

Appendix A

Boring Logs

NOT FOR BID

Project: **San Bernardino County**
 Project Location: **Lanzit Bridge, Route 66**
 Project Number: **cSB 14-01**

Log of Boring B-1
Sheet 1 of 1

Date(s) Drilled 05-20-2014	Logged By AHM	Checked By FC
Drilling Method HSA	Drill Bit Size/Type 8-inch	Total Depth of Borehole 51 feet bgs
Drill Rig Type CME75	Drilling Contractor Jet Drilling	Approximate Surface Elevation 830 ft. above msl
Groundwater Level and Date Measured Not encountered	Sampling Method(s) Bulk, Modified California, SPT	Hammer Data 140 lbs. dropped 30 inches, automatic hammer, Efficiency 75%
Borehole Backfill Cuttings and tamped	Location Lanzit Bridge west abutment south side of road: Latitude: 34.560991 Longitude: -115.594679	

L:\02 - PROJECTS\2014 Projects\cSB 14-01E (4633-0001) Bridge Replacement--Manix, Dola, Lanzit\03 Field & Lab\Boring_Logs\Dola-Lanzit\Boring_Logs.bgd[50-55 with 2 lab T1_Geo.plt]

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, # blows	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
830	0		SK-1		SP	[EMBANKMENT FILL] (af)				Hand augered to 5 feet Direct Shear
			R-1				Poorly graded SAND with gravel, brown (10 YR 4/3), dry			
825	5		R-2A SPT-2	13-16-20	SM	[NATIVE] Younger Alluvium (Qy)		1.1	115	
			R-3	20-21-30			Silty SAND with gravel, light brownish gray (10YR 6/2), dry, dense			
820	10		R-4A SPT 4	14-18-19			... (8.5 ft) medium dense ... (10 ft) dense	3.4	106	Direct Shear
			R-5	20-31-40	SP		Poorly graded SAND, brown (10YR 5/3), dry, dense			
815	15		SPT-6	12-19-23	SM		Silty SAND, brown (10YR 5/3), dry, dense			
			R-7	15-25-39	SP		Poorly graded SAND, brown (10YR 4/3), dry to damp, dense			
810	20		SPT 8	12-20-21	SM		Silty SAND, light brownish gray (10 YR 6/12), dry, dense			
			R-9	18-29-40			... (25 ft) as above			
805	25									
800	30		SPT 10	17-19-18			... (30 ft) brown (10YR 4/3), damp, dense			
					SP		Poorly graded SAND, brown, dry to damp, very dense, trace of gravel			
795	35		R-11	12-32-50						
							... (40 ft) trace of cobbles			
790	40		SPT 12	12-30-29						
			R-13	18-30-42			... (45 ft) as above			
785	45									
780	50		SPT 14	20-20-29			... (50 ft) as above			
							Bottom of boring at 51.5 feet below ground surface			
775	55									

Project: **San Bernardino County**
 Project Location: **Lanzit Bridge, Route 66**
 Project Number: **cSB 14-01**

Log of Boring B-2
Sheet 1 of 1

Date(s) Drilled 05-20-2014	Logged By AHM	Checked By FC
Drilling Method HSA	Drill Bit Size/Type 8-inch	Total Depth of Borehole 51.5 feet bgs
Drill Rig Type CME75	Drilling Contractor Jet Drilling	Approximate Surface Elevation 829.5 ft. above msl
Groundwater Level and Date Measured Not encountered	Sampling Method(s) Bulk, Modified California, SPT	Hammer Data 140 lbs. dropped 30 inches, automatic hammer, Efficiency 75%
Borehole Backfill Cuttings and tamped	Location Lanzit Bridge east abutment south side of road: Latitude 34.561001 Longitude: -115.593969	

L:\02 - PROJECTS\2014 Projects\cSB 14-01E (4633-0001) Bridge Replacement--Manix, Dola, Lanzit\03 Field & Lab\Boring_Logs\Dola-Lanzit\Boring_Logs.bgd\50-55 with 2 lab T1_Geo.plt

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, # blows	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
829.5	0		SK-1		SP	[EMBANKMENT FILL] (af)	Poorly graded SAND, light yellowish brown (10 YR 6/4), dry, trace of gravel			Hand augered to 5 feet
824.5	5		R-2	12-16-20			... (5 ft) damp, medium dense	0.9	115	G=15%, S=76%, F=9%
			SPT-3	11-12-15			... (7 ft) dry			
819.5	10		R-4	18-23-40	SW-SM	[NATIVE] Younger Alluvium (Qy)	Well graded SAND with Silt, light yellow brown (10YR 6/4), dry to damp, dense, trace of gravel up to 2 inches	1.8	121	
			SPT-5	14-15-21	SM		Silty SAND, light. yellow brown (10 YR 6/4), damp, medium dense			
814.5	15		R-6	19-25-26	SP		Poorly graded SAND with gravel, very pale brown (10YR 7/3), damp, dense, coarse grained sand, trace of gravel up to 1 inch	2.3	107	
			SPT-7	16-18-21	SW-SM		Well graded SAND with Silt and Gravel, brown (10 YR 3/3), damp, dense			
809.5	20		R-8	17-31-21			... (20.5 ft) as above	1.9	115	G=19%, S=75%, F=6%
804.5	25		SPT-9	15-21-20	SM		Silty SAND with Gravel, brown (20 YR 5/3), damp, dense, gravel up to 1/2 inch			
799.5	30		R-10	21-23-25	SW-SM		Well graded SAND with Silt, brown (20YR 5/3), damp, very dense	0.9	115	Direct Shear, G=2%, S=89%, F=9%
794.5	35		SPT-11	18-23-25	SP		Poorly graded SAND, brown (10 YR 5/3), dry to damp, dense, trace of pea sized gravel			
789.5	40		R-12	20-35-50			... (40 ft) as above	1.4	117	Direct Shear
784.5	45		SPT-13	15-20-21	SM		Silty SAND, brown (10 YR 5/3), damp, dense			
779.5	50		R-14	29-38-50/2'	SP		Poorly graded SAND, brown (10 YR 5/3), damp, very dense, coarse sand, trace of gravel and cobble fragments	2.6	113	
							Bottom of boring at 51.5 feet below ground surface			
774.5	55									

Project: **San Bernardino County**
 Project Location: **Lanzit Bridge, Route 66**
 Project Number: **cSB 14-01**

Log of Boring B-3
Sheet 1 of 1

Date(s) Drilled 03-20-2015	Logged By AHM	Checked By FC
Drilling Method HSA	Drill Bit Size/Type 8-inch	Total Depth of Borehole 51 feet bgs
Drill Rig Type CME75	Drilling Contractor Jet Drilling	Approximate Surface Elevation 824 ft. above msl
Groundwater Level and Date Measured Not encountered	Sampling Method(s) Bulk, Grab, Modified California, SPT	Hammer Data 140 lbs. dropped 30 inches, automatic hammer, Efficiency 75%
Borehole Backfill Cuttings and tamped	Location South side of road in wash: Latitude: 34.56096 Longitude: -115.59406	

L:\02 - PROJECTS\2014 Projects\cSB 14-01E (4633-0001) Bridge Replacement--Manix, Dola, Lanzit\03 Field & Lab\Boring_Logs\Dola-Lanzit\Boring_Logs.bgd[50-55 with 2 lab T1_Geo.pl]

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, # blows	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
824	0		R-1	6-6-5	SW		[NATIVE] Active Alluvium (Qa) Well graded SAND with Gravel, pale brown (10YR 6/3), damp, loose	5.4	104	G=14%, S=81%, F=4%
		SK-2 R-3		16-14-13	SP-SM		[NATIVE] Younger alluvium (Qy) Poorly graded SAND with Silt and Gravel, light yellowish brown (10YR 6/4), damp, loose	3.1	112	G=20%, S=75%, F=5%
819	5		R-4	4-5-5			... (4 ft) as above			
		SPT-5		12-12-18	SW-SM		Well graded SAND with Silt, Gravel and Cobbles, brown (10YR 5/3), dry to damp, dense, cobble zone between 6 and 10 feet			G=37%, S=57%, F=6%
814	10		R-6	10-15-21			.. (10 ft) brown (10YR 5/3), dry to damp, medium dense, no cobbles	2.5	121	Direct Shear G=6%, S=84%, F=10%
		SPT-7		10-11-15			... (15 ft) pale brown (10YR 6/3), damp, dense			Direct Shear
809	15		R-8	20-43-38			... (17.5 ft) as above, with gravel	3.5	120	Direct Shear
		SPT-9		8-11-20			Well graded SAND, pale brown (10YR 6/3), damp, medium dense			
804	20		R-10	16-20-31	SW		Well graded SAND, pale brown (10YR 6/3), damp, medium dense			
		SPT-11		10-11-14			Poorly graded SAND with Silt and Gravel, light yellowish brown (10YR 6/4), damp, medium dense	3.4	109	Direct Shear
799	25		R-12	17-22-30	SP-SM		Silty SAND, light yellowish brown (10YR 6/4), dry to damp, dense			
		SPT-13		12-14-26			... (30 ft) trace of cobbles, very dense			
794	30		SPT-14	11-18-25	SM		... (40 ft) medium dense			
789	35		SPT-15	17-14-15			Poorly graded SAND, brown (10YR 5/3), dry to damp, very dense			
784	40		SPT-16	25-24-37	SP		Bottom of boring at 51 feet below ground surface			
779	45		GB-17							
774	50		SPT-18	40-50/6"						
769	55									

Project: **San Bernardino County**
 Project Location: **Lanzit Bridge, Route 66**
 Project Number: **cSB 14-01**

Key to Log of Boring
Sheet 1 of 1

Elevation (feet)	Depth (feet)	Sample Type	Sample Number	Sampling Resistance, # blows	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS AND OTHER TESTS
1	2	3	4	5	6	7	8	9	10	11

COLUMN DESCRIPTIONS








- 1** Elevation (feet): Elevation (MSL, feet).
- 2** Depth (feet): Depth in feet below the ground surface.
- 3** Sample Type: Type of soil sample collected at the depth interval shown.
- 4** Sample Number: Sample identification number.
- 5** Sampling Resistance, # blows: Number of blows to advance driven sampler one foot (or distance shown) beyond seating interval using the hammer identified on the boring log.
- 6** USCS Symbol: USCS symbol of the subsurface material.
- 7** Graphic Log: Graphic depiction of the subsurface material encountered.
- 8** MATERIAL DESCRIPTION: Description of material encountered. May include consistency, moisture, color, and other descriptive text.
- 9** Water Content, %: Water content of the soil sample, expressed as percentage of dry weight of sample.
- 10** Dry Unit Weight, pcf: Dry weight per unit volume of soil sample measured in laboratory, in pounds per cubic foot.
- 11** REMARKS AND OTHER TESTS: Comments and observations regarding drilling or sampling made by driller or field personnel.

FIELD AND LABORATORY TEST ABBREVIATIONS










MATERIAL GRAPHIC SYMBOLS

-  Silty SAND (SM)
-  Poorly graded SAND (SP)
-  Poorly graded SAND with Silt (SP-SM)
-  Well graded SAND (SW)
-  Well graded SAND with Silt (SW-SM)

TYPICAL SAMPLER GRAPHIC SYMBOLS

-  Auger sampler
-  Bulk Sample
-  Bulk and Ring
-  Bulk sample
-  3-inch-OD California w/ brass rings
-  CME Sampler
-  Grab Sample

OTHER GRAPHIC SYMBOLS

-  2.5-inch-OD Modified California w/ brass liners
-  Pitcher Sample
-  2-inch-OD unlined split spoon (SPT)
-  Shelby Tube (Thin-walled, fixed head)
-  Water level (at time of drilling, ATD)
-  Water level (after waiting)
-  Minor change in material properties within a stratum
-  Inferred/gradational contact between strata
-  Queried contact between strata

GENERAL NOTES

L:\02 - PROJECTS\2014 Projects\cSB 14-01E (4633-0001) Bridge Replacement-Mamix, Dola, Lanzit\03 Field & Lab\Boring Logs\Dola-Lanzit Boring Logs\bgl50-55 with 2 lab T1_Geo.plt

Figure A-1

Appendix B
Results of Laboratory Testing

NOT FOR BID

MOISTURE CONTENT AND DENSITY

ASTM D2937

Job Name: Lanzit Bridge
Job Number: CSB-14-01
Tested By: MG

Date Sampled: 3/20/2015
Date Completed: 4/6/2015
Note: Page 1

Boring / Test Pit / Trench		B-1	B-2	B-2	B-2	B-2	B-2	B-3	B-3	
Sample Number		R-2A	R-2	R-4	R-6	R-8	R-14	R-3	R-4	
Sample Depth	<i>feet</i>	5-5.5	6-6.5	11-11.5	16-16.5	21-21.5	51-51.5	3-3.5	5-5.5	
USCS Soil Description		Reddish Yellow Fill (SP)	Reddish Yellow Native (SP)	Reddish Yellow Native (SP)	Reddish Yellow Native (SP)	Reddish Yellow Native (SP-SM)	Reddish Yellow Native (SP)	Reddish Yellow Native (SM)	Reddish Yellow Native (SM)	
Number of Rings		6	6	6	6	6	6	6	6	
Total Weight Rings + Soil	<i>grams</i>	1101.70	1095.10	1148.00	1054.00	1099.80	1098.50	1055.10	1094.40	
* Volume of Rings	<i>ft³</i>	0.0159	0.0159	0.0159	0.0159	0.0159	0.0159	0.0159	0.0159	
* Weight of Rings	<i>grams</i>	260.58	260.58	260.58	260.58	260.58	260.58	260.58	260.58	
* Weight of Soil	<i>grams</i>	841.12	834.52	887.42	793.42	839.22	837.92	794.52	833.82	
* Wet Density	<i>pcf</i>	116.30	115.39	122.70	109.70	116.04	115.86	109.86	115.29	
Container ID		K3	K8	P16	P35	P24	P13	K11	K9	
Tare	<i>grams</i>	14.3	14.7	9.3	9.2	8.8	9.1	14.5	14.3	
Wet Soil + Tare	<i>grams</i>	392.6	440.1	444.3	310.7	437.1	319.6	242.7	305.6	
Dry Soil + Tare	<i>grams</i>	388.4	436.2	436.5	303.9	429.2	311.6	231.1	296.8	
* Weight of Water	<i>grams</i>	4.2	3.9	7.8	6.8	7.9	8	11.6	8.8	

* Dry Density	<i>pcf</i>	115.0	114.3	120.5	107.2	113.9	112.9	104.3	111.8	
* Moisture Content	<i>%</i>	1.1	0.9	1.8	2.3	1.9	2.6	5.4	3.1	
Assumed/Measured Gs		2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	
* Saturation	<i>%</i>	6.8	5.5	13.0	11.3	11.0	15.1	24.2	17.2	



MOISTURE CONTENT AND DRY DENSITY OF RING SAMPLES

Client: Tetra Tech
Project Name: Lanzit Bridge, Route 66 (San Bernardino County)
Project No.: cSB 14-01

HAI Project No.: TRT-15-010
Performed by: SE/KL
Checked by: NB
Date: 4/1/2015

Boring No.		B-2	B-2	B-3	B-3	B-3
Sample No.		R-10	R-12	R-8	R-10	R-12
Depth (ft)		31-31.5	41-41.5	13.5-14	18.5-19	26-26.5
Total wt of rings and soil	gr	914.09	931.74	770.73	773.56	715.39
Height of sample	in	5.00	5.00	4.00	4.00	4.00
Diameter of sample	in	2.42	2.42	2.42	2.42	2.42
Volume of sample	cu.ft	0.0133	0.0133	0.0106	0.0106	0.0106
Weight of rings	gr	215.56	215.56	172.45	172.45	172.45
Weight of soil	lbs.	1.540	1.579	1.319	1.325	1.197
Wet Density	pcf	115.7	118.6	123.9	124.5	112.4
Container No.		44	42	30	29	32
Weight of cont.+ wet soil	gr	108.39	114.53	121.76	106.52	92.70
Weight of cont.+ dry soil	gr	107.51	113.06	118.86	103.06	89.81
Weight of container	gr	4.99	4.99	5.00	4.95	4.94
Weight of water	gr	0.88	1.47	2.90	3.46	2.89
Weight of dry soil	gr	102.52	108.07	113.86	98.11	84.87
Moisture Content	%	0.9	1.4	2.5	3.5	3.4
Dry Density	pcf	114.7	117.0	120.8	120.2	108.7



MOISTURE CONTENT AND DRY DENSITY OF RING SAMPLES

Client: Tetra Tech
Project Name: Lanzit Bridge, Route 66 (San Bernardino County)
Project No.: cSB 14-01

HAI Project No.: TRT-15-012
Performed by: SE/KL
Checked by: NB
Date: 4/16/2015

Boring No.	B-1
Sample No.	R-4 A
Depth (ft)	10-10.5
Total wt of rings and soil	gr 886.05
Height of sample	in 5.00
Diameter of sample	in 2.42
Volume of sample	cu.ft 0.0133
Weight of rings	gr 223.60
Weight of soil	lbs. 1.460
Wet Density	pcf 109.7
Container No.	32
Weight of cont. + wet soil	gr 96.46
Weight of cont. + dry soil	gr 93.46
Weight of container	gr 4.96
Weight of water	gr 3.00
Weight of dry soil	gr 88.50
Moisture Content	% 3.4
Dry Density	pcf 106.1



GRAIN SIZE DISTRIBUTION ANALYSIS

ASTM C136/C117/D422

Job Name: Lanzit Bridge

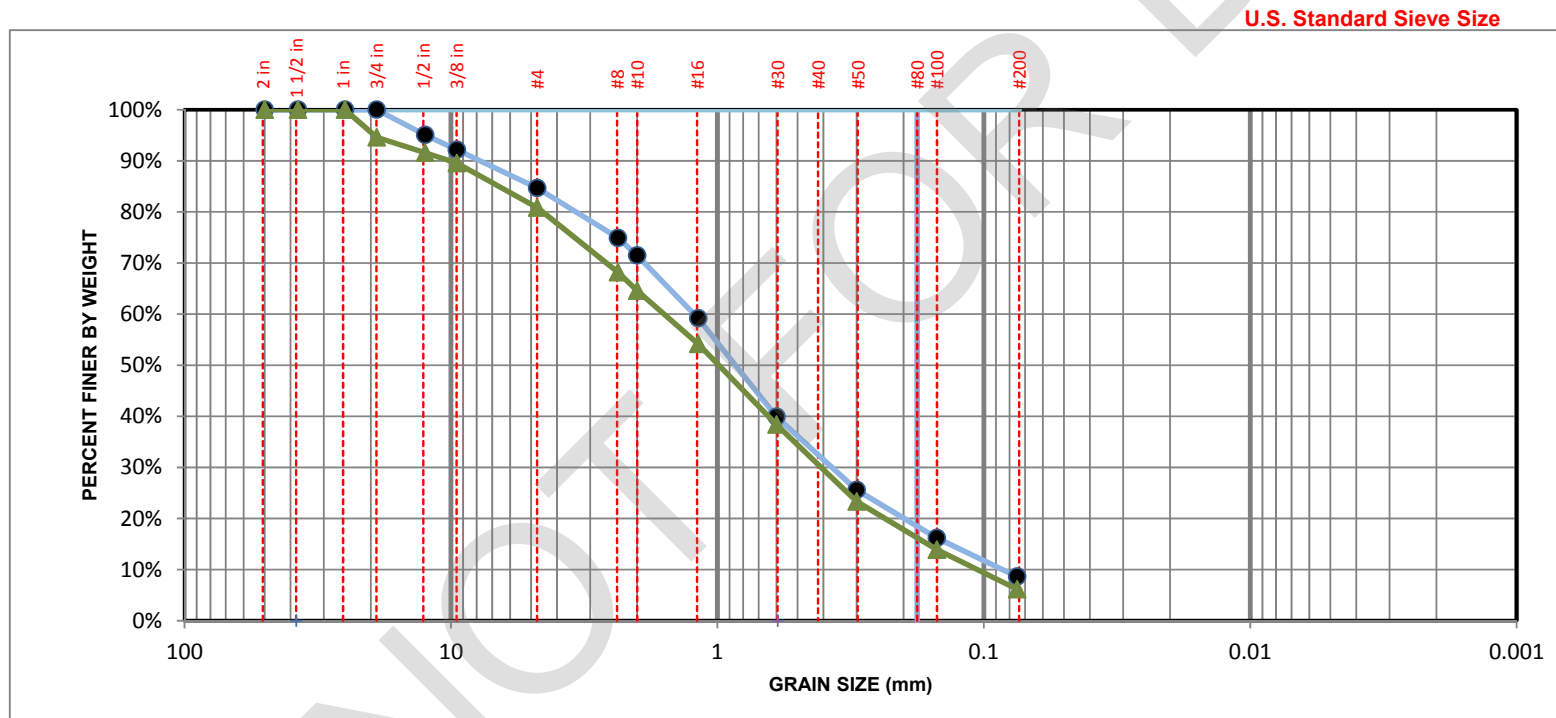
Tested By : MG

Job Number: CSB-14-01

Date Completed: April 7, 2015

Address:

Date Sampled: March 20, 2015



Symbol	Boring No.	Sample #	Depth (feet)	LL	PI	USCS	Gravel	Sand	Fines	2 μ
●	B-2	R-2	6-6.5	N/A	N/A	SW-SM	15%	76%	9%	N/A
▲	B-2	R-8	21-21.5	N/A	N/A	SW-SM	19%	75%	6%	N/A



GRAIN SIZE DISTRIBUTION ANALYSIS

ASTM C136/C117/D422

Job Name: Lanzit Bridge

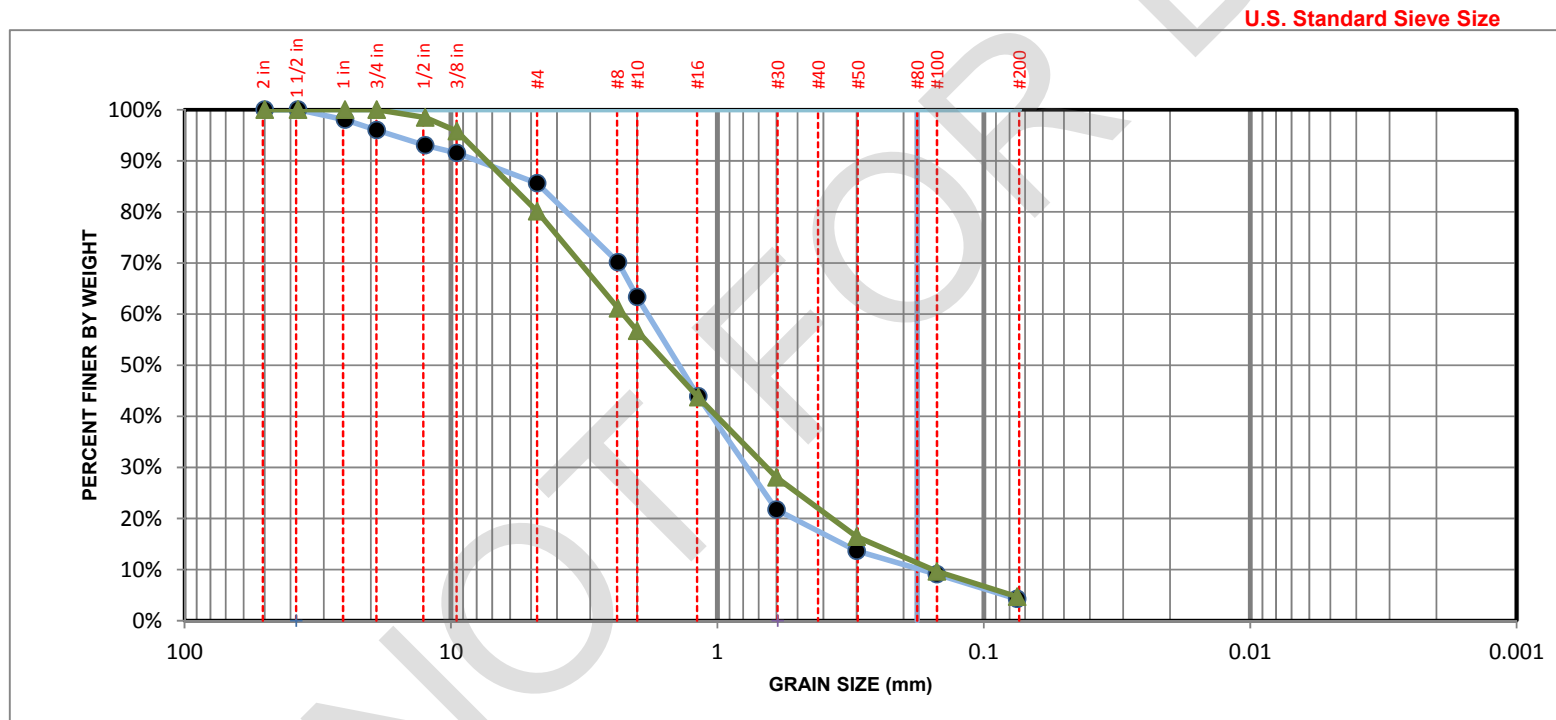
Tested By : MG

Job Number: CSB-14-01

Date Completed: April 7, 2015

Address:

Date Sampled: March 20, 2015



Symbol	Boring No.	Sample #	Depth (feet)	LL	PI	USCS	Gravel	Sand	Fines	2 μ
●	B-3	SK-2	0-6	N/A	N/A	SW	14%	81%	4%	N/A
▲	B-3	R-4	5-5.5	N/A	N/A	SW	20%	75%	5%	N/A



GRAIN SIZE DISTRIBUTION ANALYSIS

ASTM C136/C117/D422

Job Name: Lanzit Bridge

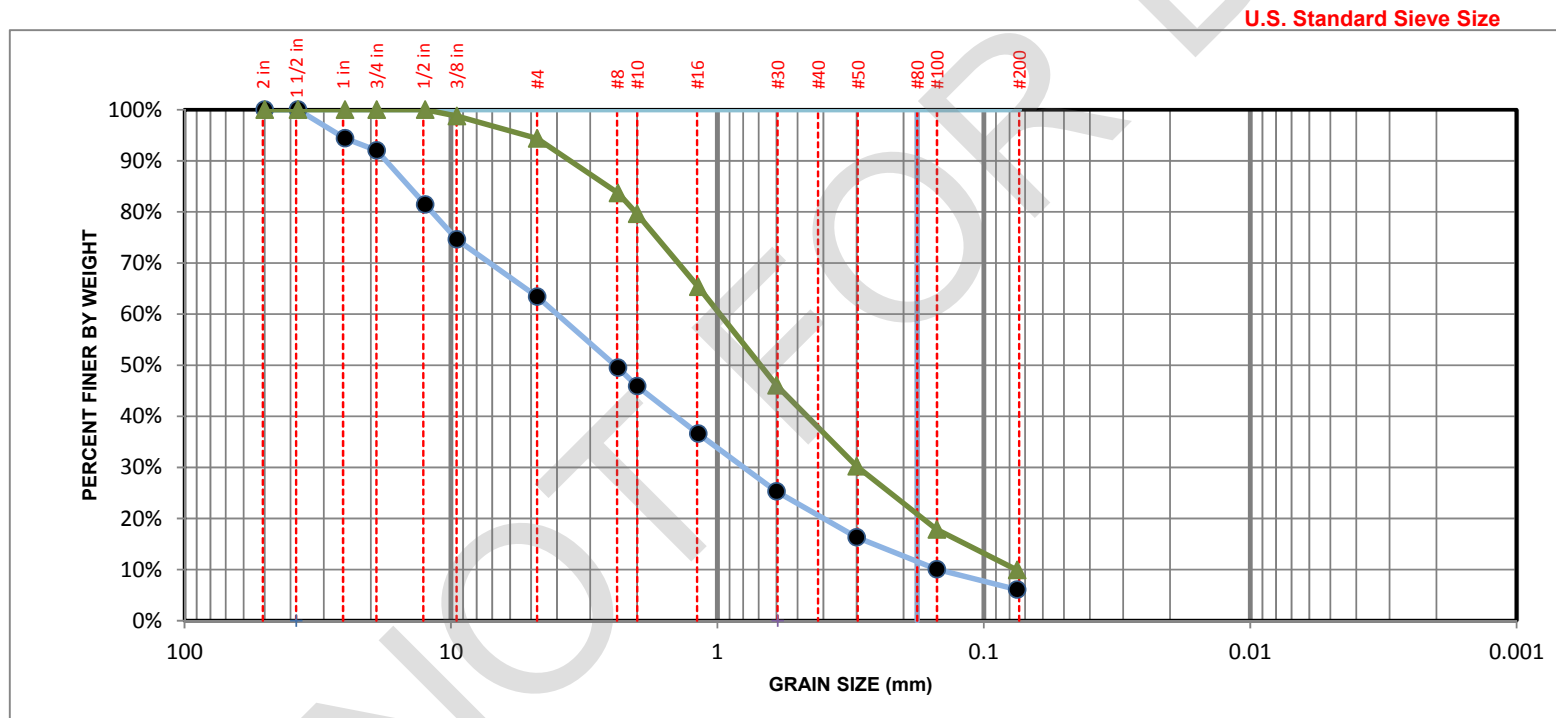
Tested By : MG

Job Number: CSB-14-01

Date Completed: April 7, 2015

Address:

Date Sampled: March 20, 2015



Symbol	Boring No.	Sample #	Depth (feet)	LL	PI	USCS	Gravel	Sand	Fines	2 μ
●	B-3	SPT-7	10-11.5	N/A	N/A	SW-SM	37%	57%	6%	N/A
▲	B-3	SPT-9	15-16.5	N/A	N/A	SW-SM	6%	84%	10%	N/A

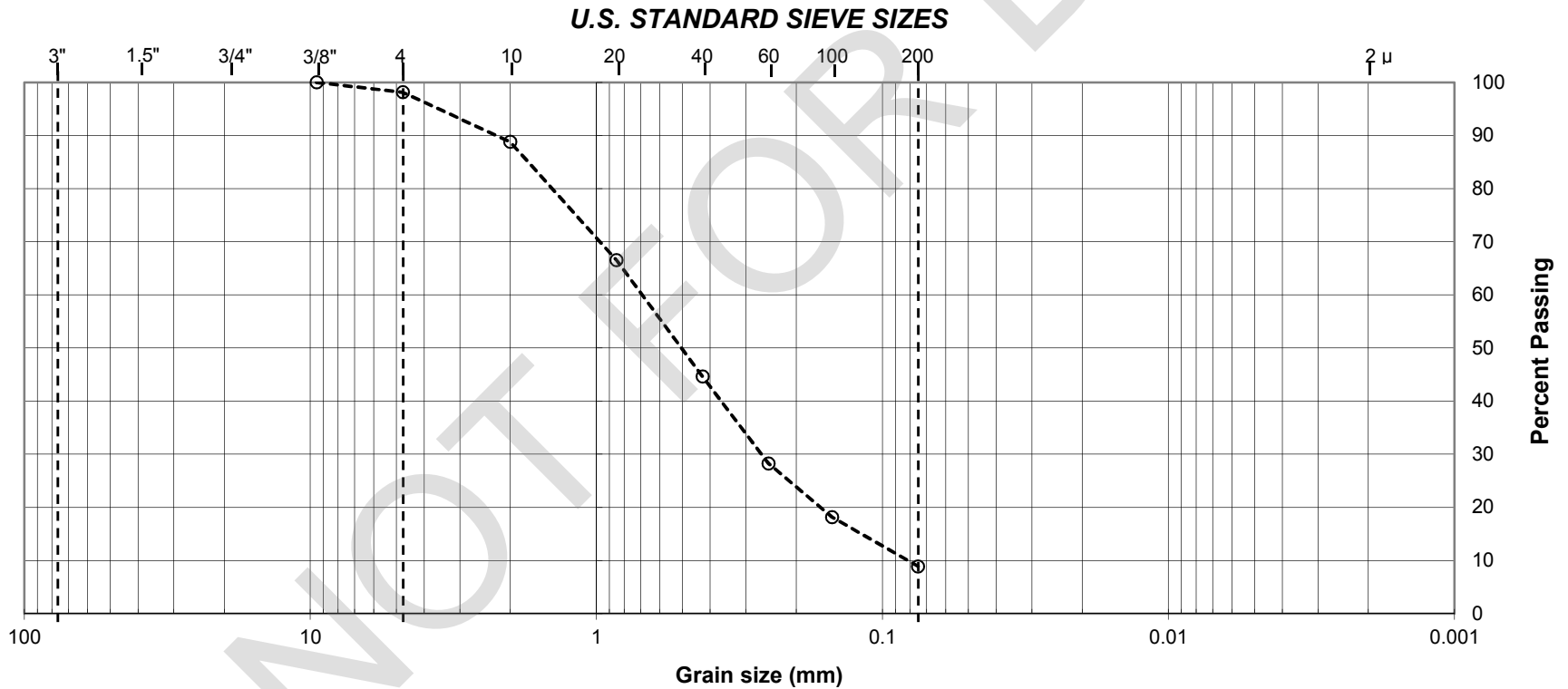


PARTICLE-SIZE ANALYSIS OF SOILS (ASTM D422)

Client: Tetra Tech
Project Name: Lanzit Bridge, Route 66 (San Bernardino County)
Project No.: cSB 14-01

HAI Project No.: TRT-15-010
Tested by: KL/SE
Checked by: NB
Date: 4/6/2015

COBBLES	GRAVEL		SAND			SILT AND CLAY
	Coarse	Fine	Coarse	Medium	Fine	



Boring No.	Sample No.	Symbol	USCS	% Gravel	% Sand	% Fines
B-2	R-10 @ 31-31.5'	○	Light Brown, Well Graded Sand with Silt (SW-SM)	1.9	89.3	8.9



DIRECT SHEAR TEST (ASTM D3080)

