WF74G Girders (334" bridge length), 2-Lanes (36' wide roadway)

Mix Design (WSDOT Form 350-040)

Water (max) = 230 lbs/cy w/c = 0.38 max

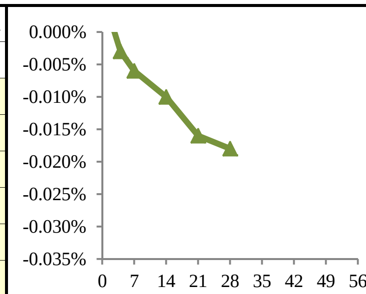
Cementitious Materials	Lbs/cy	Source	Type, Class or Grade
cement	460	Ashgrove	Type I-II
fly ash	150	Lafarge	Type F
slag			
latex			
microsilica			
Concrete Admixtures	**oz/cy**	**Manufacturer**	**Product**
air entrainment	1-15	BASF	Micro Air
water reducer			
HR water reduce	20-30	BASF	Glenium 7500
set retarder			
shrink. reducer	120-140	BASF	Masterlife

Concrete Test Results

compressive strength @ 28 days	5,691	psi
modulus of elasticity	4,012,122	psi
permeability @ 56 days	1,677	coulombs
mix design density	150.1	lb/cf

Shrinkage Test Results

Dry Age (days)	% Length Change
0	0.0060%
4	-0.0030%
7	-0.0060%
14	-0.0100%
21	-0.0160%
28	-0.0180%
56	



Aggregate

	Comp. 1	Comp. 2	Comp. 3	Comp. 4	Comp. 5
WSDOT Pit #	PS-X-130	PS-X-130	PS-X-130		
Grading	#67	#4	Class II		
% Total	42.0%	20.0%	38.0%		
Lbs/cy	1350	650	1213		

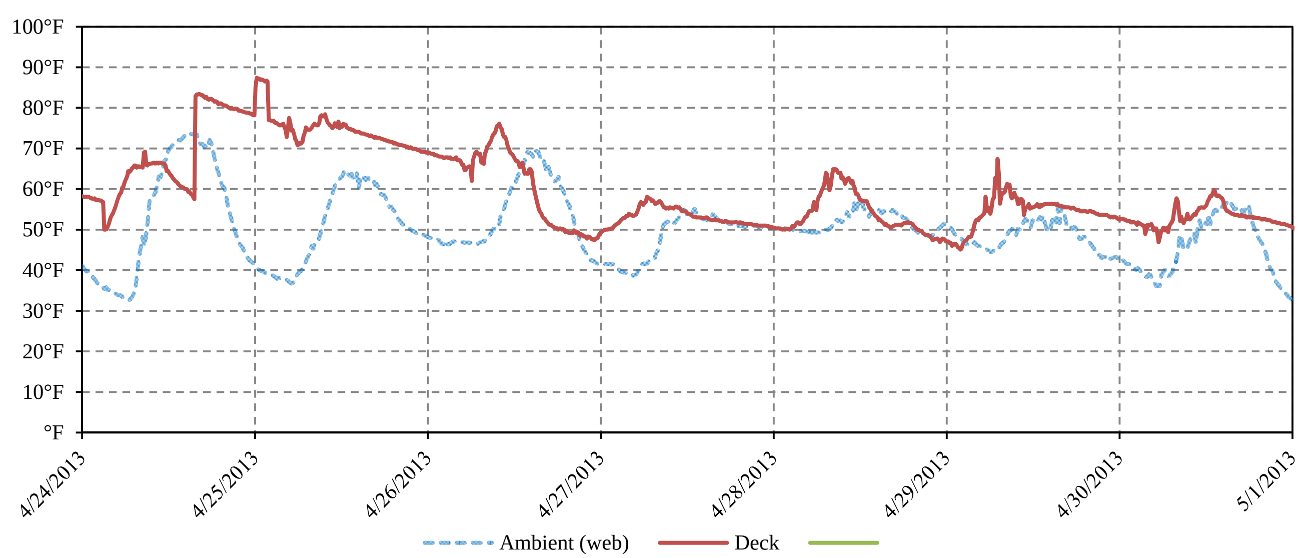
ASR Mitigation: None Required

Notes

Same Mix Design as:
* Bridge 6/8
* Bridge 101/31
* Bridge 105/4
* Bridge 105/3

if swell of concrete speciman is included, total change in length at 28 days drying is 240 microstrain (0.0060% + 0.0180%)

Temperature



CB-Y.Seo (4000D)
3-20-13

Washington State Department of Transportation

Concrete Mix Design

Contractor	Submitted By	Date
Cascade Bridge	Bayview Redi-Mix, Inc.	3-12-2013

Concrete Supplier	Plant Location
Bayview Redi-Mix, Inc	Aberdeen 011, Raymond 041

Contract Number	Contract Name
	SR 101 Bone River

This mix is to be used in the following Bid Item No(s): 40.13

Concrete Class: ***(check one only)***

☐ 3000 ☐ 4000 ☒ 4000D[a] ☐ 4000P[a] ☐ 4000W ☐ Concrete Overlay ☐ Cement Concrete Pavement[d]

☐ Other Shrinkage

Remarks:

Mix Design No. WSDT4DS130 **Plant No.** 011, 041

Cementitious Materials	Source	Type, Class or Grade	Sp. Gr.	Lbs/cy
Cement ✓6 ←	Ashgrove, Seattle, WA	Type I-II 6-02.3(2)	3.15	460
Fly Ash[a]	Lafarge, Centralia, WA	Type F	2.58	150
GGBFS (Slag)				
Latex				
Microsilica				

Concrete Admixtures	Manufacturer	Product	Type	Est. Range (oz/cy)	
Air Entrainment	BASF, Cleveland, OH	Micro-Air		1.15	
Water Reducer					HIGH 30.5-52
High-Range Water Reducer	BASF, Cleveland, OH	Glenium 7500	F	20-30	← NORMAL 12.2-91.5
Set Retarder					
Other Shrinkage	BASF, Cleveland, OH	Masterlife		120-140	64-192

CP

Water (Maximum) 230 lbs/cy Is any of the water Recycled or Reclaimed? ☐ Yes[e] ☒ No

Water Cementitious Ratio (Maximum) 0.38 Mix Design Density 150.1 lbs/cf[d]

Design Performance	1	2	3	4	5	Average[f]
28 Day Compressive Strength (cylinders) psi	5,775	5,766	5,623	5,561	5,730	5,691
14 Day Flexural[d] Strength (beams) psi						

Agency Use Only (Check appropriate Box)

☒ **This Mix Design MEETS CONTRACT SPECIFICATIONS and may be used on the bid items noted above**

☐ **This Mix Design DOES NOT MEET CONTRACT SPECIFICATIONS and is being returned for corrections**

Reviewed By: [signature] PE Signature 4/16/13 Date

DOT Form 350-040 EF
Revised 6/06

Distribution: Original - Contractor
Copies To - State Materials Lab-Structural Materials Eng.; Regional Materials Lab; Project Inspector

Mix Design No. WSDT4DS130 **Plant No.** 011, 041

Aggregate Information

Concrete Aggregates	Component 1	Component 2	Component 3	Component 4	Component 5	Combined Gradation
WSDOT Pit No.	PS-X-130	PS-X-130	PS-X-130			
WSDOT ASR 14-day Results (%) [b]	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	
Grading[c]	AASHTO #4	AASHTO #67	Class II			
Percent of Total Aggregate	20	42	38			100%
Specific Gravity	2.825	2.825	2.747			
Lbs/cy (ssd)	650	1350	1213			

Percent Passing

2 inch	100					100
1-1/2 inch	100	100				100
1 inch	52	100				90
3/4 inch	1	93				77
1/2 inch	1	58				63
3/8 inch	1	30	100			51
No. 4	0	7	99			41
No. 8	0	0	78			30
No. 16	0	0	58			22
No. 30	0	0	35			13
No. 50	0	0	14			5
No. 100	0	0	3			1
No. 200	0.1	0.1	1			0.5

Fineness Modulus: 3.14 (Required for Class 2 Sand)

ASR Mitigation Method Proposed [b]: Not Required for this Source

Notes:

a Required for Class 4000D and 4000P mixes.

b Alkali Silica Reactivity Mitigation is required for sources with expansions over 0.20% - Incidate method for ASR mitigation. For expansion of 0.21% - 0.45%, acceptable mitigation can be the use of low alkali cement or 25% type F fly ash. Any other proposed mitigation method or for pits with greater than 0.45% expansion, proof of mitigating measure, either ASTM C1260 / AASHTO T303 test results must be attached. If ASTM C 1293 testing has been submitted indicating 1-year expansion of 0.04% or less, mitigation is not required.

c AASHTO No. 467, 57, 67, 7, 8; WSDOT Class 1, Class 2; or combined gradation. See Standard Specification 9-03.1.

d Required for Cement Concrete Pavements.

e Attach test results indicating conformance to Standard Specification 9-25.1.

f Actual Average Strength as determined from testing or estimated from ACI 211.

TEST RESULTS

ASTM C 192 - Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory

Concrete Mixture Proportions — **4,000 PSI Mix**

Trial Mix Results Calculated to 1yd^3 — **D-101112-01**

S-Number	Description	SpG	Mass, lbs	Vol. Cuft
S-121541	AG Seattle Type I/II	3.15	462	2.35
S-120817	Lafarge Centralia Class F	2.58	151	0.94
S-122202	Pit X-130 Fine Agg.	2.75	1,217	7.09
S-122204	Pit X-130 1.5 to 3/4 Agg.	2.83	652	3.69
S-122203	Pit X-130 3/4 to No. 4 Agg.	2.83	1,357	7.68
---	Overland Park Municipal	1.00	233	3.73
-	Air	-	5.6%	1.51
		Totals:	4,072	27.00

Admixtures

S-Number	Description	Dosage, oz/cwt
S-122303	BASF Micro-Air	1.0
S-122302	BASF Glenium 7500	4.0
S-122225	BASF Master Life SRA 20	21.0

Plastic Properties	D-101112-01
Slump, in:	6.75
Unit Weight, lbs/cuft:	150.8
Air Content (Calculated), %:	5.6
w/cm ratio:	0.38
Concrete Temperature, F:	74°

Specs 7.93 lines 28-29

AASHTO T 277 - Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
Accelerated Cure

Sample No.	Diameter, in.	Charge Passed, C	Corrected Charge, C	Qualitative Equivalent	Age, days
D-101112-01	4.00	739	650	Very Low	28

AASHTO T 277 - Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
Standard Cure

Sample No.	Diameter, in.	Charge Passed, C	Corrected Charge, C	Qualitative Equivalent	Age, days
D-101112-01	4.00	1,902	1,672	Low	28
	4.00	1,750	1,538	Low	56
	4.00	1,908	1,677	Low	56

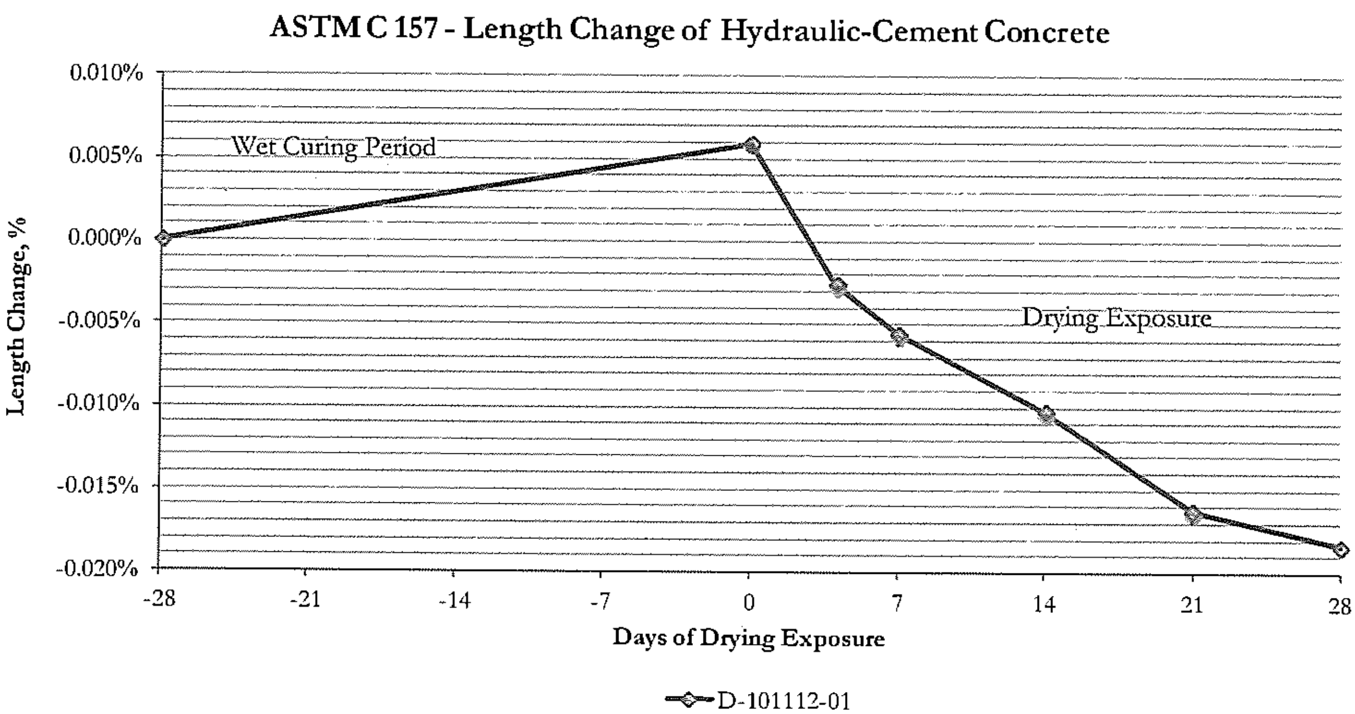
Specs 7.93, lines 23-24

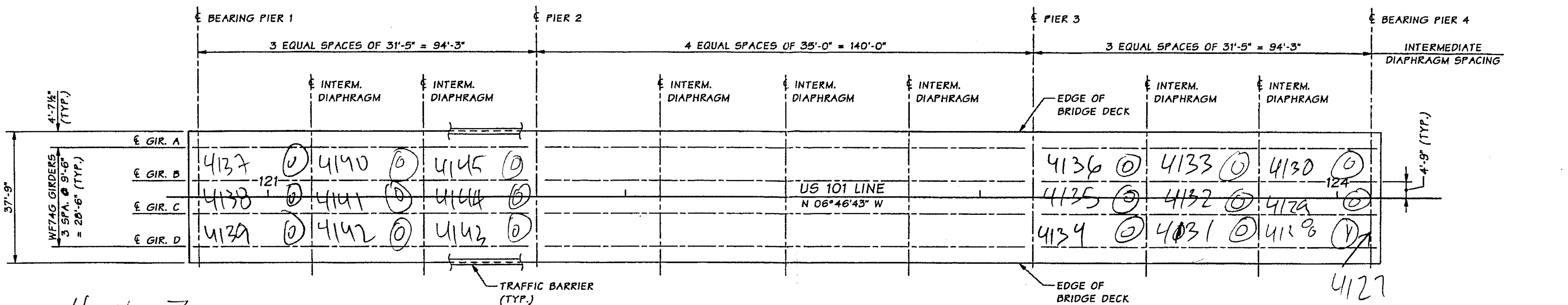
ASTM C 157 Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete

Material:		Concrete
Number of Specimens per Mixture:		4
Size of Specimens, in.:	Length:	10.0
	Width:	4.0
	Height:	4.0
Method of Consolidation:		4
Period of Moist Curing:		28-days
Drying Exposure Conditions:		23°C, 50% RH

Length Change

Reading	D-101112-01
Initial	0.000%
0-days dry	0.006%
4-days dry	-0.003%
7-days dry	-0.006%
14-days dry	-0.010%
21-days dry	-0.016%
28-days dry	-0.018%

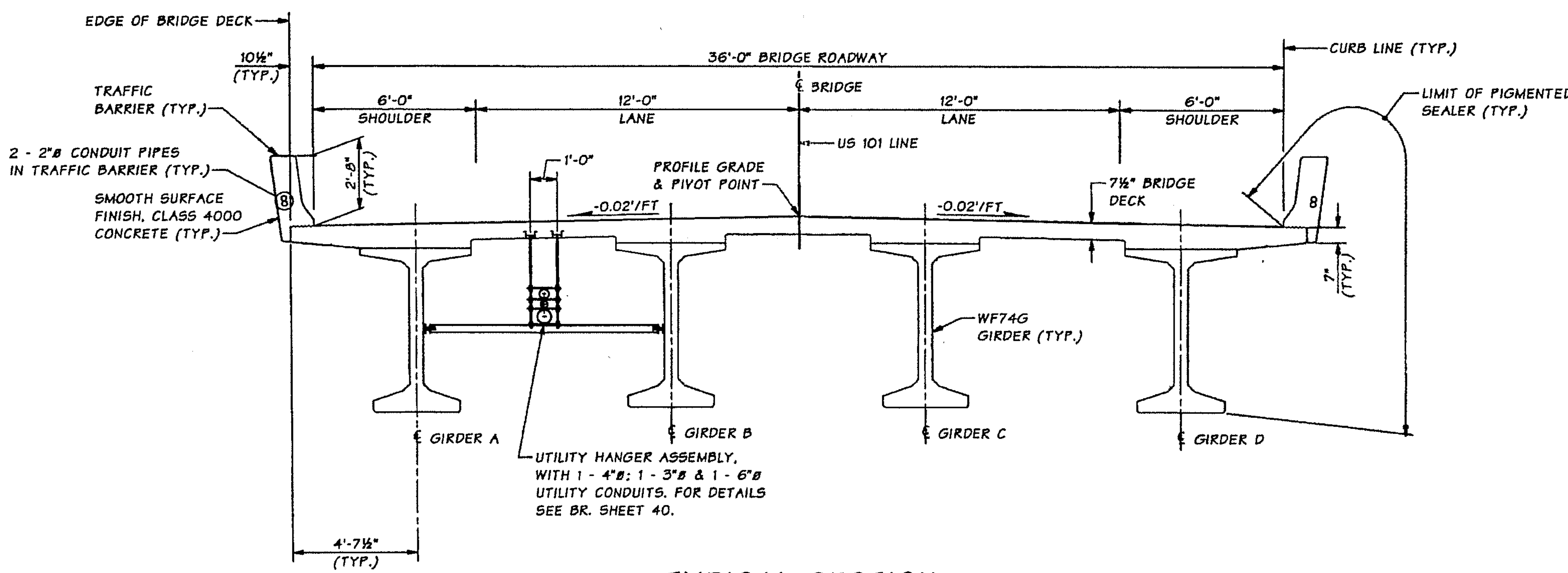




4146 →
4147
4148

FRAMING PLAN

BEARINGS OF ALL PIERS ARE NORMAL TO US 101 LINE



TYPICAL SECTION

SHOWN NEAR MID-SPAN

Bridge Design Engr.	Khaleghi, B	
Supervisor	Zeldenrust, RP	
Designed By	Zhang, H	05/11
Checked By	Gallagher, P	09/11
Detailed By	Foote, N	05/11
Bridge Projects Engr.		
Prelim. Plan By		
Architect/Specialist		

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DATE	REVISION	BY	APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 12X500

HONGZHI ZHANG — PROFESSIONAL ENGINEER — 3/13/2012

BRIDGE AND STRUCTURES OFFICE

RICHARD P. ZELDENRUST — PROFESSIONAL ENGINEER — 3/13/12

Washington State Department of Transportation

US 101
BONE RIVER BRIDGE
REPLACE BRIDGE
BR. NO. 101/44

FRAMING PLAN

BRIDGE SHEET NO. BR31

SHEET 72 OF 94 SHEETS

Tue Mar 13 08:45:05 2012

SR 101 FILE NO. 7021 SHEET BR31

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	101/44	Bridge Name	Bone River	Structure ID	0018292A
Contract #	8292	Region SW	Project Engineer Lori Figone	Performance Deck Concrete?	YES
Contractor	Cascade Bridge	Concrete Supplier	Bayview Redi Mix, Inc	Deck Placement	4/24/2013
Bridge Description	3-Span (97' / 140' / 97'), 4-WF74G Girders (334" bridge length), 2-Lanes (36' wide roadway)				

L = length between diaphragms (or length of "bay")

S = girder spacing

N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	0%
Min. =	0%
Max. =	5%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	31.42	9.50	0	16	0%
1	1	B	C	31.42	9.50	0	16	0%
1	1	C	D	31.42	9.50	0	16	0%
1	2	A	B	31.42	9.50	0	16	0%
1	2	B	C	31.42	9.50	0	16	0%
1	2	C	D	31.42	9.50	0	16	0%
1	3	A	B	31.42	9.50	0	16	0%
1	3	B	C	31.42	9.50	0	16	0%
1	3	C	D	31.42	9.50	0	16	0%
2	1	A	B	35.00	9.50	#N/A	18	#N/A
2	1	B	C	35.00	9.50	#N/A	18	#N/A
2	1	C	D	35.00	9.50	#N/A	18	#N/A
2	2	A	B	35.00	9.50	#N/A	18	#N/A
2	2	B	C	35.00	9.50	#N/A	18	#N/A
2	2	C	D	35.00	9.50	#N/A	18	#N/A
2	3	A	B	35.00	9.50	#N/A	18	#N/A
2	3	B	C	35.00	9.50	#N/A	18	#N/A
2	3	C	D	35.00	9.50	#N/A	18	#N/A
2	4	A	B	35.00	9.50	#N/A	18	#N/A
2	4	B	C	35.00	9.50	#N/A	18	#N/A
2	4	C	D	35.00	9.50	#N/A	18	#N/A
3	1	A	B	31.42	9.50	0	16	0%
3	1	B	C	31.42	9.50	0	16	0%
3	1	C	D	31.42	9.50	0	16	0%
3	2	A	B	31.42	9.50	0	16	0%
3	2	B	C	31.42	9.50	0	16	0%
3	2	C	D	31.42	9.50	0	16	0%
3	3	A	B	31.42	9.50	0	16	0%
3	3	B	C	31.42	9.50	0	16	0%
3	3	C	D	31.42	9.50	1	16	5%

	PIER 1			PIER 2					PIER 3			PIER 4
GIR. A												
GIR. B	0%	0%	0%		X X X	X X X	X X X	X X X		0%	0%	0%
GIR. C	0%	0%	0%		X X X	X X X	X X X	X X X		0%	0%	0%
GIR. D	0%	0%	0%		X X X	X X X	X X X	X X X		0%	0%	5%

CRACKING INTENSITY ~ BRIDGE 101/44

100% = CRACK EVERY 2 FT.