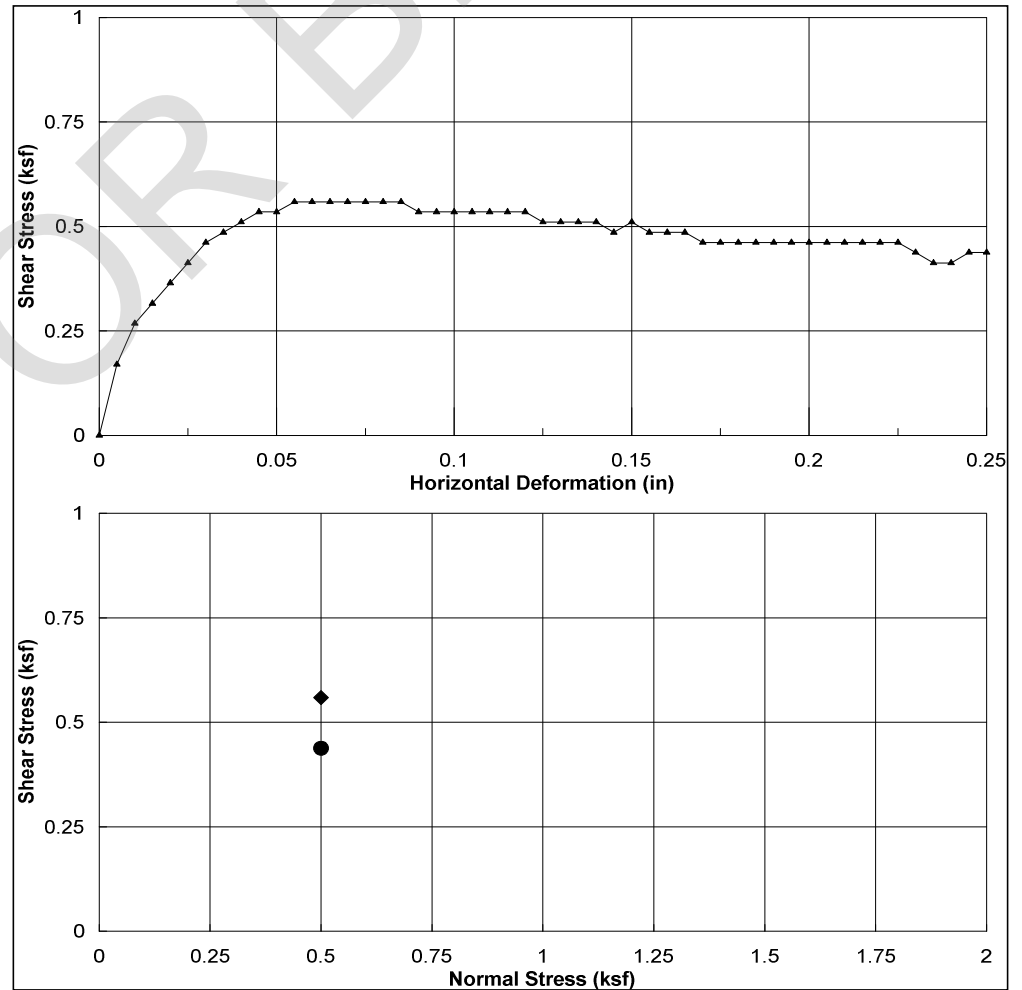
HAI Pr No.: TRT-15-012
 Tested by: KL/SE
 Checked by: NB
 Date: 4/16/15

Client: **Tetra Tech**
 Project Name: **Lanzit Bridge, Route 66 (San Bernardino County)**
 Project Number: **cSB 14-01**
 Boring No.: **B-1**
 Sample No.: **R-1**
 Depth (ft): **2.5-3'**
 Soil description: **Light Brown, Well Graded Sand with Silt and Gravel (SW-SM)**
 Sample type: **Undisturbed Ring**
 Type of test: **Consolidated, Drained**

	▲
Normal Stress (ksf)	0.5
Deformation Rate (in/min)	0.0025

Peak Shear Stress (ksf)	◆	0.56
Shear stress @ end of test (ksf)	●	0.44

Initial height of sample (in)	1
Height of sample before shear (in)	1.00
Diameter of sample (in)	2.42
Initial Moisture Content (%)	3.1
Final Moisture Content (%)	12.6
Dry Density (pcf)	114.5
Final Saturation (%)	72.3





DIRECT SHEAR TEST (ASTM D3080)

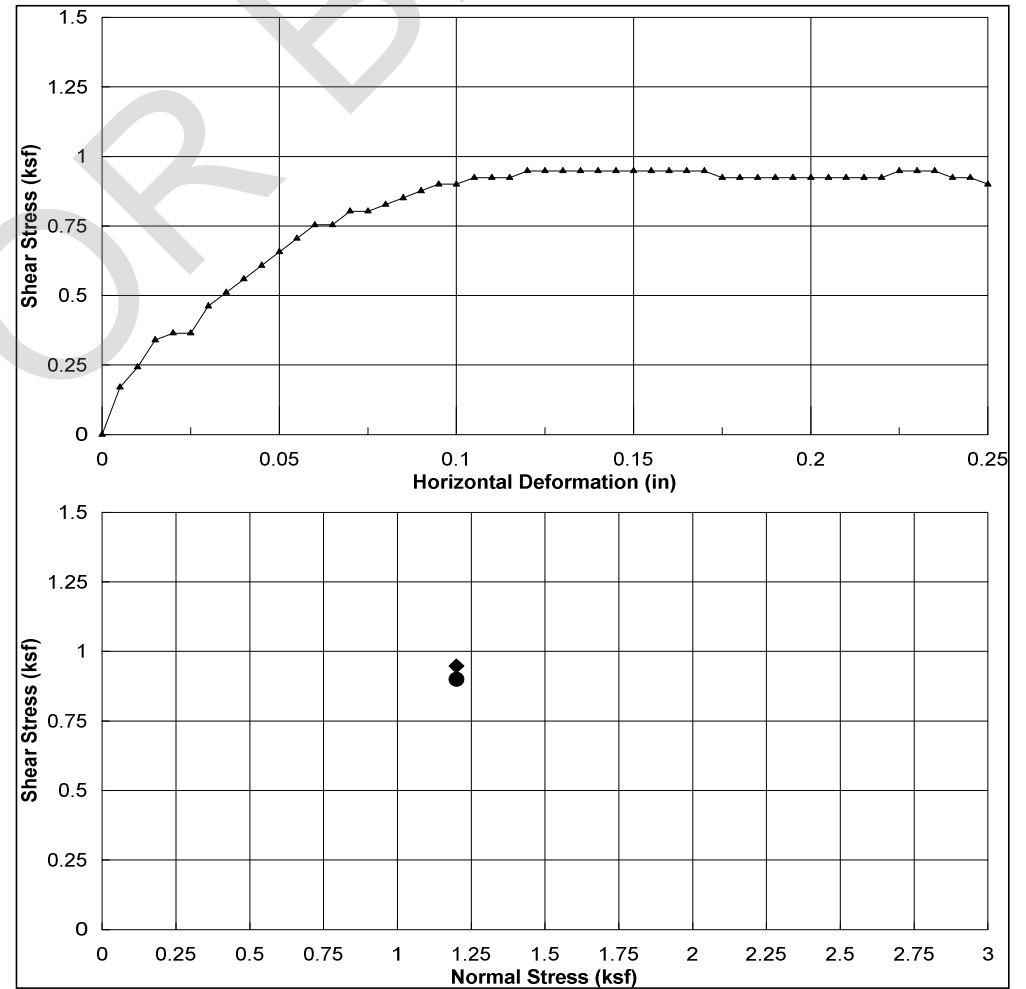
HAI Pr No.: TRT-15-012
 Tested by: KL/SE
 Checked by: NB
 Date: 4/16/15

Client: **Tetra Tech**
 Project Name: **Lanzit Bridge, Route 66 (San Bernardino County)**
 Project Number: **cSB 14-01**
 Boring No.: **B-1**
 Sample No.: **R-4A**
 Depth (ft): **10-10.5**
 Soil description: **Brown, Well Graded Sand with Silt (SW-SM)**
 Sample type: **Undisturbed Ring**
 Type of test: **Consolidated, Drained**

	▲
Normal Stress (ksf)	1.2
Deformation Rate (in/min)	0.0025

Peak Shear Stress (ksf)	◆	0.95
Shear stress @ end of test (ksf)	●	0.90

Initial height of sample (in)	1
Height of sample before shear (in)	0.9756
Diameter of sample (in)	2.42
Initial Moisture Content (%)	3.4
Final Moisture Content (%)	15.6
Dry Density (pcf)	105.3
Final Saturation (%)	74.9





DIRECT SHEAR TEST (ASTM D3080)

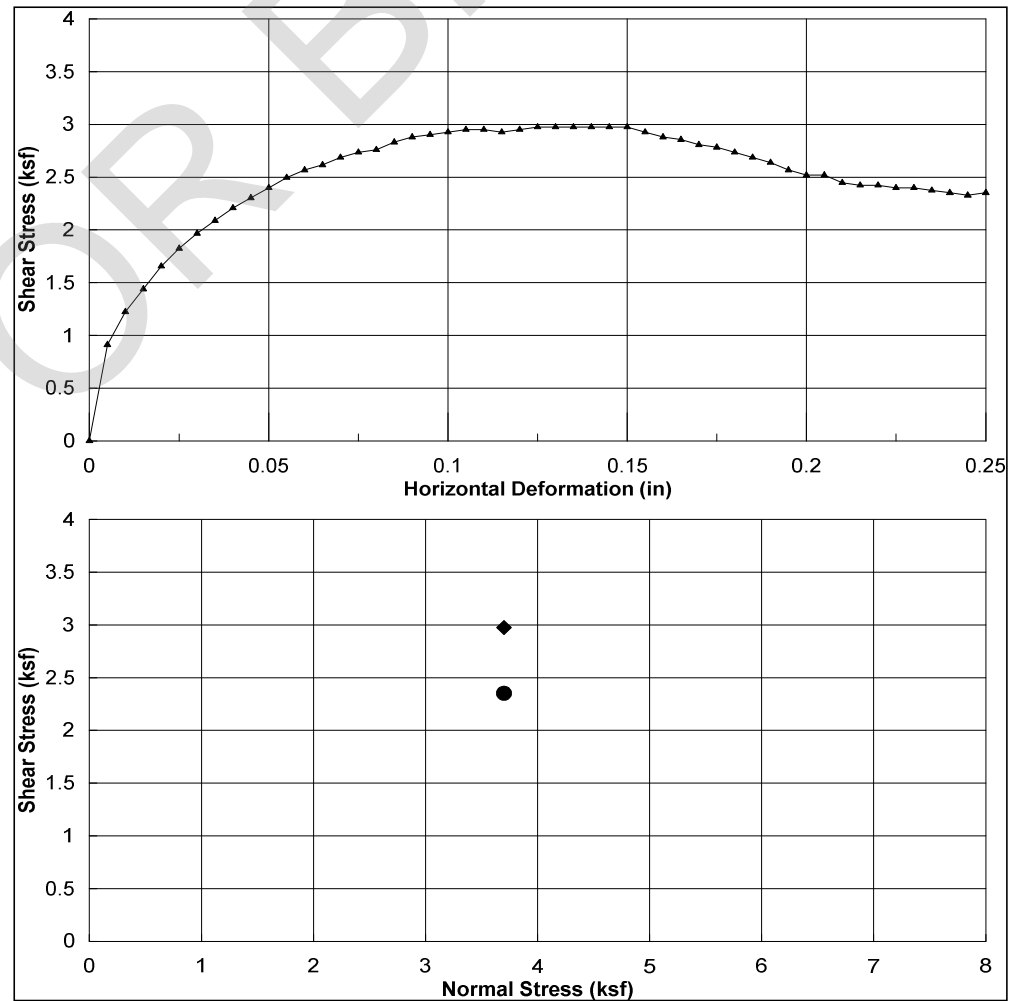
HAI Pr No.: TRT-15-010
 Tested by: KL/SE
 Checked by: NB
 Date: 4/1/2015

Client: **Tetra Tech**
 Project Name: **Lanzit Bridge, Route 66 (San Bernardino County)**
 Project Number: **cSB 14-01**
 Boring No.: **B-2**
 Sample No.: **R-10**
 Depth (ft): **31-31.5'**
 Soil description: **Light Brown, Well Graded Sand with Silt (SW-SM)**
 Sample type: **Undisturbed Ring**
 Type of test: **Consolidated, Drained**

	▲
Normal Stress (ksf)	3.7
Deformation Rate (in/min)	0.0025

Peak Shear Stress (ksf)	◆	2.98
Shear stress @ end of test (ksf)	●	2.35

Initial height of sample (in)	1
Height of sample before shear (in)	0.9617
Diameter of sample (in)	2.42
Initial Moisture Content (%)	0.9
Final Moisture Content (%)	14.5
Dry Density (pcf)	114.6
Final Saturation (%)	94.7





DIRECT SHEAR TEST (ASTM D3080)

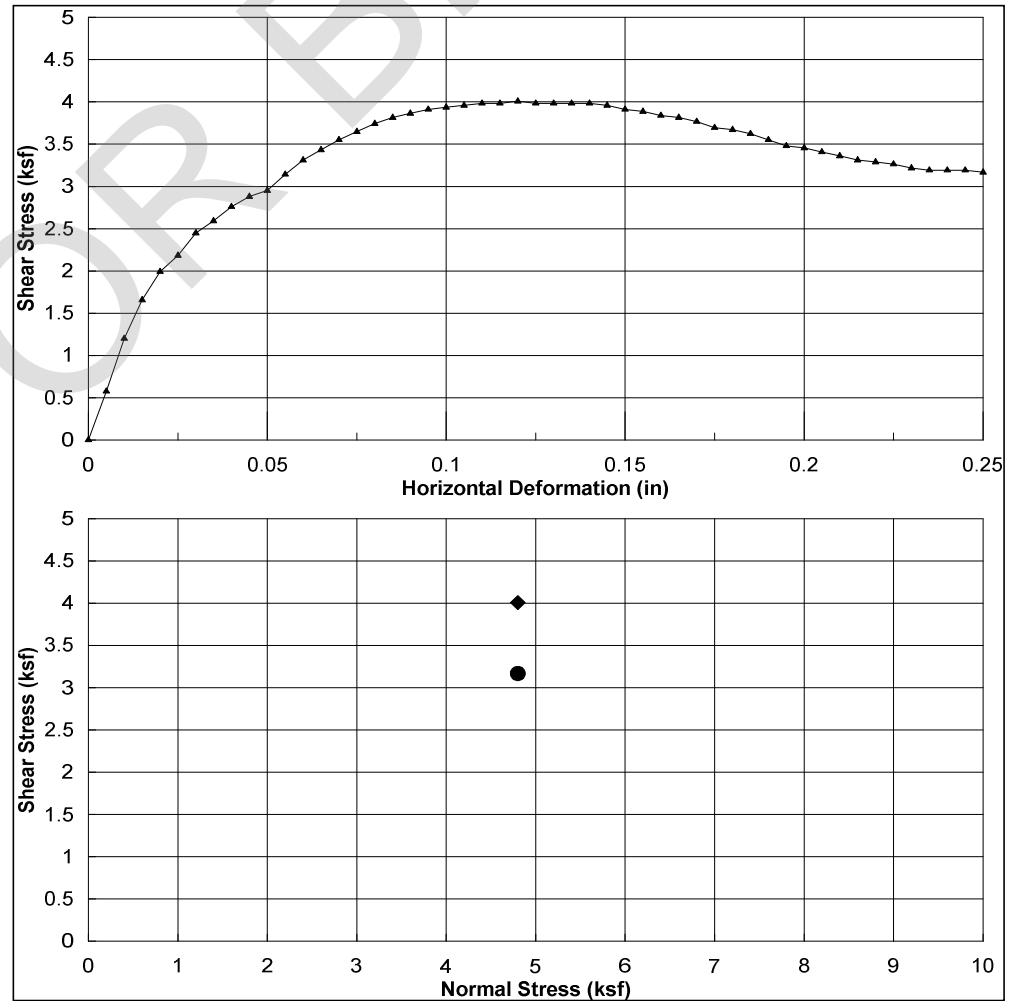
HAI Pr No.: TRT-15-010
 Tested by: KL/SE
 Checked by: NB
 Date: 4/1/2015

Client: **Tetra Tech**
 Project Name: **Lanzit Bridge, Route 66 (San Bernardino County)**
 Project Number: **cSB 14-01**
 Boring No.: **B-2**
 Sample No.: **R-12**
 Depth (ft): **41-41.5'**
 Soil description: **Light Brown, Poorly Graded Sand with Silt (SP-SM)**
 Sample type: **Undisturbed Ring**
 Type of test: **Consolidated, Drained**

	▲
Normal Stress (ksf)	4.8
Deformation Rate (in/min)	0.0025

Peak Shear Stress (ksf)	◆	4.01
Shear stress @ end of test (ksf)	●	3.17

Initial height of sample (in)	1
Height of sample before shear (in)	0.9757
Diameter of sample (in)	2.42
Initial Moisture Content (%)	1.4
Final Moisture Content (%)	13.8
Dry Density (pcf)	116.8
Final Saturation (%)	91.6





DIRECT SHEAR TEST (ASTM D3080)

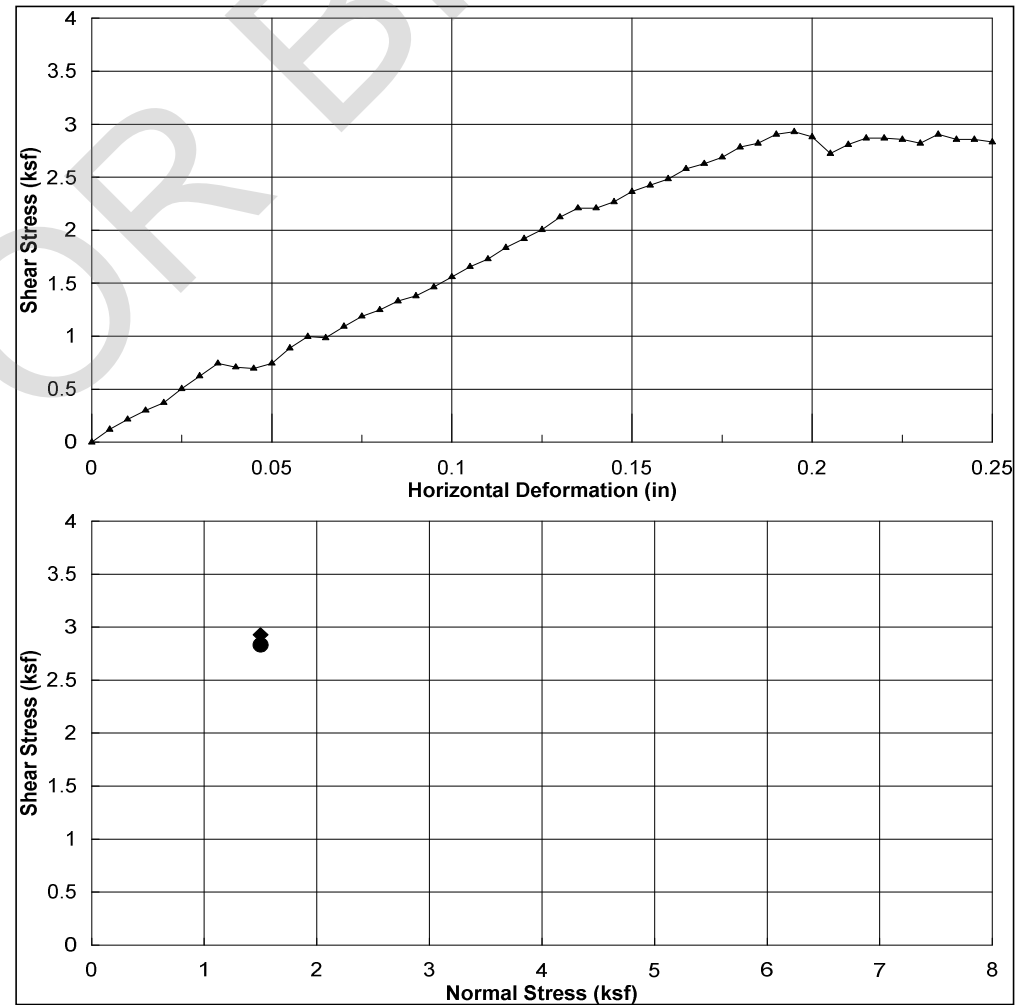
HAI Pr No.: TRT-15-010
 Tested by: KL/SE
 Checked by: NB
 Date: 4/1/2015

Client: **Tetra Tech**
 Project Name: **Lanzit Bridge, Route 66 (San Bernardino County)**
 Project Number: **cSB 14-01**
 Boring No.: **B-3**
 Sample No.: **R-8**
 Depth (ft): **13.5-14**
 Soil description: **Reddish Brown, Poorly Graded Sand with Silt and Gravel (SP-SM)**
 Sample type: **Undisturbed Ring**
 Type of test: **Consolidated, Drained**

	▲
Normal Stress (ksf)	1.5
Deformation Rate (in/min)	0.0025

Peak Shear Stress (ksf)	◆	2.93
Shear stress @ end of test (ksf)	●	2.83

Initial height of sample (in)	1
Height of sample before shear (in)	0.9795
Diameter of sample (in)	2.42
Initial Moisture Content (%)	2.5
Final Moisture Content (%)	13.4
Dry Density (pcf)	120.0
Final Saturation (%)	96.8





DIRECT SHEAR TEST (ASTM D3080)

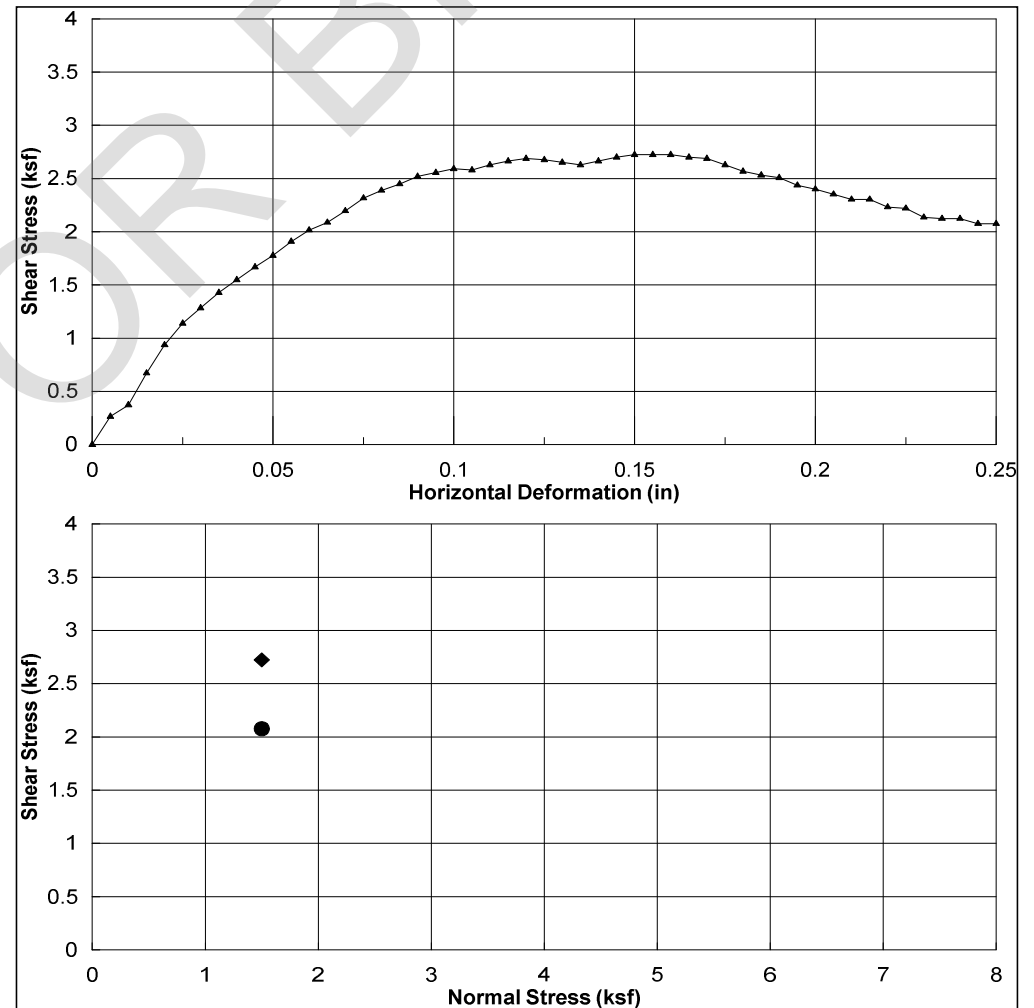
HAI Pr No.: TRT-15-010
 Tested by: KL/SE
 Checked by: NB
 Date: 4/1/2015

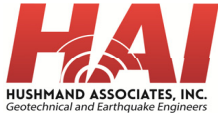
Client: **Tetra Tech**
 Project Name: **Lanzit Bridge, Route 66 (San Bernardino County)**
 Project Number: **cSB 14-01**
 Boring No.: **B-3**
 Sample No.: **R-10**
 Depth (ft): **18.5-19'**
 Soil description: **Reddish Brown, Poorly Graded Sand with Silt and Gravel (SP-SM)**
 Sample type: **Undisturbed Ring**
 Type of test: **Consolidated, Drained**

	▲
Normal Stress (ksf)	2.2
Deformation Rate (in/min)	0.0025

Peak Shear Stress (ksf)	◆	2.72
Shear stress @ end of test (ksf)	●	2.08

Initial height of sample (in)	1
Height of sample before shear (in)	0.9860
Diameter of sample (in)	2.42
Initial Moisture Content (%)	3.5
Final Moisture Content (%)	14.9
Dry Density (pcf)	119.7
Final Saturation (%)	99.0





DIRECT SHEAR TEST (ASTM D3080)

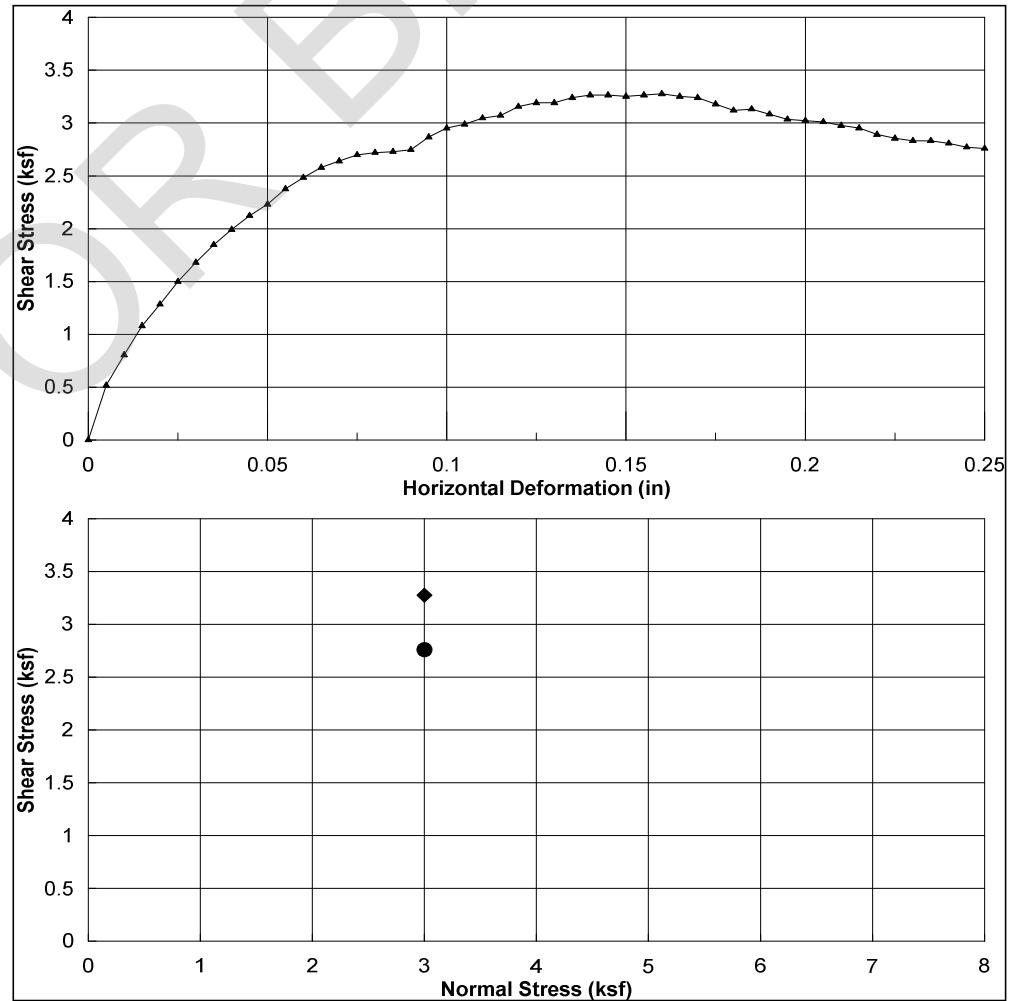
HAI Pr No.: TRT-15-010
 Tested by: KL/SE
 Checked by: NB
 Date: 4/1/2015

Client: **Tetra Tech**
 Project Name: **Lanzit Bridge, Route 66 (San Bernardino County)**
 Project Number: **cSB 14-01**
 Boring No.: **B-3**
 Sample No.: **R-12**
 Depth (ft): **26-26.5'**
 Soil description: **Reddish Brown, Poorly Graded Sand with Silt (SP-SM)**
 Sample type: **Undisturbed Ring**
 Type of test: **Consolidated, Drained**

	▲
Normal Stress (ksf)	3
Deformation Rate (in/min)	0.0025

Peak Shear Stress (ksf)	◆	3.28
Shear stress @ end of test (ksf)	●	2.76

Initial height of sample (in)	1
Height of sample before shear (in)	0.9672
Diameter of sample (in)	2.42
Initial Moisture Content (%)	3.4
Final Moisture Content (%)	19.0
Dry Density (pcf)	109.3
Final Saturation (%)	99.4



Appendix C

Dynamic Settlement Analyses

NOT FOR BID

SPT LIQUEFACTION SUSCEPTIBILITY AND EARTHQUAKE INDUCED SETTLEMENT
 You must input all fields highlighted in blue. Insert or delete rows only immediately above the red row.

Boring: **B-2** M 6.4 PGA 0.25 MSF 1.500

This spreadsheet is suitable only for evaluation of liquefaction of SANDS.
 If fines content greater than 50% is input, sensitivity of the fine-grained soils will be evaluated.

P_{atm} = 100 kPa
 = 2088.54 psf
 σ_{ref} = 2000 psf
 M_{base} = 7.5

Boring Data										Earthquake Loading			Derivation of $(N_1)_{60,cs}$						Soil Earthquake Resistance				Factor of Safety										
Depth to Layer Top	Depth to Layer Bottom	Groundwater present?	Layer Thickness	Depth to layer middle	SPT - N	Fines %	Dry Unit Wt	Moisture Content	Total Unit Wt	Total Stress	Pore Pressure	Pore Pressure	Effective Stress	Test for first groundwater	Cyclic Stress Ratio CSR	SPT Readings and Corrections			Cyclic Resistance Ratio CRR				Factor of Safety against Liquefaction										
feet	feet	yes / no	feet	meters		%	pcf	%	pcf	psf	psf	psf	psf	n/a	r_d	CSR	$CSR_{1.5}$	C_N	rod length	C_R	$(N_1)_{60}$	α	β	$(N_1)_{60,cs}$	K_v	$CRR_{SPT,CS}$	$CRR_{SPT,CS}$	$CRR_{SPT,CS,Kv}$	Total evaluated profile thickness		Profile thickness susceptible to liquefaction		
																	not interpreted				Interpreted Factor of Safety against liquefaction												
																	FS _{SPT,CS,Kv}				Liquefiable thickness for plotting only												
																	feet				feet												
0	5	no	5.0	2.5	0.8	22	3.0	116	3.0	119.5	299	0.0	0.0	299	0.996	0.162	0.108	2.000	1.7	0.75	54.3	0.000	1.000	54.3	1.000	no liq	no liq	no liq	no liq	no liq	55.00	0.00	5.00
5	10	no	5.0	7.5	2.3	27	3.0	116	3.0	119.5	896	0.0	0.0	896	0.985	0.160	0.107	1.527	3.2	0.75	50.8	0.000	1.000	50.8	1.000	no liq	no liq	no liq	no liq	no liq	55.00	0.00	5.00
10	15	no	5.0	12.5	3.8	36	7.0	116	3.0	119.5	1494	0.0	0.0	1494	0.974	0.158	0.105	1.183	4.7	0.85	59.5	0.120	1.009	60.1	1.000	no liq	no liq	no liq	no liq	no liq	55.00	0.00	5.00
15	20	no	5.0	17.5	5.3	31	5.0	116	3.0	119.5	2091	0.0	0.0	2091	0.963	0.156	0.104	0.999	6.2	0.95	48.4	0.000	1.000	48.4	0.995	no liq	no liq	no liq	no liq	no liq	55.00	0.00	5.00
20	25	no	5.0	22.5	6.9	31	7.0	116	3.0	119.5	2688	0.0	0.0	2688	0.950	0.154	0.103	0.881	7.8	0.95	42.7	0.120	1.009	43.2	0.952	no liq	no liq	no liq	no liq	no liq	55.00	0.00	5.00
25	30	no	5.0	27.5	8.4	41	20.0	116	3.0	119.5	3286	0.0	0.0	3286	0.932	0.151	0.101	0.797	9.3	0.95	51.1	3.615	1.079	58.7	0.914	no liq	no liq	no liq	no liq	no liq	55.00	0.00	5.00
30	35	no	5.0	32.5	9.9	36	7.0	116	3.0	119.5	3883	0.0	0.0	3883	0.907	0.147	0.098	0.733	10.8	1.00	43	0.120	1.009	43.9	0.880	no liq	no liq	no liq	no liq	no liq	55.00	0.00	5.00
35	40	no	5.0	37.5	11.4	48	3.0	116	3.0	119.5	4481	0.0	0.0	4481	0.872	0.142	0.094	0.683	12.3	1.00	54	0.000	1.000	53.9	0.850	no liq	no liq	no liq	no liq	no liq	55.00	0.00	5.00
40	45	no	5.0	42.5	13.0	51	3.0	116	3.0	119.5	5078	0.0	0.0	5078	0.828	0.135	0.090	0.641	13.9	1.00	54	0.000	1.000	53.8	0.823	no liq	no liq	no liq	no liq	no liq	55.00	0.00	5.00
45	50	no	5.0	47.5	14.5	41	3.0	116	3.0	119.5	5675	0.0	0.0	5675	0.778	0.126	0.084	0.607	15.4	1.00	41	0.000	1.000	40.9	0.798	no liq	no liq	no liq	no liq	no liq	55.00	0.00	5.00
50	55	no	5.0	52.5	16.0	50	3.0	116	3.0	119.5	6273	0.0	0.0	6273	0.728	0.118	0.079	0.577	16.9	1.00	47	0.000	1.000	47.4	0.776	no liq	no liq	no liq	no liq	no liq	55.00	0.00	5.00

EARTHQUAKE-INDUCED SETTLEMENT OF SATURATED SAND
 Earthquake-induced Settlement of Saturated Sand (fines < 50%)
 by Tokimatsu and Seed

Total liquefaction settlement: **0.00** inches

Fines % Correction	$(N_1)_{60,cs,slimnt}$	CSR _{1.5}	ϵ_v	Δz	$S_i = \epsilon_v / \Delta z_i$	S_{cumul}
			%	feet	in	inches
0.00	54.3	0.108	0.00	5.00	no GW	0.00
0.00	50.8	0.107	0.00	5.00	no GW	0.00
3.00	62.5	0.105	0.00	5.00	no GW	0.00
3.00	51.4	0.104	0.00	5.00	no GW	0.00
3.00	45.7	0.103	0.00	5.00	no GW	0.00
5.00	56.1	0.101	0.00	5.00	no GW	0.00
3.00	46.4	0.098	0.00	5.00	no GW	0.00
0.00	53.9	0.094	0.00	5.00	no GW	0.00
0.00	53.8	0.090	0.00	5.00	no GW	0.00
0.00	40.9	0.084	0.00	5.00	no GW	0.00
0.00	47.4	0.079	0.00	5.00	no GW	0.00

EARTHQUAKE-INDUCED SETTLEMENT OF DRY SAND
 Earthquake-induced Settlement of Dry Sand (fines < 50%)
 by Daniel Pradel

Total settlement of dry sand: **0.04** inches

K_v	σ_m	G_{max}	r_d	τ_{av}	a	b	γ	ϵ_{15}	ϵ_{Nc}	Δz	$S_i = \epsilon_v / \Delta z_i$	S_{cumul}
	psf	psf		psf						feet	in	in
0.50	199	1068274	0.999	49	0.128	25545	0.006%	0.002%	0.001%	5.00	0.00	0.00
0.50	597	1810488	0.994	145	0.136	13214	0.010%	0.003%	0.002%	5.00	0.00	0.00
0.50	996	2471876	0.985	239	0.143	9726	0.012%	0.003%	0.002%	5.00	0.00	0.01
0.50	1394	2720667	0.970	330	0.151	7948	0.015%	0.005%	0.004%	5.00	0.00	0.01
0.50	1792	2969552	0.952	416	0.159	6835	0.017%	0.007%	0.005%	5.00	0.01	0.02
0.50	2190	3637825	0.930	496	0.167	6060	0.016%	0.004%	0.003%	5.00	0.00	0.02
0.50	2589	3589136	0.905	571	0.174	5482	0.019%	0.007%	0.005%	5.00	0.01	0.03
0.50	2987	4127847	0.877	638	0.182	5031	0.018%	0.006%	0.004%	5.00	0.00	0.03
1.50	6771	6210609	0.847	699	0.256	3079	0.012%	0.004%	0.003%	5.00	0.00	0.03
2.50	11351	7339896	0.816	753	0.345	2258	0.011%	0.005%	0.003%	5.00	0.00	0.04
3.50	16727	9362124	0.784	799	0.449	1790	0.009%	0.003%	0.002%	5.00	0.00	0.04

Settlement Distribution

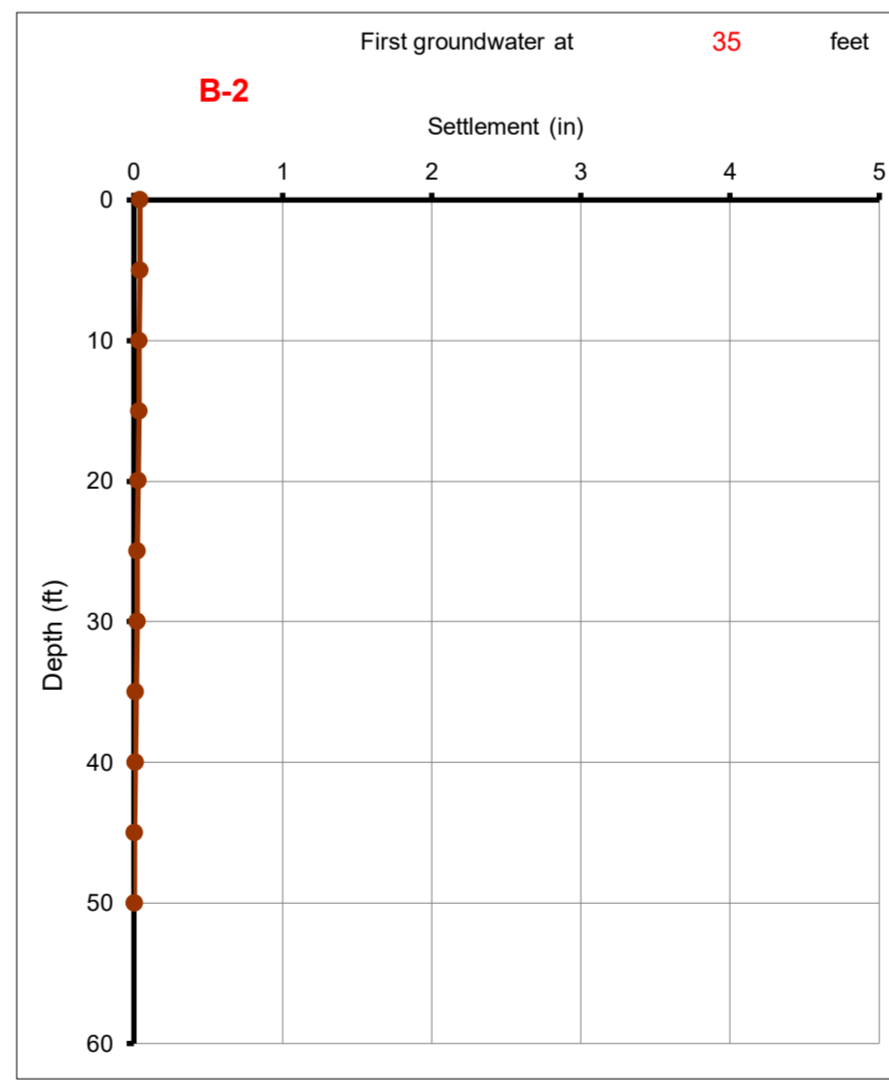
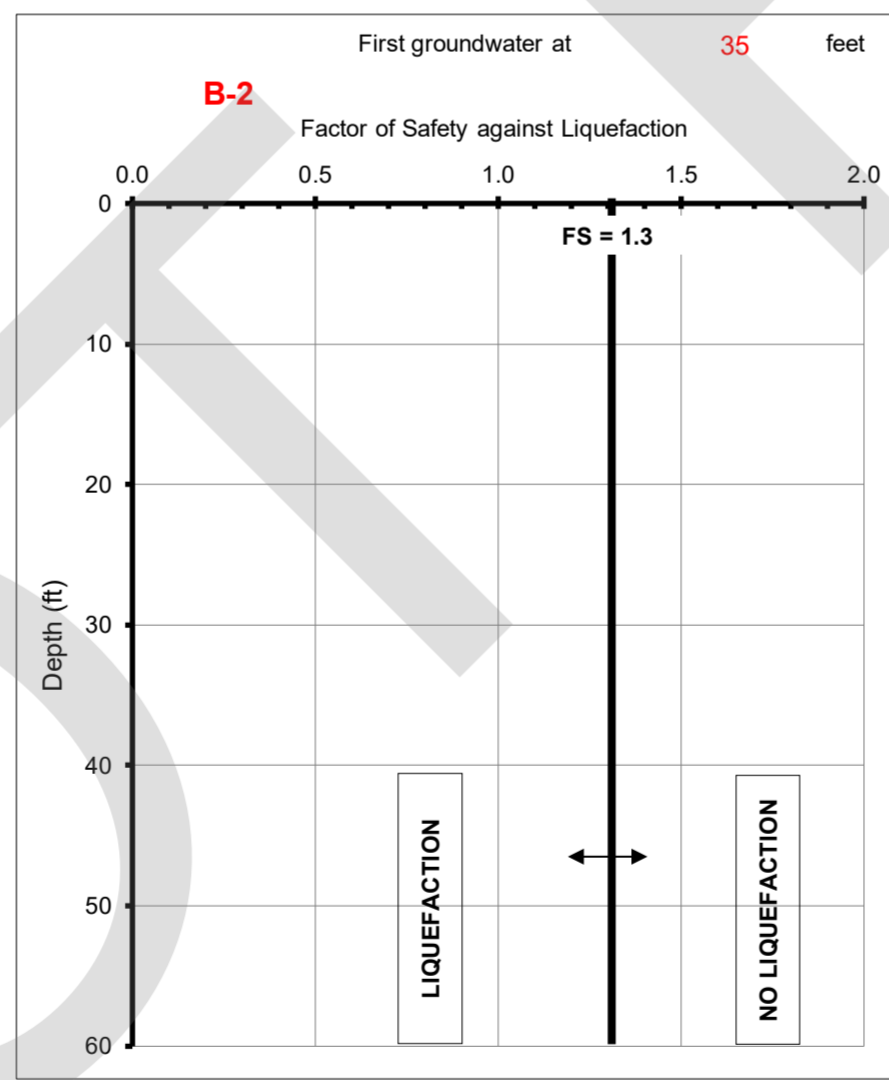
Layer settlement (compression) both liquefied and dry sand	Distribution of Earthquake-induced settlement (top of layer)
S_{layer}	Surface settlement
in	in
0.00	0.04
0.00	0.04
0.00	0.04
0.00	0.03
0.01	0.03
0.00	0.02
0.01	0.02
0.00	0.01
0.00	0.01
0.00	0.01
0.00	0.01

Summary of analysis

Total liquefaction settlement: **0.00** inches
 Total dry sand settlement: **0.04** inches
 Total earthquake-induced settlement: **0.04** inches
 Number of evaluated intervals: **11**
 Number of potentially liquefiable intervals: **0**
 Average Factor of Safety: **no liquefaction**
 Depth to first groundwater: **0.00** feet
 Total thickness of evaluated profile: **55.00** feet
 Profile thickness susceptible to liquefaction: **0.00** feet

Earthquake loading: M 6.4 PGA 0.25

Depth to Layer Top	Depth to Layer Bottom	SPT - N	Fines %	$F_{SPT,cs,kv}$	Interpreted Factor of Safety against liquefaction	Settlement
feet	feet					in
0	5	22	3	no liq	Not liquefiable - no groundwater	0.00
5	10	27	3	no liq	Not liquefiable - no groundwater	0.00
10	15	36	7	no liq	Not liquefiable - no groundwater	0.00
15	20	31	5	no liq	Not liquefiable - no groundwater	0.00
20	25	31	7	no liq	Not liquefiable - no groundwater	0.01
25	30	41	20	no liq	Not liquefiable - no groundwater	0.00
30	35	36	7	no liq	Not liquefiable - no groundwater	0.01
35	40	48	3	no liq	Not liquefiable - no groundwater	0.00
40	45	51	3	no liq	Not liquefiable - no groundwater	0.00
45	50	41	3	no liq	Not liquefiable - no groundwater	0.00
50	55	50	3	no liq	Not liquefiable - no groundwater	0.00



SPT LIQUEFACTION SUSCEPTIBILITY AND EARTHQUAKE INDUCED SETTLEMENT

You must input all fields highlighted in blue

Insert or delete rows only immediately above the red row.

Boring: **B-3** M PGA **6.4** **0.25** ==> MSF **1.500**

This spreadsheet is suitable only for evaluation of liquefaction of SANDS.

If fines content greater than 50% is input, sensitivity of the fine-grained soils will be evaluated.

P_{atm} = 100 kPa
 = 2088.54 psf
 σ_{ref} = 2000 psf
 M_{base} = 7.5

Boring Data										Earthquake Loading			Derivation of $(N_1)_{60,cs}$						Soil Earthquake Resistance				Factor of Safety										
Depth to Layer Top	Depth to Layer Bottom	Groundwater present ?	Layer Thickness	Depth to layer middle		SPT - N	Fines %	Dry Unit Wt	Moisture Content	Total Unit Wt	Total Stress	Pore Pressure	Pore Pressure	Effective Stress	Test for first groundwater	Cyclic Stress Ratio CSR	SPT Readings and Corrections						Cyclic Resistance Ratio CRR				Factor of Safety against Liquefaction						
feet	feet	yes / no	feet	feet	meters		%	pcf	%	pcf	psf	psf	psf	n/a	r_d		CSR	CSR _{1.5}	C_N	rod length	C_R	$(N_1)_{60}$	α	β	$(N_1)_{60,cs}$	K_v	CRR _{SPT,CS}	CRR _{SPT,CS}	CRR _{SPT,CS,Kv}	FS _{SPT,CS,Kv}	Interpreted Factor of Safety against liquefaction		Liquefiable thickness
0	5	no	5.0	2.5	0.8	7	3.0	116	3.0	119.5	299	0.0	0.0	299	0.996	0.162	0.108	2.000	1.7	0.75	17.3	0.000	1.000	17.3	1.000	0.188	0.184	0.184	1.70	Not liquefiable - no groundwater		0.00	5.00
5	10	no	5.0	7.5	2.3	22	5.0	116	3.0	119.5	896	0.0	0.0	896	0.985	0.160	0.107	1.527	3.2	0.75	41.4	0.000	1.000	41.4	1.000	no liq	no liq	no liq	no liq	Not liquefiable - no groundwater		0.00	5.00
10	15	no	5.0	12.5	3.8	26	5.0	116	3.0	119.5	1494	0.0	0.0	1494	0.974	0.158	0.105	1.183	4.7	0.85	43.0	0.000	1.000	43.0	1.000	no liq	no liq	no liq	no liq	Not liquefiable - no groundwater		0.00	5.00
15	20	no	5.0	17.5	5.3	31	5.0	116	3.0	119.5	2091	0.0	0.0	2091	0.963	0.156	0.104	0.999	6.2	0.95	48.4	0.000	1.000	48.4	0.995	no liq	no liq	no liq	no liq	Not liquefiable - no groundwater		0.00	5.00
20	25	no	5.0	22.5	6.9	25	3.0	116	3.0	119.5	2688	0.0	0.0	2688	0.950	0.154	0.103	0.881	7.8	0.95	34.4	0.000	1.000	34.4	0.952	no liq	no liq	no liq	no liq	Not liquefiable - no groundwater		0.00	5.00
25	30	no	5.0	27.5	8.4	31	5.0	116	3.0	119.5	3286	0.0	0.0	3286	0.932	0.151	0.101	0.797	9.3	0.95	38.6	0.000	1.000	38.6	0.914	no liq	no liq	no liq	no liq	Not liquefiable - no groundwater		0.00	5.00
30	35	no	5.0	32.5	9.9	40	5.0	116	3.0	119.5	3883	0.0	0.0	3883	0.907	0.147	0.098	0.733	10.8	1.00	48	0.000	1.000	48.2	0.880	no liq	no liq	no liq	no liq	Not liquefiable - no groundwater		0.00	5.00
35	40	no	5.0	37.5	11.4	43	20.0	116	3.0	119.5	4481	0.0	0.0	4481	0.872	0.142	0.094	0.683	12.3	1.00	48	3.615	1.079	55.7	0.850	no liq	no liq	no liq	no liq	Not liquefiable - no groundwater		0.00	5.00
40	45	no	5.0	42.5	13.0	39	20.0	116	3.0	119.5	5078	0.0	0.0	5078	0.828	0.135	0.090	0.641	13.9	1.00	41	3.615	1.079	48.0	0.823	no liq	no liq	no liq	no liq	Not liquefiable - no groundwater		0.00	5.00
45	50	no	5.0	47.5	14.5	61	3.0	116	3.0	119.5	5675	0.0	0.0	5675	0.778	0.126	0.084	0.607	15.4	1.00	61	0.000	1.000	60.8	0.798	no liq	no liq	no liq	no liq	Not liquefiable - no groundwater		0.00	5.00
50	55	no	5.0	52.5	16.0	50	3.0	116	3.0	119.5	6273	0.0	0.0	6273	0.728	0.118	0.079	0.577	16.9	1.00	47	0.000	1.000	47.4	0.776	no liq	no liq	no liq	no liq	Not liquefiable - no groundwater		0.00	5.00

EARTHQUAKE-INDUCED SETTLEMENT OF SATURATED SAND
 Earthquake-induced Settlement of Saturated Sand (fines < 50%)
 by Tokimatsu and Seed

Total liquefaction settlement: **0.00** inches

Fines% Correction for Tokimatsu & Seed	$(N_1)_{60,cs,slimet}$	CSR _{1.5}	ϵ_v	Δz	$S_v = \epsilon_v \Delta z$	S_{cumul}
			%	feet	in	inches
0.00	17.3	0.108	0.00	5.00	no GW	0.00
3.00	44.4	0.107	0.00	5.00	no GW	0.00
3.00	46.0	0.105	0.00	5.00	no GW	0.00
3.00	51.4	0.104	0.00	5.00	no GW	0.00
0.00	34.4	0.103	0.00	5.00	no GW	0.00
3.00	41.6	0.101	0.00	5.00	no GW	0.00
3.00	51.2	0.098	0.00	5.00	no GW	0.00
5.00	53.3	0.094	0.00	5.00	no GW	0.00
5.00	46.1	0.090	0.00	5.00	no GW	0.00
0.00	60.8	0.084	0.00	5.00	no GW	0.00
0.00	47.4	0.079	0.00	5.00	no GW	0.00

EARTHQUAKE-INDUCED SETTLEMENT OF DRY SAND
 Earthquake-induced Settlement of Dry Sand (fines < 50%)
 by Daniel Pradel

Total settlement of dry sand: **0.06** inches

K_v	σ_m	G_{max}	r_d	τ_{av}	a	b	γ	ϵ_{15}	ϵ_{Nc}	Δz	$S_v = \epsilon_v \Delta z$	S_{cumul}
	psf	psf		psf						feet	in	in
0.50	199	729331	0.999	49	0.128	25545	0.010%	0.012%	0.008%	5.00	0.01	0.01
0.50	597	1691031	0.994	145	0.136	13214	0.011%	0.004%	0.003%	5.00	0.00	0.01
0.50	996	2210057	0.985	239	0.143	9726	0.013%	0.005%	0.004%	5.00	0.00	0.02
0.50	1394	2720667	0.970	330	0.151	7948	0.015%	0.005%	0.004%	5.00	0.00	0.02
0.50	1792	2753730	0.952	416	0.159	6835	0.019%	0.010%	0.007%	5.00	0.01	0.03
0.50	2190	3163081	0.930	496	0.167	6060	0.019%	0.009%	0.006%	5.00	0.01	0.04
0.50	2589	3703527	0.905	571	0.174	5482	0.018%	0.006%	0.004%	5.00	0.01	0.04
0.50	2987	4174229	0.877	638	0.182	5031	0.018%	0.005%	0.004%	5.00	0.00	0.05
1.50	6771	5979997	0.847	699	0.256	3079	0.013%	0.004%	0.003%	5.00	0.00	0.05
2.50	11351	8379141	0.816	753	0.345	2258	0.010%	0.003%	0.002%	5.00	0.00	0.05
3.50	16727	9362124	0.784	799	0.449	1790	0.009%	0.003%	0.002%	5.00	0.00	0.06

Settlement Distribution

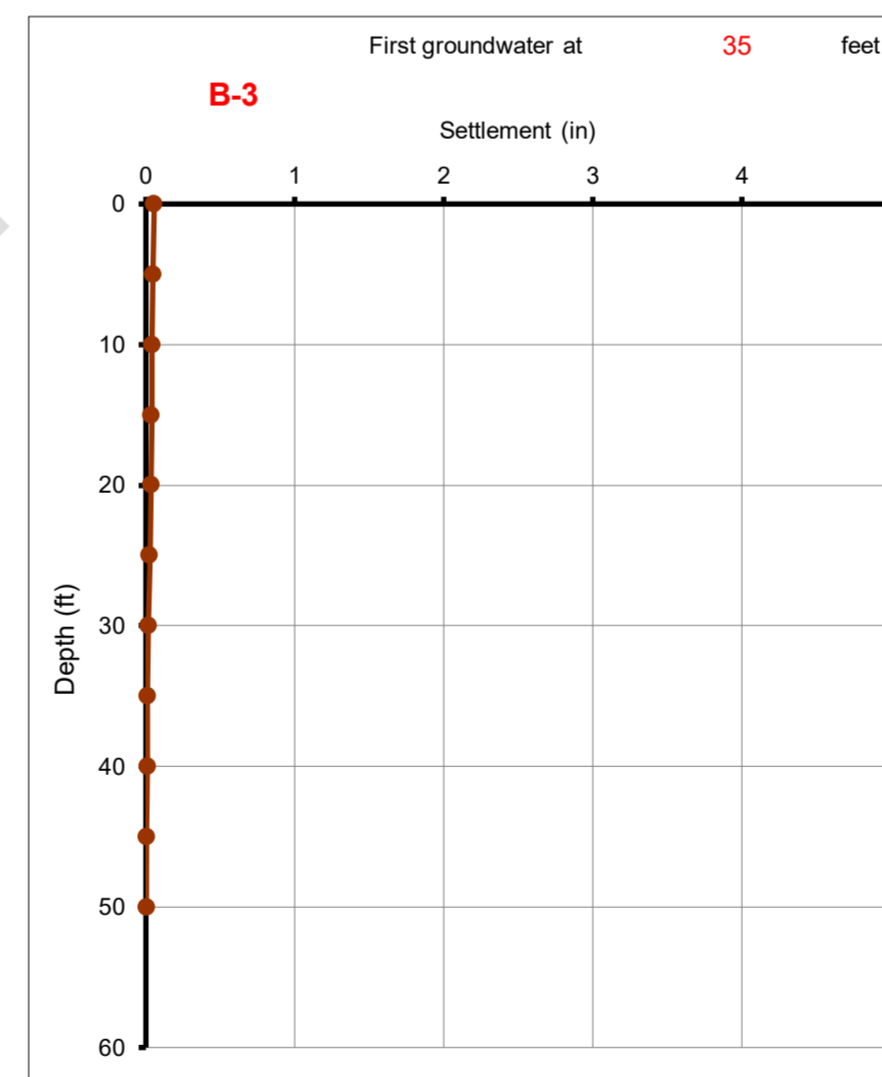
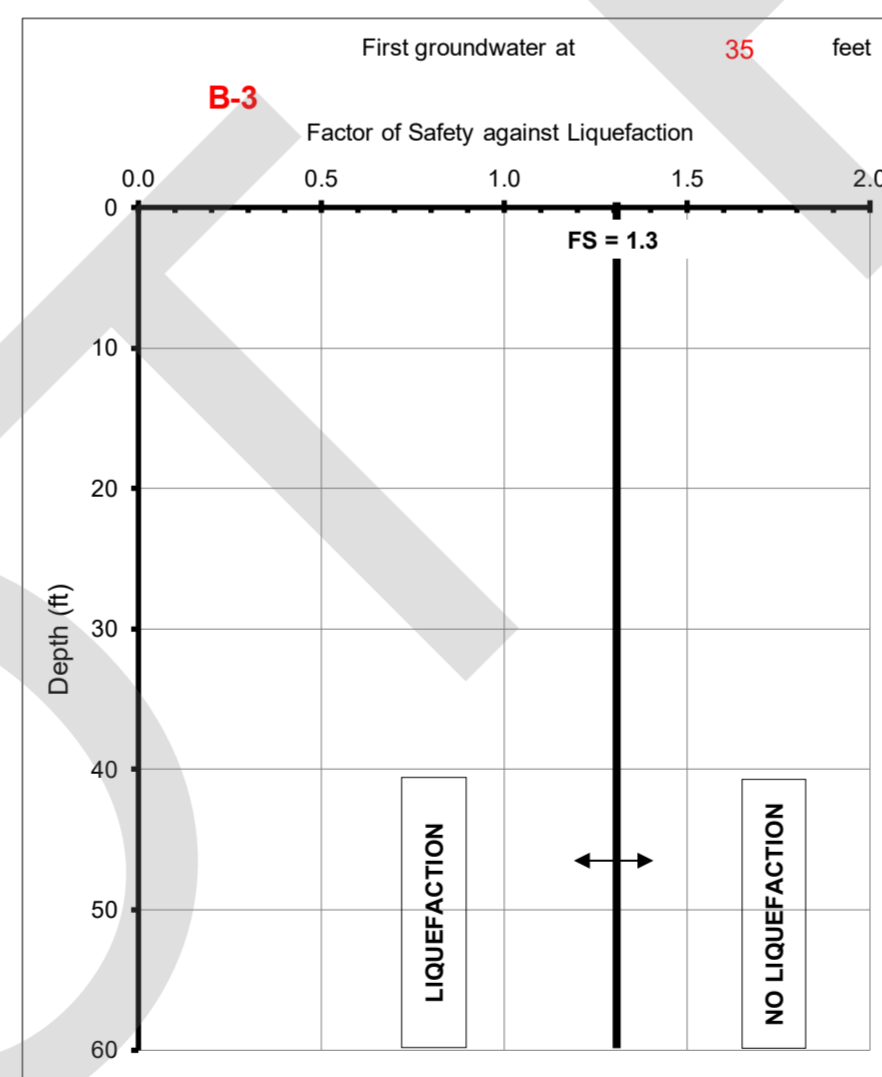
Layer settlement (compression) both liquefied and dry sand	Distribution of Earthquake-induced settlement (top of layer)
S_{layer}	Surface settlement
0.00	0.06
0.00	0.05
0.00	0.04
0.00	0.04
0.01	0.03
0.01	0.03
0.01	0.02
0.00	0.01
0.00	0.01
0.00	0.00
0.00	0.00

Summary of analysis

Total liquefaction settlement: **0.00** inches
 Total dry sand settlement: **0.06** inches
 Total earthquake-induced settlement: **0.06** inches
 Number of evaluated intervals: **11**
 Number of potentially liquefiable intervals: **0**
 Average Factor of Safety: **no liquefaction**
 Depth to first groundwater: **0.00** feet
 Total thickness of evaluated profile: **55.00** feet
 Profile thickness susceptible to liquefaction: **0.00** feet

Earthquake loading: M PGA **6.4** **0.25**

Depth to Layer Top	Depth to Layer Bottom	SPT - N	Fines %	$F_{SPT,cs,kv}$	Interpreted Factor of Safety against liquefaction	Settlement
feet	feet					in
0	5	7	3	1.70	Not liquefiable - no groundwater	0.01
5	10	22	5	no liq	Not liquefiable - no groundwater	0.00
10	15	26	5	no liq	Not liquefiable - no groundwater	0.00
15	20	31	5	no liq	Not liquefiable - no groundwater	0.00
20	25	25	3	no liq	Not liquefiable - no groundwater	0.01
25	30	31	5	no liq	Not liquefiable - no groundwater	0.01
30	35	40	5	no liq	Not liquefiable - no groundwater	0.01
35	40	43	20	no liq	Not liquefiable - no groundwater	0.00
40	45	39	20	no liq	Not liquefiable - no groundwater	0.00
45	50	61	3	no liq	Not liquefiable - no groundwater	0.00
50	55	50	3	no liq	Not liquefiable - no groundwater	0.00



Appendix D

Spreadsheets with Calculations of Axial CIDH Pile Capacities

NOT FOR BID

PROJECT SITE		LANZIT BRIDGE - CIDH Piles	
SOIL PROFILE (BORING) BEGINS AT ELEVATION	823.5 feet		
PILE BEGINS AT GROUND ELEVATION	823.5 feet		
SCOUR DEPTH CONSIDERED	6.5 feet		
LIMIT STATE CONSIDERED	Service		

Boring:	B-3
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Resistance Factor for Side Friction	1
Resistance Factor for End Bearing	1
Reduction Factor for Caving or poor construction	1.00
Reduction Factor for Group Effects	0.76

Overburden at Ground Surface for Limit State	0 psf
PILE SHAPE	circular
Pile Side (Only for Square or Octagonal Piles)	feet
For other piles (perimeter)	6.283185
For other piles (area)	3.141593
Information for Round Piles to be provided below:	
Pile Diameter (top)	2 feet
Pile Diameter (tip)	2 feet
Specified Length of Pile	45 feet
Estimated Initial Pile Tip Elevation	778.5 feet
Stick Up Length	8 feet
Taper Angle ω	0.000 deg
Pile Embedment Depth into bearing stratum	2 feet
Predrilling Reduction fraction for side resistance < 1.0	1

Octagon Calculator	
Given total width=	1.25 ft
Octagon Side=	0.517767 ft

Group Design Load	687	kips
Pile Group Width	2	feet
Pile Group Length	39.26	feet

SPT Corrections convert California sampler blowcounts into SPT and use SPT blowcounts only			
Correction for borehole diameter	D_b (in)	4	C_b 1.00
Correction for sampling method		no liner	C_s 1
Correction for energy ratio			C_e 1.25
Correction for rod length	$r_{stickup}$ (ft)	3	see C_R

FHWA-HI-10-016(Beta and Alpha Methods)																																														
Elevation at Top of Layer	Elevation at bottom of Layer	Depth to Layer Top	Depth to Layer Bottom	Groundwater present during drilling? yes/no	Groundwater present for Limit State Considered? yes/no	Pre-drilling? Yes/no	Layer Thickness	Depth to middle of layer	SPT - N	Total Unit Wt during Drilling	Total Unit Wt for modeled Limit State	Soil Type	S_u (for clays and silts)	Rod length	C_r	Corrected SPT - N	Corrected SPT - N (max 50)	Angle of friction	m	C_n	Corrected SPT - N (Overburden) MIDDLE LAYER	Pore Pressure @ layer middle	Pore Pressure @ layer bottom	Effective Stress @ layer middle	Effective Stress @ layer bottom	Angle of friction (with correction for C_n)	Pore Pressure @ layer middle	Pore Pressure @ layer bottom	Effective Stress @ layer middle	Effective Stress @ layer bottom	Pile Diameter at top of layer For Circular Piles	Pile Diameter at bottom of layer For Circular Piles	Beta	alpha	F_{sn}	R_{sn}	Factored R_{sn} for predrill	Cumulative R_{sn}	N_c	Base Resistance qbn	Base Resistance Qbn	Factored Cumulative R_{sn}	Factored Qbn	Total Q	Settlement	
feet	feet	feet	feet	yes/no	yes/no	yes/no	feet	feet	blowcounts	pcf	pcf		psf	m	%	blowcount	blowcount	degrees		blowcount	psf	psf	psf	psf	degrees	psf	psf	psf	psf	feet	feet			psf	kips	kips	kips	kips	ksf	kips	kips	kips	kips	kips	kips	(inches)
823.5	821.5	0	2	no	no	no	2	1	0.3	7	110	0.001	Sand	1.2	0.75	7	7	29	0.53	4.76	11	0	0	110	220	30	0	0	0.001	0.002	2.000	2.000	1.786	N/A	0	0	0	0	0	N/A	18	57	0	57	N/A	N/A
821.5	820.5	2	3	no	no	no	1	2.5	0.8	16	110	0.001	Sand	1.7	0.75	15	15	31	0.40	2.24	26	0	0	275	330	34	0	0	0.0025	0.003	2.000	2.000	2.463	N/A	0	0	0	0	0	N/A	18	57	0	57	N/A	N/A
820.5	819.5	3	4	no	no	no	1	3.5	1.1	16	110	0.001	Sand	2.0	0.75	15	15	31	0.40	1.96	26	0	0	385	440	34	0	0	0.0035	0.004	2.000	2.000	2.463	N/A	0	0	0	0	0	N/A	7	21	0	21	N/A	N/A
819.5	818.5	4	5	no	no	no	1	4.5	1.4	6	115	0.001	Sand	2.3	0.75	6	6	29	0.55	2.21	10	0	0	497.5	555	30	0	0	0.0045	0.005	2.000	2.000	1.721	N/A	0	0	0	0	0	N/A	7	21	0	21	N/A	N/A
818.5	817.5	5	6	no	no	no	1	5.5	1.7	6	115	0.001	Sand	2.6	0.75	6	6	29	0.55	1.97	10	0	0	612.5	670	30	0	0	0.0055	0.006	2.000	2.000	1.721	N/A	0	0	0	0	0	N/A	34	106	0	106	N/A	N/A
817.5	816.5	6	7	no	no	no	1	6.5	2.0	30	115	0.001	Sand	2.9	0.75	28	28	35	0.30	1.38	39	0	0	727.5	785	38	0	0	0.0065	0.007	2.000	2.000	3.275	N/A	0	0	0	0	0	N/A	34	106	0	106	N/A	N/A
816.5	815.5	7	8	no	yes	no	1	7.5	2.3	30	115	0.001	Sand	3.2	0.75	28	28	35	0.31	1.33	38	0	0	842.5	900	38	31.2	62.4	28.807	57.607	2.000	2.000	3.181	N/A	49	0	0	0	0	N/A	25	78	0	78	59	0.89
815.5	814.5	8	9	no	yes	no	1	8.5	2.6	22	115	0.001	Sand	3.5	0.75	21	21	33	0.38	1.35	28	0	0	957.5	1015	35	93.6	124.8	86.407	115.207	2.000	2.000	2.591	N/A	111	1	1	1	1	N/A	25	78	1	78	60	0.92
814.5	813.5	9	10	no	yes	no	1	9.5	2.9	22	115	0.001	Sand	3.8	0.75	21	21	33	0.39	1.30	27	0	0	1072.5	1130	35	156	187.2	144.007	172.807	2.000	2.000	2.528	N/A	178	1	1	2	2	N/A	33	104	2	104	81	0.74
813.5	812.5	10	11	no	yes	no	1	10.5	3.2	26	115	0.001	Sand	4.1	0.85	28	28	35	0.34	1.22	34	0	0	1187.5	1245	37	218.4	249.6	199.107	225.407	2.000	2.000	2.561	N/A	265	2	2	4	4	N/A	33	104	4	104	82	0.76
812.5	811.5	11	12	no	yes	no	1	11.5	3.5	26	124	0.001	Sand	4.4	0.85	28	28	35	0.35	1.18	33	0	0	1307	1369	36	280.8	312	256.207	287.607	2.000	2.000	2.176	N/A	287	2	2	6	6	N/A	33	104	6	104	83	0.78
811.5	810.5	12	13	no	yes	no	1	12.5	3.8	26	124	0.001	Sand	4.7	0.85	28	28	35	0.35	1.15	32	0	0	1431	1493	36	343.2	374.4	317.807	348.607	2.000	2.000	1.893	N/A	307	2	2	8	8	N/A	60	188	8	188	149	0.49
810.5	809.5	13	14	no	yes	no	1	13.5	4.1	49	124	0.001	Sand	5.0	0.85	52	50	41	0.24	1.08	50	0	0	1555	1617	40	405.6	436.8	379.407	410.207	2.000	2.000	2.518	N/A	551	3	3	11	11	N/A	60	188	11	188	152	0.49
809.5	808.5	14	15	no	yes	no	1	14.5	4.4	49	124	0.001	Sand	5.3	0.85	52	50	41	0.24	1.06	50	0	0	1679	1741	40	458	489.2	441.007	471.807	2.000	2.000	2.286	N/A	582	4	4	15	15	N/A	40	124	15	124	105	0.71
808.5	807.5	15	16	no	yes	no	1	15.5	4.7	31	124	0.001	Sand	5.6	0.85	33	33	36	0.33	1.05	34	0	0	1803	1865	37	530.4	561.6	502.607	533.407	2.000	2.000	1.900	N/A	419	3	3	17	17	N/A	40	124	17	124	107	0.73
807.5	806.5	16	17	no	yes	no	1	16.5	5.0	31	124	0.001	Sand	5.9	0.85	33	33	36	0.34	1.03	34	0	0	1927	1989	37	592.8	624	564.207	595.007	2.000	2.000	1.472	N/A	432	3	3	20	20	N/A	44	139	20	139	124	0.68
806.5	805.5	17	18	no	yes	no	1	17.5	5.3	31	124	0.001	Sand	6.2	0.95	37	37	37	0.32	1.01	37	0	0	2051	2113	38	655.2	686.4	625.807	656.607	2.000	2.000	1.486	N/A	497	3	3	23	23	N/A	44	139	23	139	123	0.68
805.5	804.5	18	19	no	yes	no	1	18.5	5.6	31	124	0.001	Sand	6.5	0.95	37	37	37	0.32	0.99	36	0	0	2175	2237	37	717.6	748.8	687.407	718.207	2.000	2.000	1.316	N/A	510	3	3	26	26	N/A	44	139	26	139	125	0.69
804.5	803.5	19	20	no	yes	no	1	19.5	5.9	31	124	0.001	Sand	6.8	0.95	37	37	37	0.32	0.97	36	0	0	2299	2361	37	780	811.2	749.007	779.807	2.000	2.000	1.316	N/A	521	3	3	30	30	N/A	36	112	30	112	108	0.88
803.5	802.5	20	21	no	yes	no	1	20.5	6.2	25	124	0.001	Sand	7.1	0.95	30	30	36	0.38	0.95	28	0	0	2423	2485	35	842.4	873.6	810.607	841.407	2.000	2.000	1.084	N/A	435	3	3	32	32	N/A	36	112	32	112	110	0.89
802.5	801.5	21	22	no	yes	no	1	21.5	6.5	25	124	0.001	Sand	7.4	0.95	30	30	36	0.38	0.93	28	0	0	2547	2609	35	904.8	936	872.207	903.007	2.000	2.000	1.034	N/A	444	3	3	35	35	N/A	36	112	35	112	112	0.91
801.5	800.5	22	23	no	yes	no	1	22.5	6.8	25	124	0.001	Sand	7.7	0.95	30	30	36	0.38	0.91	27	0	0	2671	2733	35	967.2	998.4	933.807	964.607	2.000	2.000	0.989	N/A	453	3	3	38	38	N/A	36	112	38	112	114	0.93
800.5	799.5	23	24	no	yes	no	1	23.5	7.1	25	124	0.001	Sand	8.0	0.95	30	30	36	0.39	0.90	27	0	0	2795	2857	35	1029.6	1060.8	995.407	1026.207	2.000	2.000	0.950	N/A	462	3	3	41	41	N/A	36	112	41	112	116	0.95
799.5	798.5	24	25	no	yes	no	1	24.5	7.4	25	124	0.001	Sand	8.3	0.95	30	30	36	0.39	0.88	26	0	0	2919	2981	35	1092	1123.2	1057.007	1087.807	2.000	2.000	0.914	N/A	470	3	3	44	44	N/A	44	139	44	139	139	0.76
798.5	797.5	25	26	no	yes	no	1	25.5	7.7	31	113	0.001	Sand	8.6	0.95	37	37	37	0.35	0.88	32	0	0	3037.5	3099	36	1154.4	1185.6	1113.107	1138.407	2.000	2.000	1.008	N/A	577	4	4	47	47	N/A	44	139	47	139	142	0.77
797.5	796.5	26	27	no	yes	no	1	26.5	8.0	31	113	0.001	Sand	8.9	0.95	37	37	37	0.35	0.87	32	0	0	3150.5	3207	36	1216.8	1248	1163.707	1189.007	2.000	2.000	0.979	N/A	583	4	4	51	51	N/A	44	139	51	139	144	0.78
796.5	795.5	27	28	no	yes	no	1	27.5	8.3	31	113	0.001	Sand	9.2	0.95	37	37	37	0.35	0.86	32	0	0	3263.5	3320	36	1279.2	1310.4	1214.307	1239.607	2.000	2.000	0.951	N/A	589	4	4	55	55							