X X X = CRACKS NOT COUNTED DUE TO LIMITED ACCESS

LESS CRACKING — MORE CRACKING

BRIDGE NUMBER	101/44
BRIDGE NAME	BONE RIVER
INSPECTION DATE	5/7/2015
DECK CONCRETE	PERFORMANCE BASED

APPENDIX D

MULTI-SPAN STEEL PLATE GIRDER BRIDGES

BRIDGE 5/434SCD (SBCD OVER SR 16)

BRIDGE 529/25 (EBEY SLOUGH)

BRIDGE 2/651W-S (W-S RAMP OVER US 2 / US 395)

BRIDGE 9/134 (PILCHUCK CREEK)

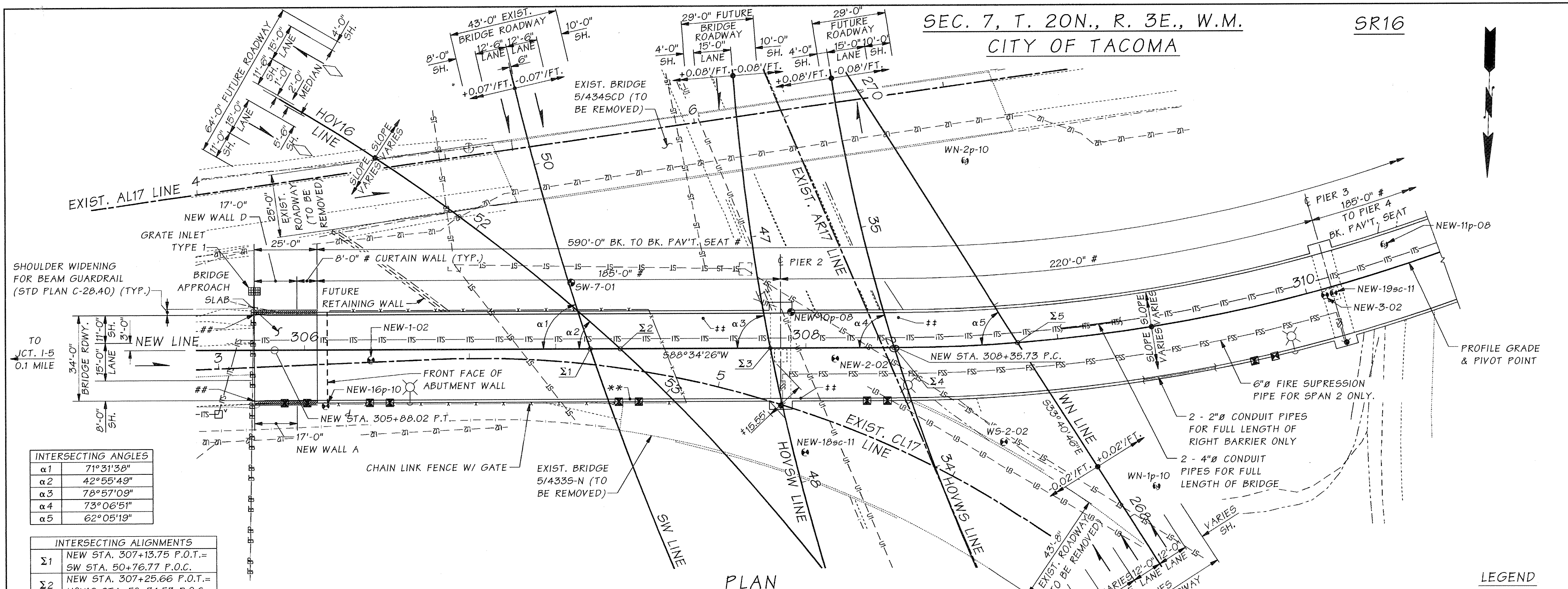
BRIDGE 5/434SCD (SBCD OVER SR 16)

Bridge #	5/434SCD	Bridge Name	SBCD Over SR 16 HOV & Ramps	Structure ID	0018189B
Contract #	8189 Region OR	Project Engineer	Neal Uhlmeyer	Performance Deck Concrete?	Yes
Contractor	Mowat Construction	Concrete Supplier	Holroyd Co.	Deck Placement	2/11/13, 2/19/13 & 2/26/13
Bridge Description	3-Span (185' / 220' / 185'), 3-Steel Plate Girders (590' bridge length), 1-Lane (34' wide roadway)				

CONTENTS

SEC. 7, T. 20N., R. 3E., W.M.
CITY OF TACOMA

SR16



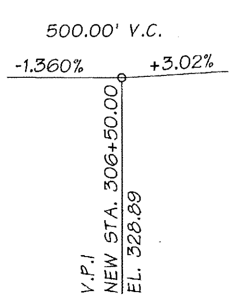
PLAN

BEARINGS OF ALL PIERS ARE NORMAL OR RADIAL TO NEW LINE.

INTERSECTING ANGLES	
α1	71°31'38"
α2	42°55'49"
α3	78°57'09"
α4	73°06'51"
α5	62°05'19"

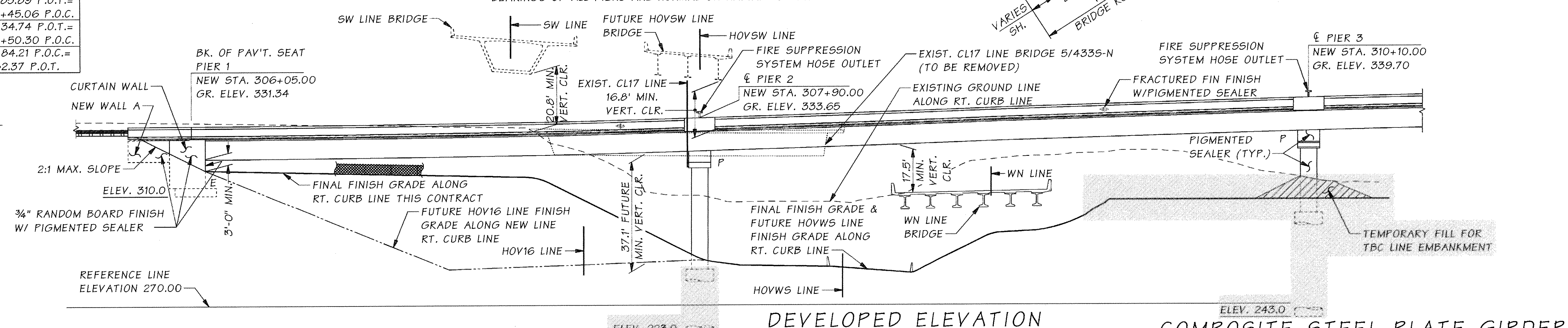
INTERSECTING ALIGNMENTS	
Σ1	NEW STA. 307+13.75 P.O.T.= SW STA. 50+76.77 P.O.C.
Σ2	NEW STA. 307+25.66 P.O.T.= HOV16 STA. 52+74.53 P.O.C.
Σ3	NEW STA. 307+85.89 P.O.T.= HOVSW STA. 47+45.06 P.O.C.
Σ4	NEW STA. 308+34.74 P.O.T.= HOVWS STA. 34+50.30 P.O.C.
Σ5	NEW STA. 308+84.21 P.O.C.= WN STA. 268+82.37 P.O.T.

LEGEND
SEE BR. SHEET BA3



NEW LINE PROFILE

DATUM
N.A.V.D. OF 1988



DEVELOPED ELEVATION

GRADE ELEVATIONS SHOWN ARE FINISH GRADES AT TOP OF BRIDGE DECK ON NEW LINE AND ARE EQUAL TO PROFILE GRADE. SEE STD. PLAN A-50.20 FOR EMBANKMENT DETAILS AT BRIDGE ENDS.

COMPOSITE STEEL PLATE GIRDER
LOADING: HL-93

Bridge Design Engr.	Khaleghi, B	
Supervisor	Zeldenrust, RP	
Designed By	Rosa, M	02/10
Checked By	Swett, GD	04/11
Detailed By	Foote, N	03/10
Bridge Projects Engr.	Lewis, RA	
Prelim. Plan By	CH2MHILL	
Architect/Specialist	PDK / NSB	

M:\Z-Team\SR16 EB NV\NEW Line\window files\Layout 1.Add1.WND

DATE	REVISION	BY	APP'D
7/14/11	ADDED TEMP FILL FOR TBC LINE EMBANKMENT; REVISED SHAFT ELEV'S	MAR	RPZ

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 09C519

BRIDGE AND STRUCTURES OFFICE

JUGESH KAPUR, STATE OF WASHINGTON, PROFESSIONAL ENGINEER

7/7/11

Washington State Department of Transportation

I-5 / SR 16
EB NALLEY VALLEY - HOV

NEW LINE BRIDGE

LAYOUT 1

BRIDGE SHEET NO. BA2

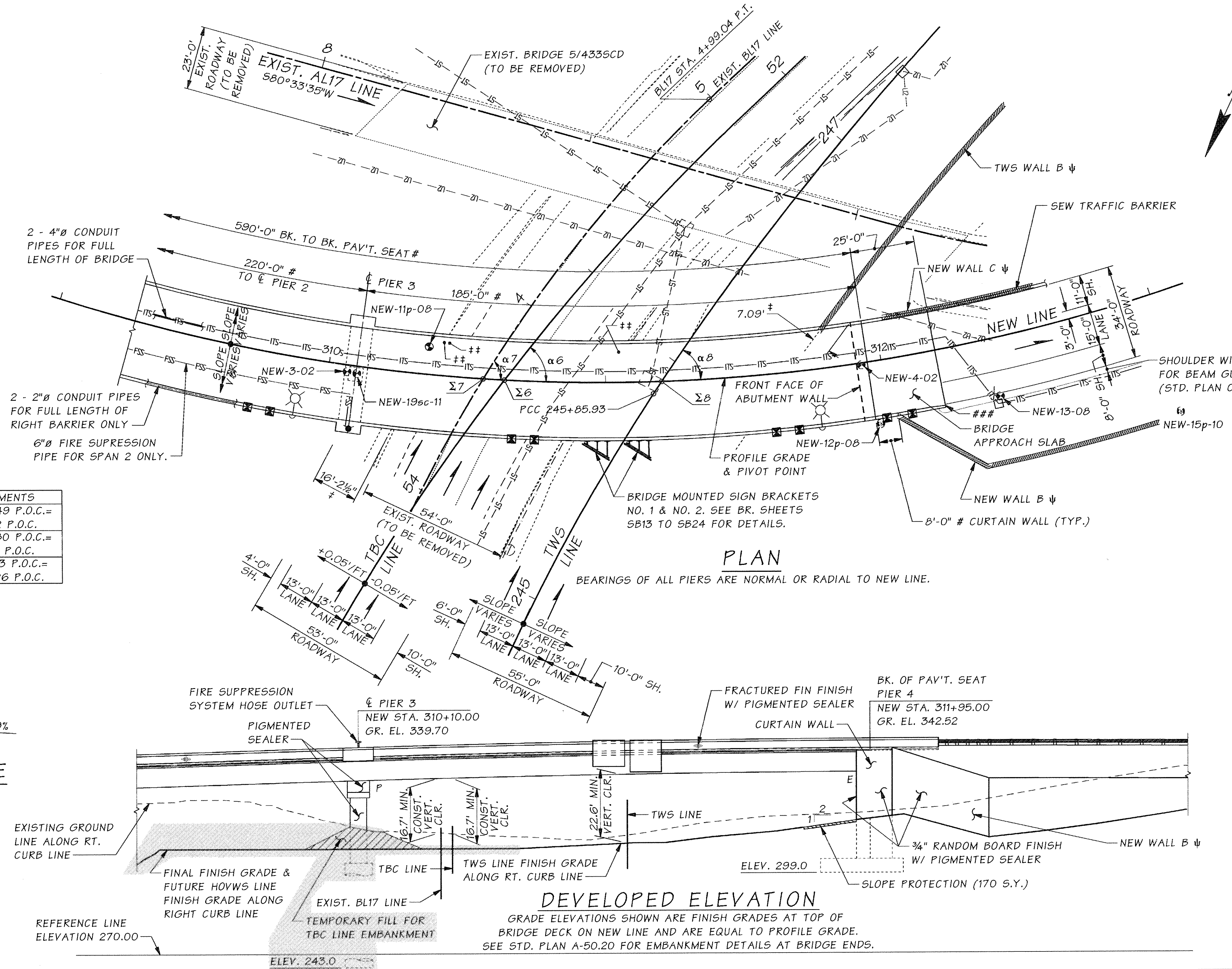
SHEET 713 OF 1341 SHEETS

C.S. 270103 ~ PROJ. NO. XL3477 ~ OLYMPIC REGION ~ I-5 & SR16 INTERCHANGE ~ EASTBOUND NALLEY VALLEY ~ NEW LINE BRIDGE

SR 16 FILE NO. 2587 SHEET BA2

Wed Jul 06 08:33:52 2011

SR16



INTERSECTING ANGLES	
α6	55°26'56"
α7	62°09'29"
α8	54°10'56"

INTERSECTING ALIGNMENTS	
Σ6	NEW STA. 310+63.49 P.O.C.= TBC STA. 53+50.22 P.O.C.
Σ7	NEW STA. 310+55.80 P.O.C.= BL17 STA. 3+68.47 P.O.C.
Σ8	NEW STA. 311+20.53 P.O.C.= TWS STA. 245+91.26 P.O.C.

V.P.I. NEW STA. 311+25.00 EL. 343.24
+3.02% -0.499%
300.00' V.C.

NEW LINE PROFILE

DATUM
N.A.V.D. OF 1988

LEGEND

- ‡ MIN. HORIZ. CLR. IS MEASURED TO EDGE OF TRAVELLED LANE
- ‡‡ POINT OF MINIMUM VERTICAL CLEARANCE
- # MEASURED ALONG NEW LINE
- ## W-BEAM GUARDRAIL "D" CONNECTION (STD. PLAN C-5)
- ### W-BEAM GUARDRAIL "F" CONNECTION (STD. PLAN C-5)
- ψ SEE WALL SHEETS FOR DETAILS AND DIMENSIONS
- NEMA JUNCTION BOX
- ITS JUNCTION BOX
- LUMINAIRE
- PIEZOMETER
- TEST HOLE
- FIRE SUPPRESSION SYSTEM HOSE OUTLET INCLUDING SIGN
- —U1— EXIST. MULTI-UTILITY TYPE 1 (TO BE RELOCATED)
- —U2— EXIST. MULTI-UTILITY TYPE 2 (TO BE REMOVED)
- —U3— EXIST. MULTI-UTILITY TYPE 3 (TO BE REMOVED)
- —BF— EXIST. UNDERGROUND FIBER OPTICS (TO REMAIN)
- —ITS— PROPOSED ITS
- —FSS— PROPOSED FSS

NOTE: SEE DRAINAGE PLANS FOR PROPOSED DRAINAGE UNDER AND AROUND THE NEW LINE BRIDGE (TYP.)

LEGEND

- B/BA7 — IDENTIFIES SECTION, VIEW OR DETAIL — TAKEN OR SHOWN ON BRIDGE SHEET BA7
- B/— — TAKEN OR SHOWN ON THE SAME SHEET

C.S. 270103 ~ PROJ. NO. XL1254 ~ OLYMPIC REGION ~ I-5 & SR16 INTERCHANGE ~ EASTBOUND NALLEY VALLEY ~ NEW LINE BRIDGE

Bridge Design Engr.	Khaleghi, B	
Supervisor	Zeldenrust, RP	
Designed By	Rosa, M	02/10
Checked By	Swett, GD	04/11
Detailed By	Foote, N	03/10
Bridge Projects Engr.	Lewis, RA	
Prelim. Plan By	CH2MHILL	
Architect/Specialist	PDK / NSB	

M:\Z-Team\SR16 EB NV\NEW Line\Window files\Layout 2.Add1.WND

DATE	REVISION	BY	APP'D
7/14/11	ADDED TEMP FILL FOR TBC LINE EMBANKMENT; REVISED SHAFT ELEV'S	MAR	RPZ

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 09C519

BRIDGE AND STRUCTURES OFFICE

JUGESH KAPUR, STATE OF WASHINGTON, 25400, PROFESSIONAL ENGINEER
7/7/11

Washington State Department of Transportation

I-5 / SR 16
EB NALLEY VALLEY - HOV
NEW LINE BRIDGE
LAYOUT 2

BRIDGE SHEET NO. BA3
SHEET 714 OF 1341 SHEETS

SR 16 FILE NO. 2587 SHEET BA3

Wed Jul 06 08:33:58 2011

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	5/434SCD	Bridge Name	SBCD Over SR 16 HOV & Ramps	Structure ID	0018189B
Contract #	8189 Region OR	Project Engineer	Neal Uhlmeyer	Performance Deck Concrete?	Yes
Contractor	Mowat Construction	Concrete Supplier	Holroyd Co.	Deck Placement	2/11/13, 2/19/13 & 2/26/13
Bridge Description	3-Span (185' / 220' / 185'), 3-Steel Plate Girders (590' bridge length), 1-Lane (34' wide roadway)				

Mix Design (WSDOT Form 350-040)

Water (max) = 217 lbs/cy w/c = 0.38 max

Cementitious Materials	Lbs/cy	Source	Type, Class or Grade
cement	480	Lehigh Cement Co.	Type I-II
fly ash	85	Lafarge	Type F
slag			
latex			
microsilica			

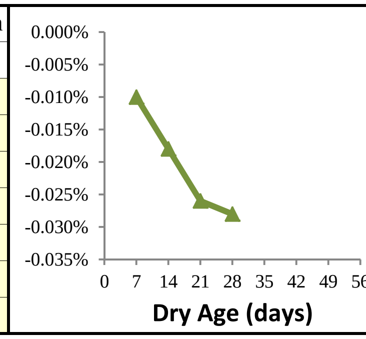
Concrete Admixtures	oz/cy	Manufacturer	Product
air entrainment	1-6	BASF	MB AE 90
water reducer			
HR water reduce	25-45	BASF	Glenium 3030 NS
set retarder			
shrink. reducer	30-45	BASF	MasterLife SRA 20

Concrete Test Results

compressive strength @ 28 days	6,458	psi
modulus of elasticity		psi
permeability @ 56 days	1,463	coulombs
mix design density	146.8	lb/cf

Shrinkage Test Results

Dry Age (days)	% Length Change
0	
4	
7	-0.0100%
14	-0.0180%
21	-0.0260%
28	-0.0280%
56	



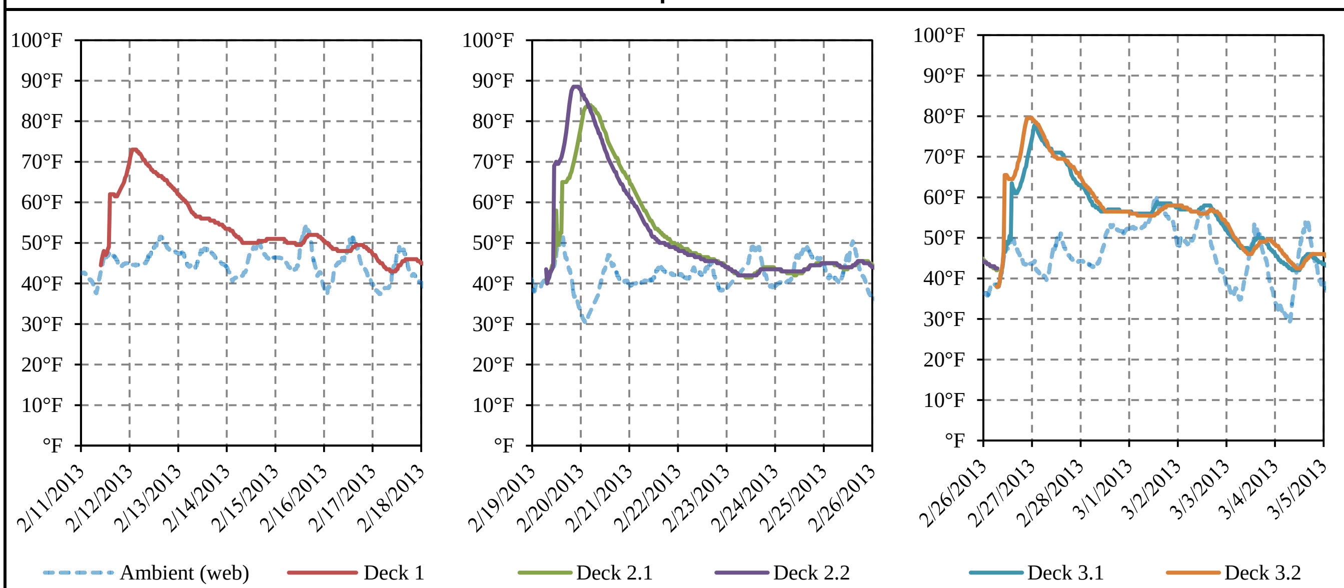
Aggregate

	Comp. 1	Comp. 2	Comp. 3	Comp. 4	Comp. 5
WSDOT Pit #	J-9	J-9	J-9		
Grading	Class 1	#67	#4		
% Total	39.6%	45.1%	15.3%		
Lbs/cy	1265	1440	490		
ASR Mitigation	Use of low alkali cement				

Notes

This is the same mix that was used for Br. 16/3W

Temperature



Washington State Department of Transportation

Concrete Mix Design

Contractor	Submitted By	Date
Mowat Construction Co	Greg Smith	12/15/2011

Concrete Supplier	Plant Location
Holroyd Co., Inc.	3131 29th Ave Sw Tumwater , WA

Contract Number	Contract Name
8189	Nalley Valley Eastbound

This mix is to be used in the following Bid Item No(s): 121, 122, 123, 124, 125, 126, 127

Concrete Class: *(check one only)*

☐ 3000 ☐ 4000 ☒ 4000D[a] ☐ 4000P[a] ☐ 4000W ☐ Concrete Overlay ☐ Cement Concrete Pavement[d]

☐ Other Shrinkage Reducer

Remarks:

Mix Design No. 6091FASD **Plant No.** Tacoma (3-4)

Cementitious Materials	Source	Type, Class or Grade	Sp. Gr.	Lbs/cy
Cement	Lehigh Cement Co	Type I-II	3.15	480
Fly Ash[a]	Lafarge	Type F	2.61	85
GGBFS (Slag)				
Latex				
Microsilica				

Concrete Admixtures	Manufacturer	Product	Type	Est. Range (oz/cy)
Air Entrainment	BASF Admixtures, Inc.	MB AE™ 90		1-6
Water Reducer				
High-Range Water Reducer	BASF Admixtures, Inc.	Glenium® 3030 NS	Type F	25-45
Set Retarder				
Other Shrinkage Reducer	BASF Admixtures, Inc.	MasterLIFE® SRA 20	Type S	30-45

Water (Maximum) 217 lbs/cy   Is any of the water Recycled or Reclaimed? ☐ Yes[e] ☒ No

Water Cementitious Ratio (Maximum) 0.38   Mix Design Density 146.8 lbs/cf[d]

Design Performance	1	2	3	4	5	Average[f]
28 Day Compressive Strength (cylinders) psi	6,370	6,460	6,380	6,410	6,670	6,458
14 Day Flexural[d] Strength (beams) psi						

Agency Use Only (Check appropirate Box)

☒ **This Mix Design MEETS CONTRACT SPECIFICATIONS and may be used on the bid items noted above**

☐ **This Mix Design DOES NOT MEET CONTRACT SPECIFICATIONS and is being returned for corrections**

Reviewed By: [signature] for Noel Wahlmeyer   11 Apr 2013

PE Signature   Date

DOT Form 350-040 EF
Revised 6/06

Distribution: Original - Contractor
Copies To - State Materials Lab-Structural Materials Eng. ; Regional Materials Lab; Project Inspector

C8189 Submittal 562-066.3

Mix Design No. 6091FASD **Plant No.** Tacoma (3-4)

Aggregate Information

Concrete Aggregates	Component 1	Component 2	Component 3	Component 4	Component 5	Combined Gradation
WSDOT Pit No.	J-9	J-9	J-9			
WSDOT ASR 14-day Results (%) [b]	☒ Yes ☐ No	☒ Yes ☐ No	☒ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	
Grading[c]	Class 1	#67	#4			
Percent of Total Aggregate	39.6	45.1	15.3			100%
Specific Gravity	2.63	2.69	2.69			
Lbs/cy (ssd)	1265	1440	490			3195

Percent Passing

2 inch			100.0			100
1-1/2 inch			100.0			100
1 inch		100.0	52.0			93.4
3/4 inch		99.0	12.0			87.3
1/2 inch						66.9
3/8 inch	100.0	36.0	0			50.3
No. 4	97.0	3.0				39.4
No. 8	81.0	1.0				31.9
No. 16	62.0					23.2
No. 30	36.0					13.9
No. 50	13.0					5.2
No. 100	5.0					1.9
No. 200	2.5					1.0

Fineness Modulus: ____________ (Required for Class 2 Sand)

ASR Mitigation Method Proposed [b]: Pit No. J-9 has ASR of 0.43 and is mitigated by the use of low alkali cement.

Notes:

a Required for Class 4000D and 4000P mixes.

b Alkali Silica Reactivity Mitigation is required for sources with expansions over 0.20% - Incidate method for ASR mitigation. For expansion of 0.21% - 0.45%, acceptable mitigation can be the use of low alkali cement or 25% type F fly ash. Any other proposed mitigation method or for pits with greater than 0.45% expansion, proof of mitigating measure, either ASTM C1260 / AASHTO T303 test results must be attached. If ASTM C 1293 testing has been submitted indicating 1-year expansion of 0.04% or less, mitigation is not required.

c AASHTO No. 467, 57, 67, 7, 8; WSDOT Class 1, Class 2; or combined gradation. See Standard Specification 9-03.1.

d Required for Cement Concrete Pavements.

e Attach test results indicating conformance to Standard Specification 9-25.1.

f Actual Average Strength as determined from testing or estimated from ACI 211.

Lafarge North America Concrete Lab
5400 W Marginal Way SW
Seattle, WA. 98106

Report To: **Holroyd** Date: September 30, 2011
Attention: **Quality Control Personnel**

Subject: Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration: ASTM C-1202

Tested Materials: Date Sampled: **August 2, 2011**
Mix Design: **Nalley Valley HPC**

Curing: ASTM C-1202 Standard Cure

<u>Results:</u>

Age	Coulombs
56 day	**1463**

*The ASTM C-1202 procedure was followed.

The test result is only valid if the aggregate(s) sample(s) is(are) representative of the current production and it is to be noted that Lafarge has no knowledge of the representatives of the sample received for testing. Also, material quality can vary with different locations in a quarry. It is recommended that testing be carried out on an annual basis or more frequently if a variation in stone quality is suspected.

Although the Lafarge North America Seattle Concrete Lab. applies state-of-the-art test methods, Lafarge North America. and its affiliates (Lafarge) can not guarantee the results shown above and shall assume no liability whatsoever for any errors in such results and for the consequence of such errors.

Robert G. Shogren

Rob Shogren, P.E.
Technical Service Engineer
Lafarge North America

Lafarge North America Concrete Lab
5400 W Marginal Way SW
Seattle, WA. 98106

Report To: **Holroyd**
Attention: **Quality Control Personnel**

Date: September 30, 2011

Subject: Length Change of Hardened Hydraulic-Cement Concrete Using Procedures of ASTM C-157

Tested Materials: Date Sampled: **August 2, 2011**
Source of Aggregates: Holroyd

Mix Design: WSDOT HPC

Results:
Slump: 4.5”
Temp: 64^{F}
Specimen Size: 4”x4”x10”
Consolidation: Rodding
Initial Cure: Lime water submersion (28 day initial cure)

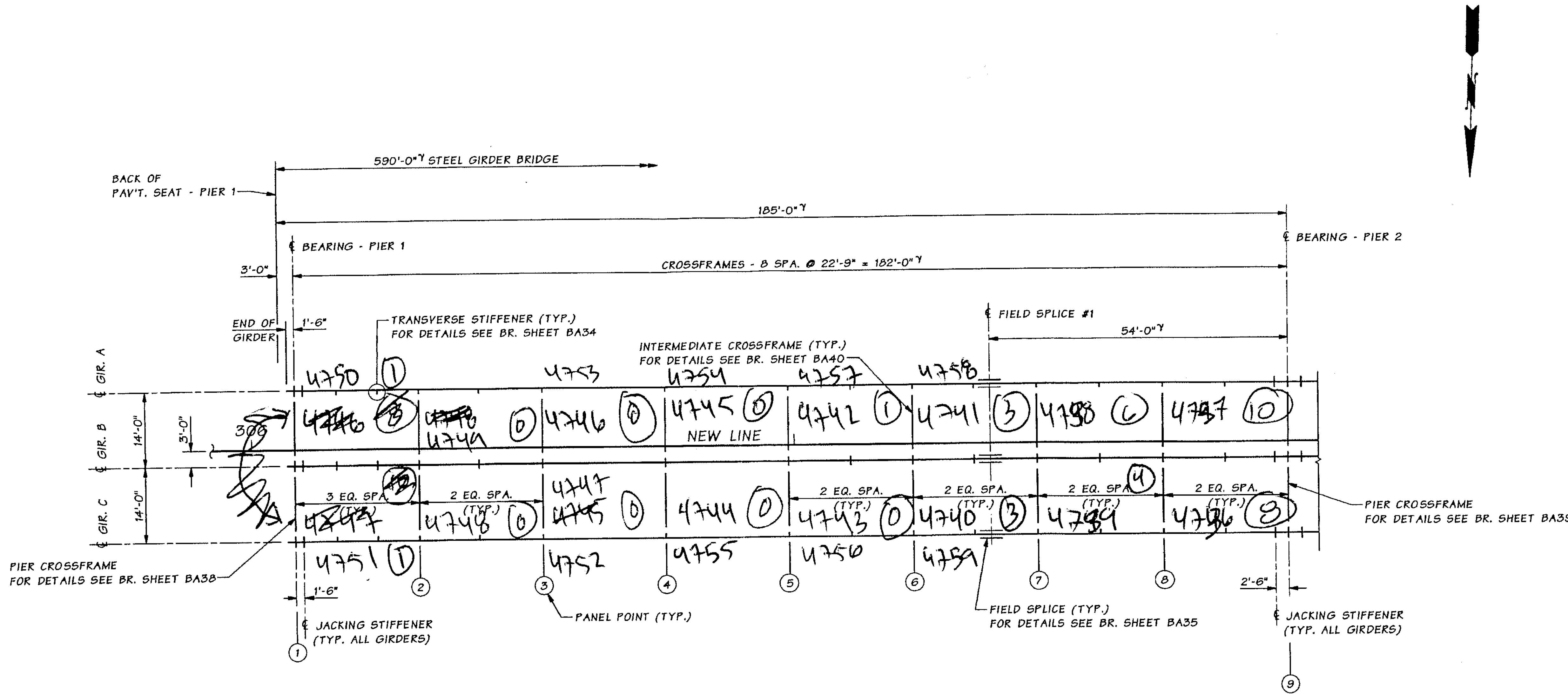
Age (Days) After Initial Cure	Percent Length Change (Average of 3)
7	0.010
14	0.018
21	0.026
28 (final)	0.028

*The ASTM C-157 procedure was followed.

The test result is only valid if the aggregate(s) sample(s) is(are) representative of the current production and it is to be noted that Lafarge has no knowledge of the representatives of the sample received for testing. Also, material quality can vary with different locations in a quarry. It is recommended that testing be carried out on an annual basis or more frequently if a variation in stone quality is suspected.

Robert G. Shogren

Rob Shogren, P.E.
Technical Service Engineer
Lafarge North America



FRAMING PLAN - SPAN 1

ALL CROSSFRAMES ARE NORMAL TO NEW LINE

Y MEASURED ALONG NEW LINE

Bridge Design Engr.	Khaleghi, B		
Supervisor	Zeldenrust, RP		
Designed By	Rosa, M	02/10	
Checked By	Swett, GD	04/11	
Detailed By	Foote, N	08/10	
Bridge Projects Engr.			
Prelim. Plan By			
Architect/Specialist			

M:\Z-Team\SR16 EB NV\NEW Line\Window files\Framing Plan 1.WND

DATE	REVISION	BY	APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 09C519

BRIDGE AND STRUCTURES OFFICE

MICHAEL A. ROSA — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER 5/9/11

RICHARD P. ZELDENRUST — STATE OF WASHINGTON — REGISTERED PROFESSIONAL ENGINEER 5/9/11

Washington State Department of Transportation

I-5 / SR 16
EB NALLEY VALLEY - HOV

NEW LINE BRIDGE

FRAMING PLAN
SHEET 1 OF 3

BRIDGE SHEET NO. BA28

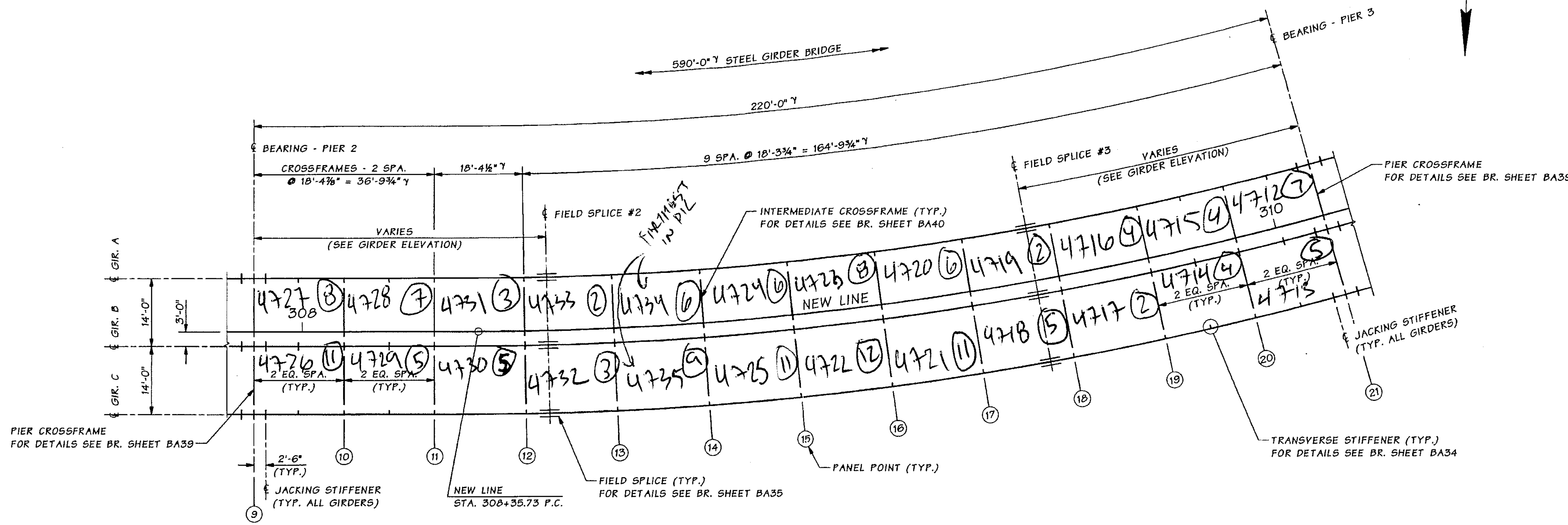
SHEET 739 OF 1341 SHEETS

SR 16 FILE NO. 2587 SHEET BA28

Fri May 06 15:07:28 2011

5/434 SCD

GIRDER	RADIUS
A	628'-9⅛"
B	642'-9⅛"
C	656'-9⅛



FRAMING PLAN - SPAN 2

ALL CROSSFRAMES ARE NORMAL OR RADIAL TO NEW LINE

γ MEASURED ALONG NEW LINE

SHEET BA29

Engr.	Khaleghi, B	M:\Z-Team\SR16 EB NV\NEW Line\Window files\Framing Plan 2.WND		
	Zeldenrust, RP			
	Rosa, M	02/10		
	Swett, GD	04/11		
	Foote, N	08/10		
DATE	REVISION	BY	APP'D	

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			
JOB NUMBER 09C519				

BRIDGE AND STRUCTURES OFFICE

Washington State Department of Transportation

I-5 / SR 16
EB NALLEY VALLEY - HOV

NEW LINE BRIDGE

FRAMING PLAN
SHEET 2 OF 3

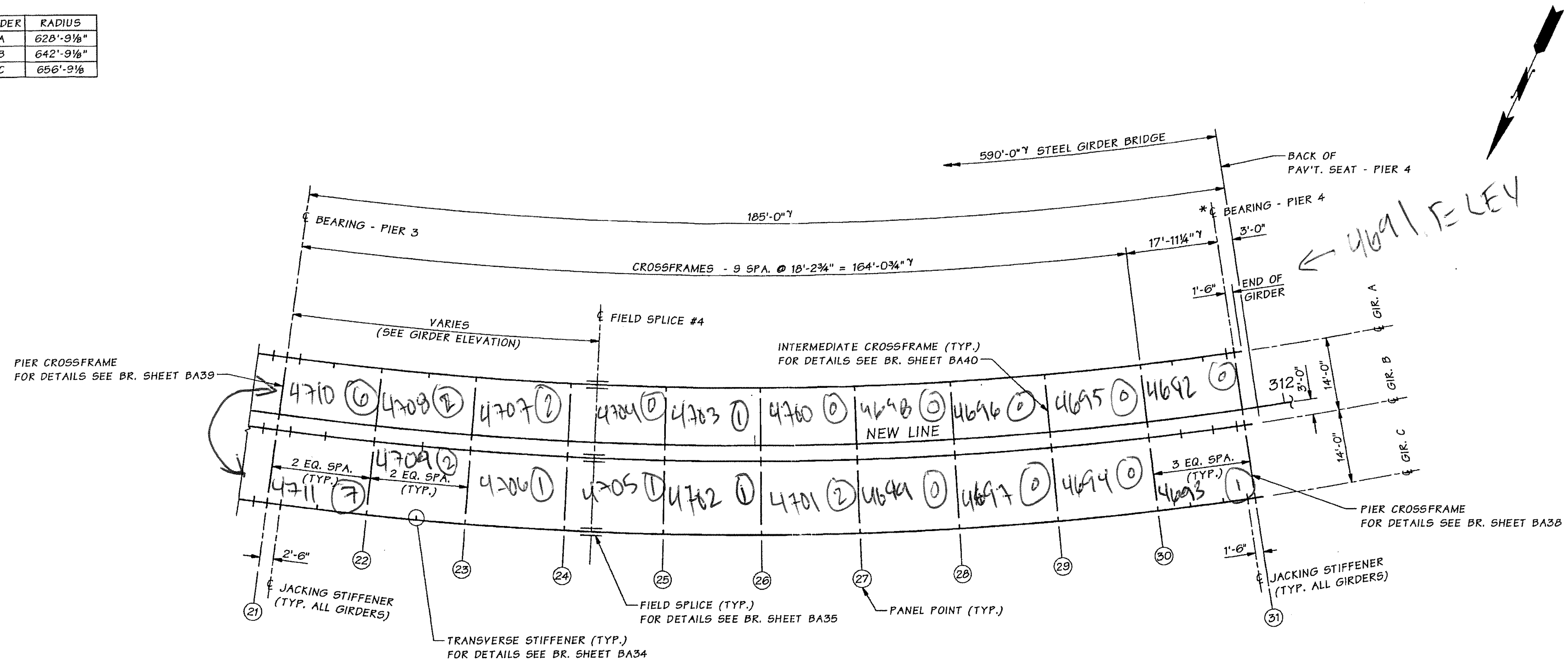
BRIDGE SHEET NO. BA29

SHEET 740 OF 1341 SHEETS

5/4/11 5/9/11

5/434SCD

GIRDER	RADIUS
A	628'-9⅛"
B	642'-9⅛"
C	656'-9⅛



FRAMING PLAN - SPAN 3

ALL CROSSFRAMES ARE NORMAL OR RADIAL TO NEW LINE

ϒ MEASURED ALONG NEW LINE

* PARALLEL TO BACK OF PAVEMENT SEAT

SR 16 FILE NO. 2587 SHEET BA30

Bridge Design Engr.	Khaleghi, B		
Supervisor	Zeldenrust, RP		
Designed By	Rosa, M	02/10	
Checked By	Swett, GD	04/11	
Detailed By	Foote, N	08/10	
Bridge Projects Engr.			
Prelim. Plan By			
Architect/Specialist			

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DATE	REVISION	BY	APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 09C519

Fri May 06 15:07:37 2011

MICHAEL A. ROSA, STATE OF WASHINGTON, 43707, REGISTERED PROFESSIONAL ENGINEER 5/7/11

BRIDGE AND STRUCTURES OFFICE

RICHARD P. ZELDENRUST, STATE OF WASHINGTON, REGISTERED PROFESSIONAL ENGINEER 5/9/11

Washington State Department of Transportation

I-5 / SR 16
EB NALLEY VALLEY - HOV

NEW LINE BRIDGE

FRAMING PLAN
SHEET 3 OF 3

BRIDGE SHEET NO. BA30

SHEET 741 OF 1341 SHEETS

5/434 SCD

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	5/434SCD	Bridge Name	SBCD Over SR 16 HOV & Ramps	Structure ID	0018189B
Contract #	8189	Region: OR	Project Engineer: Neal Uhlmeyer	Performance Deck Concrete?	Yes
Contractor	Mowat Construction	Concrete Supplier	Holroyd Co.	Deck Placement	11/13, 2/19/13 & 2/26/
Bridge Description	3-Span (185' / 220' / 185'), 3-Steel Plate Girders (590' bridge length), 1-Lane (34' wide roadway)				

L = length between diaphragms (or length of "bay")

S = girder spacing

N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	36%
Min. =	0%
Max. =	100%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	22.75	14.00	1	11	10%
1	1	B	C	22.75	14.00	1	11	10%
1	2	A	B	22.75	14.00	0	11	0%
1	2	B	C	22.75	14.00	0	11	0%
1	3	A	B	22.75	14.00	0	11	0%
1	3	B	C	22.75	14.00	0	11	0%
1	4	A	B	22.75	14.00	0	11	0%
1	4	B	C	22.75	14.00	0	11	0%
1	5	A	B	22.75	14.00	1	11	10%
1	5	B	C	22.75	14.00	0	11	0%
1	6	A	B	22.75	14.00	3	11	25%
1	6	B	C	22.75	14.00	3	11	25%
1	7	A	B	22.75	14.00	6	11	55%
1	7	B	C	22.75	14.00	4	11	35%
1	8	A	B	22.75	14.00	10	11	90%
1	8	B	C	22.75	14.00	8	11	75%
2	1	A	B	18.41	14.00	8	9	90%
2	1	B	C	18.41	14.00	11	9	100%
2	2	A	B	18.41	14.00	7	9	80%
2	2	B	C	18.41	14.00	5	9	55%
2	3	A	B	18.38	14.00	3	9	35%
2	3	B	C	18.38	14.00	5	9	55%
2	4	A	B	18.31	14.00	2	9	20%
2	4	B	C	18.31	14.00	3	9	35%
2	5	A	B	18.31	14.00	6	9	65%
2	5	B	C	18.31	14.00	9	9	100%
2	6	A	B	18.31	14.00	6	9	65%
2	6	B	C	18.31	14.00	11	9	100%
2	7	A	B	18.31	14.00	8	9	90%
2	7	B	C	18.31	14.00	12	9	100%
2	8	A	B	18.31	14.00	6	9	65%
2	8	B	C	18.31	14.00	11	9	100%
2	9	A	B	18.31	14.00	2	9	20%
2	9	B	C	18.31	14.00	5	9	55%
2	10	A	B	18.31	14.00	4	9	45%
2	10	B	C	18.31	14.00	2	9	20%
2	11	A	B	18.31	14.00	4	9	45%
2	11	B	C	18.31	14.00	4	9	45%
2	12	A	B	18.31	14.00	7	9	80%
2	12	B	C	18.31	14.00	5	9	55%
3	1	A	B	18.31	14.00	6	9	65%

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	5/434SCD	Bridge Name	SBCD Over SR 16 HOV & Ramps	Structure ID	0018189B
Contract #	8189 Region OR	Project Engineer	Neal Uhlmeyer	Performance Deck Concrete?	Yes
Contractor	Mowat Construction	Concrete Supplier	Holroyd Co.	Deck Placement	11/13, 2/19/13 & 2/26/
Bridge Description	3-Span (185' / 220' / 185'), 3-Steel Plate Girders (590' bridge length), 1-Lane (34' wide roadway)				

L = length between diaphragms (or length of "bay")