PROJECT SITE		LANZIT BRIDGE - CIDH Piles	
SOIL PROFILE (BORING) BEGINS AT ELEVATION	823.5 feet	PILE BEGINS AT GROUND ELEVATION	823.5 feet
SCOUR DEPTH CONSIDERED	4 feet	LIMIT STATE CONSIDERED	Strength

Boring:	B-3
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Resistance Factor for Side Friction	0.7
Resistance Factor for End Bearing	0.5
Reduction Factor for Caving or poor construction	1.00
Reduction Factor for Group Effects	0.76

Overburden at Ground Surface for Limit State	0 psf
PILE SHAPE	circular
Pile Side (Only for Square or Octagonal Piles)	6.283185 feet
For other piles (perimeter)	3.141593 feet
For other piles (area)	ft2
Information for Round Piles to be provided below:	
Pile Diameter (top)	2 feet
Pile Diameter (tip)	2 feet
Specified Length of Pile	45 feet
Estimated Initial Pile Tip Elevation	778.5 feet
Stick Up Length	8 feet
Taper Angle ω	0.000 deg
Pile Embedment Depth into bearing stratum	2 feet
Pre-drilling Reduction fraction for side resistance <1.0	1

Octagon Calculator	
Given total width=	1.25 ft
Octagon Side=	0.517767 ft

Group Design Load	1052	kips
Pile Group Width	2	feet
Pile Group Length	39.26	feet

SPT Corrections convert California sampler blowcounts into SPT and use SPT blowcounts only			
Correction for borehole diameter	D _b (in)	4	C _b 1.00
Correction for sampling method		no liner	C _s 1
Correction for energy ratio			C _e 1.25
Correction for rod length	r _{stickup} (ft)	3	see C _b

FHWA-HI-10-016(Beta and Alpha Methods)																																														
Elevation at Top of Layer	Elevation at bottom of Layer	Depth to Layer Top	Depth to Layer Bottom	Groundwater present during drilling?	Groundwater present for Limit State Considered?	Pre-drilling?	Layer Thickness	Depth to middle of layer	SPT - N	Total Unit Wt during Drilling	Total Unit Wt for modeled Limit State	Soil Type	Su (for clays and silts)	Rod length	Cr	Corrected SPT - N	Corrected SPT - N (max 80)	Angle of friction	m	C _u	Corrected SPT - N (Overburden) MIDDLE LAYER	Pore Pressure @ layer middle	Pore Pressure @ layer bottom	Effective Stress @ layer middle	Effective Stress @ layer bottom	Angle of friction (with correction for C _u)	Pore Pressure @ layer middle	Pore Pressure @ layer bottom	Effective Stress @ layer middle	Effective Stress @ layer bottom	Pile Diameter at top of layer For Circular Piles	Pile Diameter at bottom of layer For Circular Piles	Beta	alpha	F _{sn}	R _{sn}	Factored R _n for predrill	Cumulative R _n	N _c	Base Resistance φ _{bn}	Base Resistance Q _{bn}	Factored Cumulative R _n	Factored Q _{bn}	Total Q	Settlement	
feet	feet	feet	feet	yes/no	yes/no	yes/no	feet	feet	blowcounts	pcf	pcf		psf	m	%	blowcount	blowcount	degrees		blowcount	psf	psf	psf	psf	degrees	psf	psf	psf	psf	feet	feet			psf	kips	kips	kips		kips	kips	kips	kips	kips	(inches)		
823.5	821.5	0	2	no	no	no	2	1	0.3	7	110	0.001	Sand	1.2	0.75	7	7	29	0.53	4.76	11	0	0	110	220	30	0	0	0.001	0.002	2.000	2.000	1.786	N/A	0	0	0	0	0	N/A	18	57	0	28	N/A	N/A
821.5	820.5	2	3	no	no	no	1	2.5	0.8	16	110	0.001	Sand	1.7	0.75	15	15	31	0.40	2.24	26	0	0	275	330	34	0	0	0.0025	0.003	2.000	2.000	2.463	N/A	0	0	0	0	0	N/A	18	57	0	28	N/A	N/A
820.5	819.5	3	4	no	no	no	1	3.5	1.1	16	110	0.001	Sand	2.0	0.75	15	15	31	0.40	1.96	26	0	0	385	440	34	0	0	0.0035	0.004	2.000	2.000	2.463	N/A	0	0	0	0	0	N/A	7	21	0	11	N/A	N/A
819.5	818.5	4	5	no	yes	no	1	4.5	1.4	6	115	120	Sand	2.3	0.75	6	6	29	0.55	2.21	10	0	0	497.5	555	30	31.2	62.4	28.804	57.604	2.000	2.000	1.721	N/A	20	0	0	0	0	N/A	7	21	0	11	8	5.45
818.5	817.5	5	6	no	yes	no	1	5.5	1.7	6	115	120	Sand	2.6	0.75	6	6	29	0.55	1.97	10	0	0	612.5	670	30	93.6	124.8	86.404	115.204	2.000	2.000	1.636	N/A	58	0	0	0	0	N/A	34	106	0	53	41	1.22
817.5	816.5	6	7	no	yes	no	1	6.5	2.0	30	115	120	Sand	2.9	0.75	28	28	35	0.30	1.38	39	0	0	727.5	785	38	156	187.2	144.004	172.804	2.000	2.000	3.275	N/A	256	2	2	2	2	N/A	34	106	1	53	41	1.14
816.5	815.5	7	8	no	yes	no	1	7.5	2.3	30	115	120	Sand	3.2	0.75	28	28	35	0.31	1.33	38	0	0	842.5	900	38	218.4	249.6	201.604	230.404	2.000	2.000	2.697	N/A	292	2	2	4	N/A	25	78	3	39	32	1.36	
815.5	814.5	8	9	no	yes	no	1	8.5	2.6	22	115	120	Sand	3.5	0.75	21	21	33	0.38	1.35	28	0	0	957.5	1015	35	280.8	312	259.204	288.004	2.000	2.000	1.833	N/A	235	1	5	5	N/A	25	78	4	39	32	1.41	
814.5	813.5	9	10	no	yes	no	1	9.5	2.9	22	115	120	Sand	3.8	0.75	21	21	33	0.39	1.30	27	0	0	1072.5	1130	35	343.2	374.4	316.804	345.604	2.000	2.000	1.612	N/A	250	2	2	7	N/A	33	104	5	52	43	1.13	
813.5	812.5	10	11	no	yes	no	1	10.5	3.2	26	115	115	Sand	4.1	0.85	28	28	35	0.34	1.22	34	0	0	1187.5	1245	37	405.6	436.8	371.904	398.204	2.000	2.000	1.765	N/A	341	2	9	9	N/A	33	104	6	52	44	1.16	
812.5	811.5	11	12	no	yes	no	1	11.5	3.5	26	124	124	Sand	4.4	0.85	28	28	35	0.35	1.18	33	0	0	1307	1369	36	468	499.2	429.004	459.804	2.000	2.000	1.603	N/A	354	2	2	11	N/A	33	104	8	52	46	1.20	
811.5	810.5	12	13	no	yes	no	1	12.5	3.8	26	124	124	Sand	4.7	0.85	28	28	35	0.35	1.15	32	0	0	1431	1493	36	530.4	561.6	490.604	521.404	2.000	2.000	1.456	N/A	367	2	2	14	N/A	60	188	10	94	79	0.76	
810.5	809.5	13	14	no	yes	no	1	13.5	4.1	49	124	124	Sand	5.0	0.85	52	50	41	0.24	1.08	50	0	0	1555	1617	40	592.8	624	552.204	583.004	2.000	2.000	1.978	N/A	631	4	4	18	N/A	60	188	12	94	81	0.76	
809.5	808.5	14	15	no	yes	no	1	14.5	4.4	49	124	124	Sand	5.3	0.85	52	50	41	0.24	1.06	50	0	0	1679	1741	40	655.2	686.4	613.804	644.604	2.000	2.000	1.848	N/A	655	4	4	22	N/A	40	124	15	62	59	1.09	
808.5	807.5	15	16	no	yes	no	1	15.5	4.7	31	124	124	Sand	5.6	0.85	33	33	36	0.33	1.05	35	0	0	1803	1865	37	717.6	748.8	675.404	706.204	2.000	2.000	1.331	N/A	471	3	3	25	N/A	40	124	17	62	60	1.11	
807.5	806.5	16	17	no	yes	no	1	16.5	5.0	31	124	124	Sand	5.9	0.85	33	33	36	0.34	1.03	34	0	0	1927	1989	37	780	811.2	737.004	767.804	2.000	2.000	1.255	N/A	482	3	3	28	N/A	44	139	19	69	67	1.02	
806.5	805.5	17	18	no	yes	no	1	17.5	5.3	31	124	124	Sand	6.2	0.95	37	37	37	0.32	1.01	37	0	0	2051	2113	38	842.4	873.6	798.604	829.404	2.000	2.000	1.281	N/A	547	3	3	31	N/A	44	139	22	69	69	1.04	
805.5	804.5	18	19	no	yes	no	1	18.5	5.6	31	124	124	Sand	6.5	0.95	37	37	37	0.32	0.99	36	0	0	2175	2237	37	904.8	936	860.204	891.004	2.000	2.000	1.217	N/A	557	3	3	35	N/A	44	139	24	69	71	1.06	
804.5	803.5	19	20	no	yes	no	1	19.5	5.9	31	124	124	Sand	6.8	0.95	37	37	37	0.32	0.97	36	0	0	2299	2361	37	967.2	998.4	921.804	952.604	2.000	2.000	1.161	N/A	566	4	4	38	N/A	36	112	27	56	63	1.34	
803.5	802.5	20	21	no	yes	no	1	20.5	6.2	25	124	124	Sand	7.1	0.95	30	30	36	0.38	0.95	28	0	0	2423	2485	35	1029.6	1060.8	983.404	1014.204	2.000	2.000	0.970	N/A	472	3	3	41	N/A	36	112	29	56	64	1.37	
802.5	801.5	21	22	no	yes	no	1	21.5	6.5	25	124	124	Sand	7.4	0.95	30	30	36	0.38	0.93	28	0	0	2547	2609	35	1092	1123.2	1045.004	1075.804	2.000	2.000	0.932	N/A	480	3	3	44	N/A	36	112	31	56	66	1.40	
801.5	800.5	22	23	no	yes	no	1	22.5	6.8	25	124	124	Sand	7.7	0.95	30	30	36	0.38	0.91	27	0	0	2671	2733	35	1154.4	1185.6	1106.604	1137.404	2.000	2.000	0.898	N/A	487	3	3	47	N/A	36	112	33	56	68	1.42	
800.5	799.5	23	24	no	yes	no	1	23.5	7.1	25	124	124	Sand	8.0	0.95	30	30	36	0.39	0.90	27	0	0	2795	2857	35	1216.8	1248	1168.204	1199.004	2.000	2.000	0.867	N/A	495	3	3	50	N/A	36	112	35	56	69	1.45	
799.5	798.5	24	25	no	yes	no	1	24.5	7.4	25	124	124	Sand	8.3	0.95	30	30	36	0.39	0.88	26	0	0	2919	2981	35	1279.2	1310.4	1229.804	1260.604	2.000	2.000	0.839	N/A	502	3	3	54	N/A	44	139	37	69	81	1.17	
798.5	797.5	25	26	no	yes	no	1	25.5	7.7	31	113	113	Sand	8.6	0.95	37	37	37	0.35	0.88	32	0	0	3037.5	3094	36	1341.6	1372.8	1285.904	1311.204	2.000	2.000	0.926	N/A	612	4	4	57	N/A	44	139	40	69	83	1.18	
797.5	796.5	26	27	no	yes	no	1	26.5	8.0	31	113	113	Sand	8.9	0.95	37	37	37	0.35	0.87	32	0	0	3150.5	3207	36	1404	1435.2	1336.504	1361.804	2.000	2.000	0.902	N/A	617	4	4	61	N/A	44	139	43	69	85	1.20	
796.5	795.5	27	28	no	yes	no	1	27.5	8.3	31	113	113	Sand	9.2	0.95	37	37	37	0.35	0.86	32	0	0	3263.5	3320	36	1466.4	1497.6	1387.104	1412.404	2.000	2.000	0.880	N/A	622	4	4	65	N/A	44	139	46	69	87	1.22	
795.5	794.5	28	29	no	yes																																									

PROJECT SITE		LANZIT BRIDGE - CIDH Piles	
SOIL PROFILE (BORING) BEGINS AT ELEVATION	823.5 feet		
PILE BEGINS AT GROUND ELEVATION	823.5 feet		
SCOUR DEPTH CONSIDERED	6.5 feet		
LIMIT STATE CONSIDERED	Service		

Boring:	B-3
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Resistance Factor for Side Friction	1
Resistance Factor for End Bearing	1
Reduction Factor for Caving or poor construction	1.00
Reduction Factor for Group Effects	0.76

Overburden at Ground Surface for Limit State	0 psf
PILE SHAPE	circular
Pile Side (Only for Square or Octagonal Piles)	feet
For other piles (perimeter)	6.283185
For other piles (area)	3.141593
Information for Round Piles to be provided below:	
Pile Diameter (top)	2 feet
Pile Diameter (tip)	2 feet
Specified Length of Pile	45 feet
Estimated Initial Pile Tip Elevation	778.5 feet
Stick Up Length	8 feet
Taper Angle ω	0.000 deg
Pile Embedment Depth into bearing stratum	2 feet
Predrilling Reduction fraction for side resistance < 1.0	1

Octagon Calculator	
Given total width=	1.25 ft
Octagon Side=	0.517767 ft

Group Design Load	684	kips
Pile Group Width	2	feet
Pile Group Length	39.26	feet

SPT Corrections convert California sampler blowcounts into SPT and use SPT blowcounts only			
Correction for borehole diameter	D_b (in)	4	C_b 1.00
Correction for sampling method		no liner	C_s 1
Correction for energy ratio			C_e 1.25
Correction for rod length	$f_{stickup}$ (ft)	3	see C_R

FHWA-HI-10-016(Beta and Alpha Methods)																																														
Elevation at Top of Layer	Elevation at bottom of Layer	Depth to Layer Top	Depth to Layer Bottom	Groundwater present during drilling? yes/no	Groundwater present for Limit State Considered? yes/no	Pre-drilling? Yes/no	Layer Thickness	Depth to middle of layer	SPT - N	Total Unit Wt during Drilling	Total Unit Wt for modeled Limit State	Soil Type	Su (for clays and silts)	Rod length	Cr	Corrected SPT - N	Corrected SPT - N (max 50)	Angle of friction	m	Cn	Corrected SPT - N (Overburden) MIDDLE LAYER	Pore Pressure @ layer middle	Pore Pressure @ layer bottom	Effective Stress @ layer middle	Effective Stress @ layer bottom	Angle of friction (with correction for Cn)	Pore Pressure @ layer middle	Pore Pressure @ layer bottom	Effective Stress @ layer middle	Effective Stress @ layer bottom	Pile Diameter at top of layer For Circular Piles	Pile Diameter at bottom of layer For Circular Piles	Beta	alpha	Fsn	Rsn	Factored Rsn for predrill	Cumulative Rsn	Nc	Base Resistance qbn	Base Resistance Qbn	Factored Cumulative Rsn	Factored Qbn	Total Q	Settlement	
feet	feet	feet	feet	yes/no	yes/no	yes/no	feet	feet	blowcounts	pcf	pcf		psf	m	%	blowcount	blowcount	degrees		blowcount	psf	psf	psf	psf	degrees	psf	psf	psf	psf	feet	feet			psf	kips	kips	kips		ksf	kips	Kips	Kips	Kips	Kips	(inches)	
823.5	821.5	0	2	no	no	no	2	1	0.3	7	110	0.001	Sand	1.2	0.75	7	7	29	0.53	4.76	11	0	0	110	220	30	0	0	0.001	0.002	2.000	2.000	1.786	N/A	0	0	0	0	0	N/A	18	57	0	57	N/A	N/A
821.5	820.5	2	3	no	no	no	1	2.5	0.8	16	110	0.001	Sand	1.7	0.75	15	15	31	0.40	2.24	26	0	0	275	330	34	0	0	0.0025	0.003	2.000	2.000	2.463	N/A	0	0	0	0	0	N/A	18	57	0	57	N/A	N/A
820.5	819.5	3	4	no	no	no	1	3.5	1.1	16	110	0.001	Sand	2.0	0.75	15	15	31	0.40	1.96	26	0	0	385	440	34	0	0	0.0035	0.004	2.000	2.000	2.463	N/A	0	0	0	0	0	N/A	7	21	0	21	N/A	N/A
819.5	818.5	4	5	no	no	no	1	4.5	1.4	6	115	0.001	Sand	2.3	0.75	6	6	29	0.55	2.21	10	0	0	497.5	555	30	0	0	0.0045	0.005	2.000	2.000	1.721	N/A	0	0	0	0	0	N/A	7	21	0	21	N/A	N/A
818.5	817.5	5	6	no	no	no	1	5.5	1.7	6	115	0.001	Sand	2.6	0.75	6	6	29	0.55	1.97	10	0	0	612.5	670	30	0	0	0.0055	0.006	2.000	2.000	1.721	N/A	0	0	0	0	0	N/A	34	106	0	106	N/A	N/A
817.5	816.5	6	7	no	no	no	1	6.5	2.0	30	115	0.001	Sand	2.9	0.75	28	28	35	0.30	1.38	39	0	0	727.5	785	38	0	0	0.0065	0.007	2.000	2.000	3.275	N/A	0	0	0	0	0	N/A	34	106	0	106	N/A	N/A
816.5	815.5	7	8	no	yes	no	1	7.5	2.3	30	115	0.001	Sand	3.2	0.75	28	28	35	0.31	1.33	38	0	0	842.5	900	38	31.2	62.4	28.807	57.607	2.000	2.000	3.181	N/A	49	0	0	0	0	N/A	25	78	0	78	59	0.88
815.5	814.5	8	9	no	yes	no	1	8.5	2.6	22	115	0.001	Sand	3.5	0.75	21	21	33	0.38	1.35	28	0	0	957.5	1015	35	93.6	124.8	86.407	115.207	2.000	2.000	2.591	N/A	111	1	1	1	1	N/A	25	78	1	78	60	0.92
814.5	813.5	9	10	no	yes	no	1	9.5	2.9	22	115	0.001	Sand	3.8	0.75	21	21	33	0.39	1.30	27	0	0	1072.5	1130	35	156	187.2	144.007	172.807	2.000	2.000	2.528	N/A	178	1	1	2	2	N/A	33	104	2	104	81	0.73
813.5	812.5	10	11	no	yes	no	1	10.5	3.2	26	115	0.001	Sand	4.1	0.85	28	28	35	0.34	1.22	34	0	0	1187.5	1245	37	218.4	249.6	199.107	225.407	2.000	2.000	2.561	N/A	265	2	2	4	4	N/A	33	104	4	104	82	0.76
812.5	811.5	11	12	no	yes	no	1	11.5	3.5	26	124	0.001	Sand	4.4	0.85	28	28	35	0.35	1.18	33	0	0	1307	1369	36	280.8	312	256.207	287.607	2.000	2.000	2.176	N/A	287	2	2	6	6	N/A	33	104	6	104	83	0.78
811.5	810.5	12	13	no	yes	no	1	12.5	3.8	26	124	0.001	Sand	4.7	0.85	28	28	35	0.35	1.15	32	0	0	1431	1493	36	343.2	374.4	317.807	348.607	2.000	2.000	1.893	N/A	307	2	2	8	8	N/A	60	188	8	188	149	0.49
810.5	809.5	13	14	no	yes	no	1	13.5	4.1	49	124	0.001	Sand	5.0	0.85	52	50	41	0.24	1.08	50	0	0	1555	1617	40	405.6	436.8	379.407	410.207	2.000	2.000	2.518	N/A	551	3	3	11	11	N/A	60	188	11	188	152	0.49
809.5	808.5	14	15	no	yes	no	1	14.5	4.4	49	124	0.001	Sand	5.3	0.85	52	50	41	0.24	1.06	50	0	0	1679	1741	40	458.8	490.2	441.007	471.807	2.000	2.000	2.286	N/A	582	4	4	15	15	N/A	40	124	15	124	105	0.71
808.5	807.5	15	16	no	yes	no	1	15.5	4.7	31	124	0.001	Sand	5.6	0.85	33	33	36	0.33	1.05	34	0	0	1803	1865	37	530.4	561.6	502.607	533.407	2.000	2.000	1.900	N/A	419	3	3	17	17	N/A	40	124	17	124	107	0.72
807.5	806.5	16	17	no	yes	no	1	16.5	5.0	31	124	0.001	Sand	5.9	0.85	33	33	36	0.34	1.03	34	0	0	1927	1989	37	592.8	624	564.207	595.007	2.000	2.000	1.472	N/A	432	3	3	20	20	N/A	44	139	20	139	124	0.68
806.5	805.5	17	18	no	yes	no	1	17.5	5.3	31	124	0.001	Sand	6.2	0.95	37	37	37	0.32	1.01	37	0	0	2051	2113	38	655.2	686.4	625.807	656.607	2.000	2.000	1.486	N/A	497	3	3	23	23	N/A	44	139	23	139	123	0.68
805.5	804.5	18	19	no	yes	no	1	18.5	5.6	31	124	0.001	Sand	6.5	0.95	37	37	37	0.32	0.99	36	0	0	2175	2237	37	717.6	748.8	687.407	718.207	2.000	2.000	1.316	N/A	510	3	3	26	26	N/A	44	139	26	139	125	0.69
804.5	803.5	19	20	no	yes	no	1	19.5	5.9	31	124	0.001	Sand	6.8	0.95	37	37	37	0.32	0.97	36	0	0	2299	2361	37	780	811.2	749.007	779.807	2.000	2.000	1.316	N/A	521	3	3	30	30	N/A	36	112	30	112	108	0.87
803.5	802.5	20	21	no	yes	no	1	20.5	6.2	25	124	0.001	Sand	7.1	0.95	30	30	36	0.38	0.95	28	0	0	2423	2485	35	842.4	873.6	810.607	841.407	2.000	2.000	1.084	N/A	435	3	3	32	32	N/A	36	112	32	112	110	0.89
802.5	801.5	21	22	no	yes	no	1	21.5	6.5	25	124	0.001	Sand	7.4	0.95	30	30	36	0.38	0.93	28	0	0	2547	2609	35	904.8	936	872.207	903.007	2.000	2.000	1.034	N/A	444	3	3	35	35	N/A	36	112	35	112	112	0.91
801.5	800.5	22	23	no	yes	no	1	22.5	6.8	25	124	0.001	Sand	7.7	0.95	30	30	36	0.38	0.91	27	0	0	2671	2733	35	967.2	998.4	933.807	964.607	2.000	2.000	0.989	N/A	453	3	3	38	38	N/A	36	112	38	112	114	0.92
800.5	799.5	23	24	no	yes	no	1	23.5	7.1	25	124	0.001	Sand	8.0	0.95	30	30	36	0.39	0.90	27	0	0	2795	2857	35	1029.6	1060.8	995.407	1026.207	2.000	2.000	0.950	N/A	462	3	3	41	41	N/A	36	112	41	112	116	0.94
799.5	798.5	24	25	no	yes	no	1	24.5	7.4	25	124	0.001	Sand	8.3	0.95	30	30	36	0.39	0.88	26	0	0	2919	2981	35	1092	1123.2	1057.007	1087.807	2.000	2.000	0.914	N/A	470	3	3	44	44	N/A	44	139	44	139	139	0.76
798.5	797.5	25	26	no	yes	no	1	25.5	7.7	31	113	0.001	Sand	8.6	0.95	37	37	37	0.35	0.88	32	0	0	3037.5	3094	36	1154.4	1185.6	1113.107	1138.407	2.000	2.000	1.008	N/A	577	4	4	47	47	N/A	44	139	47	139	142	0.77
797.5	796.5	26	27	no	yes	no	1	26.5	8.0	31	113	0.001	Sand	8.9	0.95	37	37	37	0.35	0.87	32	0	0	3150.5	3207	36	1216.8	1248	1163.707	1189.007	2.000	2.000	0.979	N/A	583	4	4	51	51	N/A	44	139	51	139	144	0.78
796.5	795.5	27	28	no	yes	no	1	27.5	8.3	31	113	0.001	Sand	9.2	0.95	37	37	37	0.35	0.86	32	0	0	3263.5	3320	36	1279.2	1310.4	1214.307	1239.607	2.000	2.000	0.951	N/A	589	4	4	55	55	N/A	44	139	55	139	147	0.79
795																																														

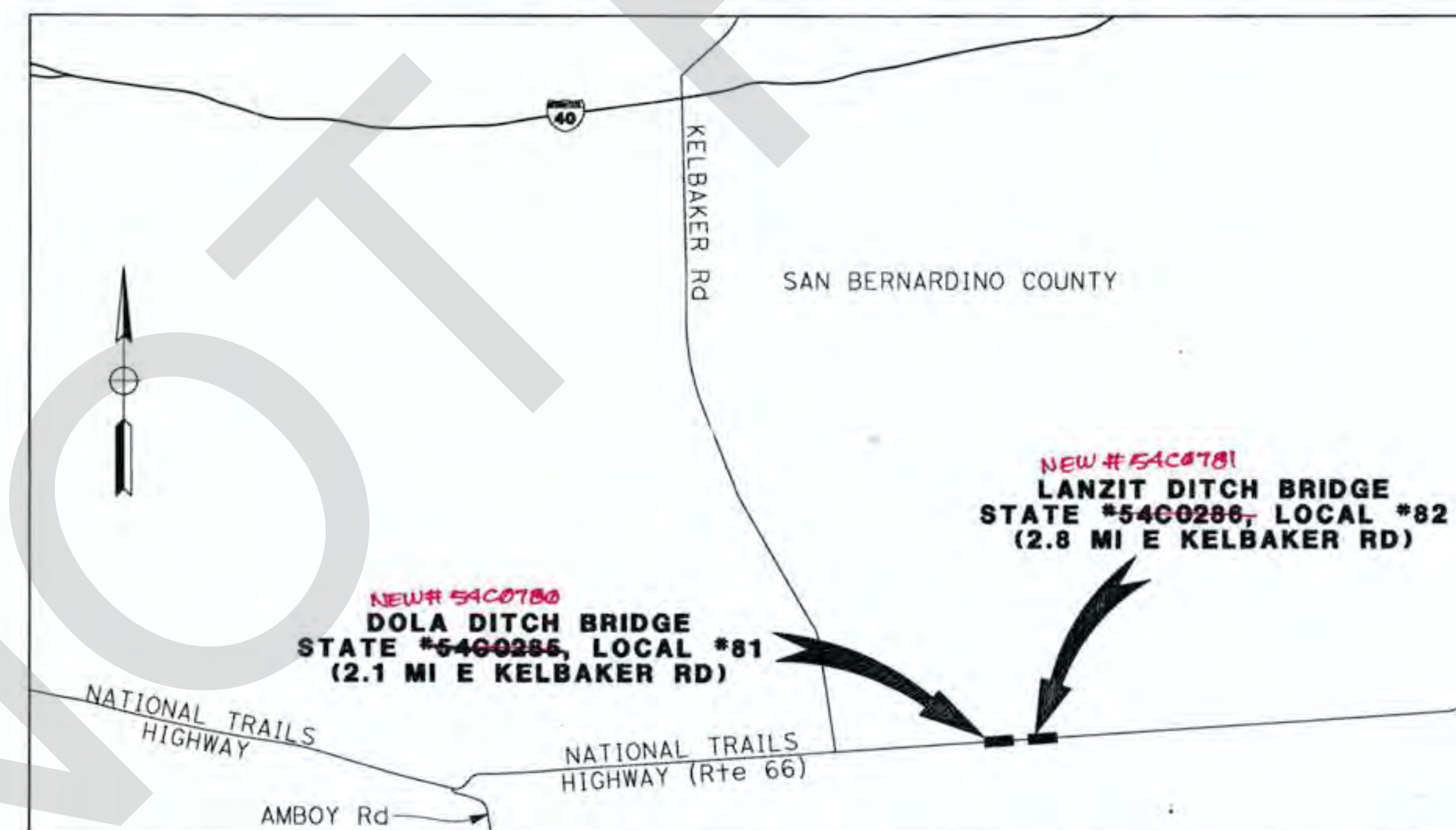
COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS



TRANSPORTATION PLANS FOR CONSTRUCTION ON

BRIDGE REPLACEMENT PROJECT ON NATIONAL TRAILS HIGHWAY AT DOLA DITCH AND LANZIT DITCH

WORK ORDER NO. HF0025/HF0026 ROAD NO. 586600-120



LOCATION MAP
NO SCALE

APPROVED RECORD
DRAWING

AS-BUILT
NO CORRECTIONS THIS SHEET
BY: TARIG MAALIK P.E.
DATE COMPLETED: 10-16-17

COUNTY OF SAN BERNARDINO

APPROVED BY: [Signature] 4-4-2016
MAZIN KASEY, DEPUTY DIRECTOR OF PUBLIC WORKS/ROAD COMMISSIONER, R.C.E. 53328 DATE

RECOMMENDED FOR AUTHORIZATION BY: [Signature] 4/4/16
GERRY NEWCOMBE, DIRECTOR OF PUBLIC WORKS DATE

FILE NO. 586600 120

PLANS PREPARED BY:
**BIGGS CARDOSA
ASSOCIATES INC**
STRUCTURAL ENGINEERS
500 S. Main Street, Suite 400
Orange, California 92668
714-550-4885

MARK	CHANGES	RESIDENT ENGINEER	DATE
	NO CHANGES		
FIELD CHANGES		DWG. No. T1	SHT. No. 1 OF 39

FILE NO. 586600 120

INDEX OF DRAWINGS

DRAWING No.	SHEET No.	TITLE
T1	1	TITLE SHEET
T2	2	INDEX OF DRAWINGS, LEGEND AND ABBREVIATIONS
X1-X2	3-4	TYPICAL SECTIONS
P1-P2	5-6	PLAN AND PROFILE
TH1	7	TRAFFIC HANDLING PLAN
SS1	8	SIGNING AND STRIPING
D1	9	DETOUR PLAN
S1-S14	10-23	DOLA DITCH BRIDGE PLANS
S1-S14	24-37	LANZIT DITCH BRIDGE PLANS
S1-S14	38-39	LOG OF TEST BORINGS

CONSTRUCTION NOTES:

- CONSTRUCT 0.30' HMA (TYPE A) OVER 0.35' AB (CLASS 2)
- 2" GRIND AND HMA (TYPE A) OVERLAY
- INSTALL MIDWEST GUARDRAIL SYSTEM STANDARD RAILING SECTION, PER CALTRANS STD PLAN RSP A77L1, WITH CALTRANS END ANCHOR SYSTEM (TYPE SRT) USING TYPE 12B LAYOUT PER CALTRANS STD PLAN RSP A77Q1
- INSTALL MIDWEST GUARDRAIL SYSTEM STANDARD RAILING SECTION, PER CALTRANS STD PLAN RSP A77L1, WITH CALTRANS END ANCHOR SYSTEM (TYPE SRT), USING TYPE 12BB LAYOUT PER CALTRANS STD PLAN RSP A77Q4
- CONSTRUCT HOT MIX ASPHALT DIKE TYPE A PER CALTRANS STANDARD PLAN RSP A87B PER PLACEMENT AS INDICATED ON CALTRANS STANDARD PLAN A77N4
- INSTALL TYPE E WHITE RETROREFLECTOR (2-SIDED) GUARDRAIL DELINEATOR; SPACING TO BE EVERY 20 FT PER CA MUTCD 2014, FIG 3F-101(CA)
- MODIFY MIDWEST GUARDRAIL SYSTEM TRANSITION RAILING (TYPE WB-31) PER BRIDGE PLANS, SEE S SHEETS

CONSTRUCTION NOTES:

- INSTALL DETAIL 21 STRIPING PER CALTRANS STD DWG A20A
- INSTALL DETAIL 24 STRIPING PER CALTRANS STD DWG A20B
- INSTALL DETAIL 18 STRIPING PER CALTRANS STD DWG A20A
- INSTALL OBJECT MARKER TYPE P (CA)
- PROTECT IN PLACE EXISTING OBJECT MARKER
- REMOVE EXISTING OBJECT MARKER
- INSTALL ROAD CLOSURE BARRICADE PER COUNTY OF SAN BERNARDINO STD DWG 305C

LEGEND AND ABBREVIATIONS:

AB	AGGREGATE BASE
BB	BEGIN BRIDGE
BOI	BEGINNING OF IMPROVEMENTS
DL	DOLA LANZIT CENTERLINE
E	EASTING
(E)	EXISTING
EB	END BRIDGE
EOI	END OF IMPROVEMENTS
ELEV	ELEVATION
EP	EDGE OF PAVEMENT
ETW	EDGE OF TRAVEL WAY
FO	FIBER OPTIC
GB	GRADE BREAK
HMA	HOT MIX ASPHALT
HP	HINGE POINT
LT	LEFT
N	NORTHING
OG	ORIGINAL GROUND
PG	PROFILE GRADE
RT	RIGHT
R/W	RIGHT OF WAY
SHLD	SHOULDER
TI	TRAFFIC INDEX

	PROPOSED PAVEMENT
	GRIND AND OVERLAY
	CONSTRUCTION ZONE
	CLASS 2 AGGREGATE BASE
	TEMPORARY RAILING (TYPE K)
	TYPE III BARRICADE
	TEMPORARY ROADWAY SIGN
	TEMPORARY FENCE
	EXISTING OBJECT MARKER/SIGN
	PROPOSED OBJECT MARKER/SIGN

LANZIT DITCH BRIDGE

PROJECT BENCHMARK:

POINT #6 - FOUND D.O.T. CONCRETE "C" R/W MONUMENT, UP .50', PER CSFB 4224; HELD ELEVATION = 828.59' ESTABLISHED PER GPS CONTROL PROCEDURES.