S = girder spacing

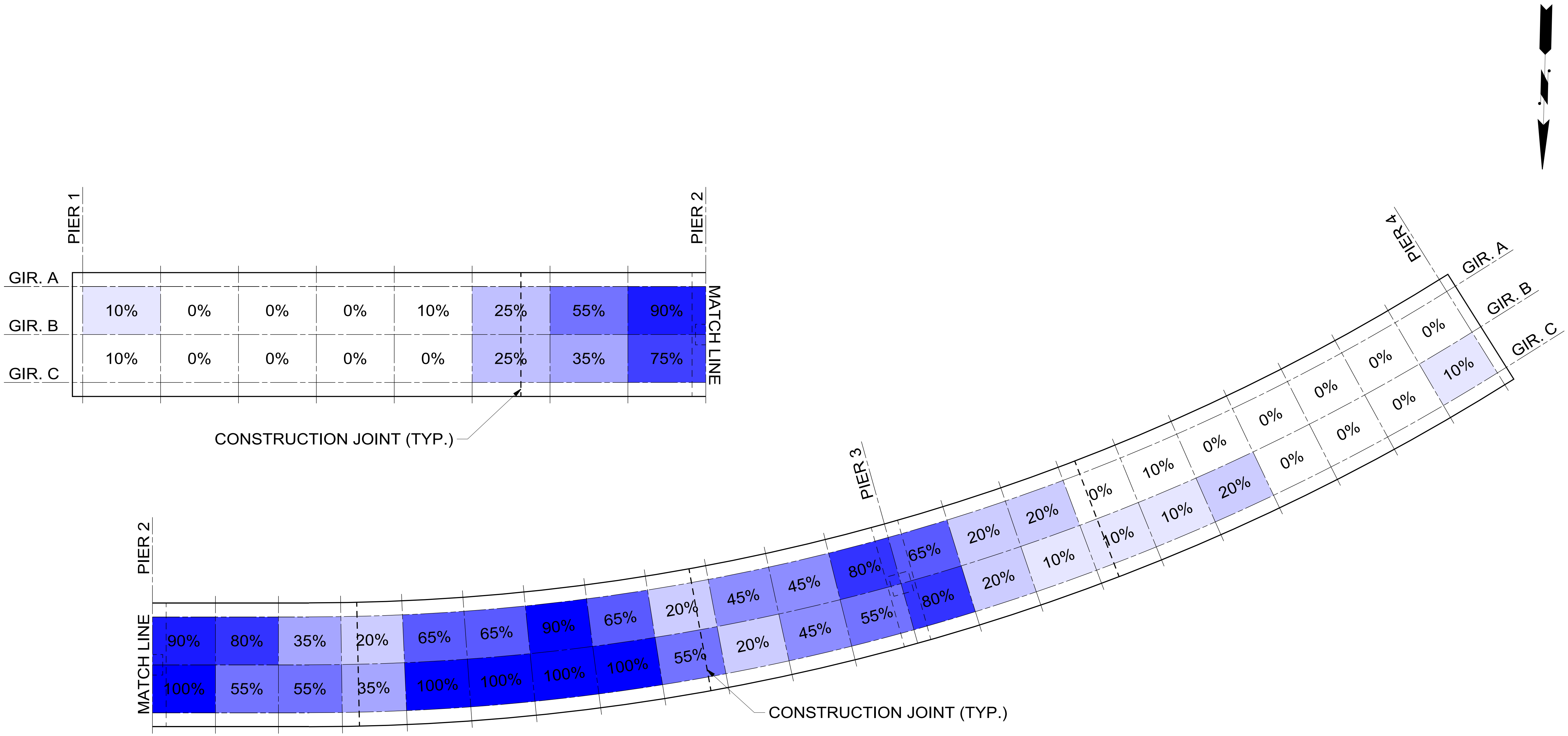
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	36%
Min. =	0%
Max. =	100%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
3	1	B	C	18.31	14.00	7	9	80%
3	2	A	B	18.31	14.00	2	9	20%
3	2	B	C	18.31	14.00	2	9	20%
3	3	A	B	18.31	14.00	2	9	20%
3	3	B	C	18.31	14.00	1	9	10%
3	4	A	B	18.31	14.00	0	9	0%
3	4	B	C	18.31	14.00	1	9	10%
3	5	A	B	18.31	14.00	1	9	10%
3	5	B	C	18.31	14.00	1	9	10%
3	6	A	B	18.31	14.00	0	9	0%
3	6	B	C	18.31	14.00	2	9	20%
3	7	A	B	18.31	14.00	0	9	0%
3	7	B	C	18.31	14.00	0	9	0%
3	8	A	B	18.31	14.00	0	9	0%
3	8	B	C	18.31	14.00	0	9	0%
3	9	A	B	18.31	14.00	0	9	0%
3	9	B	C	18.31	14.00	0	9	0%
3	10	A	B	17.94	14.00	0	9	0%
3	10	B	C	17.94	14.00	1	9	10%



CRACKING INTENSITY ~ BRIDGE 5/434SCD

100% = CRACK EVERY 2 FT.

LESS CRACKING — MORE CRACKING

BRIDGE NUMBER	5/434SCD
BRIDGE NAME	SBCD OVER SR 16 HOV & RAMPS
INSPECTION DATE	5/29/2015
DECK CONCRETE	PERFORMANCE BASED

BRIDGE 529/25 (EBEY SLOUGH)

Bridge #	529/25	Bridge Name	Ebey Slough	Structure ID	0017948A
Contract #	7948	Region	NW	Project Engineer	Mark Sawyer
Performance Deck Concrete?	No	Contractor	Granite Construction	Concrete Supplier	
Deck Placement	≈ 2012				
Bridge Description	4-Span (115' / 160' / 160' / 170'), 7-Steel Plate Girders (680' bridge length), 4-Lanes (58' wide roadway)				

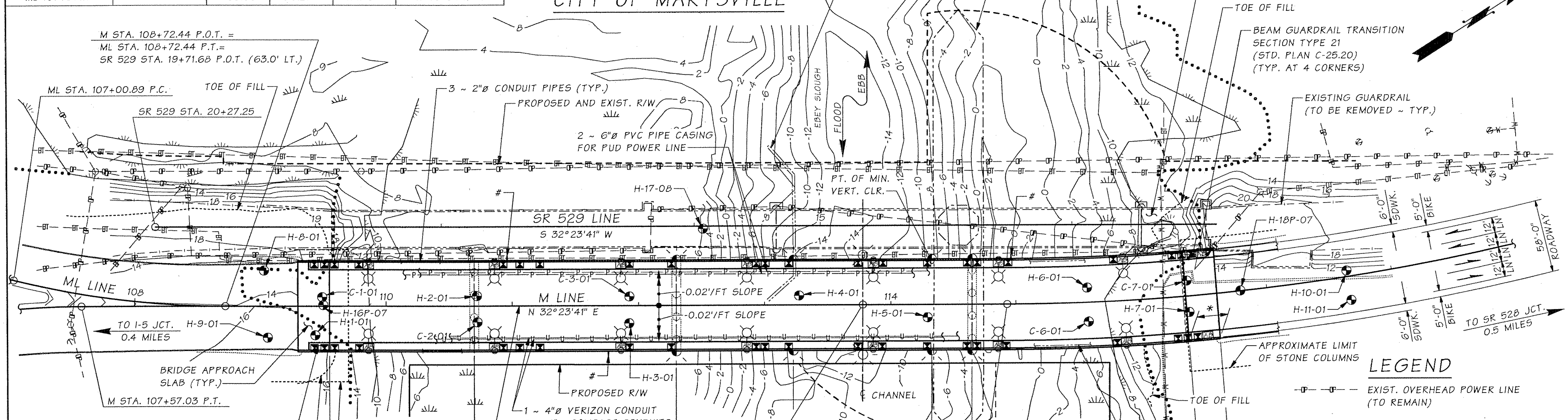
CONTENTS

1. Layout Plan Sheet
2. Field Notes
3. Crack Summary
4. Crack Intensity Diagram

CURVE DATA					
P.I. STATION	Δ	RADIUS	TANGENT	LENGTH	BK. TANGENT BRG.
M 118+13.52	20°45'25" LT.	1750.00'	320.51'	633.99'	N 32°23'41" E
ML 107+87.11	14°08'32" LT.	695.00'	86.21'	171.55'	N 46°54'17" E

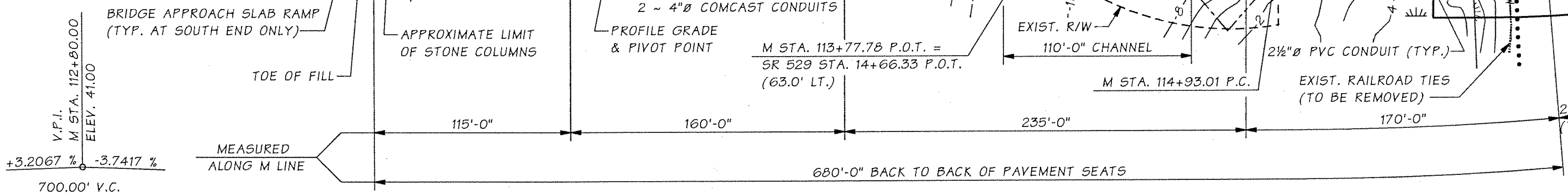
SEC. 33, T.30N., R.5E., W.M.
SNOHOMISH COUNTY
CITY OF MARYSVILLE

SR 529

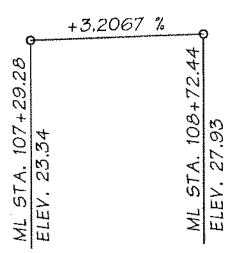


PLAN

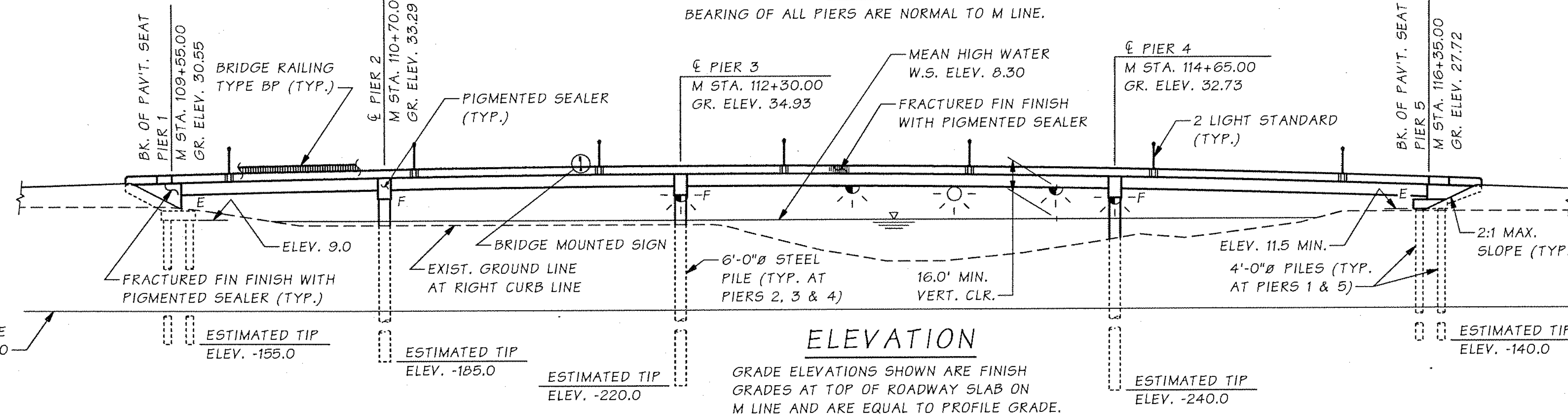
BEARING OF ALL PIERS ARE NORMAL TO M LINE.



M LINE PROFILE



ML LINE PROFILE



DATUM

NAVD 1988

ELEVATION

GRADE ELEVATIONS SHOWN ARE FINISH GRADES AT TOP OF ROADWAY SLAB ON M LINE AND ARE EQUAL TO PROFILE GRADE.

LEGEND

- EXIST. OVERHEAD POWER LINE (TO REMAIN)
- EXIST. BURIED TELEPHONE LINE (TO BE RELOCATED)
- EXIST. BURIED POWER LINE (TO BE RELOCATED)
- EXIST. WATER LINE (TO BE ABANDONED)
- WETLAND BUFFER
- WETLAND BOUNDARY
- JUNCTION BOX NEMA 4X S.S.
- IRRIGATION PIPING ACCESS BOX
- SOIL BORING LOCATIONS
- 180° RED NAVIGATION LIGHT
- 360° GREEN NAVIGATION LIGHT
- NEW LIGHT STANDARD
- * 25'-0" WINGWALL (TYP. ALL 4 CORNERS)
- # BRIDGE MOUNTED SIGN

COMPOSITE
STEEL PLATE GIRDERS

LOADING: HL-93

Bridge Design Engr.	Khaleghi, B		
Supervisor	Stoddard, RB		
Designed By	AAB/LHT/JCH/JLY	02/09	
Checked By	AAB/LHT/JCH/JLY	04/10	
Detailed By	McCarthy, DJ	02/09	
Bridge Projects Engr.	Lewis, RA	11/08	
Prelim. Plan By	Wei, J	11/08	
Architect/Specialist	PDK/NSB/RJD/GAW	11/08	

M:\X-Team\EBEY SLOUGH BR 529-25 REPL\EBEY SLOUGH BR 529-25 REPL-C\window files\LAYOUT.WND

DATE	REVISION	BY	APP'D
04/30/10	DELETED FUTURE GAS LINE	AAB	EBS

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 10A008

BRIDGE AND STRUCTURES OFFICE

JUGESH KAPUR, STATE OF WASHINGTON, PROFESSIONAL ENGINEER, 25400

4/29/10

Washington State Department of Transportation

SR 529
EBEY SLOUGH BR. - REPLACE BRIDGE

EBEY SLOUGH BR. NO. 529/25 REPLACEMENT

LAYOUT

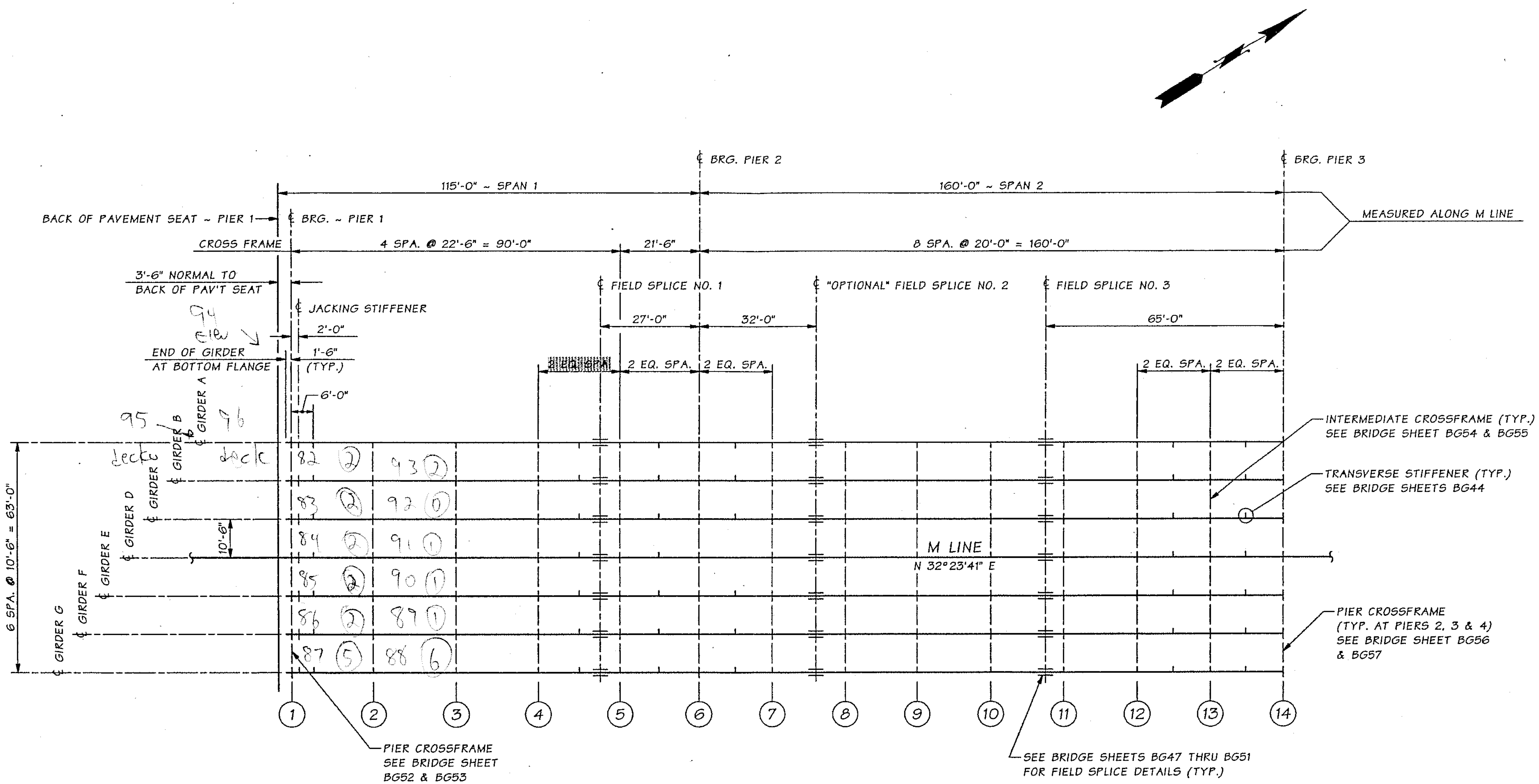
BRIDGE SHEET NO. BG1

SHEET 160 OF 260 SHEETS

Thu Apr 29 06:46:10 2010

SR 529 FILE NO. 7009 SHEET BG1

C. S. 310306 ~ PROJ. NO. XL1137 ~ NORTHWEST REGION ~ SR 529 ~ EBEY SLOUGH BR. NO 529/25 REPLACEMENT



GIRDER FRAMING PLAN ~ SPANS 1 & 2

ALL LENGTHS ARE MEASURED HORIZONTALLY AND ARE ALONG ℄ OF THE BRIDGE.
CROSSFRAMES ARE PERPENDICULAR TO THE M LINE.

NOTE:

(•) ~ INDICATES PANEL POINT.
1 THRU 14

SR 529 FILE NO. 7009 SHEET BG34

Bridge Design Engr.	Khaleghi, B	
Supervisor	Stoddard, RB	
Designed By	Bushnaq, AA	11/09
Checked By	Tran, LH	04/10
Detailed By	McCarthy, DJ	11/09
Bridge Projects Engr.		
Prelim. Plan By		
Architect/Specialist		

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DATE	REVISION	BY	APP'D
04/30/10	ADDED TRANSVERSE STIFFENERS	AAB	RBS

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 10A008

BRIDGE AND STRUCTURES OFFICE

Washington State Department of Transportation

SR 529
EBEY SLOUGH BR. - REPLACE BRIDGE

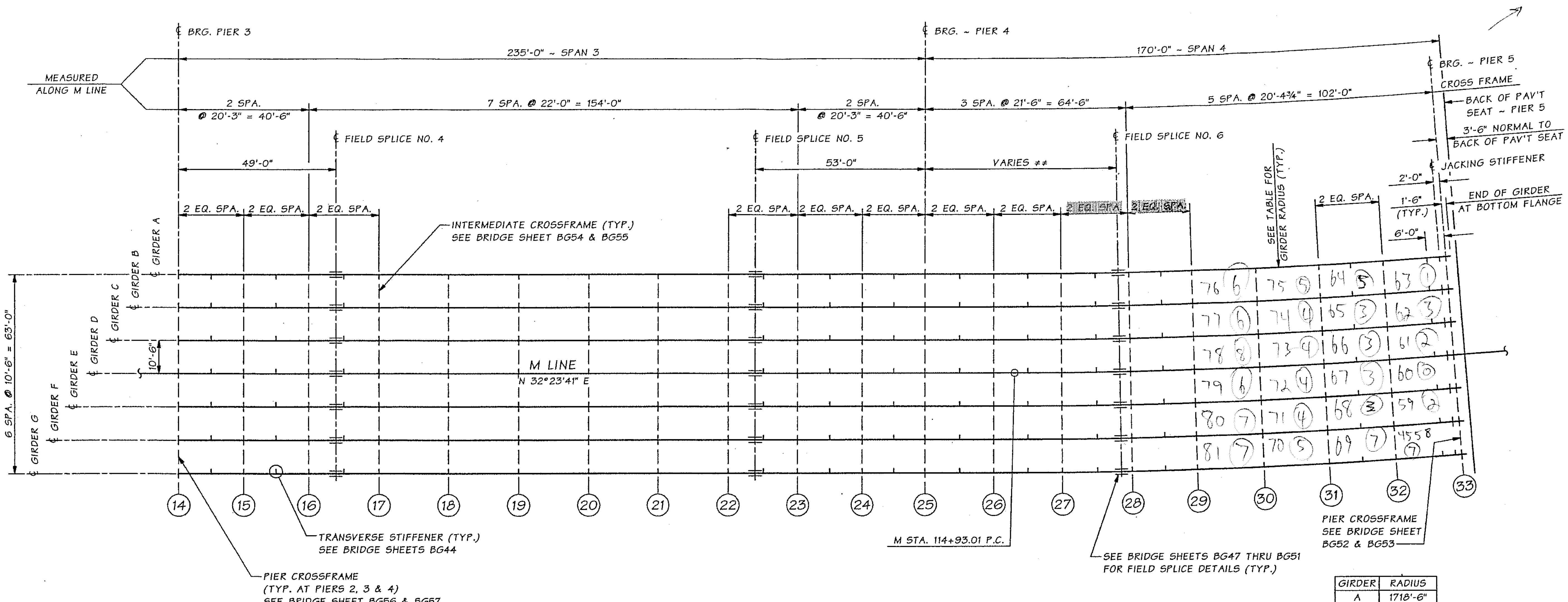
EBEY SLOUGH BR. NO. 529/25 REPLACEMENT

FRAMING PLAN
DETAIL 1 OF 2

BRIDGE SHEET NO. BG34

SHEET 193 OF 260 SHEETS

Thu Apr 29 06:57:57 2010



GIRDER FRAMING PLAN ~ SPANS 3 & 4

ALL LENGTHS ARE MEASURED HORIZONTALLY AND ARE ALONG ℄ OF THE BRIDGE.
CROSSFRAMES (14) TO (26) ARE PERPENDICULAR TO THE M LINE AND (27) TO (33) ARE RADIAL TO THE M-LINE.

GIRDER	RADIUS
A	1718'-6"
B	1729'-0"
C	1739'-6"
D	1750'-0"
E	1760'-6"
F	1771'-0"
G	1781'-6"

NOTES:

14 THRU 33 ( ) ~ INDICATES PANEL POINT.

SEE GIRDER ELEVATION SHEETS FOR DETAILS.