BASIS OF BEARINGS:

PROJECT BASIS OF BEARINGS IS THE CENTERLINE OF NATIONAL TRAILS HWY PER CS 3145/6-8 BEING N88°42'45"E)

HORIZONTAL AND VERTICAL CONTROL:

RTK GPS CONTROL POINT COORDINATES (CCS83 ZONE 5, NAD-83(1992.88)) AND ELEVATIONS WERE ESTABLISHED USING RAPID-STATIC GPS TIES TO CONTINUOUSLY OPERATING REFERENCE STATIONS: "GMRC", "P603", "P610", & "614".

CONVERSION TO GROUND COORDINATES:

GRID COORDINATES WAS TRANSLATED AT POINT #1.

FROM N 2034973.093 N 5000.000
E 7281508.697 TO E 5000.000

PROJECT DATA WAS THEN ROTATED AROUND POINT #1 (+1°18'26.064") TO THE RECORD BASIS-OF BEARINGS, THEN THE PROJECT DATA WAS SCALED AT POINT #1 (1.0001082305) TO OBTAIN GROUND COORDINATES.

	CCS83 ZONE 5 (1992.8)		GROUND	
	N	E	N	E
POINT 1	2034973.093	7281508.697	5000	5000
POINT 6	2035169.090	7285834.534	5097.269	9329.651

DOLA DITCH BRIDGE

PROJECT BENCHMARK:

POINT #5 - FOUND D.O.T. CONCRETE "C" R/W MONUMENT, UP .50', PER CSFB 4224; HELD ELEVATION = 877.02' ESTABLISHED PER GPS CONTROL PROCEDURES.

BASIS OF BEARINGS:

PROJECT BASIS OF BEARINGS IS THE CENTERLINE OF NATIONAL TRAILS HWY PER CS 3145/6-8 BEING N88°42'45"E)

HORIZONTAL AND VERTICAL CONTROL:

RTK GPS CONTROL POINT COORDINATES (CCS83 ZONE 5, NAD-83(1992.88)) AND ELEVATIONS WERE ESTABLISHED USING RAPID-STATIC GPS TIES TO CONTINUOUSLY OPERATING REFERENCE STATIONS: "GMRC", "P603", "P610", & "614".

CONVERSION TO GROUND COORDINATES:

GRID COORDINATES WAS TRANSLATED AT POINT #1.

FROM N 2034973.093 N 5000.000
E 7281508.697 TO E 5000.000

PROJECT DATA WAS THEN ROTATED AROUND POINT #1 (+1°18'26.064") TO THE RECORD BASIS-OF BEARINGS, THEN THE PROJECT DATA WAS SCALED AT POINT #1 (1.0001082305) TO OBTAIN GROUND COORDINATES.

	CCS83 ZONE 5 (1992.8)		GROUND	
	N	E	N	E
POINT 1	2034973.093	7281508.697	5000	5000
POINT 5	2035203.81	7282182.124	5215.316	5678.589

APPROVED RECORD DRAWING

AS-BUILT
NO CORRECTIONS THIS SHEET
BY TARIQ MAHMOUD, P.E.
DATE COMPLETED 10-16-17

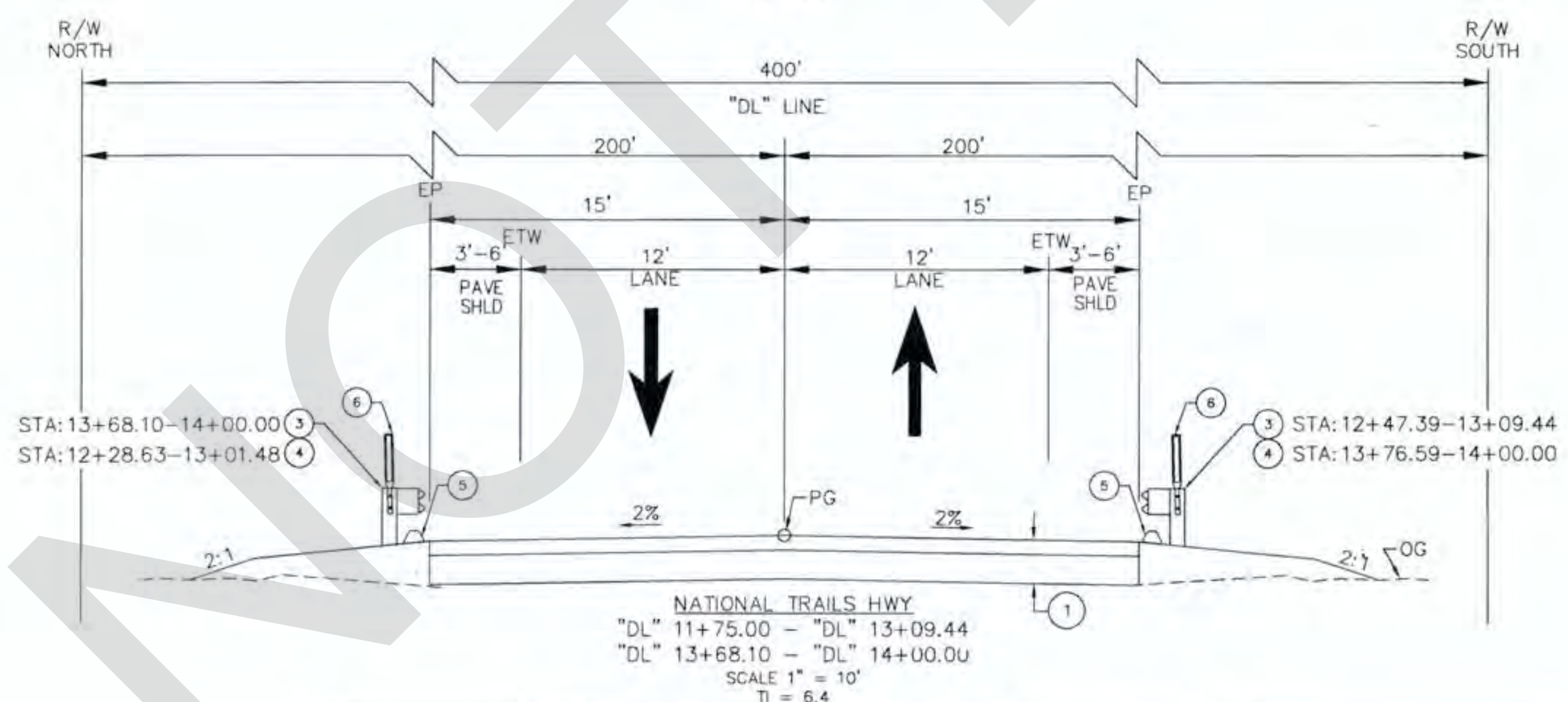
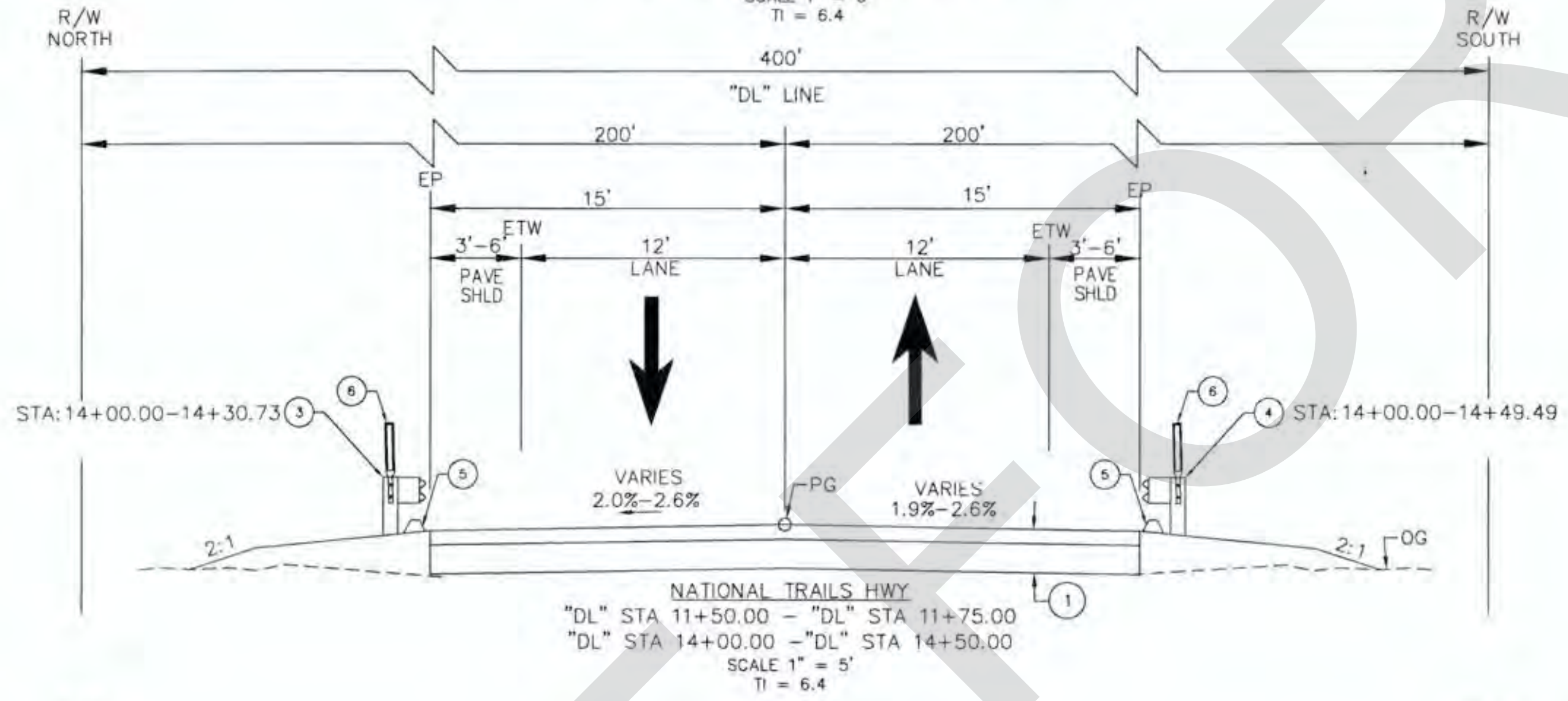
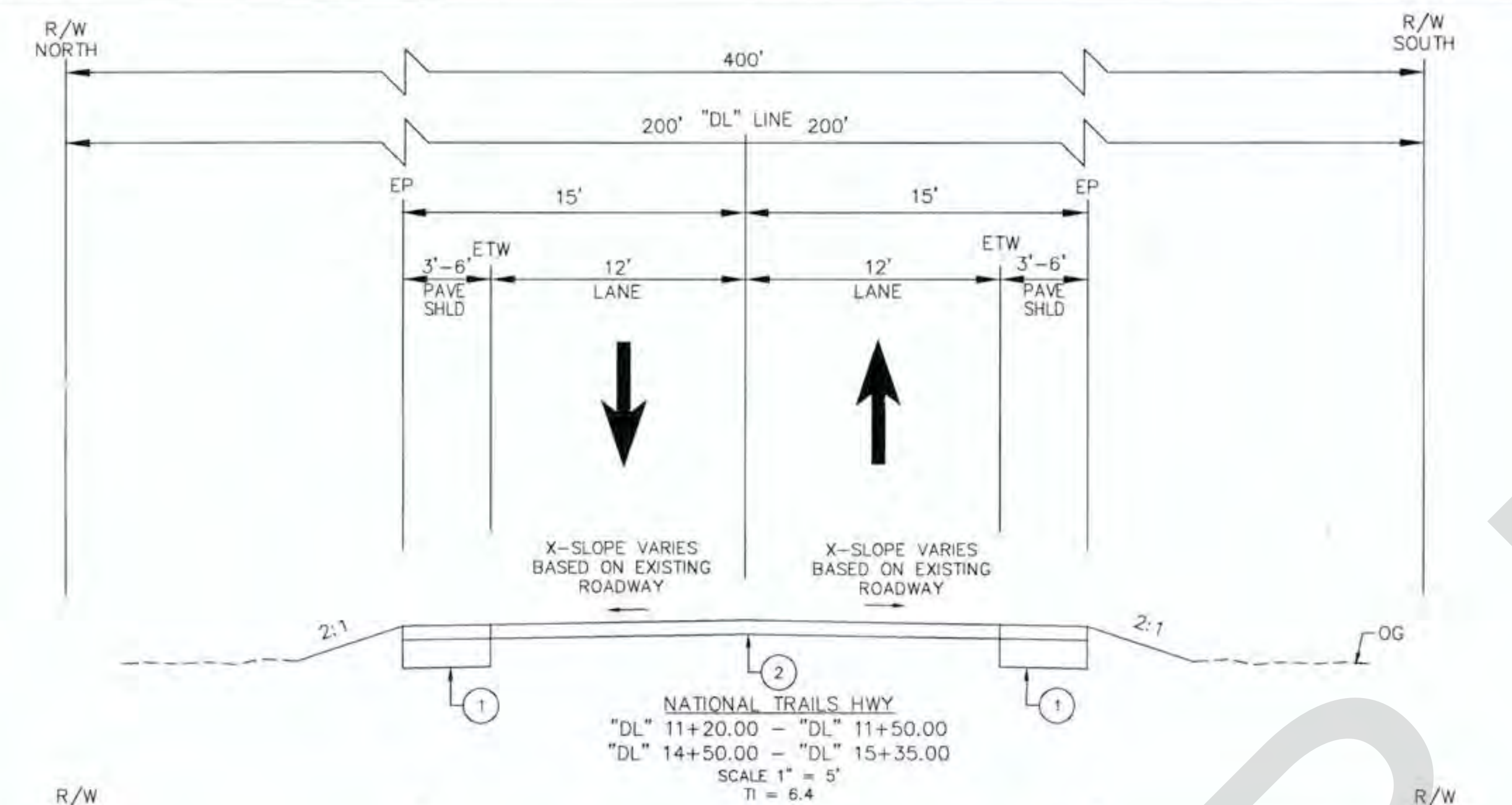
FILE NO. 586600 120

FILE NO. 586600 120

BKF ENGINEERS - SURVEYORS - PLANNERS		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS		DOLA & LANZIT DITCH BRIDGES INDEX OF DRAWINGS LEGEND AND ABBREVIATIONS PROJECT NOTES NATIONAL TRAILS HIGHWAY	
APPROVED BY: CHRIS RIDEOUT NAME 03/31/18 EXPIRES	PLANS PREPARED BY: BKF ENGINEERS (949) 528-8462 18000 VON KARMAN AVE. SUITE 950 IRVINE, CA 92612	REVIEWED BY: ANDY DILOS DATE 4/4/16	RECOMMENDED BY: MERVAT N. KHALIL, P.E., TRANSPORTATION DESIGN, DIVISION CHIEF DATE 4/4/16	APPROVED BY: MAZIN KASEY, P.E., DEPUTY DIRECTOR DATE 4-9-2016	J.L. REF. L 10927 W.O. NO. HF0025 HF0026 SCALE NTS DRWG. NO. T2 SHT. NO. 2 OF 39
FIELD CHANGES					

- CONSTRUCTION NOTES:**
- 1 CONSTRUCT 0.30' HMA (TYPE A) OVER 0.35' AB (CLASS 2)
 - 2 2" GRIND AND HMA (TYPE A) OVERLAY
 - 3 INSTALL MIDWEST GUARDRAIL SYSTEM STANDARD RAILING SECTION, PER CALTRANS STD PLAN RSP A77L1, WITH CALTRANS END ANCHOR SYSTEM (TYPE SRT), USING TYPE 12B LAYOUT PER CALTRANS STD PLAN RSP A77Q1
 - 4 INSTALL MIDWEST GUARDRAIL SYSTEM STANDARD RAILING SECTION, PER CALTRANS STD PLAN RSP A77L1, WITH CALTRANS END ANCHOR SYSTEM (TYPE SRT), USING TYPE 12BB LAYOUT PER CALTRANS STD PLAN RSP A77Q4
 - 5 CONSTRUCT HOT MIX ASPHALT DIKE TYPE A PER CALTRANS STANDARD PLAN RSP A87B PER PLACEMENT AS INDICATED ON CALTRANS STANDARD PLAN A77N4.
 - 6 INSTALL TYPE E WHITE RETROREFLECTOR (2-SIDED) GUARDRAIL DELINEATOR; SPACING TO BE EVERY 20 FT PER CA MUTCD 2014, FIG 3F-101(CA)

CONTRACTOR CAN USE TYPE A OR TYPE E DIKE; EITHER OF THESE TWO COULD BE USED FOR SPALL COLLECTING SYSTEM. (ENTER PERM DIA 8/29/14)





APPROVED RECORD DRAWING

AS BUILT

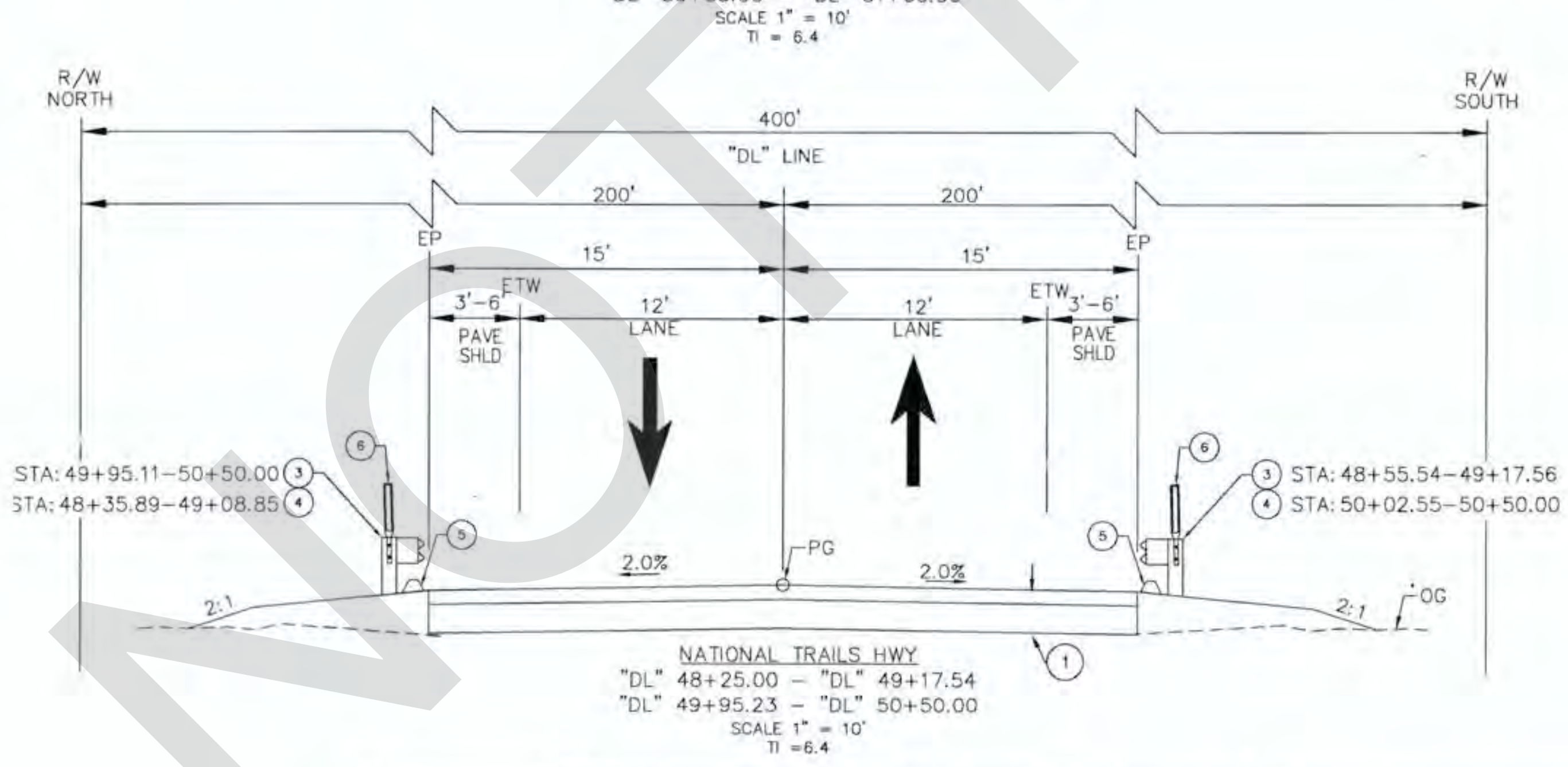
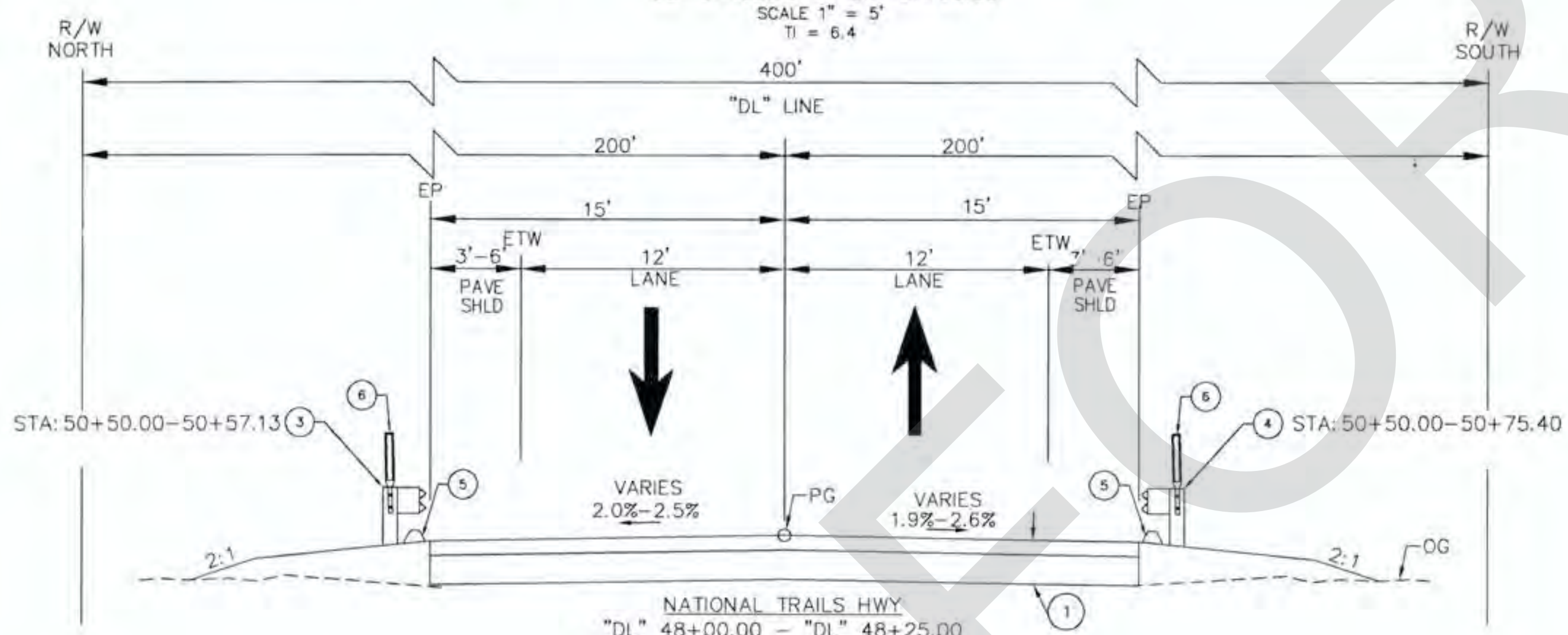
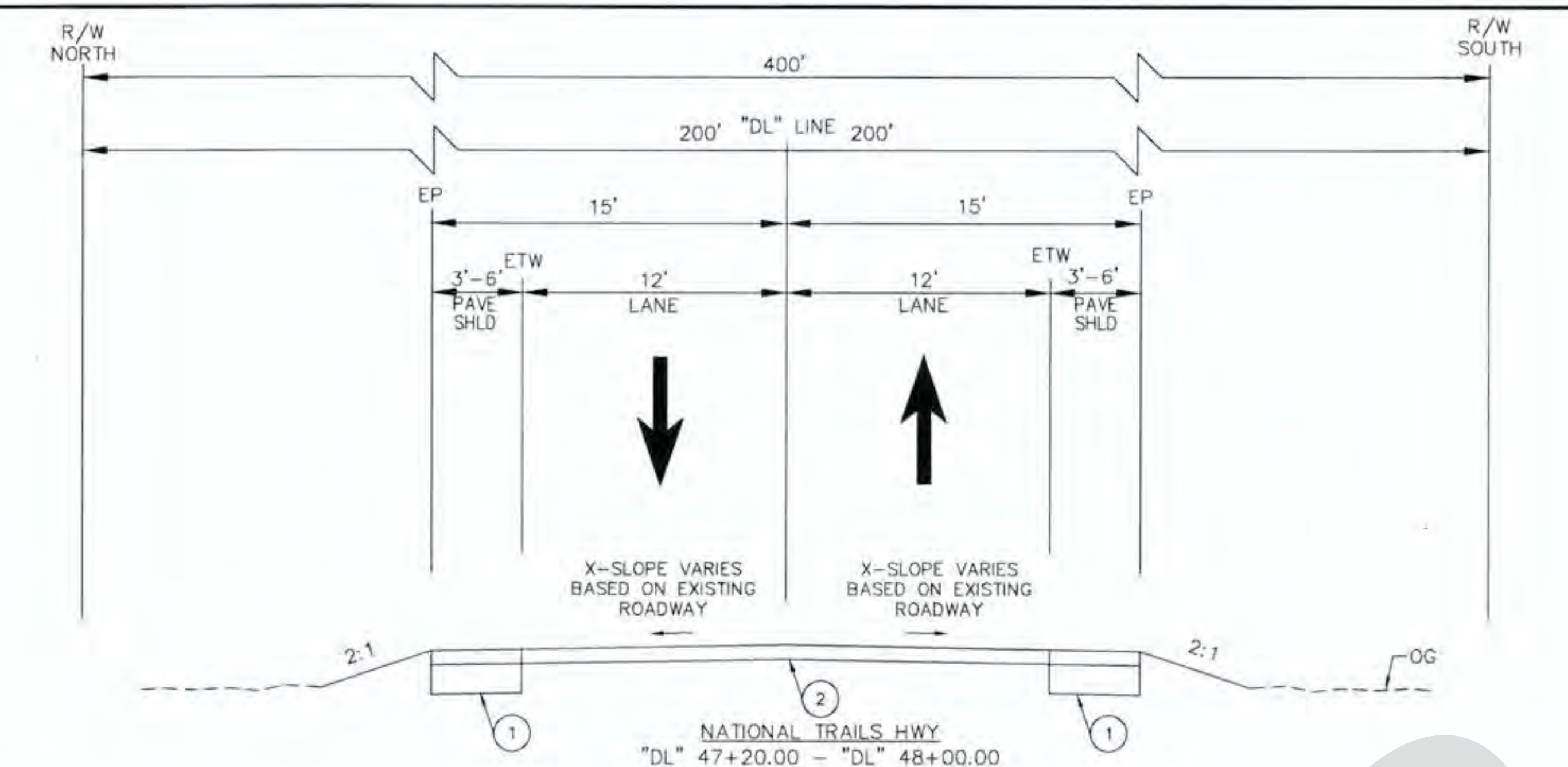
CORRECTIONS BY *Tarib Malik, P.E.*
 CONTRACT NO. BRLS 5954(023)
 DATE 10-16-17

MARK	REVISIONS	DATE

FILE NO. 586600 120

BKF ENGINEERS - SURVEYORS - PLANNERS APPROVED BY:  CHRIS RIDEOUT NAME: CHRIS RIDEOUT EXPIRES: 03/31/18 DATE:		PLANS PREPARED BY:  BKF ENGINEERS 16200 VON KARMAN AVE, SUITE 950 IRVINE, CA 92612		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS REVIEWED BY: <i>Andy Edmond</i> DATE: 9/9/16 RECOMMENDED BY: <i>David Khan</i> DATE: 9/14/16 MERVAT N. MIRJAL, P.E., TRANSPORTATION DESIGN, DIVISION CHIEF APPROVED BY: <i>Mazra Kasey</i> DATE: 9-9-2016 MAZRA KASEY, P.E., DEPUTY DIRECTOR		DOLA DITCH BRIDGE TYPICAL SECTIONS FROM STA. 11+20 TO STA. 15+35	
FIELD CHANGES MARK: NO CHANGES RESIDENT ENGINEER: DATE:				J.L. REF. W.O. NO. SCALE DRWG. NO. SHT. NO. JL 10927 HF0025 AS SHOWN X1 3 OF 39			

- CONSTRUCTION NOTES:**
- 1 CONSTRUCT 0.30' HMA (TYPE A) OVER 0.35' AB (CLASS 2)
 - 2 2" GRIND AND HMA (TYPE A) OVERLAY
 - 3 INSTALL MIDWEST GUARDRAIL SYSTEM STANDARD RAILING SECTION, PER CALTRANS STD PLAN RSP A77L1, WITH CALTRANS END ANCHOR SYSTEM (TYPE SRT), USING TYPE 12B LAYOUT PER CALTRANS STD PLAN RSP A77Q1
 - 4 INSTALL MIDWEST GUARDRAIL SYSTEM STANDARD RAILING SECTION, PER CALTRANS STD PLAN RSP A77L1, WITH CALTRANS END ANCHOR SYSTEM (TYPE SRT), USING TYPE 12BB LAYOUT PER CALTRANS STD PLAN RSP A77Q4
 - 5 CONSTRUCT HOT MIX ASPHALT DIKE TYPE A PER CALTRANS STANDARD PLAN RSP AB7B PER PLACEMENT AS INDICATED ON CALTRANS STANDARD PLAN A77N4.
 - 6 INSTALL TYPE E WHITE RETROREFLECTOR (2-SIDED) GUARDRAIL DELINEATOR; SPACING TO BE EVERY 20 FT PER CA MUTCD 2014, FIG 3F-101(CA)





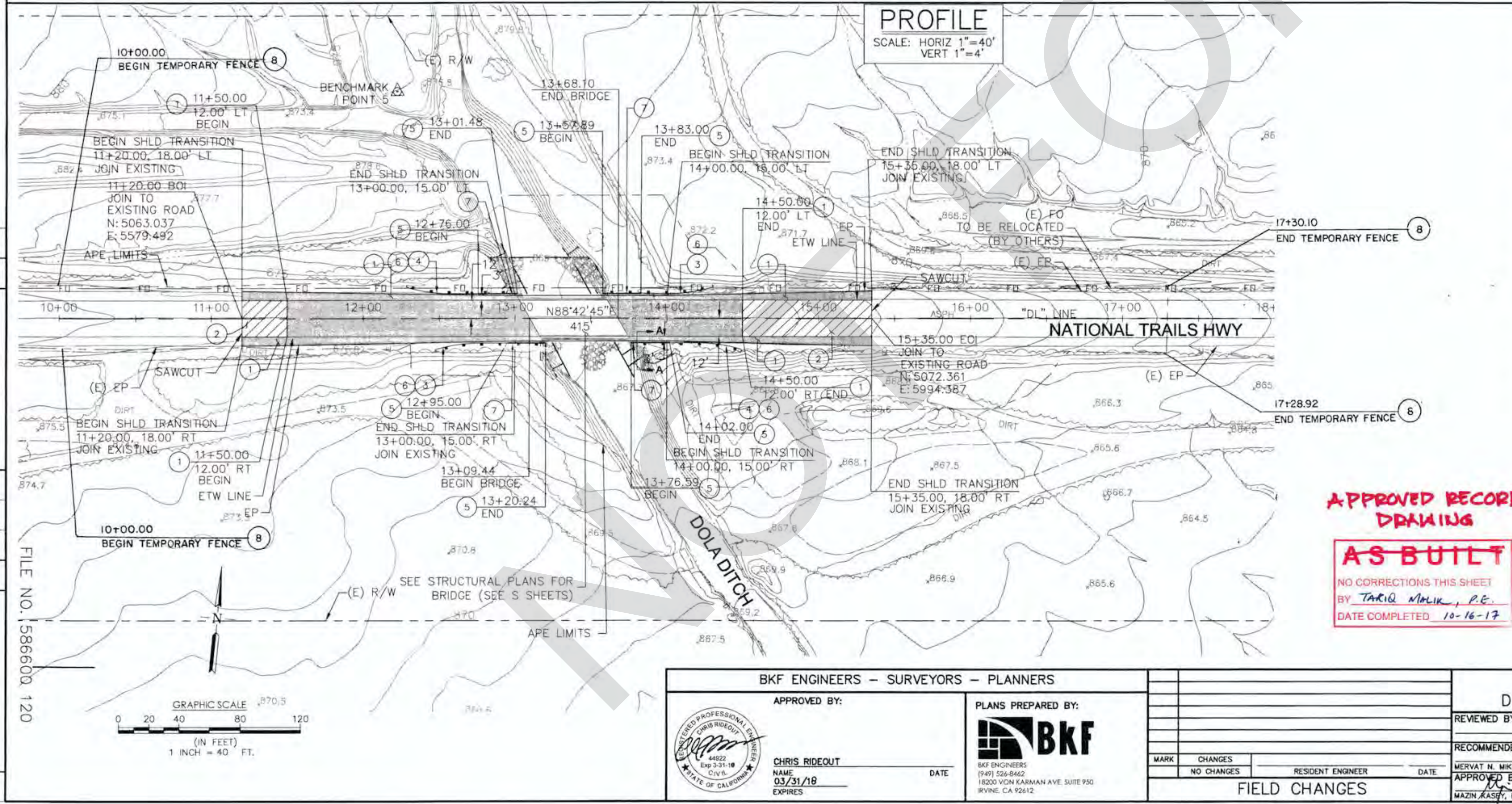
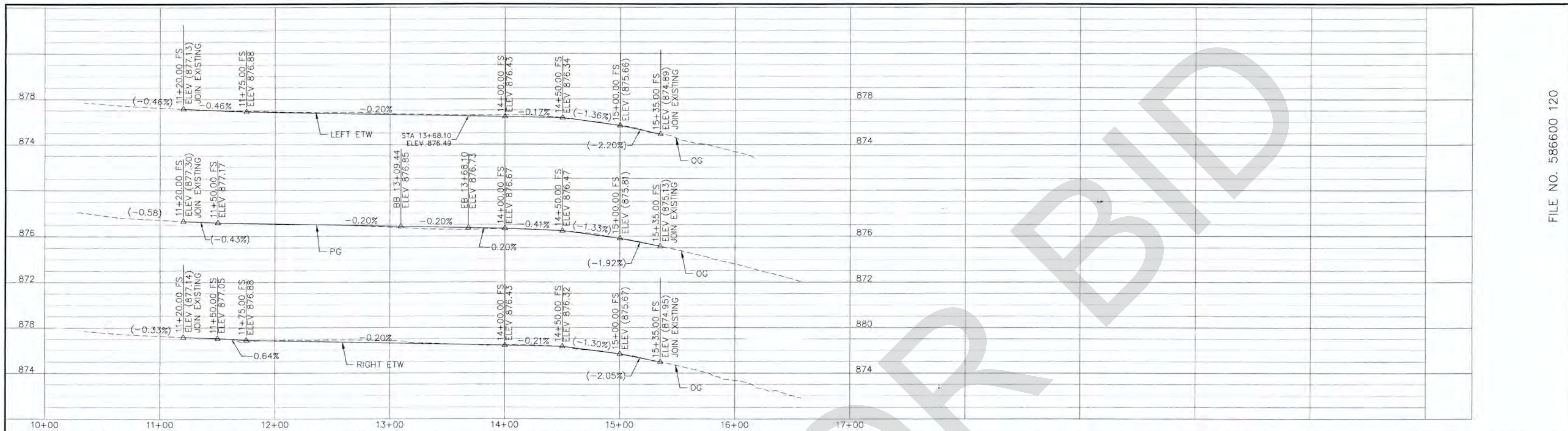
**APPROVED RECORD
DRAWING**

AS-BUILT
 NO CORRECTIONS THIS SHEET
 BY: *Tariq Malik, P.E.*
 DATE COMPLETED: 10-16-17

REVISIONS	MARK	DATE

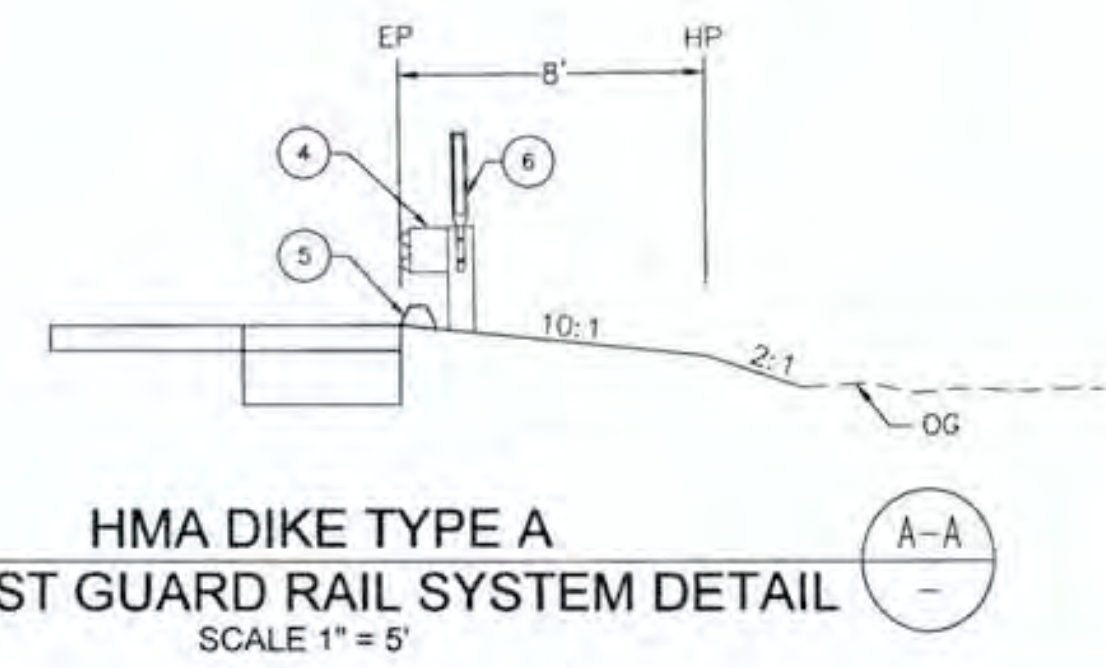
FILE NO. 586600 120

BKF ENGINEERS - SURVEYORS - PLANNERS APPROVED BY:  CHRIS RIDEOUT NAME: CHRIS RIDEOUT DATE: 03/31/18 EXPIRES:		PLANS PREPARED BY:  BKF ENGINEERS 881 ENGINEERS (949) 528-8442 18000 VON KARMAN AVE. SUITE 950 IRVINE, CA 92612		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS REVIEWED BY: <i>Andy Salas</i> DATE: 9/9/16 RECOMMENDED BY: <i>Mervat N. Mihalil</i> DATE: 4/4/16 MERVAT N. MIHAIL, P.E., TRANSPORTATION DESIGN, DIVISION CHIEF APPROVED BY: <i>Mazin Basey</i> DATE: 4-4-2016 MAZIN BASEY, P.E., DEPUTY DIRECTOR		LANZIT DITCH BRIDGE TYPICAL SECTIONS FROM STA. 47+20 TO STA. 51+95	
FIELD CHANGES MARK: NO CHANGES RESIDENT ENGINEER:				SCALE: AS SHOWN DRWG. NO: X2 SHT. NO: 4 OF 39			



- CONSTRUCTION NOTES:**
1. CONSTRUCT 0.30' HMA (TYPE A) OVER 0.35' AB (CLASS 2)
 2. 2" GRIND AND HMA (TYPE A) OVERLAY
 3. INSTALL MIDWEST GUARDRAIL SYSTEM STANDARD RAILING SECTION, PER CALTRANS STD PLAN RSP A77L1, WITH CALTRANS END ANCHOR SYSTEM (TYPE SRT), USING TYPE 12B LAYOUT PER CALTRANS STD PLAN RSP A77Q1
 4. INSTALL MIDWEST GUARDRAIL SYSTEM STANDARD RAILING SECTION, PER CALTRANS STD PLAN RSP A77L1, WITH CALTRANS END ANCHOR SYSTEM (TYPE SRT), USING TYPE 12BB LAYOUT PER CALTRANS STD PLAN RSP A77Q4
 5. CONSTRUCT HOT MIX ASPHALT DIKE TYPE A PER CALTRANS STANDARD PLAN RSP A87B PER PLACEMENT AS INDICATED ON CALTRANS STANDARD PLAN A77N4.
 6. INSTALL MUTCD STANDARD TYPE E WHITE RETROREFLECTOR (2-SIDED) GUARDRAIL DELINEATOR; SPACING TO BE EVERY 20 FT
 7. MODIFY MIDWEST GUARDRAIL SYSTEM TRANSITION RAILING (TYPE WB-31) PER BRIDGE PLANS, SEE S SHEETS
 8. INSTALL TEMPORARY FENCE (TYPE ESA). ESA FENCE LIMITS ARE TO FOLLOW APE NOTES: LIMITS OUTSIDE OF ROADWAY, AS SHOWN ON PLAN.
 1. FOR DOLA DITCH BRIDGE GENERAL BRIDGE PLAN, SEE S1.
 2. FOR SIGNING AND STRIPING, SEE SIGNING AND STRIPING PLAN.

- LEGEND:**
- [Solid Grey Box] PROPOSED PAVEMENT
 - [Hatched Box] GRIND AND OVERLAY



APPROVED RECORD DRAWING

AS-BUILT

NO CORRECTIONS THIS SHEET
 BY TARIQ MOLLIK, P.E.
 DATE COMPLETED 10-16-17

BKF ENGINEERS - SURVEYORS - PLANNERS

APPROVED BY: CHRIS RIDEOUT DATE: 03/31/18

PLANS PREPARED BY: **BKF**

BKF ENGINEERS
 (P40) 528-8462
 18200 VON KARMAN AVE. SUITE P30
 IRVINE, CA 92612

MARK	CHANGES	RESIDENT ENGINEER	DATE
	NO CHANGES		

FIELD CHANGES

COUNTY OF SAN BERNARDINO
 DEPARTMENT OF PUBLIC WORKS

REVIEWED BY: Andy Silco DATE: 4/4/16

RECOMMENDED BY: Mervat N. Mikhail DATE: 4/4/16

APPROVED BY: Mervat N. Mikhail DATE: 4-4-2016

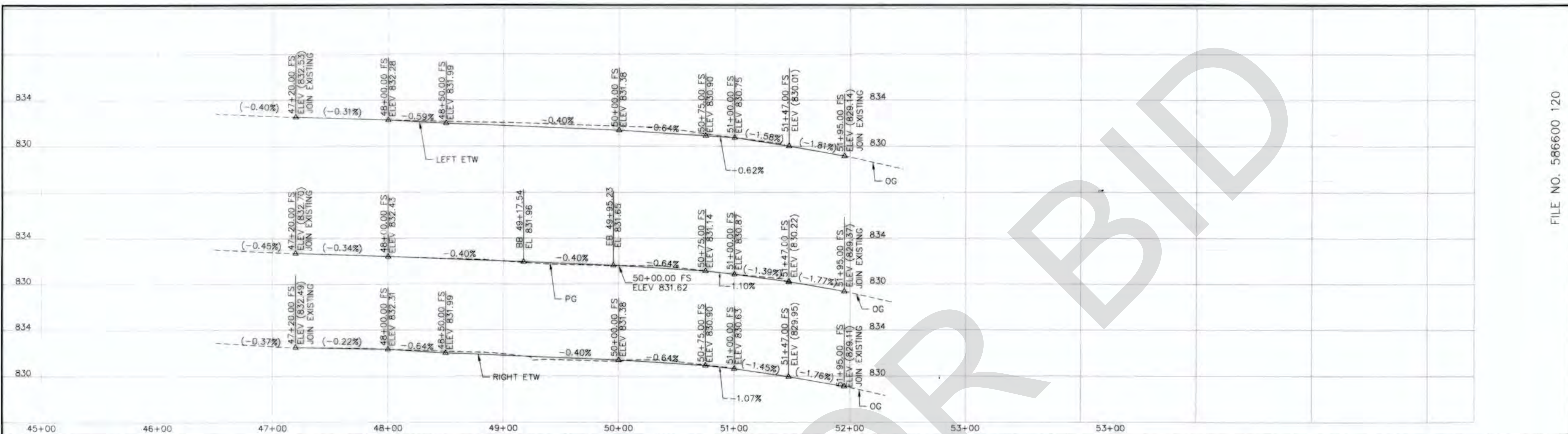
MERVAT N. MIKHAIL, P.E., TRANSPORTATION DESIGN, DIVISION CHIEF
 MAZIN KASBY, P.E., DEPUTY DIRECTOR

DOLA DITCH BRIDGE

PLAN & PROFILE
 FROM STA. 11+20 TO STA. 15+35

J.L. REF. JL 10927	W.O. NO. HF0025	SCALE 1"=40'	DRWG. NO. P1	SHT. NO. 5 OF 39
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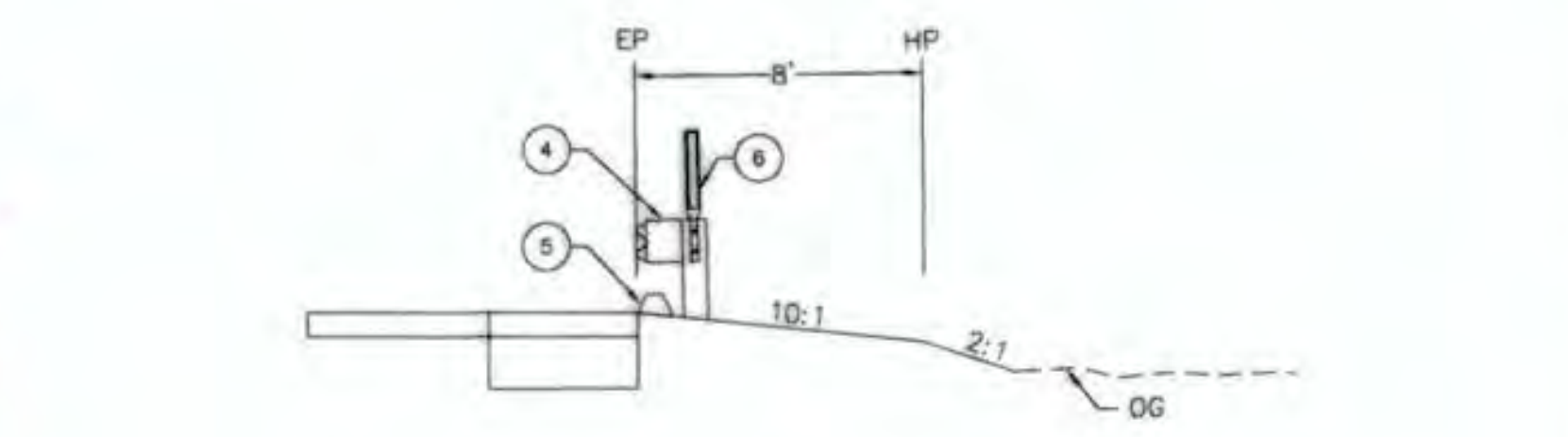
MARK	REVISIONS	DATE



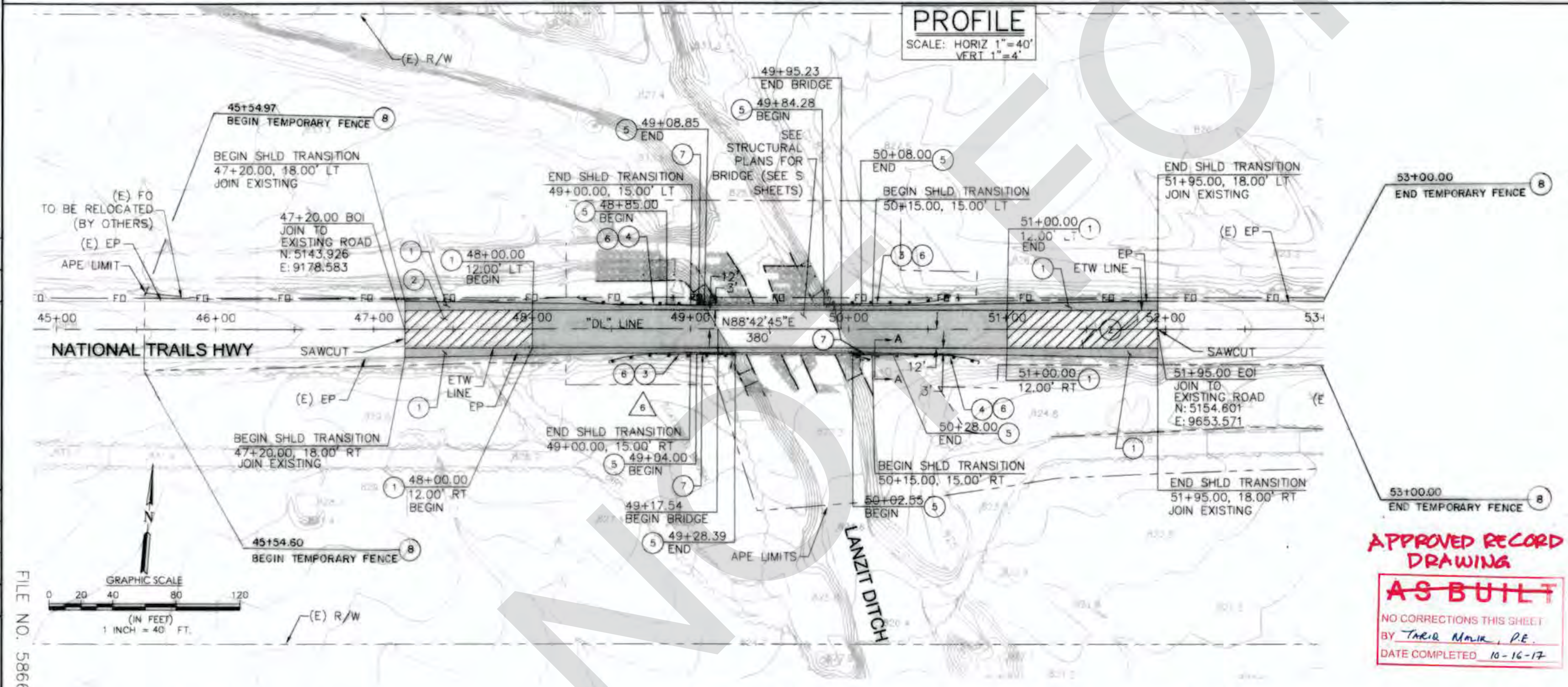
PROFILE
SCALE: HORIZ 1"=40'
VERT 1"=4'

- CONSTRUCTION NOTES:**
1. CONSTRUCT 0.30' HMA (TYPE A) OVER 0.35' AB (CLASS 2)
 2. 2" GRIND AND HMA (TYPE A) OVERLAY
 3. INSTALL MIDWEST GUARDRAIL SYSTEM STANDARD RAILING SECTION, PER CALTRANS STD PLAN RSP A77L1, WITH CALTRANS END ANCHOR SYSTEM (TYPE SRT) USING TYPE 12B LAYOUT PER CALTRANS STD PLAN RSP A77Q1
 4. INSTALL MIDWEST GUARDRAIL SYSTEM STANDARD RAILING SECTION, PER CALTRANS STD PLAN RSP A77L1, WITH CALTRANS END ANCHOR SYSTEM (TYPE SRT), USING TYPE 12BB LAYOUT PER CALTRANS STD PLAN RSP A77Q4
 5. CONSTRUCT HOT MIX ASPHALT DIKE TYPE A PER CALTRANS STANDARD PLAN RSP A87B PER PLACEMENT AS INDICATED ON CALTRANS STANDARD PLAN A77N4.
 6. INSTALL MUTCD STANDARD TYPE E WHITE RETROREFLECTOR (2-SIDED) GUARDRAIL DELINEATOR; SPACING TO BE EVERY 20 FT
 7. MODIFY MIDWEST GUARDRAIL SYSTEM TRANSITION RAILING (TYPE WB-31) PER BRIDGE PLANS, SEE S SHEETS
 8. INSTALL TEMPORARY FENCE (TYPE ESA). ESA FENCE LIMITS ARE TO FOLLOW APE LIMITS OUTSIDE OF ROADWAY, AS SHOWN ON PLAN.

- LEGEND:**
- PROPOSED PAVEMENT
 - GRIND AND OVERLAY





HMA DIKE TYPE A
MIDWEST GUARD RAIL SYSTEM DETAIL
SCALE 1"=5'

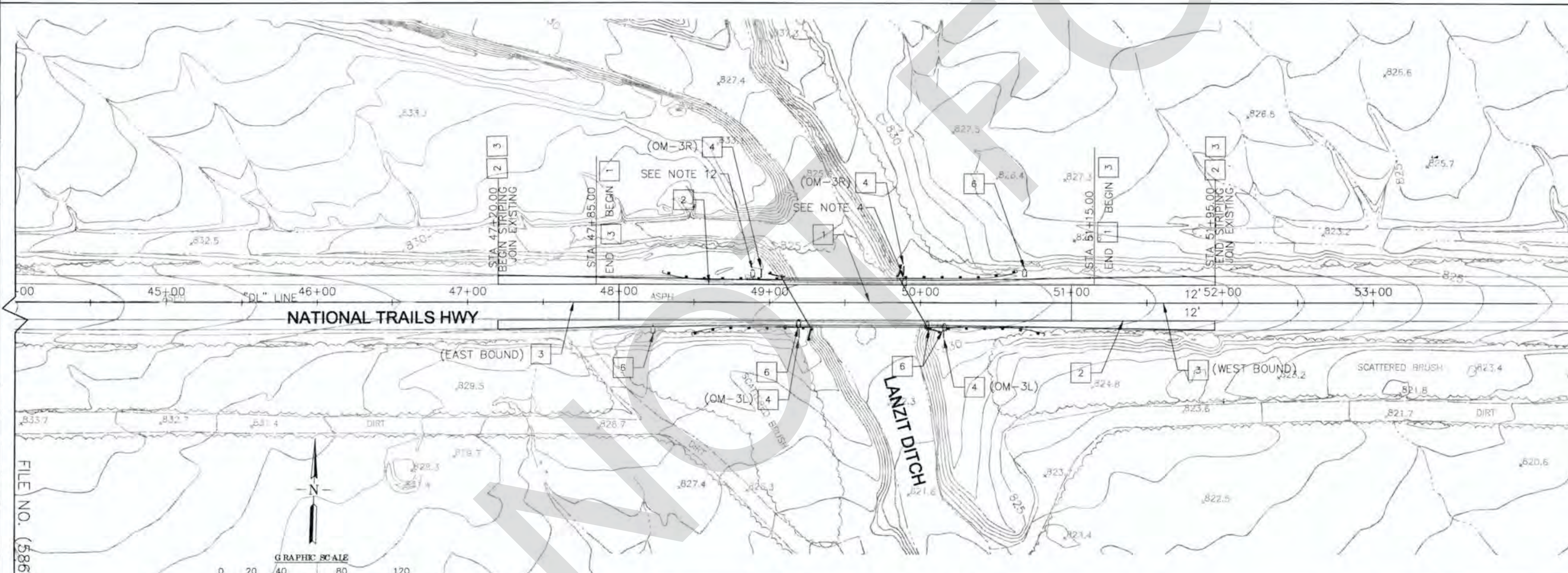
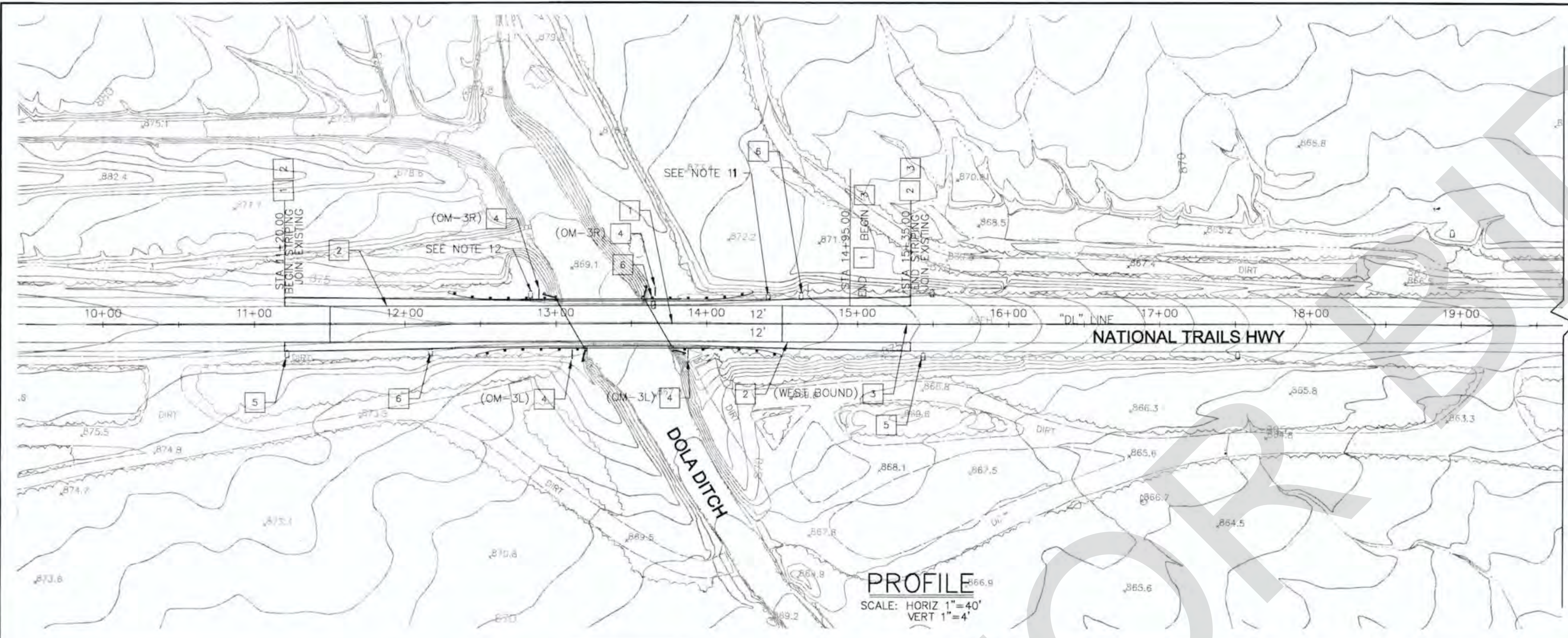


APPROVED RECORD DRAWING
AS-BUILT
NO CORRECTIONS THIS SHEET
BY *TARIB MAMIK, P.E.*
DATE COMPLETED 10-16-17

REVISIONS	APPR. DATE	BY

FILE NO. 586600 120

BKF ENGINEERS - SURVEYORS - PLANNERS APPROVED BY:  CHRIS RIDEOUT NAME 03/31/18 EXPIRES		PLANS PREPARED BY:  BKF BKF ENGINEERS (714) 534-8402 1800 VON KARMAN AVE. SUITE 930 IRVINE, CA 92612		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS REVIEWED BY: <i>Andy Dubois</i> DATE: 4/16/18 RECOMMENDED BY: <i>Tarib Mamik</i> DATE: 4/16/18 MERVAT N. MINJAE, TRANSPORTATION DESIGN DIVISION CHIEF APPROVED BY: <i>Mazin Kasbi</i> MAZIN KASBI, P.E., DEPUTY DIRECTOR DATE: 4-9-2018		LANZIT DITCH BRIDGE PLAN & PROFILE FROM STA. 47+20 TO STA. 51+95 J.L. REF. W.O. NO. SCALE DRWG. NO. SHT. NO. JL 10927 HF0026 1"=40' P2 6 OF 39	
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- NOTES:**
1. ALL SIGNING, STRIPING, AND PAVEMENT MARKINGS SHALL BE IN CONFORMANCE WITH 2014 CALIFORNIA MUTCD.
 2. ALL STRIPING AND PAVEMENT MARKINGS SHALL BE PAINTED IN CONFORMANCE WITH THE 2010 CALTRANS STANDARD PLANS.
 3. ALL STRIPING (LONG LINE) AND PAVEMENT MARKINGS SHALL BE RETROREFLECTIVE PAINT.
 4. ALL SIGNS SHALL BE OF HIGH INTENSITY (FHWA TYPE III/IV) RETROREFLECTIVE SHEETING.
 5. ALL DELINEATORS, CHANNELIZERS, AND OBJECT MARKERS SHALL BE OF FHWA TYPE VII RETROREFLECTIVE SHEETING.
 6. SIGNS SHALL BE MOUNTED ON METAL POSTS SIMILAR TO COUNTY STANDARDS 303(A) AND 303(B).
 7. ALL CONFLICTING STRIPING AND PAVEMENT MARKINGS NOT SHOWN ON PLANS SHALL BE REMOVED BY CONTRACTOR. REMOVAL SHALL BE ACCOMPLISHED BY SANDBLASTING, GRINDING, OR AS DIRECTED BY COUNTY REPRESENTATIVE.
 8. ALL CONFLICTING SIGNS SHALL BE REMOVED, RELOCATED, OR COVERED BY THE CONTRACTOR. RELOCATABLE SIGNS SHALL BE INSTALLED AS SPECIFIED ON THE PLANS OR AS DIRECTED BY COUNTY REPRESENTATIVE.
 9. ALL UNPROTECTED LOCATIONS RESULTING IN ISOLATED ABRUPT DEPRESSIONS OR ELEVATED OBJECTS (I.E. CATCH BASINS, HEADWALLS, POWERPOLES, END TREATMENT OF ASPHALT DIKES AND CONCRETE CURBS) SHALL BE PROTECTED BY DELINEATORS OR BARRIERS PER THE CALIFORNIA MUTCD.
 10. ALL EXISTING SIGNING, STRIPING AND PAVEMENT MARKINGS (I.E. CROSS STREET STOP, STOP LIMIT LINE, AND CROSSWALK PAVEMENT MARKINGS) NOT SHOWN ON PLANS, IF REMOVED/OBLITERATED, SHALL BE REPLACED/RESTORED OF SAME KIND, AND IN CONFORMANCE WITH THE 2014 CALIFORNIA MUTCD.
 11. FIBER OPTIC LINE AND SIGNAGE TO BE RELOCATED BY OTHERS.

- CONSTRUCTION NOTES**
- 1 INSTALL DETAIL 21 STRIPING PER CALTRANS STD DWG A20A
 - 2 INSTALL DETAIL 27B STRIPING PER CALTRANS STD DWG A20B
 - 3 INSTALL DETAIL 18 STRIPING PER CALTRANS STD DWG A20A
 - 4 INSTALL OBJECT MARKER TYPE P (CA)
 - 5 PROTECT IN PLACE EXISTING OBJECT MARKER
 - 6 REMOVE EXISTING OBJECT MARKER

- LEGEND**
- 0 EXISTING OBJECT MARKER/SIGN
 - 1 PROPOSED OBJECT MARKER/SIGN

APPROVED RECORD DRAWING

AS BUILT

NO CORRECTIONS THIS SHEET

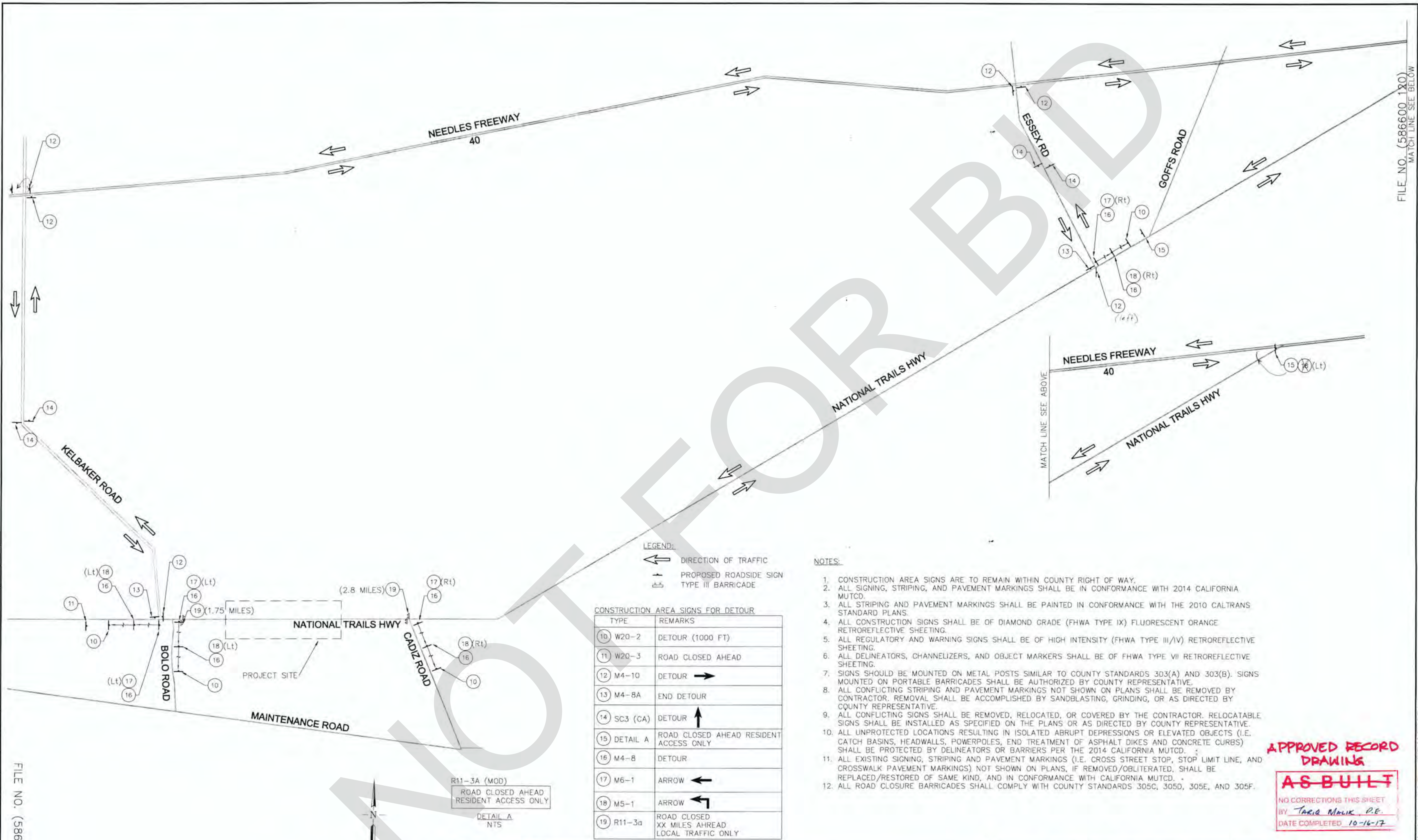
BY **TARQ MAWLA, P.E.**

DATE COMPLETED **10-16-17**

REVISIONS	MARK	DATE	APPR.