Bridge Design Engr.	Khaleghi, B		
Supervisor	Stoddard, RB		
Designed By	Bushnaq, AA	11/09	
Checked By	Tran, LH	04/10	
Detailed By	McCarthy, DJ	11/09	
Bridge Projects Engr.			
Prelim. Plan By			
Architect/Specialist			

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DATE	REVISION	BY	APP'D
04/30/10	ADDED TRANSVERSE STIFFENERS	AAB	RBS

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 10A008

BRIDGE AND STRUCTURES OFFICE

4/30/2010 4/30/10

Washington State Department of Transportation

SR 529
EBEY SLOUGH BR. - REPLACE BRIDGE

EBEY SLOUGH BR. NO. 529/25 REPLACEMENT

FRAMING PLAN
DETAIL 2 OF 2

BRIDGE SHEET NO. BG35

SHEET 194 OF 260 SHEETS

SR 529 FILE NO. 7009 SHEET BG35

Thu Apr 29 06:58:16 2010

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	529/25	Bridge Name	Ebey Slough	Structure ID	0017948A
Contract #	7948	Region	NW	Project Engineer	Mark Sawyer
Performance Deck Concrete?	No				
Contractor	Granite Construction	Concrete Supplier		Deck Placement	≈ 2012
Bridge Description	4-Span (115' / 160' / 160' / 170'), 7-Steel Plate Girders (680' bridge length), 4-Lanes (58' wide roadway)				

L = length between diaphragms (or length of "bay")

S = girder spacing

N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	36%
Min. =	0%
Max. =	80%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	22.50	10.50	2	11	20%
1	1	B	C	22.50	10.50	2	11	20%
1	1	C	D	22.50	10.50	2	11	20%
1	1	D	E	22.50	10.50	2	11	20%
1	1	E	F	22.50	10.50	2	11	20%
1	1	F	G	22.50	10.50	5	11	45%
1	2	A	B	22.50	10.50	2	11	20%
1	2	B	C	22.50	10.50	0	11	0%
1	2	C	D	22.50	10.50	1	11	10%
1	2	D	E	22.50	10.50	1	11	10%
1	2	E	F	22.50	10.50	1	11	10%
1	2	F	G	22.50	10.50	6	11	55%
1	3	A	B	22.50	10.50	#N/A	11	#N/A
1	3	B	C	22.50	10.50	#N/A	11	#N/A
1	3	C	D	22.50	10.50	#N/A	11	#N/A
1	3	D	E	22.50	10.50	#N/A	11	#N/A
1	3	E	F	22.50	10.50	#N/A	11	#N/A
1	3	F	G	22.50	10.50	#N/A	11	#N/A
1	4	A	B	22.50	10.50	#N/A	11	#N/A
1	4	B	C	22.50	10.50	#N/A	11	#N/A
1	4	C	D	22.50	10.50	#N/A	11	#N/A
1	4	D	E	22.50	10.50	#N/A	11	#N/A
1	4	E	F	22.50	10.50	#N/A	11	#N/A
1	4	F	G	22.50	10.50	#N/A	11	#N/A
1	5	A	B	21.50	10.50	#N/A	11	#N/A
1	5	B	C	21.50	10.50	#N/A	11	#N/A
1	5	C	D	21.50	10.50	#N/A	11	#N/A
1	5	D	E	21.50	10.50	#N/A	11	#N/A
1	5	E	F	21.50	10.50	#N/A	11	#N/A
1	5	F	G	21.50	10.50	#N/A	11	#N/A
2	1	A	B	20.00	10.50	#N/A	10	#N/A
2	1	B	C	20.00	10.50	#N/A	10	#N/A
2	1	C	D	20.00	10.50	#N/A	10	#N/A
2	1	D	E	20.00	10.50	#N/A	10	#N/A
2	1	E	F	20.00	10.50	#N/A	10	#N/A
2	1	F	G	20.00	10.50	#N/A	10	#N/A
2	2	A	B	20.00	10.50	#N/A	10	#N/A
2	2	B	C	20.00	10.50	#N/A	10	#N/A
2	2	C	D	20.00	10.50	#N/A	10	#N/A
2	2	D	E	20.00	10.50	#N/A	10	#N/A
2	2	E	F	20.00	10.50	#N/A	10	#N/A

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	529/25	Bridge Name	Ebey Slough	Structure ID	0017948A
Contract #	7948	Region	NW	Project Engineer	Mark Sawyer
Performance Deck Concrete?	No	Contractor	Granite Construction	Concrete Supplier	
Deck Placement	≈ 2012				

Bridge Description: 4-Span (115' / 160' / 160' / 170'), 7-Steel Plate Girders (680' bridge length), 4-Lanes (58' wide roadway)

L = length between diaphragms (or length of "bay")

S = girder spacing

N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	36%
Min. =	0%
Max. =	80%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
2	2	F	G	20.00	10.50	#N/A	10	#N/A
2	3	A	B	20.00	10.50	#N/A	10	#N/A
2	3	B	C	20.00	10.50	#N/A	10	#N/A
2	3	C	D	20.00	10.50	#N/A	10	#N/A
2	3	D	E	20.00	10.50	#N/A	10	#N/A
2	3	E	F	20.00	10.50	#N/A	10	#N/A
2	3	F	G	20.00	10.50	#N/A	10	#N/A
2	4	A	B	20.00	10.50	#N/A	10	#N/A
2	4	B	C	20.00	10.50	#N/A	10	#N/A
2	4	C	D	20.00	10.50	#N/A	10	#N/A
2	4	D	E	20.00	10.50	#N/A	10	#N/A
2	4	E	F	20.00	10.50	#N/A	10	#N/A
2	4	F	G	20.00	10.50	#N/A	10	#N/A
2	5	A	B	20.00	10.50	#N/A	10	#N/A
2	5	B	C	20.00	10.50	#N/A	10	#N/A
2	5	C	D	20.00	10.50	#N/A	10	#N/A
2	5	D	E	20.00	10.50	#N/A	10	#N/A
2	5	E	F	20.00	10.50	#N/A	10	#N/A
2	5	F	G	20.00	10.50	#N/A	10	#N/A
2	6	A	B	20.00	10.50	#N/A	10	#N/A
2	6	B	C	20.00	10.50	#N/A	10	#N/A
2	6	C	D	20.00	10.50	#N/A	10	#N/A
2	6	D	E	20.00	10.50	#N/A	10	#N/A
2	6	E	F	20.00	10.50	#N/A	10	#N/A
2	6	F	G	20.00	10.50	#N/A	10	#N/A
2	7	A	B	20.00	10.50	#N/A	10	#N/A
2	7	B	C	20.00	10.50	#N/A	10	#N/A
2	7	C	D	20.00	10.50	#N/A	10	#N/A
2	7	D	E	20.00	10.50	#N/A	10	#N/A
2	7	E	F	20.00	10.50	#N/A	10	#N/A
2	7	F	G	20.00	10.50	#N/A	10	#N/A
2	8	A	B	20.00	10.50	#N/A	10	#N/A
2	8	B	C	20.00	10.50	#N/A	10	#N/A
2	8	C	D	20.00	10.50	#N/A	10	#N/A
2	8	D	E	20.00	10.50	#N/A	10	#N/A
2	8	E	F	20.00	10.50	#N/A	10	#N/A
2	8	F	G	20.00	10.50	#N/A	10	#N/A
3	1	A	B	20.25	10.50	#N/A	10	#N/A
3	1	B	C	20.25	10.50	#N/A	10	#N/A
3	1	C	D	20.25	10.50	#N/A	10	#N/A
3	1	D	E	20.25	10.50	#N/A	10	#N/A

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	529/25	Bridge Name	Ebey Slough	Structure ID	0017948A
Contract #	7948	Region	NW	Project Engineer	Mark Sawyer
Performance Deck Concrete?	No	Contractor	Granite Construction	Concrete Supplier	
Deck Placement	≈ 2012				

Bridge Description: 4-Span (115' / 160' / 160' / 170'), 7-Steel Plate Girders (680' bridge length), 4-Lanes (58' wide roadway)

L = length between diaphragms (or length of "bay")
S = girder spacing
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)
N_{cr} = number of leaching cracks counted during visual inspection
% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	36%
Min. =	0%
Max. =	80%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
3	1	E	F	20.25	10.50	#N/A	10	#N/A
3	1	F	G	20.25	10.50	#N/A	10	#N/A
3	2	A	B	20.25	10.50	#N/A	10	#N/A
3	2	B	C	20.25	10.50	#N/A	10	#N/A
3	2	C	D	20.25	10.50	#N/A	10	#N/A
3	2	D	E	20.25	10.50	#N/A	10	#N/A
3	2	E	F	20.25	10.50	#N/A	10	#N/A
3	2	F	G	20.25	10.50	#N/A	10	#N/A
3	3	A	B	22.00	10.50	#N/A	11	#N/A
3	3	B	C	22.00	10.50	#N/A	11	#N/A
3	3	C	D	22.00	10.50	#N/A	11	#N/A
3	3	D	E	22.00	10.50	#N/A	11	#N/A
3	3	E	F	22.00	10.50	#N/A	11	#N/A
3	3	F	G	22.00	10.50	#N/A	11	#N/A
3	4	A	B	22.00	10.50	#N/A	11	#N/A
3	4	B	C	22.00	10.50	#N/A	11	#N/A
3	4	C	D	22.00	10.50	#N/A	11	#N/A
3	4	D	E	22.00	10.50	#N/A	11	#N/A
3	4	E	F	22.00	10.50	#N/A	11	#N/A
3	4	F	G	22.00	10.50	#N/A	11	#N/A
3	5	A	B	22.00	10.50	#N/A	11	#N/A
3	5	B	C	22.00	10.50	#N/A	11	#N/A
3	5	C	D	22.00	10.50	#N/A	11	#N/A
3	5	D	E	22.00	10.50	#N/A	11	#N/A
3	5	E	F	22.00	10.50	#N/A	11	#N/A
3	5	F	G	22.00	10.50	#N/A	11	#N/A
3	6	A	B	22.00	10.50	#N/A	11	#N/A
3	6	B	C	22.00	10.50	#N/A	11	#N/A
3	6	C	D	22.00	10.50	#N/A	11	#N/A
3	6	D	E	22.00	10.50	#N/A	11	#N/A
3	6	E	F	22.00	10.50	#N/A	11	#N/A
3	6	F	G	22.00	10.50	#N/A	11	#N/A
3	7	A	B	22.00	10.50	#N/A	11	#N/A
3	7	B	C	22.00	10.50	#N/A	11	#N/A
3	7	C	D	22.00	10.50	#N/A	11	#N/A
3	7	D	E	22.00	10.50	#N/A	11	#N/A
3	7	E	F	22.00	10.50	#N/A	11	#N/A
3	7	F	G	22.00	10.50	#N/A	11	#N/A
3	8	A	B	22.00	10.50	#N/A	11	#N/A
3	8	B	C	22.00	10.50	#N/A	11	#N/A
3	8	C	D	22.00	10.50	#N/A	11	#N/A

Bridge Deck Concrete Study

Washington State Department of Transportation

Bridge #	529/25	Bridge Name	Ebey Slough	Structure ID	0017948A
Contract #	7948	Region	NW	Project Engineer	Mark Sawyer
Performance Deck Concrete?	No				
Contractor	Granite Construction	Concrete Supplier		Deck Placement	≈ 2012
Bridge Description	4-Span (115' / 160' / 160' / 170'), 7-Steel Plate Girders (680' bridge length), 4-Lanes (58' wide roadway)				

L = length between diaphragms (or length of "bay")

S = girder spacing

N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	36%
Min. =	0%
Max. =	80%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
3	8	D	E	22.00	10.50	#N/A	11	#N/A
3	8	E	F	22.00	10.50	#N/A	11	#N/A
3	8	F	G	22.00	10.50	#N/A	11	#N/A
3	9	A	B	22.00	10.50	#N/A	11	#N/A
3	9	B	C	22.00	10.50	#N/A	11	#N/A
3	9	C	D	22.00	10.50	#N/A	11	#N/A
3	9	D	E	22.00	10.50	#N/A	11	#N/A
3	9	E	F	22.00	10.50	#N/A	11	#N/A
3	9	F	G	22.00	10.50	#N/A	11	#N/A
3	10	A	B	20.25	10.50	#N/A	10	#N/A
3	10	B	C	20.25	10.50	#N/A	10	#N/A
3	10	C	D	20.25	10.50	#N/A	10	#N/A
3	10	D	E	20.25	10.50	#N/A	10	#N/A
3	10	E	F	20.25	10.50	#N/A	10	#N/A
3	10	F	G	20.25	10.50	#N/A	10	#N/A
3	11	A	B	20.25	10.50	#N/A	10	#N/A
3	11	B	C	20.25	10.50	#N/A	10	#N/A
3	11	C	D	20.25	10.50	#N/A	10	#N/A
3	11	D	E	20.25	10.50	#N/A	10	#N/A
3	11	E	F	20.25	10.50	#N/A	10	#N/A
3	11	F	G	20.25	10.50	#N/A	10	#N/A
4	1	A	B	21.50	10.50	#N/A	11	#N/A
4	1	B	C	21.50	10.50	#N/A	11	#N/A
4	1	C	D	21.50	10.50	#N/A	11	#N/A
4	1	D	E	21.50	10.50	#N/A	11	#N/A
4	1	E	F	21.50	10.50	#N/A	11	#N/A
4	1	F	G	21.50	10.50	#N/A	11	#N/A
4	2	A	B	21.50	10.50	#N/A	11	#N/A
4	2	B	C	21.50	10.50	#N/A	11	#N/A
4	2	C	D	21.50	10.50	#N/A	11	#N/A
4	2	D	E	21.50	10.50	#N/A	11	#N/A
4	2	E	F	21.50	10.50	#N/A	11	#N/A
4	2	F	G	21.50	10.50	#N/A	11	#N/A
4	3	A	B	21.50	10.50	#N/A	11	#N/A
4	3	B	C	21.50	10.50	#N/A	11	#N/A
4	3	C	D	21.50	10.50	#N/A	11	#N/A
4	3	D	E	21.50	10.50	#N/A	11	#N/A
4	3	E	F	21.50	10.50	#N/A	11	#N/A
4	3	F	G	21.50	10.50	#N/A	11	#N/A
4	4	A	B	20.40	10.50	#N/A	10	#N/A
4	4	B	C	20.40	10.50	#N/A	10	#N/A

Bridge Deck Concrete Study

Bridge #	529/25	Bridge Name	Ebey Slough	Structure ID	0017948A
Contract #	7948	Region	NW	Project Engineer	Mark Sawyer
Performance Deck Concrete?	No				
Contractor	Granite Construction	Concrete Supplier		Deck Placement	≈ 2012
Bridge Description	4-Span (115' / 160' / 160' / 170'), 7-Steel Plate Girders (680' bridge length), 4-Lanes (58' wide roadway)				

L = length between diaphragms (or length of "bay")

S = girder spacing

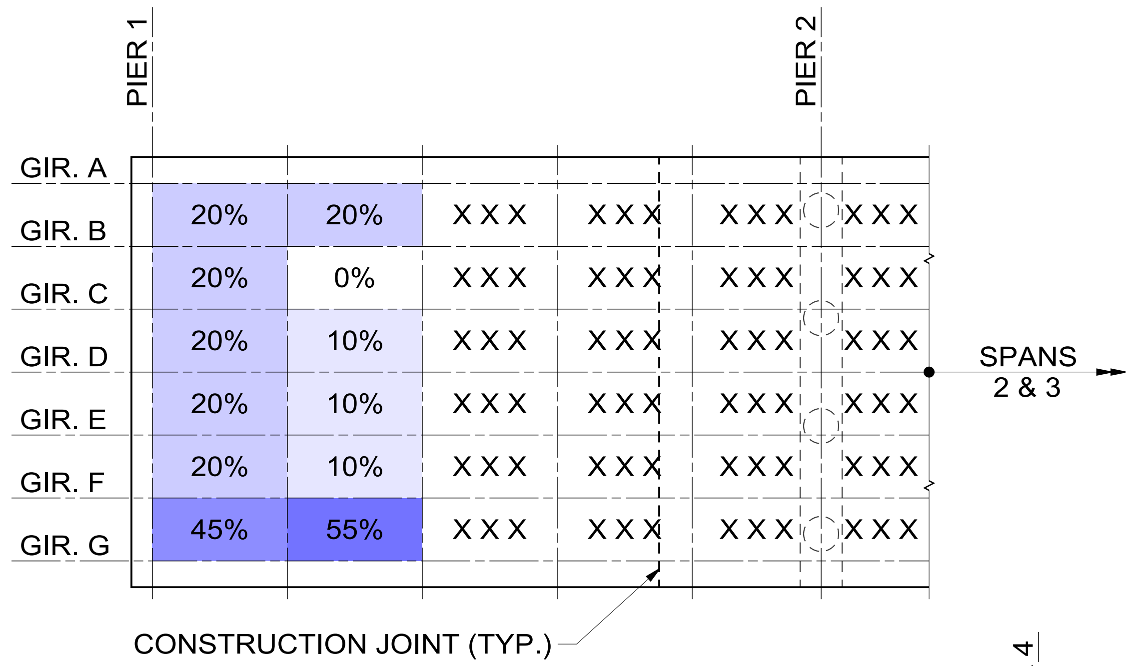
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

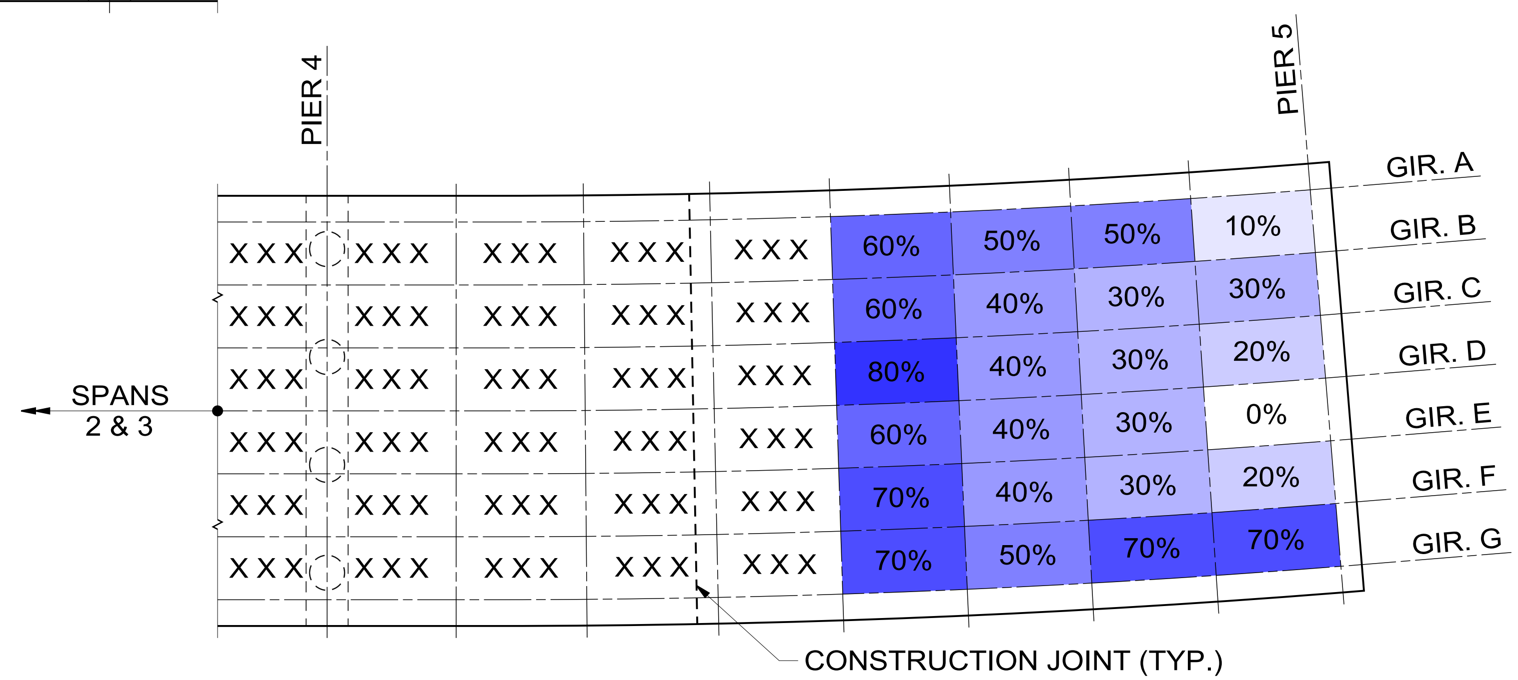
N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	36%
Min. =	0%
Max. =	80%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
4	4	C	D	20.40	10.50	#N/A	10	#N/A
4	4	D	E	20.40	10.50	#N/A	10	#N/A
4	4	E	F	20.40	10.50	#N/A	10	#N/A
4	4	F	G	20.40	10.50	#N/A	10	#N/A
4	5	A	B	20.40	10.50	6	10	60%
4	5	B	C	20.40	10.50	6	10	60%
4	5	C	D	20.40	10.50	8	10	80%
4	5	D	E	20.40	10.50	6	10	60%
4	5	E	F	20.40	10.50	7	10	70%
4	5	F	G	20.40	10.50	7	10	70%
4	6	A	B	20.40	10.50	5	10	50%
4	6	B	C	20.40	10.50	4	10	40%
4	6	C	D	20.40	10.50	4	10	40%
4	6	D	E	20.40	10.50	4	10	40%
4	6	E	F	20.40	10.50	4	10	40%
4	6	F	G	20.40	10.50	5	10	50%
4	7	A	B	20.40	10.50	5	10	50%
4	7	B	C	20.40	10.50	3	10	30%
4	7	C	D	20.40	10.50	3	10	30%
4	7	D	E	20.40	10.50	3	10	30%
4	7	E	F	20.40	10.50	3	10	30%
4	7	F	G	20.40	10.50	7	10	70%
4	8	A	B	20.40	10.50	1	10	10%
4	8	B	C	20.40	10.50	3	10	30%
4	8	C	D	20.40	10.50	2	10	20%
4	8	D	E	20.40	10.50	0	10	0%
4	8	E	F	20.40	10.50	2	10	20%
4	8	F	G	20.40	10.50	7	10	70%





CRACKING INTENSITY ~ BRIDGE 529/25

100% = CRACK EVERY 2 FT.