FILE NO. (586600 120)

BKF ENGINEERS - SURVEYORS - PLANNERS APPROVED BY: CHRIS RIDEOUT NAME: 03/31/18 EXPIRES:		PLANS PREPARED BY: BKF INC 152925 (949) 528-4402 18200 VO N KAHMAN AVE, SUITE 650 IRVINE, CA 92612		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS REVIEWED BY: MOHAMMAD SIDDIQI, P.E., TRAFFIC DIVISION DATE: 4/4/16 RECOMMENDED BY: MOHAMMAD DURESHI, PHD, P.E., T.E., DIVISION CHIEF DATE: 4/4/16 APPROVED BY: MAZIN KASEY, P.E., DEPUTY DIRECTOR DATE: 4-4-2016		DOLA & LANZIT DITCH BRIDGES SIGNING AND STRIPING NATIONAL TRAILS HIGHWAY J.L. REF. W.O. NO. SCALE DRWG. NO. SH. NO. J.L. 10927 J.L. HF0022 HF0026 1"=40' SS1 8 OF 39	
FIELD CHANGES MARK CHANGES RESIDENT ENGINEER DATE NO CHANGES				DATE			



LEGEND:
 ← DIRECTION OF TRAFFIC
 - PROPOSED ROADSIDE SIGN
 ≡ TYPE III BARRICADE

NOTES:

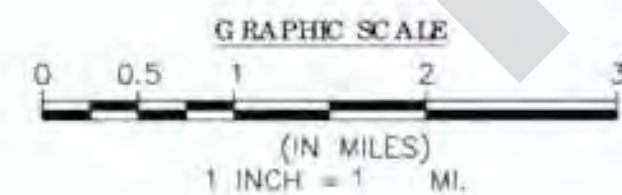
1. CONSTRUCTION AREA SIGNS ARE TO REMAIN WITHIN COUNTY RIGHT OF WAY.
2. ALL SIGNING, STRIPING, AND PAVEMENT MARKINGS SHALL BE IN CONFORMANCE WITH 2014 CALIFORNIA MUTCD.
3. ALL STRIPING AND PAVEMENT MARKINGS SHALL BE PAINTED IN CONFORMANCE WITH THE 2010 CALTRANS STANDARD PLANS.
4. ALL CONSTRUCTION SIGNS SHALL BE OF DIAMOND GRADE (FHWA TYPE IX) FLUORESCENT ORANGE RETROREFLECTIVE SHEETING.
5. ALL REGULATORY AND WARNING SIGNS SHALL BE OF HIGH INTENSITY (FHWA TYPE III/IV) RETROREFLECTIVE SHEETING.
6. ALL DELINEATORS, CHANNELIZERS, AND OBJECT MARKERS SHALL BE OF FHWA TYPE VII RETROREFLECTIVE SHEETING.
7. SIGNS SHOULD BE MOUNTED ON METAL POSTS SIMILAR TO COUNTY STANDARDS 303(A) AND 303(B). SIGNS MOUNTED ON PORTABLE BARRICADES SHALL BE AUTHORIZED BY COUNTY REPRESENTATIVE.
8. ALL CONFLICTING STRIPING AND PAVEMENT MARKINGS NOT SHOWN ON PLANS SHALL BE REMOVED BY CONTRACTOR. REMOVAL SHALL BE ACCOMPLISHED BY SANDBLASTING, GRINDING, OR AS DIRECTED BY COUNTY REPRESENTATIVE.
9. ALL CONFLICTING SIGNS SHALL BE REMOVED, RELOCATED, OR COVERED BY THE CONTRACTOR. RELOCATABLE SIGNS SHALL BE INSTALLED AS SPECIFIED ON THE PLANS OR AS DIRECTED BY COUNTY REPRESENTATIVE.
10. ALL UNPROTECTED LOCATIONS RESULTING IN ISOLATED ABRUPT DEPRESSIONS OR ELEVATED OBJECTS (I.E. CATCH BASINS, HEADWALLS, POWERPOLES, END TREATMENT OF ASPHALT DIKES AND CONCRETE CURBS) SHALL BE PROTECTED BY DELINEATORS OR BARRIERS PER THE 2014 CALIFORNIA MUTCD.
11. ALL EXISTING SIGNING, STRIPING AND PAVEMENT MARKINGS (I.E. CROSS STREET STOP, STOP LIMIT LINE, AND CROSSWALK PAVEMENT MARKINGS) NOT SHOWN ON PLANS, IF REMOVED/OBLITERATED, SHALL BE REPLACED/RESTORED OF SAME KIND, AND IN CONFORMANCE WITH CALIFORNIA MUTCD.
12. ALL ROAD CLOSURE BARRICADES SHALL COMPLY WITH COUNTY STANDARDS 305C, 305D, 305E, AND 305F.

CONSTRUCTION AREA SIGNS FOR DETOUR

TYPE	REMARKS
10	W20-2 DETOUR (1000 FT)
11	W20-3 ROAD CLOSED AHEAD
12	M4-10 DETOUR →
13	M4-8A END DETOUR
14	SC3 (CA) DETOUR ↑
15	DETAIL A ROAD CLOSED AHEAD RESIDENT ACCESS ONLY
16	M4-8 DETOUR
17	M6-1 ARROW ←
18	M5-1 ARROW ↙
19	R11-3a ROAD CLOSED XX MILES AHEAD LOCAL TRAFFIC ONLY

R11-3A (MOD)
 ROAD CLOSED AHEAD
 RESIDENT ACCESS ONLY

DETAIL A
 NTS



BKF ENGINEERS - SURVEYORS - PLANNERS

APPROVED BY:

 CHRIS RIDEOUT
 NAME
 03/31/18
 EXPIRES

PLANS PREPARED BY:

BKF
 BKF ENGINEERS
 18200 VO N BARMAN AVE, SUITE 900
 IRVINE, CA 92612

MARK	CHANGES	RESIDENT ENGINEER	DATE
	NO CHANGES		

FIELD CHANGES

COUNTY OF SAN BERNARDINO
 DEPARTMENT OF PUBLIC WORKS

REVIEWED BY:
 MOHAMMAD QURESHI, P.E., TRAFFIC DIVISION
 DATE: 4/1/18

RECOMMENDED BY:
 MOHAMMAD QURESHI, PHD, P.E., T.E., DIVISION CHIEF
 DATE: 4/1/18

APPROVED BY:
 MAZIN KASBY, P.E., DEPUTY DIRECTOR
 DATE: 4-4-2018

DOLA & LANZIT
 DITCH BRIDGES
 DETOUR PLAN
 NATIONAL TRAILS HIGHWAY

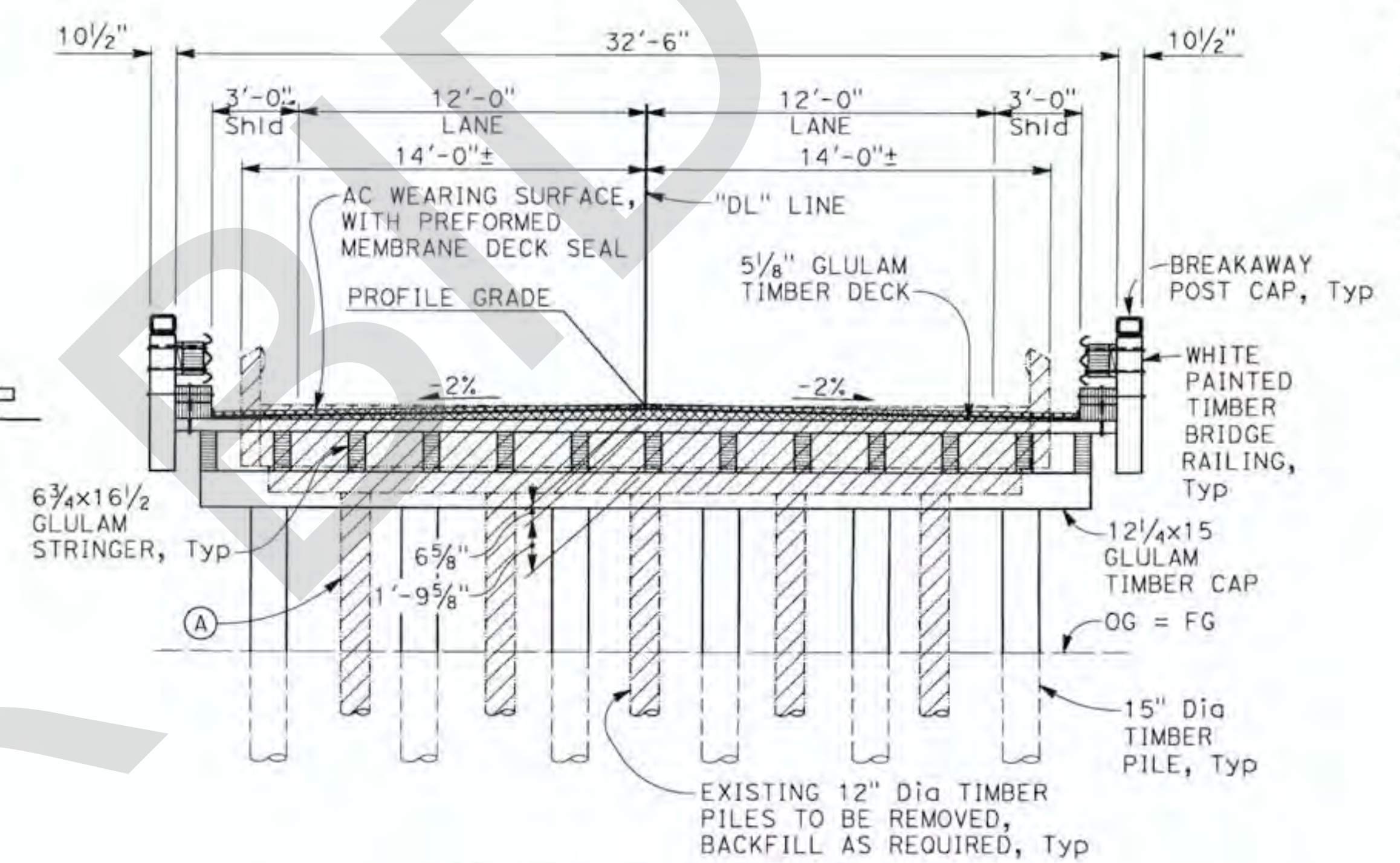
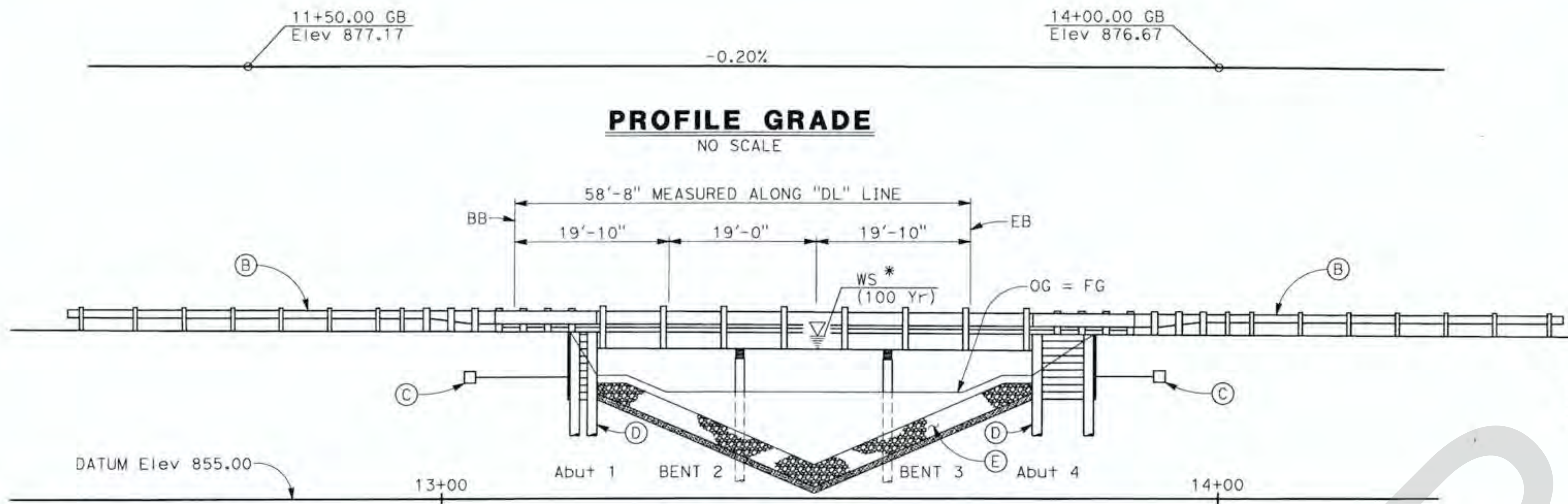
J.L. REF. JL 10927
 W.O. NO. HF0023
 SCALE 1" = 1 MI.
 DRWG. NO. D1
 SH. NO. 9 OF 39

APPROVED RECORD DRAWING
AS-BUILT
 NO CORRECTIONS THIS SHEET
 BY *Tarig Malik, P.E.*
 DATE COMPLETED 10-16-17

REVISIONS	DATE	APPR.

FILE NO. (586600 120)

FILE NO. (586600 120)
 MATCH LINE SEE BELOW



TYPICAL SECTION
1/4" = 1'-0"

- NOTES:
- (A) Remove existing bridge (54C0285)
 - (B) Midwest Guardrail System, see "Roadway Plans"
 - (C) Deadman Tieback
 - (D) Closed-end and backfilled timber pile strutted abutment
 - (E) Rock slope protection, see "ROCK SLOPE PROTECTION" sheet.
1. For General Notes, Index to Bridge Plans, and Pile Data Table, see "GENERAL NOTES" sheet.

- LEGEND:
- Indicates Bridge Removal
 - Indicates Rock Slope Protection
 - Indicates Existing Structure
 - Indicates Traffic Direction

- (B7-11) Indicates Caltrans Standard Plan sheet No.
- (U42) Indicates Detail No.
- (A 55) Indicates sheet No. shown on
- (1 56) Indicates sheet No. shown on

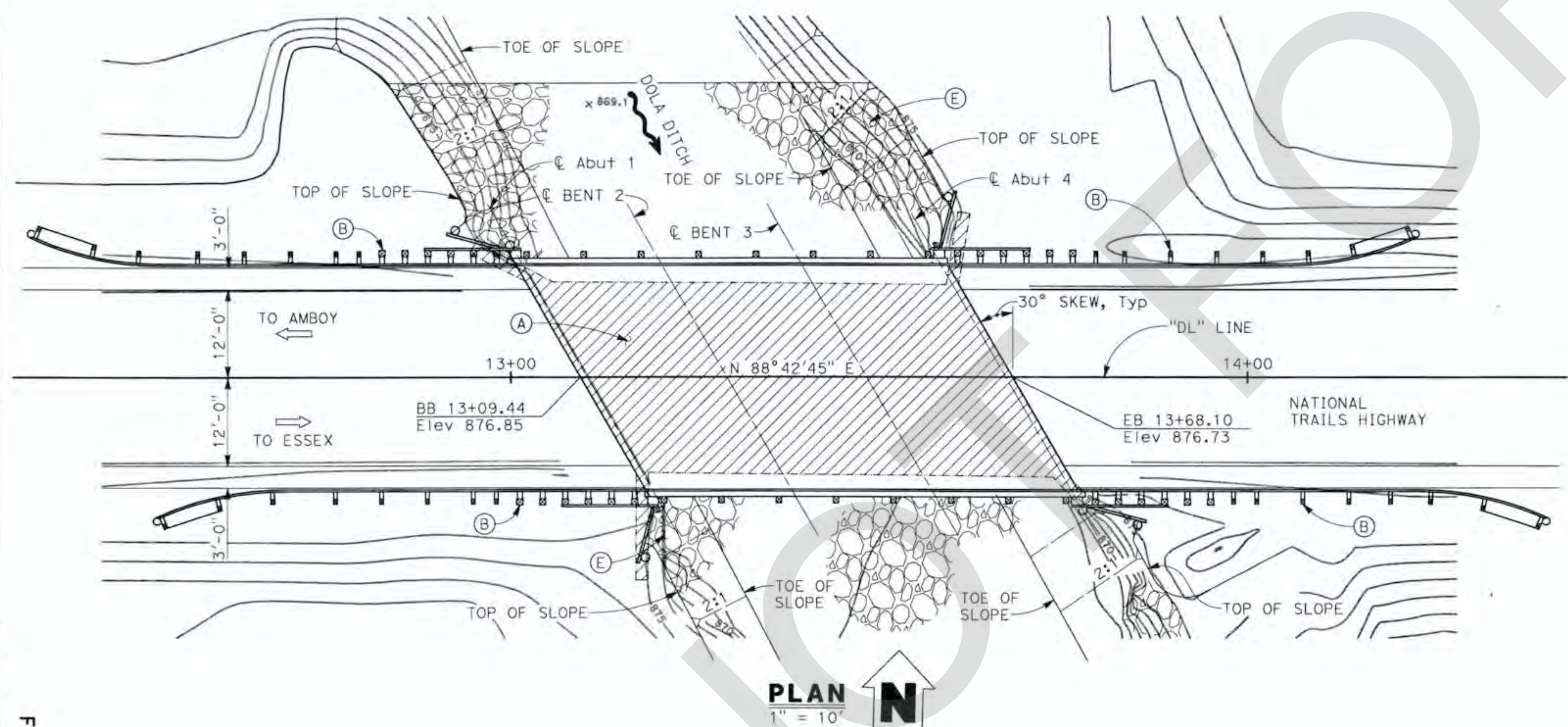
APPROVED RECORD DRAWING

AS BUILT

NO CORRECTIONS THIS SHEET

BY *Tareq M. M. P.E.*

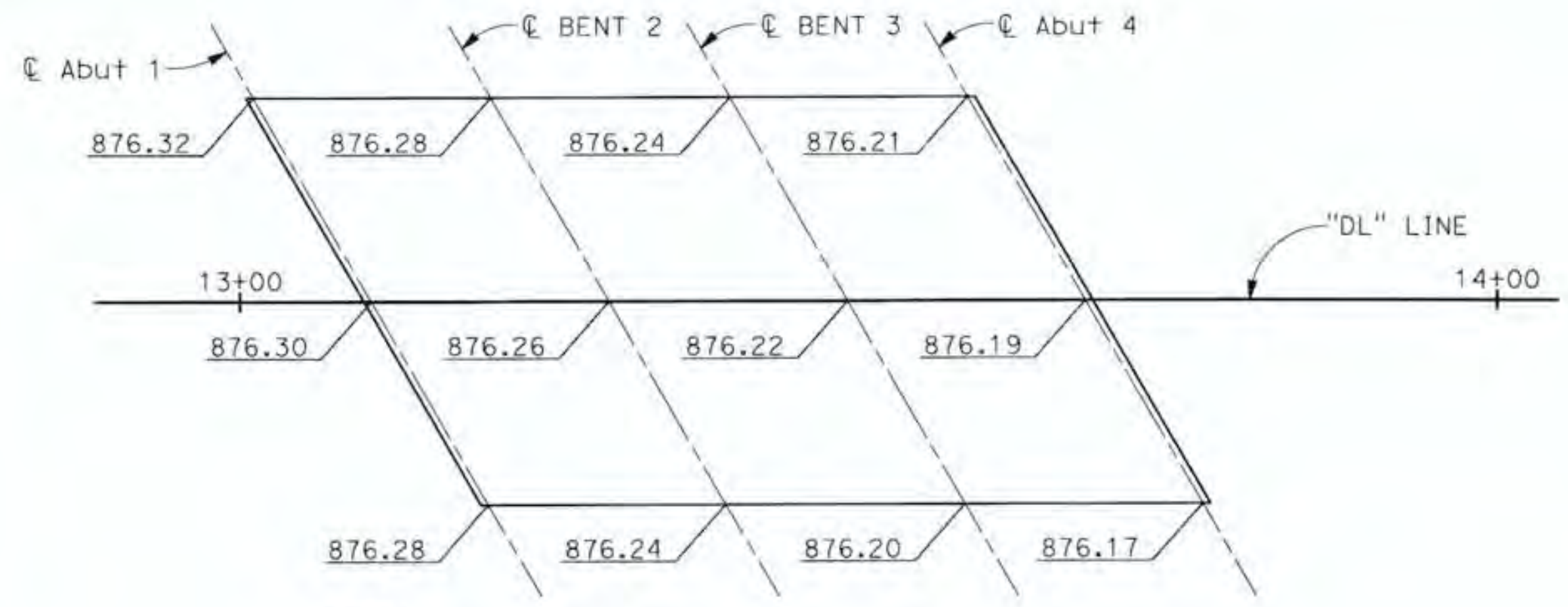
DATE COMPLETED 10-16-17



FILE NO. 586600 120

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

BIGGS CARDOSA ASSOCIATES, INC. APPROVED BY: <i>[Signature]</i> 4/4/16 NAME: 9/30/16 EXPIRES REGISTERED PROFESSIONAL ENGINEER MICHAEL A. THORNTON No. 54676 Exp. 9/30/16 STATE OF CALIFORNIA		PLANS PREPARED BY: BIGGS CARDOSA ASSOCIATES INC STRUCTURAL ENGINEERS 800 So. Main St, Suite 400 Orange, California 92668 714-550-4655 BCA		DESIGNED BY: RBS DRAWN BY: DM CHECKED BY: GDD DATE: 3/4/16		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS REVIEWED BY: <i>[Signature]</i> 4/4/16 RECOMMENDED BY: <i>[Signature]</i> 4/4/16 MERVAT N. MIKHAIL, P.E., TRANSPORTATION DESIGN, DIVISION CHIEF APPROVED BY: <i>[Signature]</i> 4-4-2016 MAZM KASEY, P.E., DEPUTY DIRECTOR		DOLA DITCH BRIDGE BRIDGE No. 54C0285 (COUNTY No. 81) GENERAL PLAN	
FIELD CHANGES MARK CHANGES NO CHANGES RESIDENT ENGINEER DATE				J.L. REF. W.O. NO. SCALE DWG. NO. SHT. NO. JL 10927 HF0025 AS SHOWN S1 10 OF 39 (2014142851) 20141428					



NOTE:
All elevations are to the top of glulam timber deck.

DECK ELEVATIONS PLAN
1" = 10'
N

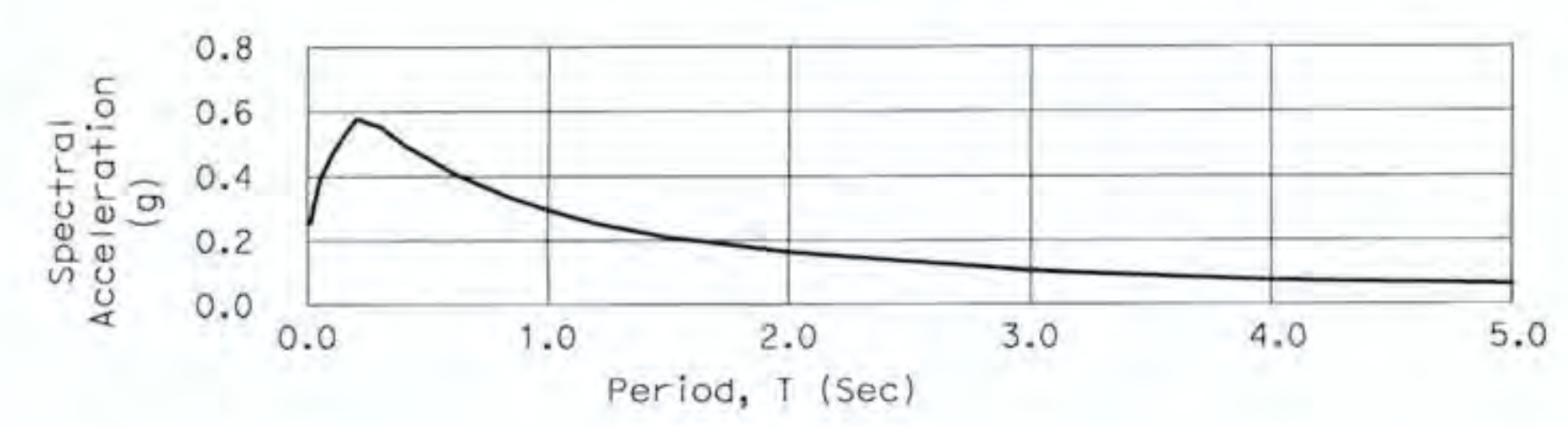
HYDROLOGIC SUMMARY
(PROVIDED BY SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT - HEC RAS STUDY 3/31/16)

	DESIGN FLOOD	BASE FLOOD
DRAINAGE AREA: 26.33 SQUARE MILES	50	100
FREQUENCY (YEARS)	3316.4	3734.60
DISCHARGE (CUBIC FEET PER SECOND)	880.50	880.86
WATER SURFACE (ELEVATION AT BRIDGE)	5.02	5.32
VELOCITY (FEET PER SECOND)		

FLOOD PLAIN DATA ARE BASED UPON INFORMATION AVAILABLE WHEN THE PLANS WERE PREPARED AND ARE SHOWN TO MEET FEDERAL REQUIREMENTS. THE ACCURACY OF SAID INFORMATION IS NOT WARRANTED BY BIGGS CARDOSA ASSOCIATES AND INTERESTED OR AFFECTED PARTIES SHOULD MAKE THEIR OWN INVESTIGATION.

GENERAL NOTES
LOAD & RESISTANCE FACTOR DESIGN

- DESIGN: AASHTO LRFD Bridge Design Specifications, 6th Edition and Caltrans Amendments, preface dated Jan. 2014
- SEISMIC DESIGN: AASHTO LRFD Bridge Design Specifications, 6th Edition and Design Basis Memorandum for Seismic Design of Timber Bridges, April 2015.
- DEAD LOAD: Includes 35 psf for future wearing surface.
- LIVE LOAD: HL93 with Low-Boy and permit design load
- SEISMIC LOAD: Soil profile: D, $V_{s30} = 310$ m/s
Moment magnitude: M6.5
Peak ground acceleration: 0.255g



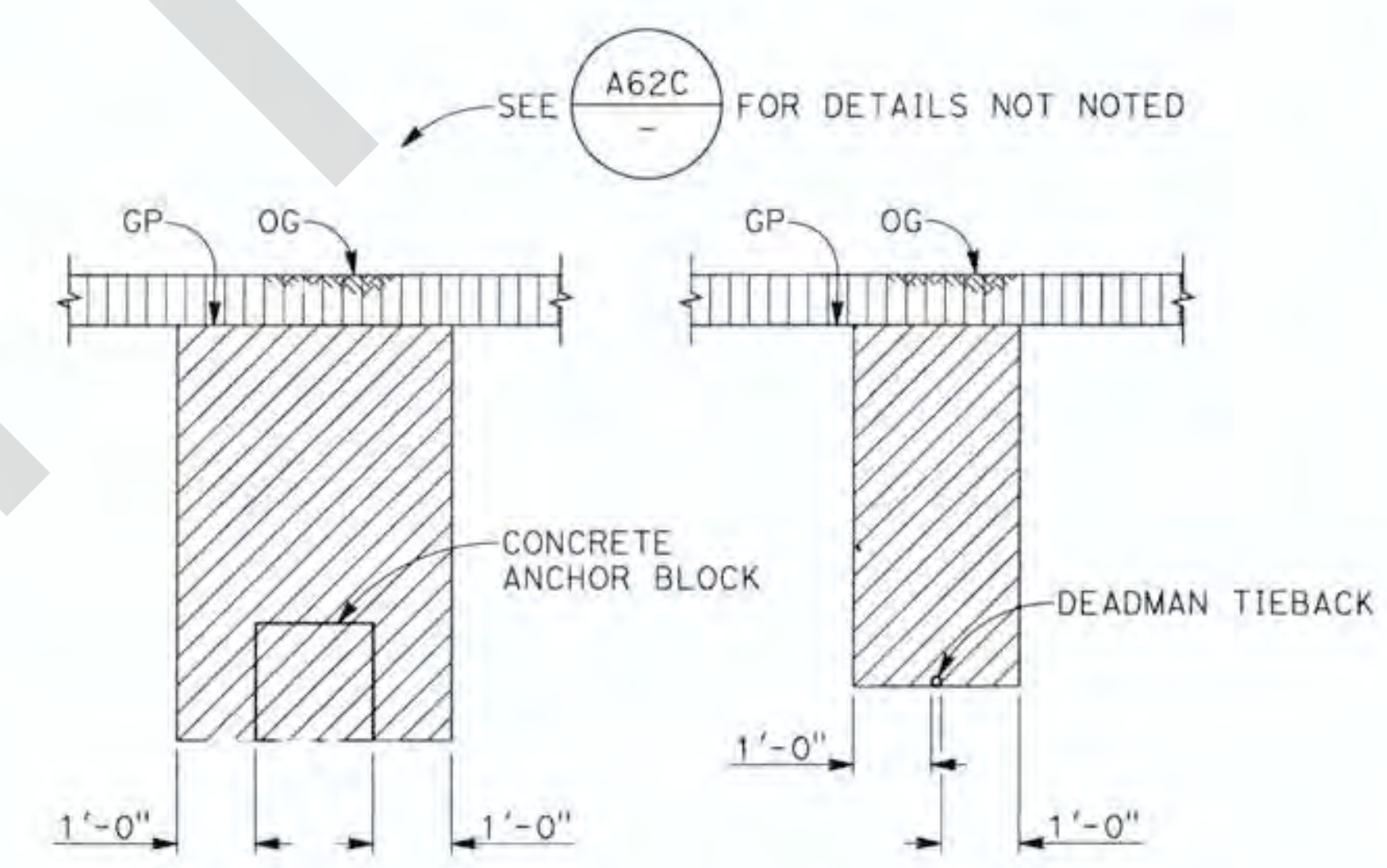
- CONCRETE: $f_y = 60$ ksi
 $f'_c = 3.6$ ksi
 $n = 8$
- TIMBER (TREATED LUMBER):
Timber railing, abutment and bent timber cap: 24F-1.8E, 24F-V8 Glulam (DF/DF)
Stringers, timber deck and all other glulam members: 24F-1.8E, 24F-V4 Glulam (DF/DF)
Timber piles: Pacific Coast DF, $F_{co} = 1.25$ ksi, $F_{bo} = 2.45$ ksi, $F_{cpo} = 0.23$ ksi, $F_{vo} = 0.115$ ksi, $E_o = 1500$ ksi
Abutment timber lagging and all other sawn members: DF-L No. 1: $F_{co} = 0.92$ ksi, $F_{bo} = 1.35$ ksi, $F_{cpo} = 0.625$ ksi, $F_{vo} = 0.17$ ksi, $E_o = 1600$ ksi, $F_{to} = 0.675$ ksi
- MISCELLANEOUS METAL (GALVANIZED):
Steel bars, dowels, plates and shapes: ASTM A36, A575 OR A576 (AISI OR M Grades)
Bolts and studs: ASTM A307
Anchor bolts and tie rod: ASTM A307
Nuts: ASTM A563
Washers: ASTM F436

CALTRANS 2010 STANDARD PLANS

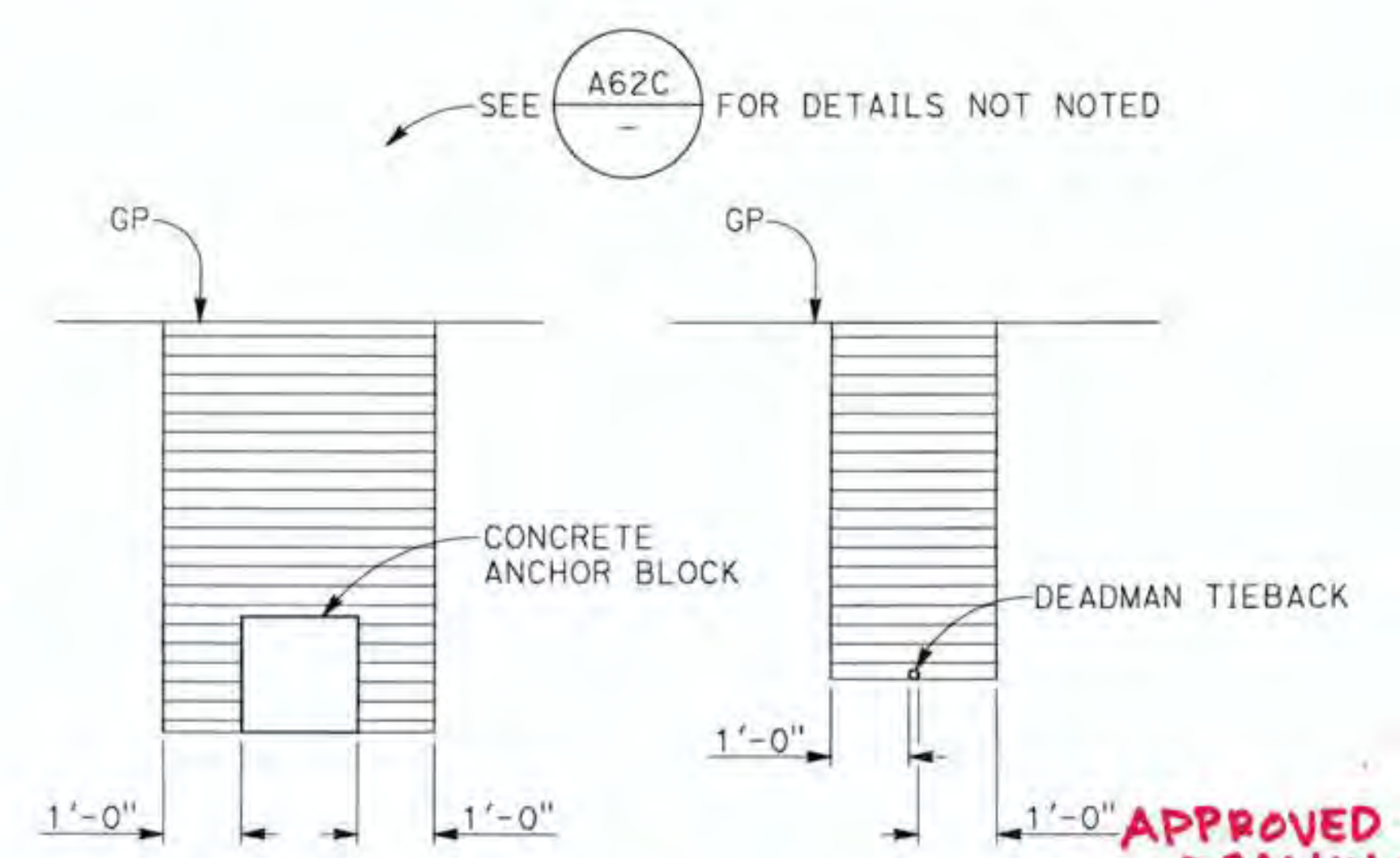
- RSP A10A ABBREVIATIONS (SHEET 1 OF 2)
A10B ABBREVIATIONS (SHEET 2 OF 2)
A10C LINES AND SYMBOLS (SHEET 1 OF 3)
A10D LINES AND SYMBOLS (SHEET 2 OF 3)
A10E LINES AND SYMBOLS (SHEET 3 OF 3)
A10F LEGEND - SOIL (SHEET 1 OF 2)
A10G LEGEND - SOIL (SHEET 2 OF 2)
A10H LEGEND - ROCK
A62B LIMITS OF PAYMENT FOR EXCAVATION AND BACKFILL - BRIDGE SURCHARGE AND WALL
A62C LIMITS OF PAYMENT FOR EXCAVATION AND BACKFILL - BRIDGE

INDEX TO BRIDGE PLANS

DRAWING NO.	TITLE
S1	GENERAL PLAN
S2	GENERAL NOTES
S3	FOUNDATION PLAN
S4	ABUTMENT LAYOUT
S5	ABUTMENT DETAILS
S6	BENT LAYOUT
S7	BENT DETAILS
S8	TYPICAL SECTION
S9	STRINGER LAYOUT
S10	STRINGER DETAILS No. 1
S11	STRINGER DETAILS No. 2
S12	RAILING DETAILS No. 1
S13	RAILING DETAILS No. 2
S14	ROCK SLOPE PROTECTION