X X X = CRACKS NOT COUNTED DUE TO LIMITED ACCESS

SPANS 2 AND 3 NOT SHOWN FOR CLARITY

BRIDGE NUMBER	529/25
BRIDGE NAME	EBEY SLOUGH
INSPECTION DATE	5/22/2015
DECK CONCRETE	TRADITIONAL

BRIDGE 2/651W-S (W-S RAMP OVER US 2 / US 395)

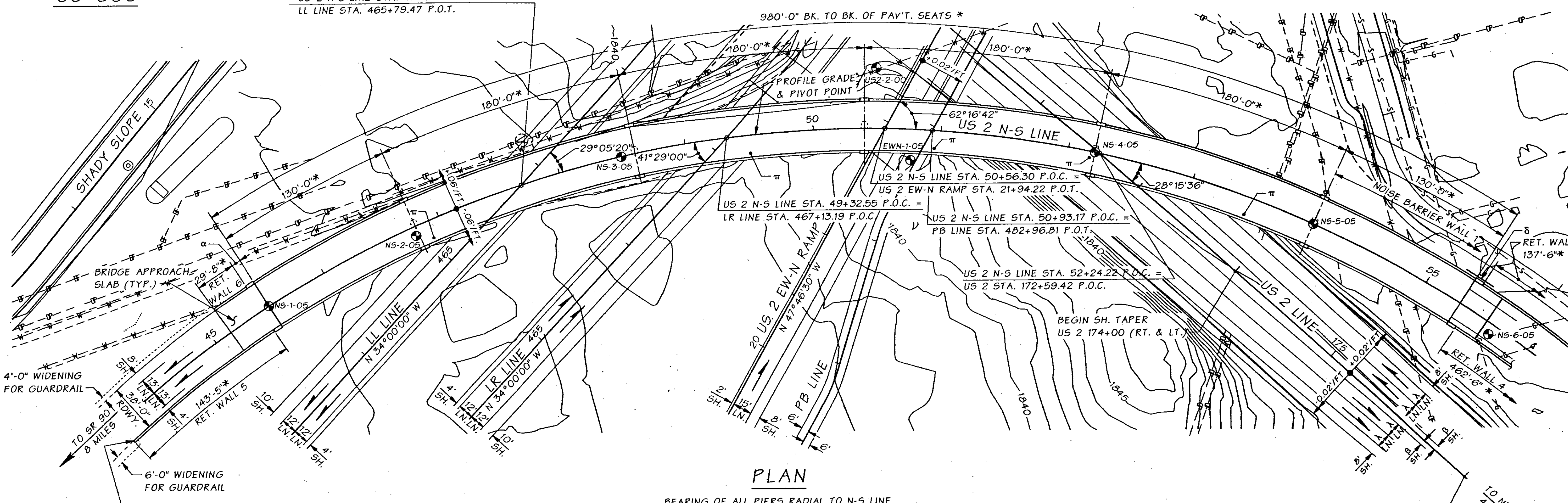
Bridge #	2/651W-S	Bridge Name	W-S Ramp over US 2/ US 395			Structure ID	0017610D
Contract #	7610	Region	ER	Project Engineer	Bob Hilmes	Performance Deck Concrete?	No
Contractor	Graham Construction			Concrete Supplier		Deck Placement	≈ 2011
Bridge Description	6-Span (130' / 180' / 180' / 180' / 180' / 130'), 3-Steel Plate Girders (980' bridge length), 2-Lanes (38' wide roadway)						

CONTENTS

1. Layout Plan Sheet
2. Field Notes
3. Crack Summary
4. Crack Intensity Diagram

SEC. 4, T.26N., R.43E., W.M.
SPOKANE COUNTY

US 395

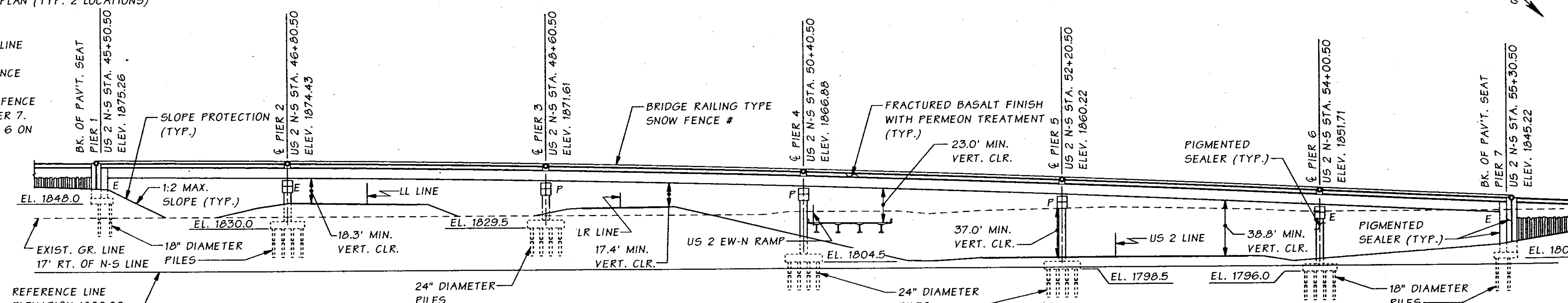


PLAN

BEARING OF ALL PIERS RADIAL TO N-S LINE.

LEGEND

- ⊕ = TEST HOLE
- * = MEASURED ALONG US 2 N-S LINE
- π = POINT OF MIN. VERT. CLEARANCE
- # = BRIDGE RAILING TYPE SNOW FENCE EXTENDS FROM PIER 1 TO PIER 7. ON RT. BARRIER & PIER 1 TO 6 ON LT. BARRIER.
- α = 7'-0" CURTAIN WALL (TYP. 4 CORNERS)
- β = 4'-0" SHOULDER
- λ = 11'-6" LANE
- δ = +20' TALL SHORING WALL



DEVELOPED ELEVATION

GRADE ELEVATIONS SHOWN ARE FINISH GRADES AT TOP OF ROADWAY SLAB ON US 2 N-S LINE AND ARE EQUAL TO PROFILE GRADE. SEE BRIDGE SHEET NS3 FOR EMBANKMENT DETAILS AT BRIDGE ENDS.

WEATHERING
STEEL PLATE GIRDER
LOADING HL - 93

NOTE: CURVE DATA, PROFILES, AND SUPERELEVATION DIAGRAMS ARE ON SHEET NS2.

DATUM
N.A.V.D. OF 1988/1991

Bridge Design Engr.	Khaleghi, B		M:\Z-Team\NSC - SR 395\PS&E\N-S RAMP STEEL\Window files\LAYOUT.WND		
Supervisor	Zeldenrust, RP				
Designed By	Rochon, MJ	09/07			
Checked By	Bennion, S	07/08			
Detailed By	Stitham, A	10/07			
Bridge Projects Engr.	Lewis, RA	09/07			
Prelim. Plan By	Rochon, MJ	10/07			
Architect/Specialist	Kinderman, P		DATE	REVISION	BY / APP'D

REGION NO	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 08Z011

BRIDGE AND STRUCTURES OFFICE

JUGESH KAPUR — STATE OF WASHINGTON — PROFESSIONAL ENGINEER
8/7/08

Washington State Department of Transportation

US 395
NSC - US 2 LOWERING
N-S RAMP OVER US 2 AND US 395 BRIDGE
LAYOUT

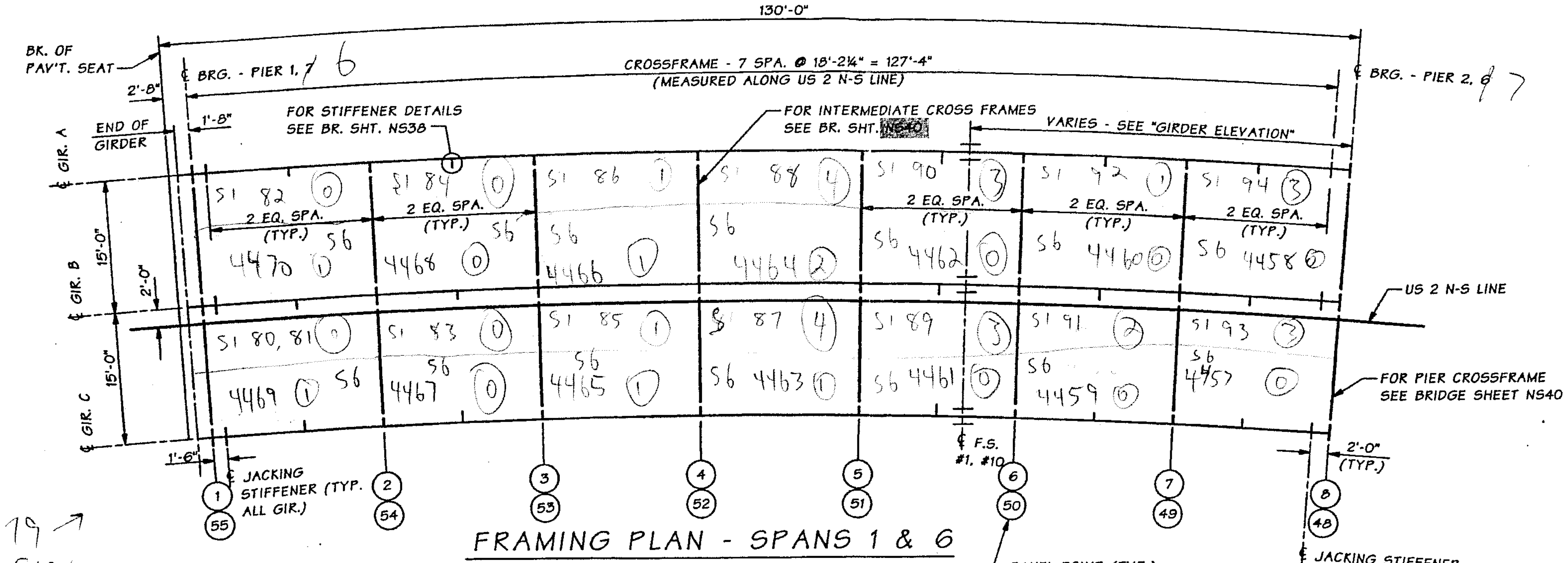
BRIDGE SHEET NO. NS1
SHEET 364 OF 548 SHEETS

Tue Aug 05 11:44:16 2008

SR 2 FILE NO. 7235 SHEET NS1

C.S 3208 ~ PROJ. NO. XL2231 ~ EASTERN REGION ~ M.P. 295.90 TO M.P. 296.01 ~ SR 2 ~ N-S RAMP BRIDGE.

GIRDER	RADIUS
A	867'-0"
B	852'-0"
C	837'-0"



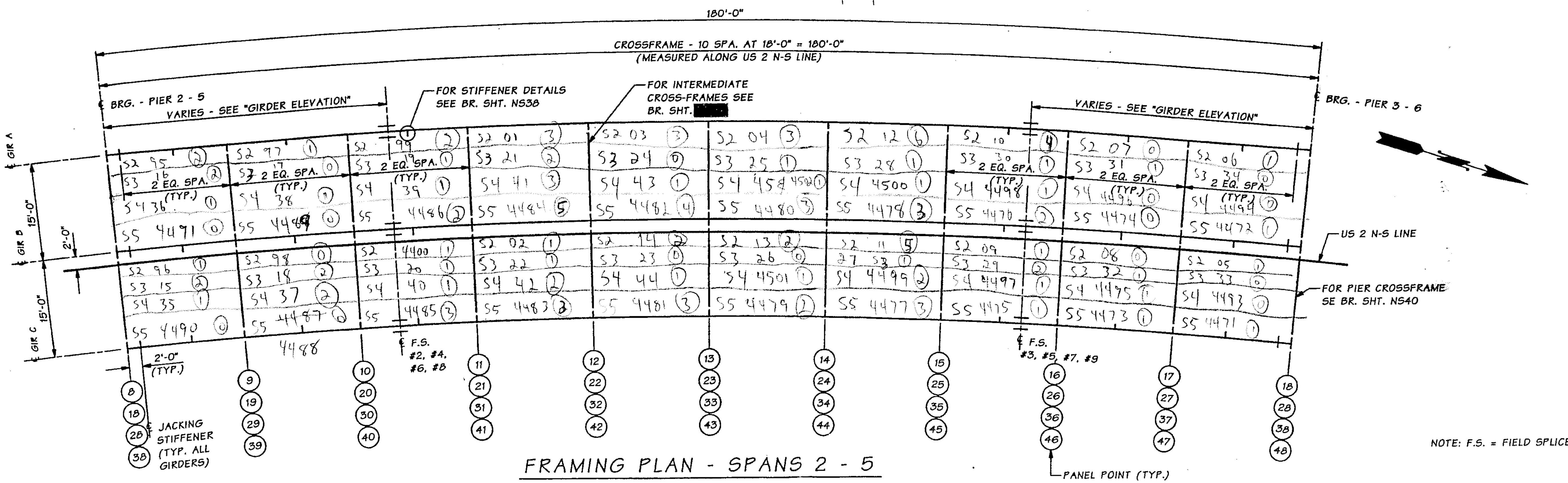
FRAMING PLAN - SPANS 1 & 6

SPAN 1 SHOWN, SPAN 6 ~~OPPOSITE HAND.~~

Not for this purpose

No deck shot

19 → Elev



FRAMING PLAN - SPANS 2 - 5

NOTE: F.S. = FIELD SPLICE

SR 2 FILE NO. 7235 SHEET NS36

Bridge Design Engr.	Khaleghi, B		
Supervisor	Zeldenrust, RP		
Designed By	Rochon, MJ	09/07	
Checked By	Brown, NS	07/08	
Detailed By	Andreotti, L	09/07	
Bridge Projects Engr.			
Prelim. Plan By			
Architect/Specialist			

Tue Sep 09 10:26:39 2008

M:\Z-Team\NSC - SR 395\PS&E\N-S RAMP STEEL\window files\FRAMING PLAN 1.WND

DATE	REVISION	BY	APP'D
9/08	CHANGED CALLOUT SHT. NUMBER	MJR	RPZ

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 08Z011

9/4/08

BRIDGE AND STRUCTURES OFFICE

9/12/08

Washington State Department of Transportation

US 395
NSC - US 2 LOWERING

N-S RAMP OVER US 2 AND US 395 BRIDGE

FRAMING PLAN

BRIDGE SHEET NO. NS36

SHEET 399 OF 548 SHEETS

2/651-W-S

Bridge Deck Concrete Study

Bridge #	2/651W-S	Bridge Name	W-S Ramp over US 2/ US 395	Structure ID	0017610D
Contract #	7610 Region ER	Project Engineer	Bob Hilmes	Performance Deck Concrete?	No
Contractor	Graham Construction	Concrete Supplier		Deck Placement	≈ 2011
Bridge Description	6-Span (130' / 180' / 180' / 180' / 180' / 130'), 3-Steel Plate Girders (980' bridge length), 2-Lanes (38' wide roadway)				

L = length between diaphragms (or length of "bay")
S = girder spacing
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)
N_{cr} = number of leaching cracks counted during visual inspection
% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	13%
Min. =	0%
Max. =	65%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%	
1	1	A	B	18.19	15.00	0	9	0%	
1	1	B	C	18.19	15.00	0	9	0%	
1	2	A	B	18.19	15.00	0	9	0%	
1	2	B	C	18.19	15.00	0	9	0%	
1	3	A	B	18.19	15.00	1	9	10%	
1	3	B	C	18.19	15.00	1	9	10%	
1	4	A	B	18.19	15.00	4	9	45%	
1	4	B	C	18.19	15.00	4	9	45%	
1	5	A	B	18.19	15.00	2	9	20%	← construction joint counte
1	5	B	C	18.19	15.00	2	9	20%	← construction joint counte
1	6	A	B	18.19	15.00	1	9	10%	
1	6	B	C	18.19	15.00	2	9	20%	
1	7	A	B	18.19	15.00	3	9	35%	
1	7	B	C	18.19	15.00	3	9	35%	
2	1	A	B	18.00	15.00	2	9	20%	
2	1	B	C	18.00	15.00	1	9	10%	
2	2	A	B	18.00	15.00	1	9	10%	
2	2	B	C	18.00	15.00	0	9	0%	
2	3	A	B	18.00	15.00	2	9	20%	
2	3	B	C	18.00	15.00	1	9	10%	
2	4	A	B	18.00	15.00	2	9	20%	← construction joint counte
2	4	B	C	18.00	15.00	0	9	0%	← construction joint counte
2	5	A	B	18.00	15.00	3	9	35%	
2	5	B	C	18.00	15.00	2	9	20%	
2	6	A	B	18.00	15.00	3	9	35%	
2	6	B	C	18.00	15.00	2	9	20%	
2	7	A	B	18.00	15.00	6	9	65%	
2	7	B	C	18.00	15.00	5	9	55%	
2	8	A	B	18.00	15.00	3	9	35%	← construction joint counte
2	8	B	C	18.00	15.00	0	9	0%	← construction joint counte
2	9	A	B	18.00	15.00	0	9	0%	
2	9	B	C	18.00	15.00	0	9	0%	
2	10	A	B	18.00	15.00	1	9	10%	
2	10	B	C	18.00	15.00	1	9	10%	
3	1	A	B	18.00	15.00	2	9	20%	
3	1	B	C	18.00	15.00	2	9	20%	
3	2	A	B	18.00	15.00	0	9	0%	
3	2	B	C	18.00	15.00	2	9	20%	
3	3	A	B	18.00	15.00	0	9	0%	← construction joint counte
3	3	B	C	18.00	15.00	0	9	0%	← construction joint counte

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	2/651W-S	Bridge Name	W-S Ramp over US 2/ US 395	Structure ID	0017610D
Contract #	7610 Region ER	Project Engineer	Bob Hilmes	Performance Deck Concrete?	No
Contractor	Graham Construction	Concrete Supplier		Deck Placement	≈ 2011
Bridge Description	6-Span (130' / 180' / 180' / 180' / 180' / 130'), 3-Steel Plate Girders (980' bridge length), 2-Lanes (38' wide roadway)				

L = length between diaphragms (or length of "bay")
S = girder spacing
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)
N_{cr} = number of leaching cracks counted during visual inspection
% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. = 13%
Min. = 0%
Max. = 65%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%	
3	4	A	B	18.00	15.00	2	9	20%	
3	4	B	C	18.00	15.00	1	9	10%	
3	5	A	B	18.00	15.00	0	9	0%	
3	5	B	C	18.00	15.00	0	9	0%	
3	6	A	B	18.00	15.00	1	9	10%	
3	6	B	C	18.00	15.00	0	9	0%	
3	7	A	B	18.00	15.00	1	9	10%	
3	7	B	C	18.00	15.00	1	9	10%	
3	8	A	B	18.00	15.00	0	9	0%	← construction joint counte
3	8	B	C	18.00	15.00	1	9	10%	← construction joint counte
3	9	A	B	18.00	15.00	1	9	10%	
3	9	B	C	18.00	15.00	1	9	10%	
3	10	A	B	18.00	15.00	0	9	0%	
3	10	B	C	18.00	15.00	0	9	0%	
4	1	A	B	18.00	15.00	1	9	10%	
4	1	B	C	18.00	15.00	1	9	10%	
4	2	A	B	18.00	15.00	1	9	10%	
4	2	B	C	18.00	15.00	2	9	20%	
4	3	A	B	18.00	15.00	0	9	0%	← construction joint counte
4	3	B	C	18.00	15.00	0	9	0%	← construction joint counte
4	4	A	B	18.00	15.00	3	9	35%	
4	4	B	C	18.00	15.00	2	9	20%	
4	5	A	B	18.00	15.00	1	9	10%	
4	5	B	C	18.00	15.00	1	9	10%	
4	6	A	B	18.00	15.00	1	9	10%	
4	6	B	C	18.00	15.00	1	9	10%	
4	7	A	B	18.00	15.00	1	9	10%	
4	7	B	C	18.00	15.00	2	9	20%	
4	8	A	B	18.00	15.00	0	9	0%	← construction joint counte
4	8	B	C	18.00	15.00	0	9	0%	← construction joint counte
4	9	A	B	18.00	15.00	0	9	0%	
4	9	B	C	18.00	15.00	1	9	10%	
4	10	A	B	18.00	15.00	0	9	0%	
4	10	B	C	18.00	15.00	0	9	0%	
5	1	A	B	18.00	15.00	0	9	0%	
5	1	B	C	18.00	15.00	0	9	0%	
5	2	A	B	18.00	15.00	0	9	0%	
5	2	B	C	18.00	15.00	0	9	0%	
5	3	A	B	18.00	15.00	1	9	10%	← construction joint counte
5	3	B	C	18.00	15.00	2	9	20%	← construction joint counte
5	4	A	B	18.00	15.00	5	9	55%	

Washington State Department of Transportation

Bridge Deck Concrete Study

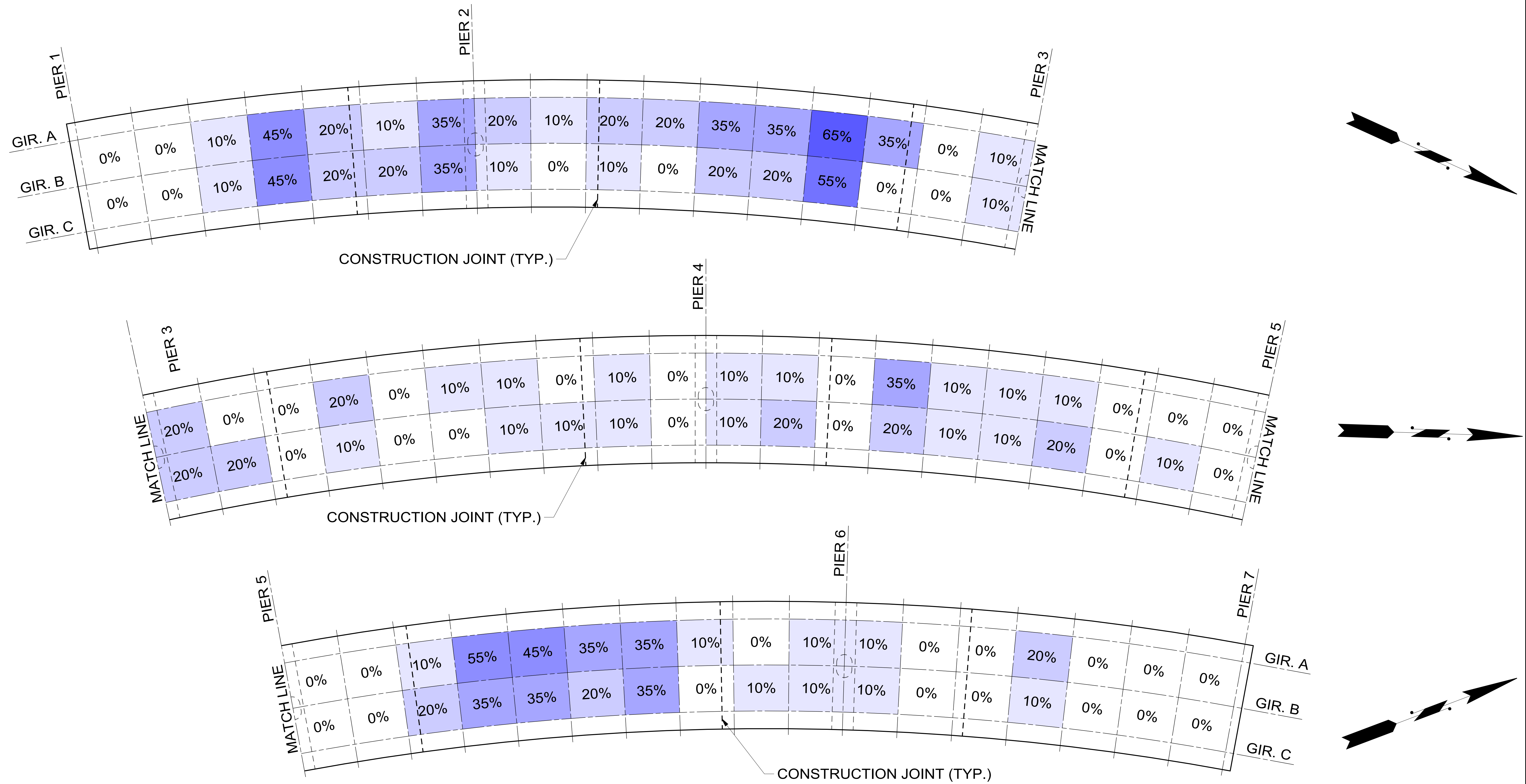
Bridge #	2/651W-S	Bridge Name	W-S Ramp over US 2/ US 395	Structure ID	0017610D
Contract #	7610	Region	ER	Project Engineer	Bob Hilmes
Performance Deck Concrete?	No	Contractor	Graham Construction	Concrete Supplier	
Deck Placement	≈ 2011				

Bridge Description: 6-Span (130' / 180' / 180' / 180' / 180' / 130'), 3-Steel Plate Girders (980' bridge length), 2-Lanes (38' wide roadway)

L = length between diaphragms (or length of "bay")
S = girder spacing
N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)
N_{cr} = number of leaching cracks counted during visual inspection
% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	13%
Min. =	0%
Max. =	65%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%	
5	4	B	C	18.00	15.00	3	9	35%	
5	5	A	B	18.00	15.00	4	9	45%	
5	5	B	C	18.00	15.00	3	9	35%	
5	6	A	B	18.00	15.00	3	9	35%	
5	6	B	C	18.00	15.00	2	9	20%	
5	7	A	B	18.00	15.00	3	9	35%	
5	7	B	C	18.00	15.00	3	9	35%	
5	8	A	B	18.00	15.00	1	9	10%	← construction joint counte
5	8	B	C	18.00	15.00	0	9	0%	← construction joint counte
5	9	A	B	18.00	15.00	0	9	0%	
5	9	B	C	18.00	15.00	1	9	10%	
5	10	A	B	18.00	15.00	1	9	10%	
5	10	B	C	18.00	15.00	1	9	10%	
6	1	A	B	18.00	15.00	1	9	10%	
6	1	B	C	18.00	15.00	1	9	10%	
6	2	A	B	18.00	15.00	0	9	0%	
6	2	B	C	18.00	15.00	0	9	0%	
6	3	A	B	18.00	15.00	0	9	0%	← construction joint counte
6	3	B	C	18.00	15.00	0	9	0%	← construction joint counte
6	4	A	B	18.00	15.00	2	9	20%	
6	4	B	C	18.00	15.00	1	9	10%	
6	5	A	B	18.00	15.00	0	9	0%	
6	5	B	C	18.00	15.00	0	9	0%	
6	6	A	B	18.00	15.00	0	9	0%	
6	6	B	C	18.00	15.00	0	9	0%	
6	7	A	B	18.00	15.00	0	9	0%	
6	7	B	C	18.00	15.00	0	9	0%	



CRACKING INTENSITY ~ BRIDGE 2/651W-S

100% = CRACK EVERY 2 FT.

LESS CRACKING MORE CRACKING

BRIDGE NUMBER	2/651W-S
BRIDGE NAME	W-S RAMP OVER US 2/US 395
INSPECTION DATE	5/21/2015
DECK CONCRETE	TRADITIONAL

BRIDGE 9/134 (PILCHUCK CREEK)

Bridge #	9/134	Bridge Name	Pilchuck Creek	Structure ID	0018363A
Contract #	8383	Region	NW	Project Engineer	Dave Crisman
Performance Deck Concrete?	Yes				
Contractor	Granite Construction	Concrete Supplier	Stanwood Redi-Mix	Deck Placement	11/27/13, 12/11/13 & 1/14/14
Bridge Description	3-Span (170' / 220' / 170'), 3-Steel Plate Girders (560' bridge length), 2-Lanes (36' wide roadway)				

CONTENTS

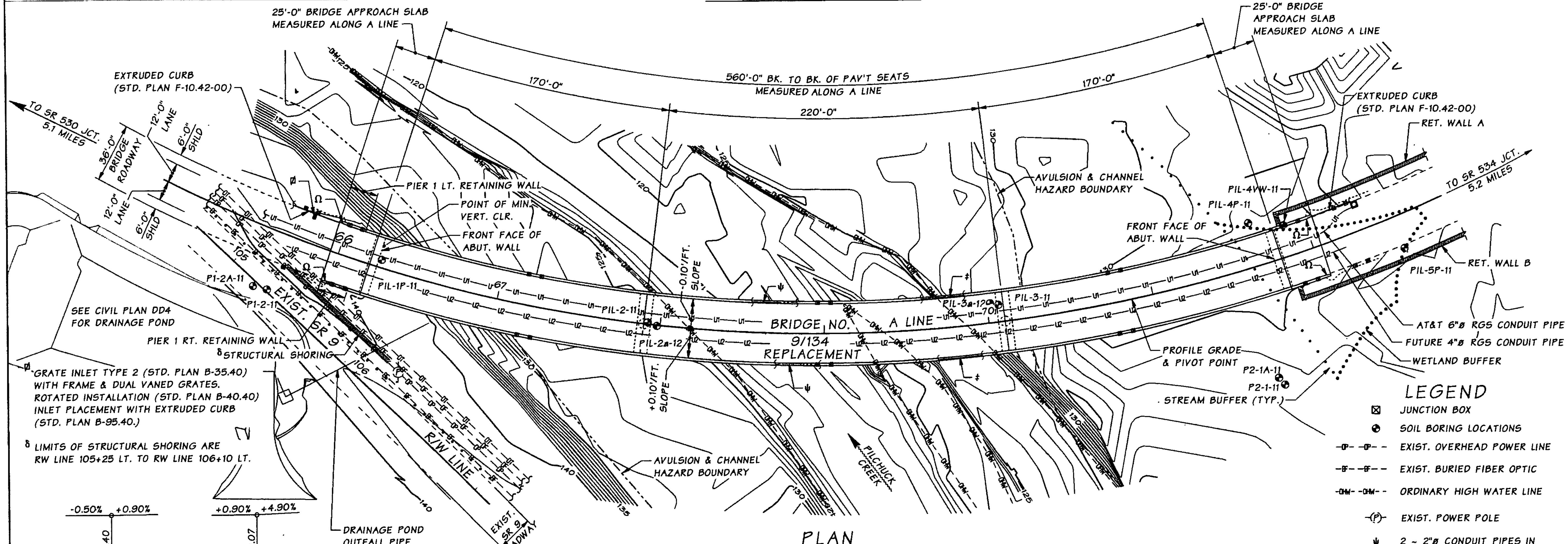
1. Layout Plan Sheet
2. Mix Design Summary
3. Concrete Mix Design Form
4. Concrete Test Results
5. Field Notes
6. Crack Summary
7. Crack Intensity Diagram

CURVE DATA

P.I. STATION	Δ	RADIUS	TANGENT	LENGTH	BK. TANGENT BRG.
A STA. 70+05.93	67°15'41" LT.	880.00'	585.35'	1033.06'	N 20°52'11" E

SEC. 16, T.32N., R.5E., W.M.
SNOHOMISH COUNTY

SR 9



ø GRATE INLET TYPE 2 (STD. PLAN B-35.40) WITH FRAME & DUAL VANED GRATES. ROTATED INSTALLATION (STD. PLAN B-40.40) INLET PLACEMENT WITH EXTRUDED CURB (STD. PLAN B-95.40.)

δ LIMITS OF STRUCTURAL SHORING ARE RW LINE 105+25 LT. TO RW LINE 106+10 LT.

PLAN

BEARING OF ALL PIERS IS RADIAL TO A LINE

LEGEND

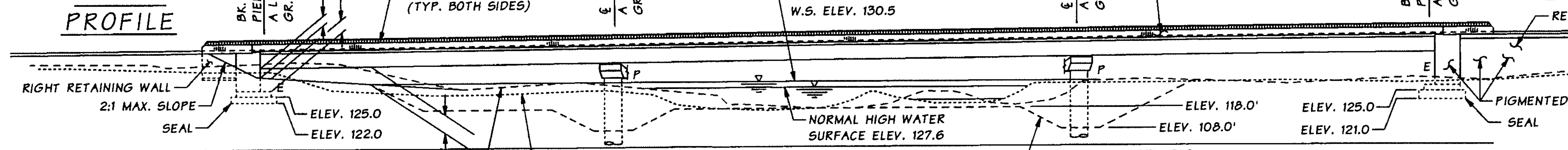
- ⊠ JUNCTION BOX
- SOIL BORING LOCATIONS
- —OP— —OP— EXIST. OVERHEAD POWER LINE
- —BF— —BF— EXIST. BURIED FIBER OPTIC
- —OHW— —OHW— ORDINARY HIGH WATER LINE
- —(P)— EXIST. POWER POLE
- ψ 2 ~ 2"ø CONDUIT PIPES IN TRAFFIC BARRIER FOR FULL LENGTH OF BARRIER (TYP.)
- ‡ BRIDGE RAILING TYPE BP (TYP. BOTH SIDES)
- Ω THRIE BEAM GUARDRAIL CONNECTION TYPE D (STD. PLAN C-5)
- ◘ PROPOSED CONCRETE MANHOLE

-0.50% +0.90%
V.P.I. A STA. 64+23.40 ELEV. 142.99
300.00' V.C.

A LINE PROFILE

+0.90% +4.90%
V.P.I. A STA. 74+69.07 ELEV. 152.40
520.00' V.C.

A LINE PROFILE



ELEVATION

GRADE ELEVATIONS SHOWN ARE FINISH GRADES AT TOP OF BRIDGE DECK ON A LINE AND ARE EQUAL TO PROFILE GRADE.
SEE STD. PLAN A-50.10-00 FOR EMBANKMENT DETAILS AT BRIDGE ENDS.

NOTE: 500 YR. M.R.I.
Q = 11240 CFS
W.S. ELEV. 131.0

DATUM
NAVD 88

COMPOSITE STEEL PLATE GIRDERS
LOADING: HL-93

Bridge Design Engr.	Khaleghi, B	02/11	M:\X-Team\SR9 PILCHUCK CREEK\window files\LAYOUT.wnd
Supervisor	Stoddard, RB		
Designed By	EJF/MT/NTR	12/11	
Checked By	NTR/ MT/EJF	05/12	
Detailed By	Puryear, D	12/11	
Bridge Projects Engr.	Lewis, R	02/11	
Prelim. Plan By	Wei, J	12/10	
Architect/Specialist	NSB/PDK/GAW	02/11	DATE / REVISION / BY / APP'D

Mon Jul 16 16:14:16 2012

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 11A020

BRIDGE AND STRUCTURES OFFICE

JUGESH KAPUR — PROFESSIONAL ENGINEER — STATE OF WASHINGTON
7/17/12

Washington State Department of Transportation

SR9
PILCHUCK CREEK
REPLACE BRIDGE

LAYOUT

BRIDGE SHEET NO. 1
SHEET 100 OF 155 SHEETS

SR 9 FILE NO. 7350 SHEET 1

C.S. 3132 ~ PROJ. NO. XL3402 ~ NORTHWEST REGION ~ SR 9 ~ MP 34.80 TO MP 35.00 ~ SR 9 OVER PILCHUCK CREEK ~ BR. NO. 9/134 REPLACEMENT.

Bridge Deck Concrete Study

Washington State Department of Transportation

Bridge #	9/134	Bridge Name	Pilchuck Creek	Structure ID	0018363A
Contract #	8383	Region NW	Project Engineer Dave Crisman	Performance Deck Concrete?	Yes
Contractor	Granite Construction	Concrete Supplier	Stanwood Redi-Mix	Deck Placement	11/27/13, 12/11/13 & 1/14/14
Bridge Description	3-Span (170' / 220' / 170'), 3-Steel Plate Girders (560' bridge length), 2-Lanes (36' wide roadway)				

Mix Design (WSDOT Form 350-040)

Water (max) = 252 lbs/cy w/c = 0.41 max

Cementitious Materials	Lbs/cy	Source	Type, Class or Grade
cement	458	Lafarge	Type I-II
fly ash	153	Lafarge	Type F/GGBFS 50/50
slag			
latex			
microsilica			

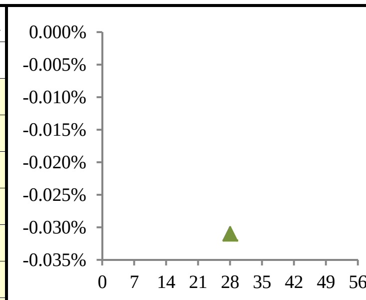
Concrete Admixtures	oz/cy	Manufacturer	Product
air entrainment	1-75	WR Grace	Dravair 1000
water reducer	1-50	WR Grace	Zyla 610
HR water reduce	1-75	WR Grace	Adva 140M
set retarder			
shrink. reducer	1-150	WR Grace	Eclipse 4500

Concrete Test Results

compressive strength @ 28 days	5,770	psi
modulus of elasticity	4,785,321	psi
permeability @ 56 days	1,705	coulombs
mix design density	148.0	lb/cf

Shrinkage Test Results

Dry Age (days)	% Length Change
0	
4	
7	
14	
21	
28	-0.0310%
56	



Aggregate

	Comp. 1	Comp. 2	Comp. 3	Comp. 4	Comp. 5
WSDOT Pit #	D-342	D-342	D-342	D-342	
Grading	#57	#8	Class 2	#4	
% Total	48.0%	5.0%	39.0%	8.0%	
Lbs/cy	1476	170	1202	247	

ASR Mitigation None Required

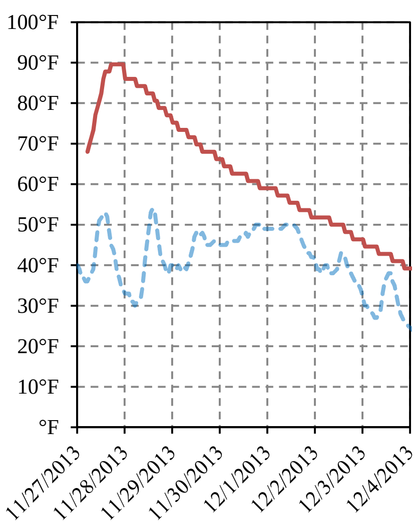
Notes

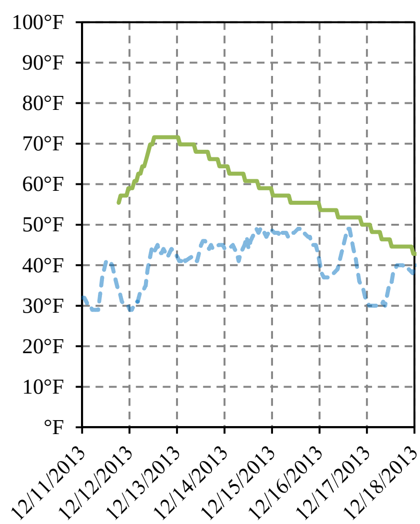
Although mix design indicates a range for the SRA, testing was d
using a 1/4 gallon SRA

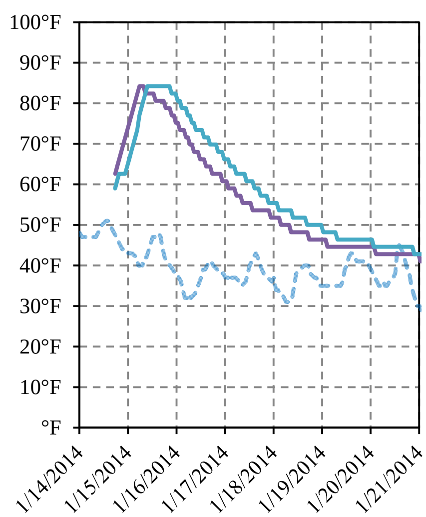
Only one number listed for "shrinkage" per AASHTO T-160, assumed to be at 28 days of drying

Deck consisted of 5 placements, only recieved info for 4.

Temperature







Ambient (web) Deck 2 Deck 3 Deck 4 Deck 5

Washington State Department of Transportation

Concrete Mix Design

Contractor	Submitted By	Date
Granite Construction Inc	Stanwood Redi-Mix	6/17/2013

Concrete Supplier	Plant Location
Stanwood Redi- Mix	Silvana Wa

Contract Number	Contract Name
	Pilchuck Creek Bridge

This mix is to be used in the following Bid Item No(s): BI-045.04.01 SUB-022.00

Concrete Class: ***(check one only)***

☐ 3000 ☐ 4000 ☒ 4000D[a] ☐ 4000P[a] ☐ 4000W ☐ Concrete Overlay ☐ Cement Concrete Pavement[d]

☐ Other

Remarks:

Mix Design No. 78424I **Plant No.** Silvana

Cementitious Materials	Source	Type, Class or Grade	Sp. Gr.	Lbs/cy
Cement	Lafarge/Richmond, BC	Type I-II	3.10	458
Fly Ash[a]	Lafarge/Seattle	Type F Flyash/GGBFS 50/50	2.67	153
GGBFS (Slag)				
Latex				
Microsilica				

Concrete Admixtures	Manufacturer	Product	Type	Est. Range (oz/cy)
Air Entrainment	WR Grace	Daravair 1000		1-75
Water Reducer	WR Grace	Zyla 610	Type A	1-50
High-Range Water Reducer	WR Grace	Adva 140M	Type A-F	1-75
Set Retarder				
Other SRA	WR Grace	Eclipse 4500		1-150

Water (Maximum) 252 lbs/cy Is any of the water Recycled or Reclaimed? ☐ Yes[e] ☒ No

Water Cementitious Ratio (Maximum) 0.41 Mix Design Density 148 lbs/cf[d]

Design Performance	1	2	3	4	5	Average[f]
28 Day Compressive Strength (cylinders) psi	5,780	5,700	5,830			5,770
14 Day Flexural[d] Strength (beams) psi						

Agency Use Only (Check appropriate Box)

☐ **This Mix Design MEETS CONTRACT SPECIFICATIONS and may be used on the bid items noted above**

☐ **This Mix Design DOES NOT MEET CONTRACT SPECIFICATIONS and is being returned for corrections**

Reviewed By: ______________________ 7/29/13

PE Signature Date

DOT Form 350-040 EF
Revised 6/06

Distribution: Original - Contractor
Copies To - State Materials Lab-Structural Materials Eng. ; Regional Materials Lab; Project Inspector

CMD-0001 8363 SUB-022.00

Mix Design No. 78424I **Plant No.** Silvana

Aggregate Information

Concrete Aggregates	Component 1	Component 2	Component 3	Component 4	Component 5	Combined Gradation
WSDOT Pit No.	D-342	D-342	D-342	D-342		
WSDOT ASR 14-day Results (%) [b]	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☐ No	
Grading[c]	No. 57	No. 8	Class 2	No.4		
Percent of Total Aggregate	48	5	39	8		100%
Specific Gravity	2.69	2.69	2.64	2.69		
Lbs/cy (ssd)	1476	170	1202	247		

Percent Passing

2 inch	100	100	100	100		
1-1/2 inch	100	100	100	100		
1 inch	100	100	100	17.2		
3/4 inch	88.06	100	100	2.6		
1/2 inch	36.15	100	100			
3/8 inch	11.07	85.79	100	.9		
No. 4	0.67	12.41	100			
No. 8	0	0.62	90.17			
No. 16	0	0.25	66.03			
No. 30	0	0	39.48			
No. 50	0	0	19.31			
No. 100	0	0	7.76			
No. 200	0	0	1.72	.1		

Fineness Modulus: 2.70 (Required for Class 2 Sand)

ASR Mitigation Method Proposed [b]: None Required

Notes:

a Required for Class 4000D and 4000P mixes.

b Alkali Silica Reactivity Mitigation is required for sources with expansions over 0.20% - Incidate method for ASR mitigation.
For expansion of 0.21% - o.45%, acceptable mitigation can be the use of low alkali cement or 25% type F fly ash.
Any other proposed mitigation method or for pits with greater than 0.45% expansion, proof of mitigating measure, either ASTM C1260 / AASHTO T303 test results must be attached.
If ASTM C 1293 testing has been submitted indicating 1-year expansion of 0.04% or less, mitigation is not required.

c AASHTO No. 467, 57, 67, 7, 8; WSDOT Class 1, Class 2; or combined gradation. See Standard Specification 9-03.1.

d Required for Cement Concrete Pavements.

e Attach test results indicating conformance to Standard Specification 9-25.1.

f Actual Average Strength as determined from testing or estimated from ACI 211.

Other2 [redacted]

LAFARGE NORTH AMERICA

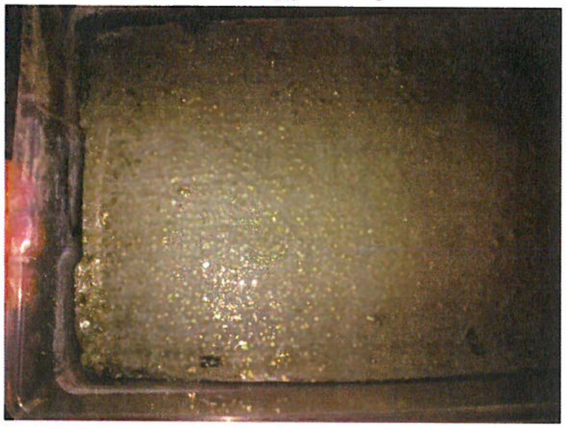
Modulus of Elasticity c-469

4,785,321 psi

ASTM C-672 Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals

Result:

Cycles	Rating
5	0
10	0
15	1
25	1
30	1
50	1



AASHTO T-160 Drying Shrinkage

Micro Strain: 310
WSDOT Requirements : Less than 320

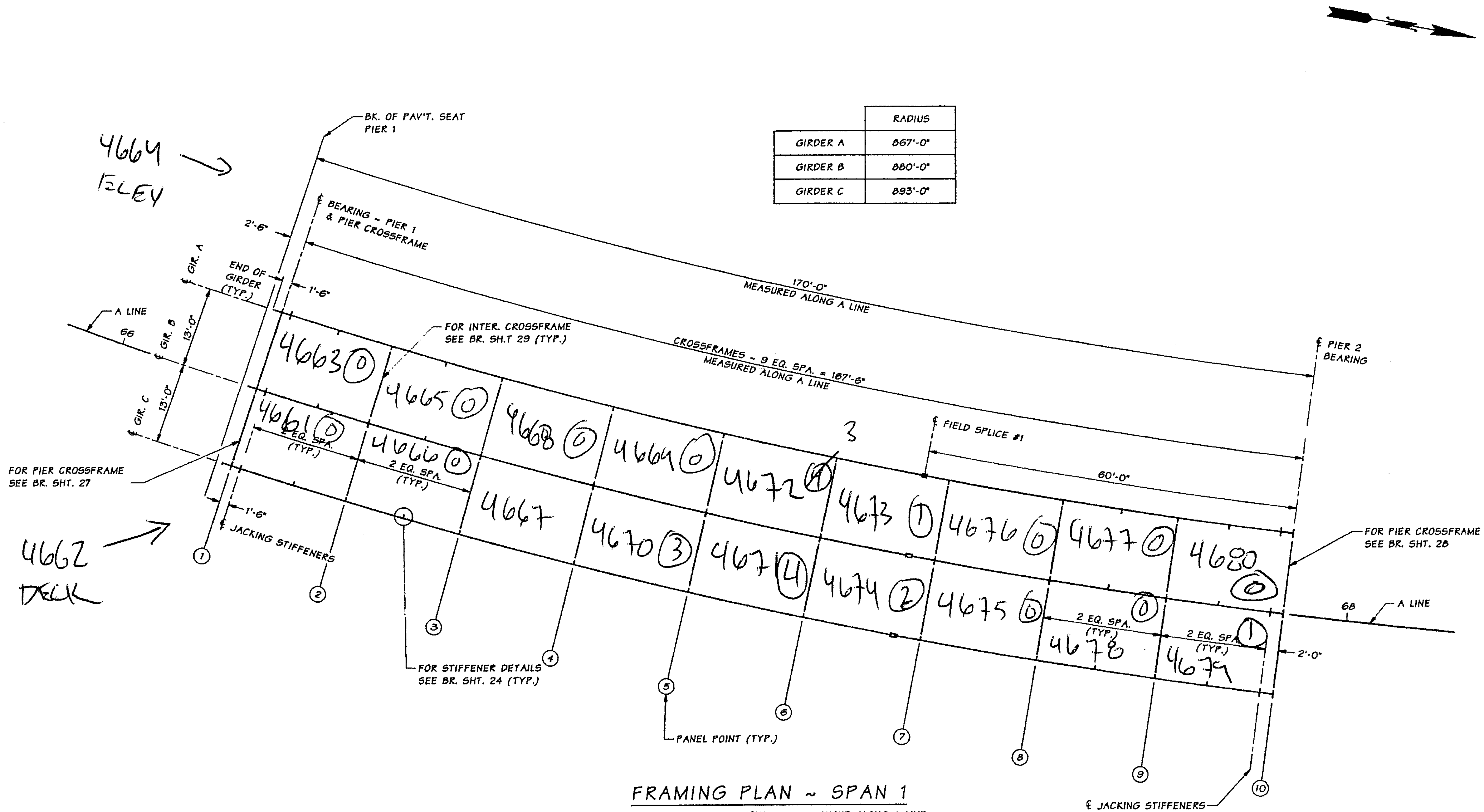
AASHTO T-227 Rapid Chloride Ion Permeability

Result:

Days	Coulumbs	WSDOT Requirements
56	1705	Less than 2000

Robert G. Shogren

Rob Shogren, P.E, Ph.D.
Technical Service Engineer
Lafarge North America



	RADIUS
GIRDER A	867'-0"
GIRDER B	880'-0"
GIRDER C	893'-0"

FRAMING PLAN ~ SPAN 1

ALL LONGITUDINAL DIMENSIONS ARE MEASURED ALONG A LINE

SR 9 FILE NO. 7350 SHEET 19

Bridge Design Engr.	Khaleghi, B	
Supervisor	Stoddard, RB	
Designed By	Talukdar, M	05/12
Checked By	Rodda, NT	05/12
Detailed By	Puryear, D	05/12
Bridge Projects Engr.		
Prelim. Plan By		
Architect/Specialist		

Mon Jul 16 16:14:55 2012

M:\X-Team\SR9 PILCHUCK CREEK\window files\FRAMING PLAN 1.wnd

DATE	REVISION	BY	APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 11A020

BRIDGE AND STRUCTURES OFFICE

7/16/12

7-16-12

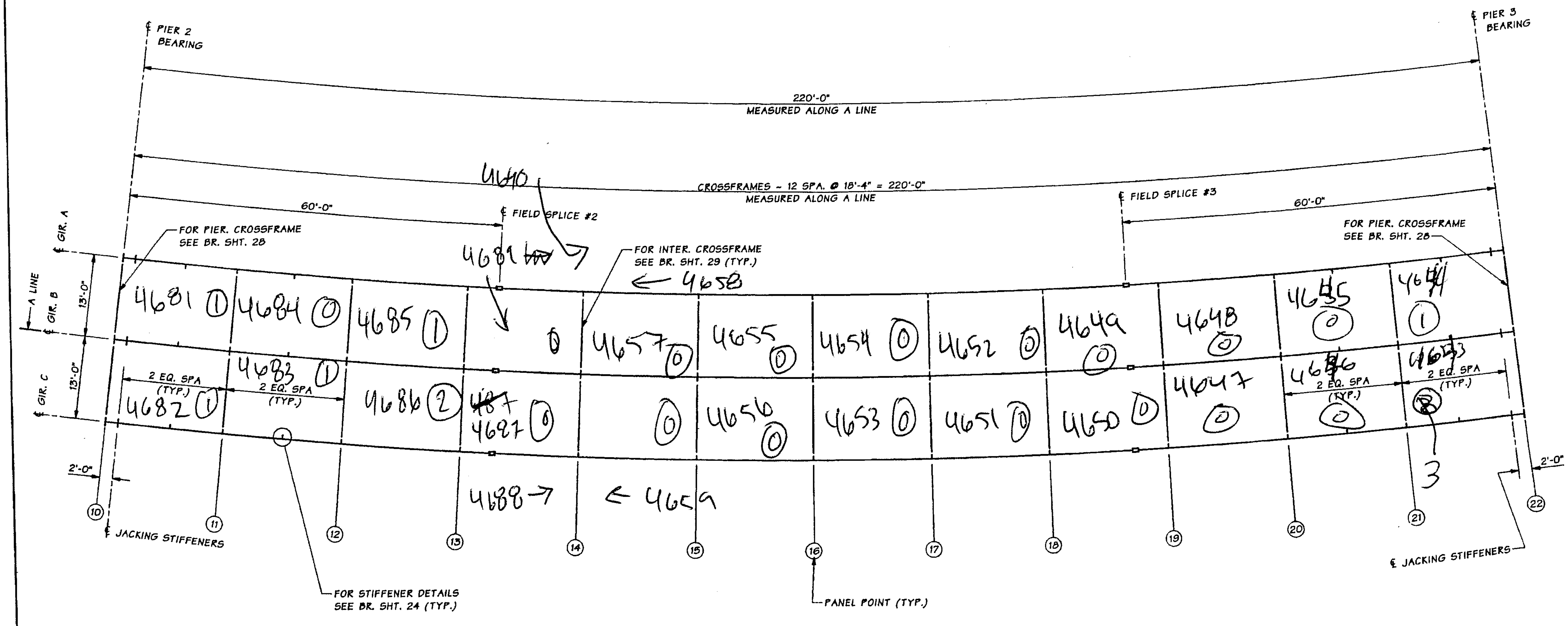
Washington State Department of Transportation

SR9
PILCHUCK CREEK
REPLACE BRIDGE

FRAMING PLAN
1 OF 3

BRIDGE SHEET NO. 19

SHEET 118 OF 155 SHEETS



FRAMING PLAN ~ SPAN 2

ALL LONGITUDINAL DIMENSIONS ARE MEASURED ALONG A LINE

SR 9 FILE NO. 7350 SHEET 20

Bridge Design Engr.	Khaleghi, B		M:\X-Team\SR9 PILCHUCK CREEK\window files\FRAMING PLAN 2.wnd				
Supervisor	Stoddard, RB						
Designed By	Talukdar, M	05/12					
Checked By	Rodda, NT	05/12					
Detailed By	Puryear, D	05/12					
Bridge Projects Engr.							
Prelim. Plan By							
Architect/Specialist			DATE	REVISION	BY	APP'D	

Mon Jul 16 16:14:54 2012

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			
JOB NUMBER 11A020				

BRIDGE AND STRUCTURES OFFICE

7/16/12

7/16/12

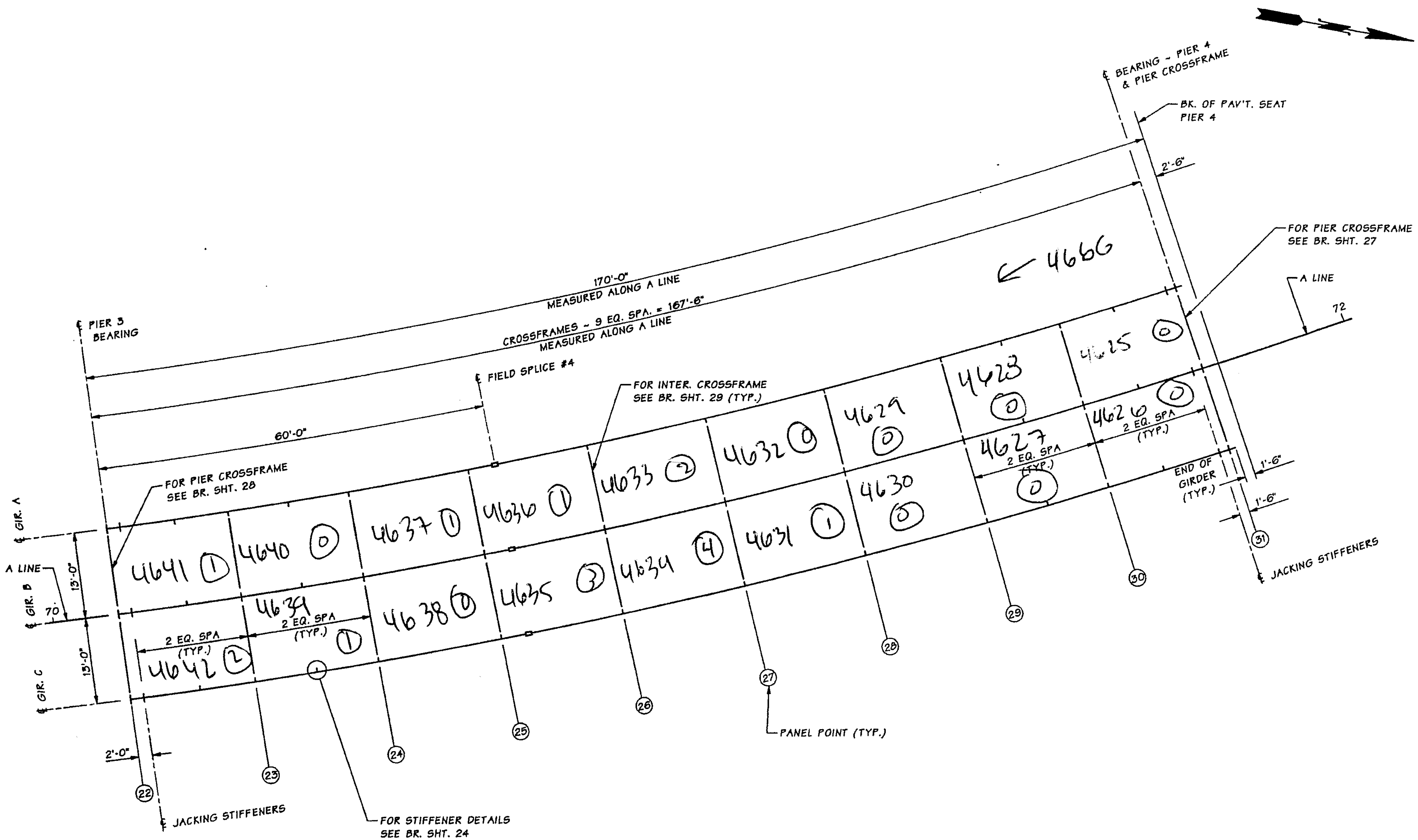
Washington State Department of Transportation

SR9
PILCHUCK CREEK
REPLACE BRIDGE

FRAMING PLAN
2 OF 3

BRIDGE SHEET NO. 20

SHEET 119 OF 155 SHEETS



FRAMING PLAN ~ SPAN 3

ALL LONGITUDINAL DIMENSIONS ARE MEASURED ALONG A LINE

SR 9 FILE NO. 7350 SHEET 21

Bridge Design Engr.	Khaleghi, B	
Supervisor	Stoddard, RB	
Designed By	Talukdar, M	05/12
Checked By	Rodda, NT	05/12
Detailed By	Puryear, D	05/12
Bridge Projects Engr.		
Prelim. Plan By		
Architect/Specialist		

Mon Jul 16 16:14:56 2012

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DATE	REVISION	BY	APP'D

REGION NO.	STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
10	WASH.			

JOB NUMBER 11A020

BRIDGE AND STRUCTURES OFFICE

7/16/12 7-16-12

Washington State Department of Transportation

SR9
PILCHUCK CREEK
REPLACE BRIDGE

FRAMING PLAN
3 OF 3

BRIDGE SHEET NO. 21

SHEET 120 OF 155 SHEETS

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	9/134	Bridge Name	Pilchuck Creek	Structure ID	0018363A
Contract #	8383	Region: NW	Project Engineer: Dave Crisman	Performance Deck Concrete?	Yes
Contractor	Granite Construction	Concrete Supplier	Stanwood Redi-Mix	Deck Placement	11/27/13, 12/11/13 & 1/14/14
Bridge Description	3-Span (170' / 220' / 170'), 3-Steel Plate Girders (560' bridge length), 2-Lanes (36' wide roadway)				

L = length between diaphragms (or length of "bay")

S = girder spacing

N_{100} = number of cracks equal to get 100% cracking severity = L / 2 ft (transverse crack spaced at 2 ft on center)

N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	7%
Min. =	0%
Max. =	45%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
1	1	A	B	18.61	13.00	0	9	0%
1	1	B	C	18.61	13.00	0	9	0%
1	2	A	B	18.61	13.00	0	9	0%
1	2	B	C	18.61	13.00	0	9	0%
1	3	A	B	18.61	13.00	0	9	0%
1	3	B	C	18.61	13.00	0	9	0%
1	4	A	B	18.61	13.00	0	9	0%
1	4	B	C	18.61	13.00	3	9	35%
1	5	A	B	18.61	13.00	3	9	35%
1	5	B	C	18.61	13.00	4	9	45%
1	6	A	B	18.61	13.00	1	9	10%
1	6	B	C	18.61	13.00	2	9	20%
1	7	A	B	18.61	13.00	0	9	0%
1	7	B	C	18.61	13.00	0	9	0%
1	8	A	B	18.61	13.00	0	9	0%
1	8	B	C	18.61	13.00	0	9	0%
1	9	A	B	18.61	13.00	0	9	0%
1	9	B	C	18.61	13.00	1	9	10%
2	1	A	B	18.33	13.00	1	9	10%
2	1	B	C	18.33	13.00	1	9	10%
2	2	A	B	18.33	13.00	0	9	0%
2	2	B	C	18.33	13.00	1	9	10%
2	3	A	B	18.33	13.00	1	9	10%
2	3	B	C	18.33	13.00	2	9	20%
2	4	A	B	18.33	13.00	0	9	0%
2	4	B	C	18.33	13.00	0	9	0%
2	5	A	B	18.33	13.00	0	9	0%
2	5	B	C	18.33	13.00	0	9	0%
2	6	A	B	18.33	13.00	0	9	0%
2	6	B	C	18.33	13.00	0	9	0%
2	7	A	B	18.33	13.00	0	9	0%
2	7	B	C	18.33	13.00	0	9	0%
2	8	A	B	18.33	13.00	0	9	0%
2	8	B	C	18.33	13.00	0	9	0%
2	9	A	B	18.33	13.00	0	9	0%
2	9	B	C	18.33	13.00	0	9	0%
2	10	A	B	18.33	13.00	0	9	0%
2	10	B	C	18.33	13.00	0	9	0%
2	11	A	B	18.33	13.00	0	9	0%
2	11	B	C	18.33	13.00	0	9	0%
2	12	A	B	18.33	13.00	1	9	10%

Washington State Department of Transportation

Bridge Deck Concrete Study

Bridge #	9/134	Bridge Name	Pilchuck Creek	Structure ID	0018363A
Contract #	8383 Region NW	Project Engineer	Dave Crisman	Performance Deck Concrete?	Yes
Contractor	Granite Construction	Concrete Supplier	Stanwood Redi-Mix	Deck Placement	11/27/13, 12/11/13 & 1/14/14
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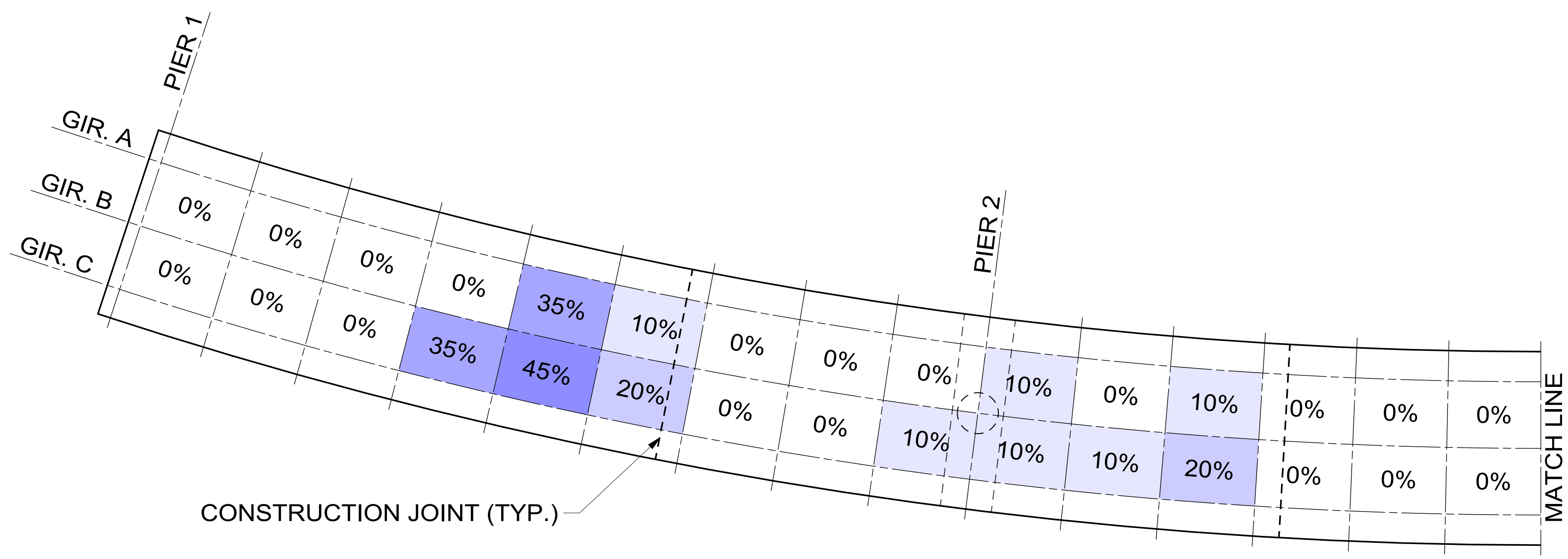
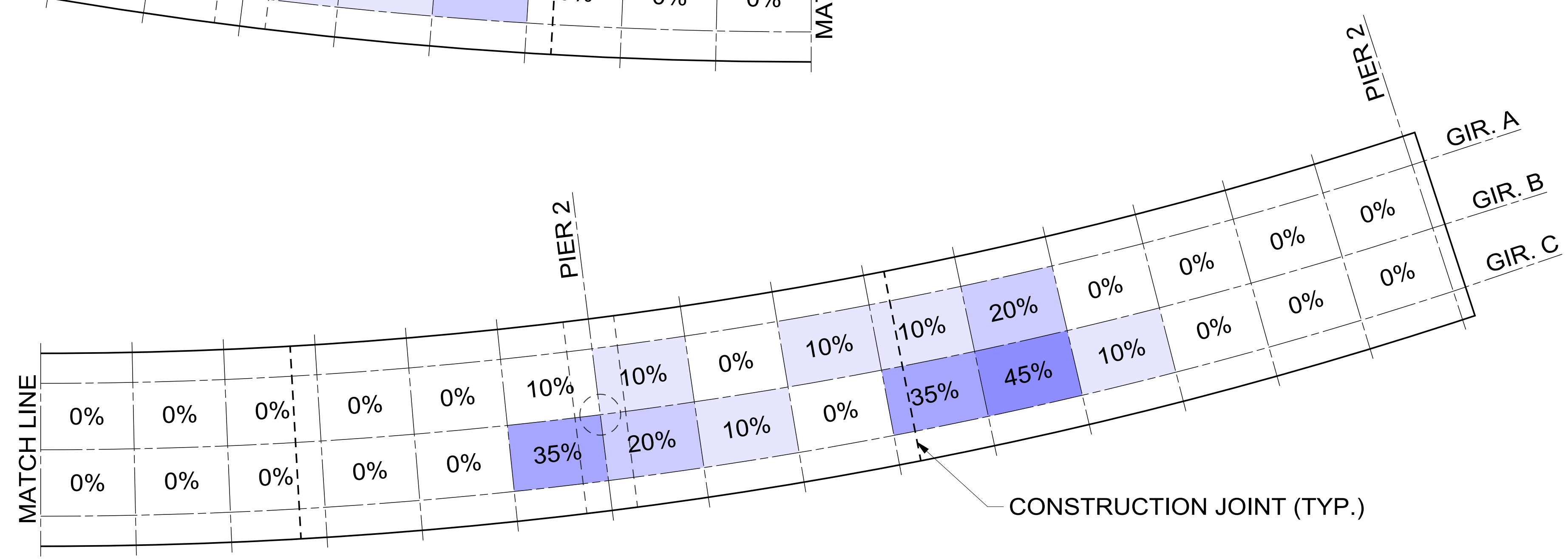
N_{cr} = number of leaching cracks counted during visual inspection

% = cracking severity percentage = N_{cr}/N_{100} (rounded to the nearest 5%)

Avg. =	7%
Min. =	0%
Max. =	45%

Span	Bay	Gir. Lt.	Gir Rt.	L (ft)	S (ft)	N_{cr}	N_{100}	%
2	12	B	C	18.33	13.00	3	9	35%
3	1	A	B	18.61	13.00	1	9	10%
3	1	B	C	18.61	13.00	2	9	20%
3	2	A	B	18.61	13.00	0	9	0%
3	2	B	C	18.61	13.00	1	9	10%
3	3	A	B	18.61	13.00	1	9	10%
3	3	B	C	18.61	13.00	0	9	0%
3	4	A	B	18.61	13.00	1	9	10%
3	4	B	C	18.61	13.00	3	9	35%
3	5	A	B	18.61	13.00	2	9	20%
3	5	B	C	18.61	13.00	4	9	45%
3	6	A	B	18.61	13.00	0	9	0%
3	6	B	C	18.61	13.00	1	9	10%
3	7	A	B	18.61	13.00	0	9	0%
3	7	B	C	18.61	13.00	0	9	0%
3	8	A	B	18.61	13.00	0	9	0%
3	8	B	C	18.61	13.00	0	9	0%
3	9	A	B	18.61	13.00	0	9	0%
3	9	B	C	18.61	13.00	0	9	0%





CRACKING INTENSITY ~ BRIDGE 9/134

100% = CRACK EVERY 2 FT.

BRIDGE NUMBER	9/134
BRIDGE NAME	PILCHUCK CREEK
INSPECTION DATE	5/22/2015
DECK CONCRETE	PERFORMANCE BASED