LIMITS OF PAYMENT FOR EXCAVATION BRIDGE
NO SCALE



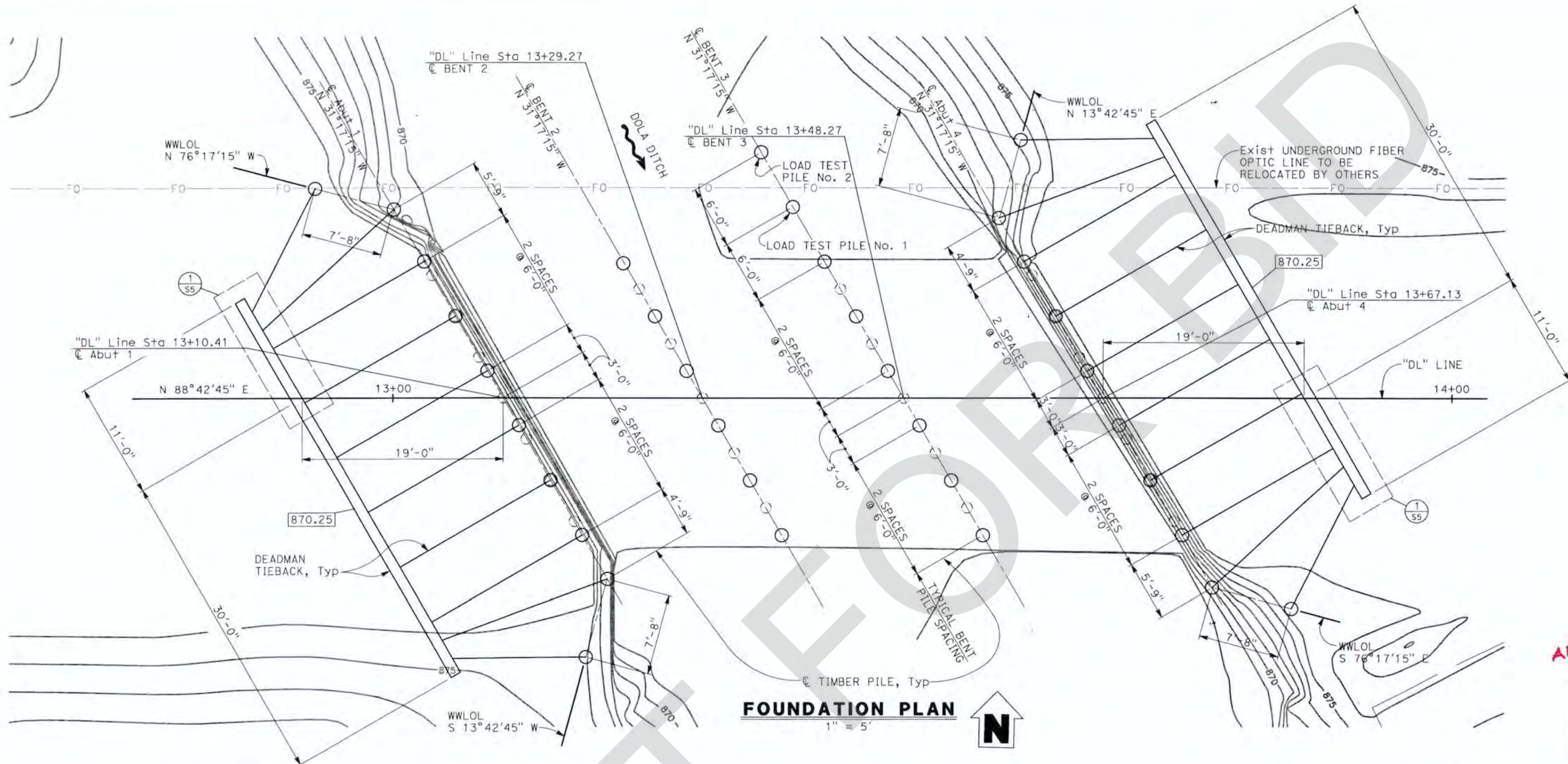
LIMITS OF PAYMENT FOR BACKFILL BRIDGE
NO SCALE

APPROVED RECORD DRAWING
AS BUILT
NO CORRECTIONS THIS SHEET
BY: Taha Malik, P.E.
DATE COMPLETED: 10-16-17

FILE NO. 586600 120

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

BIGGS CARDOSA ASSOCIATES, INC. APPROVED BY: [Signature] PLANS PREPARED BY: [Signature] DESIGNED BY: RBS DRAWN BY: DM CHECKED BY: GDD DATE: 3/4/16		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS REVIEWED BY: [Signature] RECOMMENDED BY: [Signature] APPROVED BY: [Signature] MAZIN KASEY, P.E., DEPUTY DIRECTOR		DOLA DITCH BRIDGE BRIDGE No. 54C0285 (COUNTY No. 81) GENERAL NOTES	
REGISTERED PROFESSIONAL ENGINEER MICHAEL A. THOMPSON No. 54676 EXP. 9/30/16 STATE OF CALIFORNIA	500 So. Main St. Suite 400 Orange, California 92668 714-550-4665 BCA	FIELD CHANGES MARK CHANGES NO CHANGES	J.L. REF. W.O. NO. SCALE DWG. NO. SH. NO. JL 10927 HF0025 AS SHOWN S2 11 OF 39	DATE COMPLETED: 10-16-17	



FOUNDATION PLAN
1" = 5'

APPROVED RECORD DRAWING
AS BUILT
NO CORRECTIONS THIS SHEET
BY THOMAS MARK, P.E.
DATE COMPLETED 10-16-17

BENCH MARK AND DATUM

MONUMENT	COORDINATES		ELEVATION	DESCRIPTION/LOCATION
	NORTHING	EASTING		
POINT #5	2,035,203.81	7,282,182.124	877.02'	FOUND D.O.T. CONCRETE "C" R/W MONUMENT, UP 0.50', PER CSFB 4234/10, ELEVATION ESTABLISHED PER GPS CONTROL PROCEDURES. PROJECT BASIS OF BEARING IS THE CENTERLINE OF NATIONAL TRAILS HWY PER CS 3145/6-8 BEING N88°42'45"E.

PILE DATA TABLE

LOCATION	PILE TYPE	NOMINAL RESISTANCE		DESIGN TIP Elev (ft)	SPECIFIED TIP Elev (ft)	NOMINAL DRIVING RESISTANCE (kips)
		COMPRESSION	TENSION			
ABUTMENT/WINGWALL 1	15" Dia TIMBER PILES	90 kips	0 kips	835.5 (a): 854.5 (c): 851.0 (d)	835.5	290
BENT 2	15" Dia TIMBER PILES	130 kips	0 kips	828.5 (a): 854.5 (c): 840.5 (d)	828.5	450
BENT 3	15" Dia TIMBER PILES	130 kips	0 kips	828.5 (a): 854.5 (c): 840.5 (d)	828.5	450
ABUTMENT/WINGWALL 4	15" Dia TIMBER PILES	90 kips	0 kips	835.5 (a): 854.5 (c): 851.0 (d)	835.5	290

LEGEND:

- Indicates Bottom of Concrete Elevation
- 825 Indicates Elevation
- Indicates Pile
- Indicates Exist Pile to be removed

NOTES:

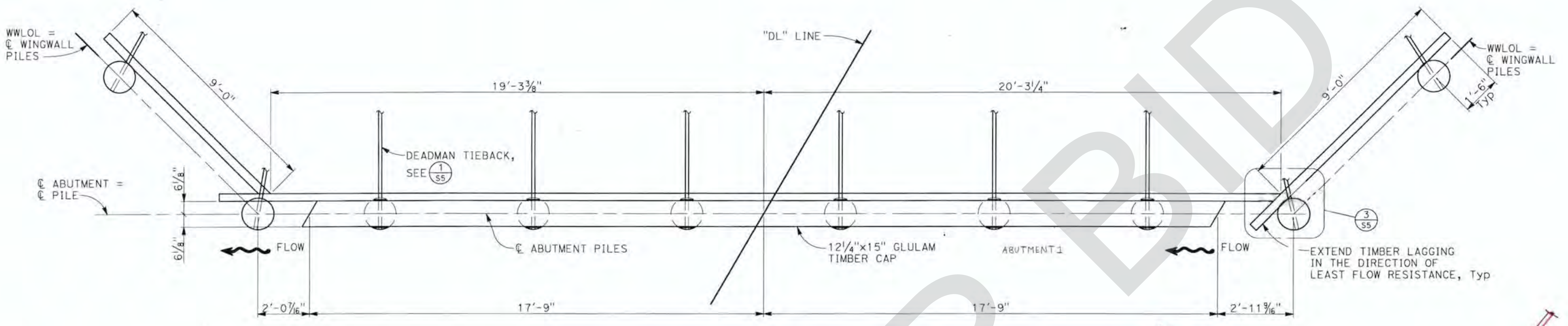
1. Verify utility locations with "Roadway Plans".
2. For WWL, see "ABUTMENT LAYOUT" sheet.
3. Grading and rock slope protection not shown for clarity, see "ROCK SLOPE PROTECTION" sheet.

NOTES:

1. Design tip elevations for Abutments and Bents are controlled by: (a) Compression, (b) Tension, (c) Settlement, (d) Lateral load.
2. Pile locations that conflict with abandoned utilities must be predrilled to 6" below utilities' invert prior to pile driving.
3. The specified tip elevation shall not be raised above the design tip elevation for tension load, lateral load, and tolerable settlement.

FILE NO. 586600 120

<p>BIGGS CARDOSA ASSOCIATES, INC.</p> <p>APPROVED BY: <i>[Signature]</i> DATE: 4/4/16</p> <p>PLANS PREPARED BY: BIGGS CARDOSA ASSOCIATES INC STRUCTURAL ENGINEERS 800 So. Main St. Suite 400 Orange, California 92668 714-550-4000</p> <p>DESIGNED BY: RBS DRAWN BY: DM CHECKED BY: DOD DATE: 3/4/16</p>	<p>COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS</p> <p>REVIEWED BY: <i>[Signature]</i> DATE: 4/2/16</p> <p>RECOMMENDED BY: <i>[Signature]</i> DATE: 4/4/16</p> <p>APPROVED BY: <i>[Signature]</i> DATE: 4-4-2016</p> <p>MAZIN KASEY, P.E., DEPUTY DIRECTOR</p>	<p>DOLA DITCH BRIDGE BRIDGE No. 54C0285 (COUNTY No. 81) FOUNDATION PLAN</p> <p>J.L. REF. W.O. NO. SCALE DWG. NO. SHT. NO. JL 10927 HF0025 AS SHOWN S3 12 OF 39</p>
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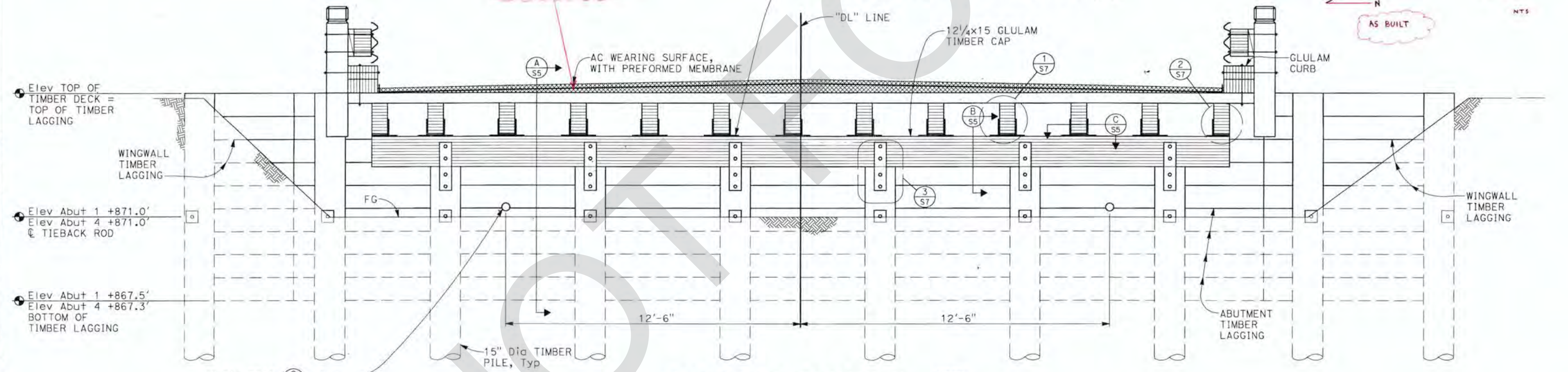
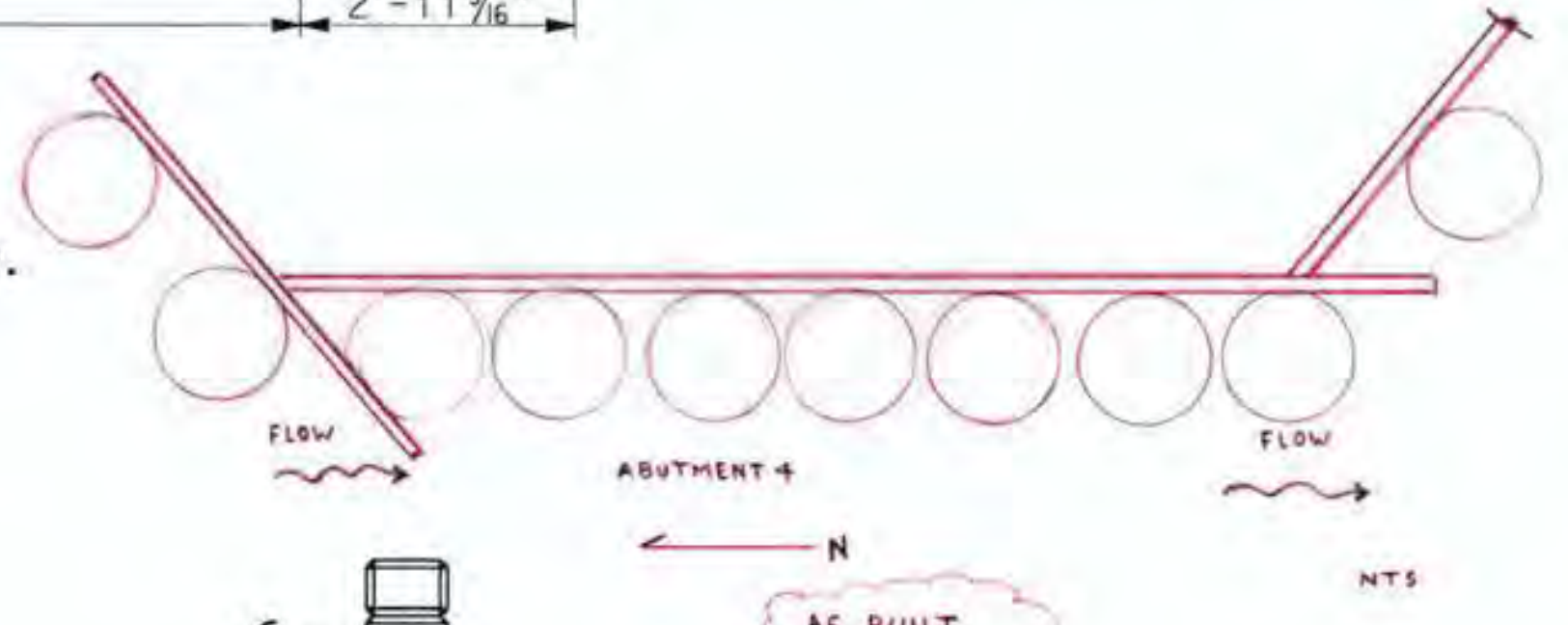


ABUTMENT PLAN
1/2" = 1'-0"

NOTE:
ABUTMENT 1 SHOWN,
ABUTMENT 4 SIMILAR.

EXTENDED WATER PROOF MEMBRANE
12" BEYOND ABUTMENTS

WHERE STEEL PLATE BEARING SHOE LAG SCREW
CONFLICTS WITH STEEL PLATE PILE CAP BOLTS,
SLIGHTLY ANGLE LAG SCREW TO AVOID CONFLICT, Typ



ABUTMENT ELEVATION
1/2" = 1'-0"

NOTE:
ABUTMENT 1 SHOWN,
ABUTMENT 4 SIMILAR.

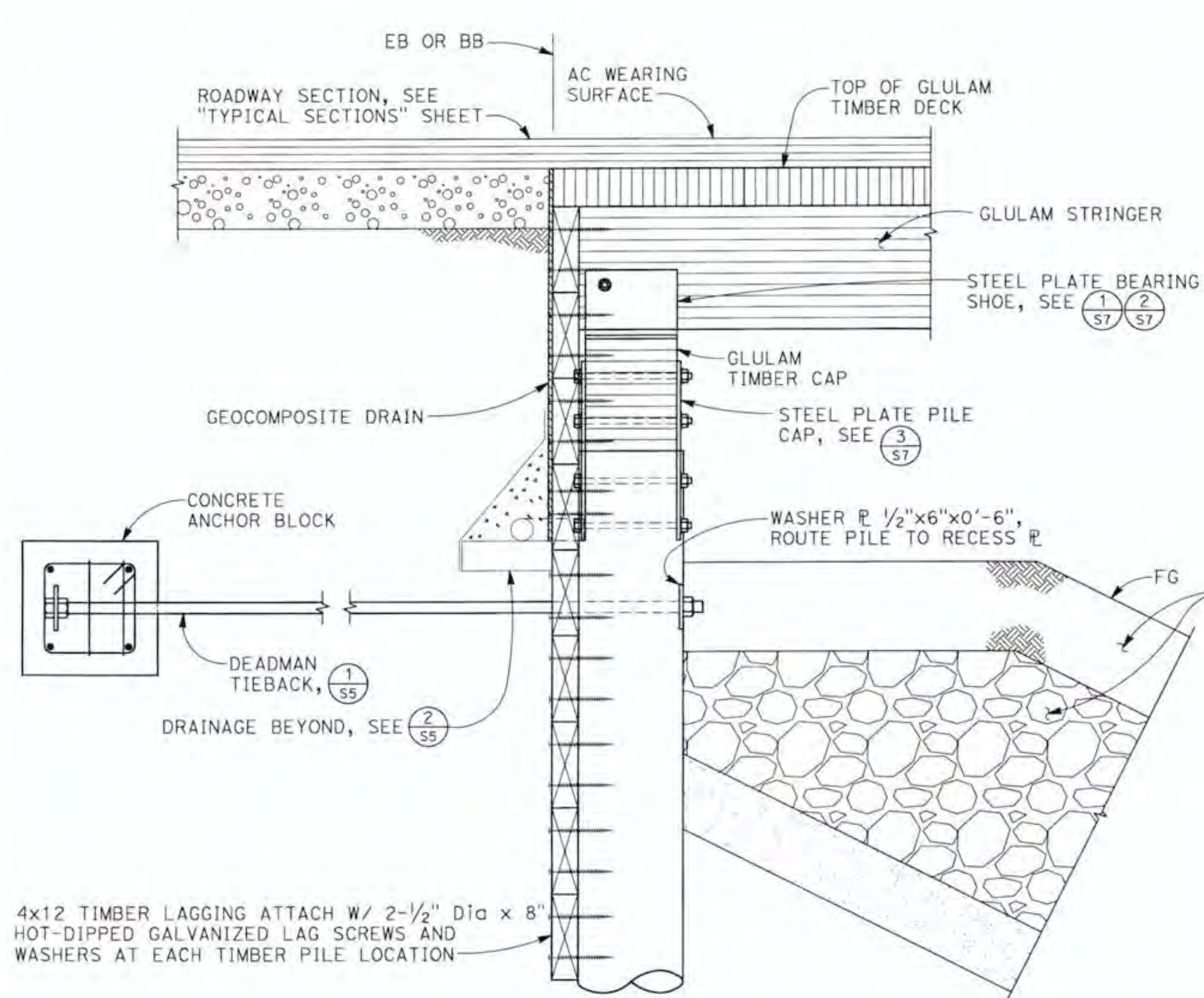
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CORRECTIONS BY *Timid Mark, PE*
CONTRACT NO. BLS 595A (023)
DATE 10-16-17

MARK	REVISIONS	APPR.	DATE

MARK	REVISIONS	APPR.	DATE

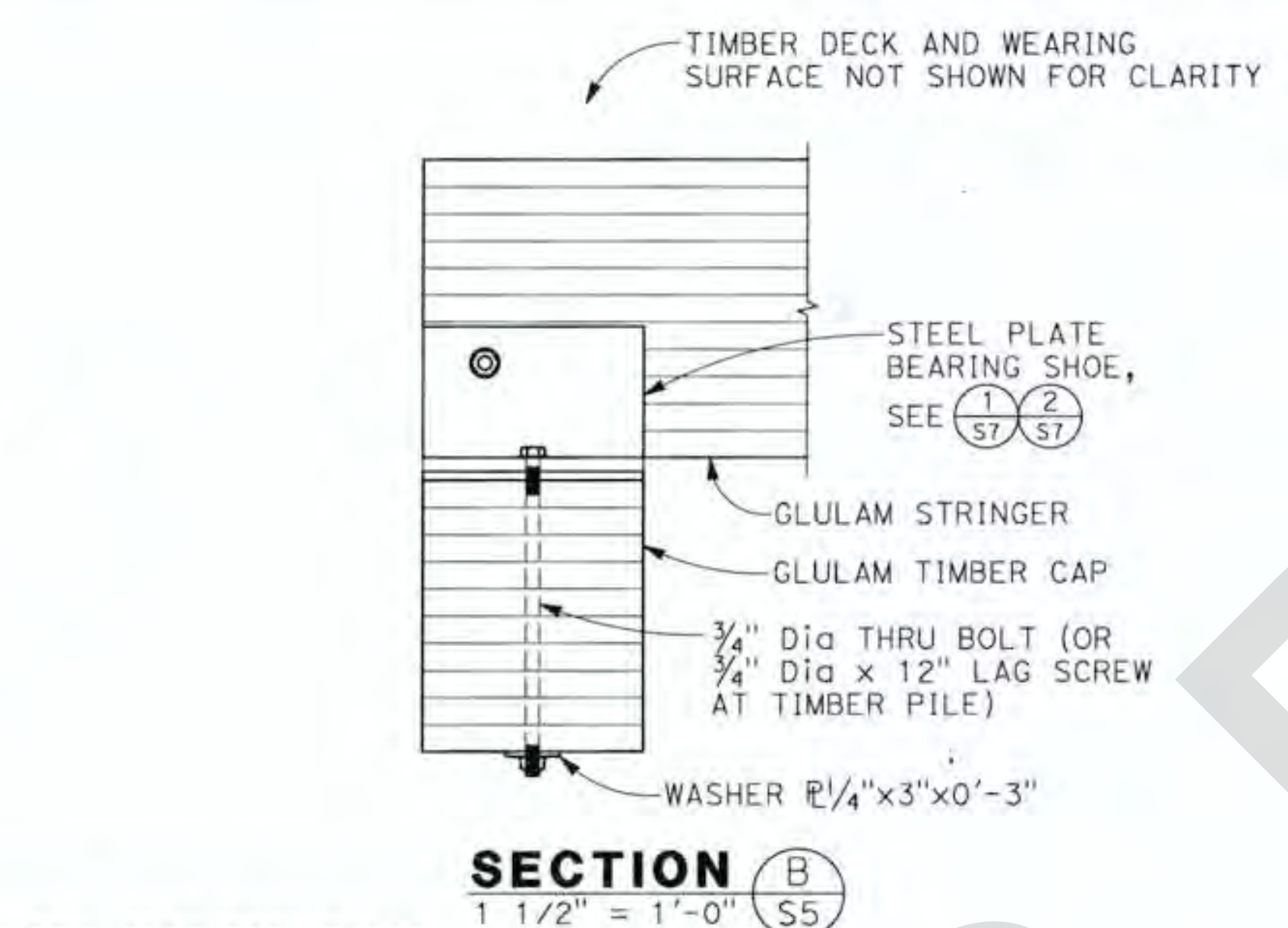
FILE NO. 586600 120

BIGGS CARDOSA ASSOCIATES, INC. APPROVED BY: <i>[Signature]</i> DATE: 4/4/16 REGISTERED PROFESSIONAL ENGINEER MICHAEL A. THOMAS No. 54676 Exp. 9/30/16 STATE OF CALIFORNIA		PLANS PREPARED BY: BIGGS CARDOSA ASSOCIATES INC STRUCTURAL ENGINEERS 900 So. Main St., Suite 400 Orange, California 92668 714-550-4855 BCR		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS DESIGNED BY: RBS DRAWN BY: DM CHECKED BY: GDD DATE: 3/4/16 FIELD CHANGES		REVIEWED BY: <i>[Signature]</i> DATE: 9/9/16 RECOMMENDED BY: <i>[Signature]</i> DATE: 9/9/16 MERVAT N. MIKHAIL, P.E., TRANSPORTATION DESIGN, DIVISION CHIEF APPROVED BY: <i>[Signature]</i> DATE: 4-4-2016 MAZIN KASEY, P.E., DEPUTY DIRECTOR		DOLA DITCH BRIDGE BRIDGE No. 54C0285 (COUNTY No. 81) ABUTMENT LAYOUT J.L. REF. W.O. NO. SCALE DWG. NO. SHI. No. JL 10927 HF0025 AS SHOWN S4 13 OF 39 (201414254) 2014142	
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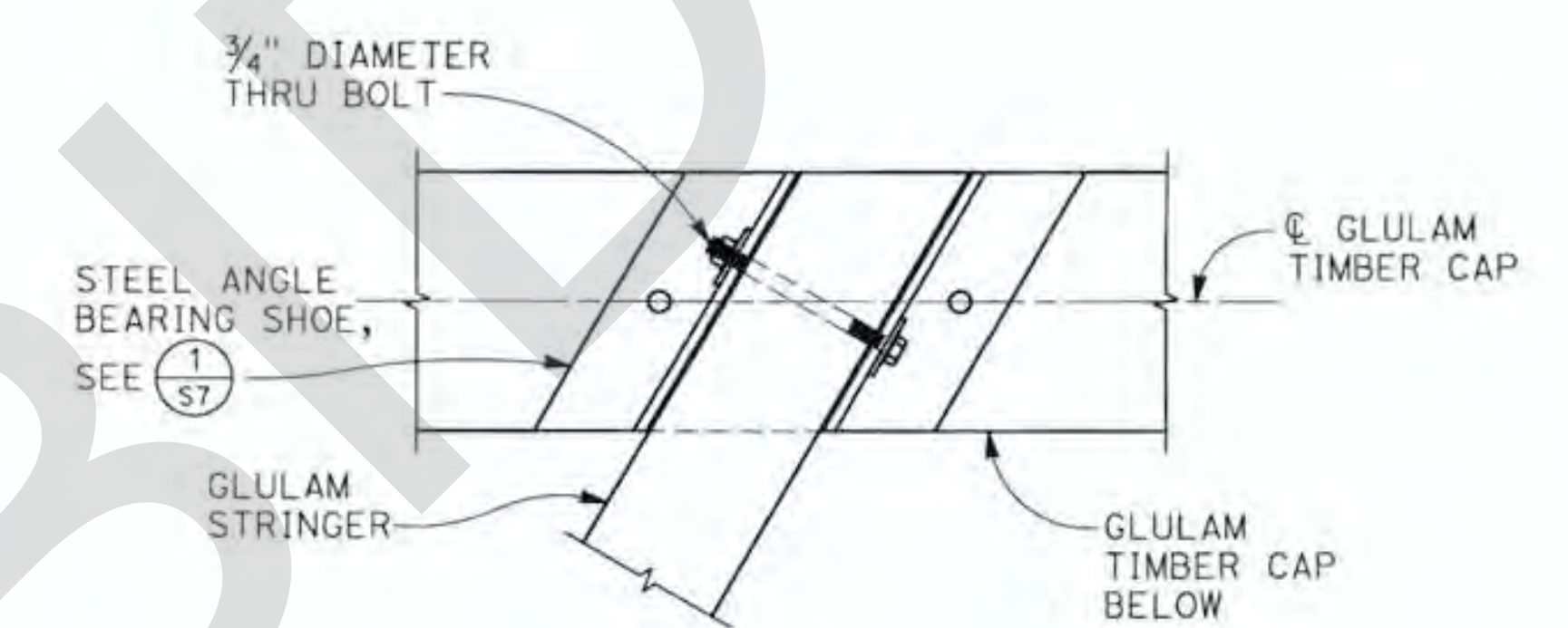


SECTION A
1" = 1'-0" S5

4x12 TIMBER LAGGING ATTACH W/ 2-1/2" Dia x 8" HOT-DIPPED GALVANIZED LAG SCREWS AND WASHERS AT EACH TIMBER PILE LOCATION

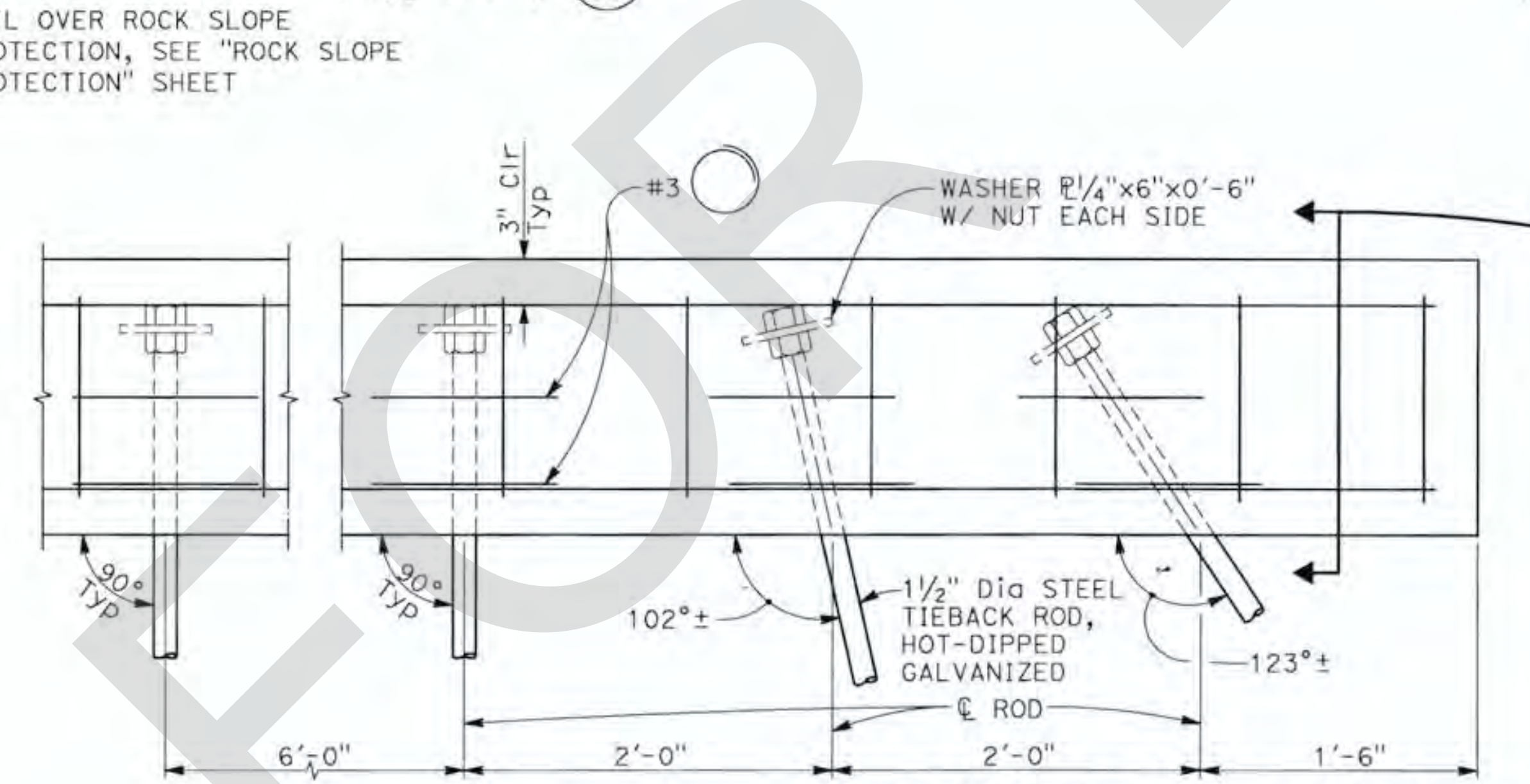


SECTION B
1 1/2" = 1'-0" S5

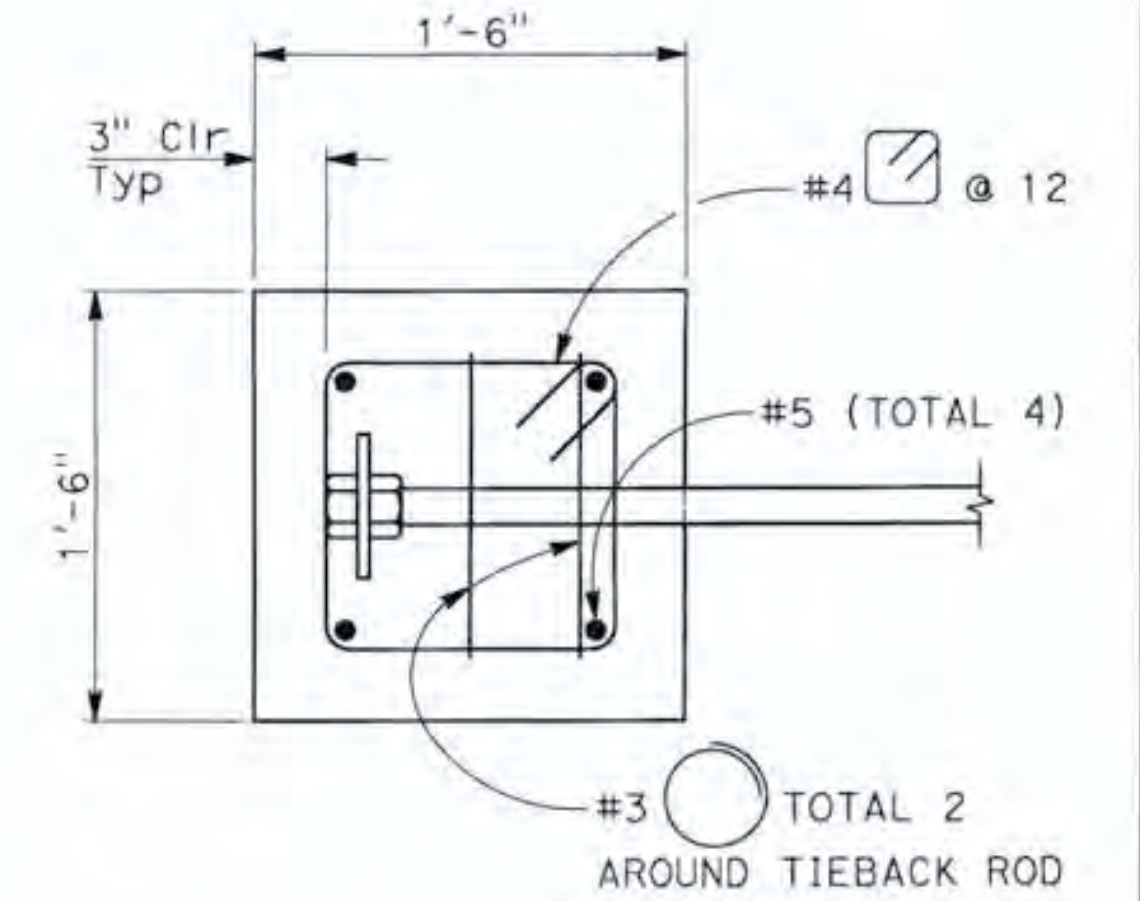


SECTION C
1 1/2" = 1'-0" S5

NOTE: INTERIOR GLULAM STRINGER SHOWN EXTERIOR GLULAM STRINGER SIMILAR

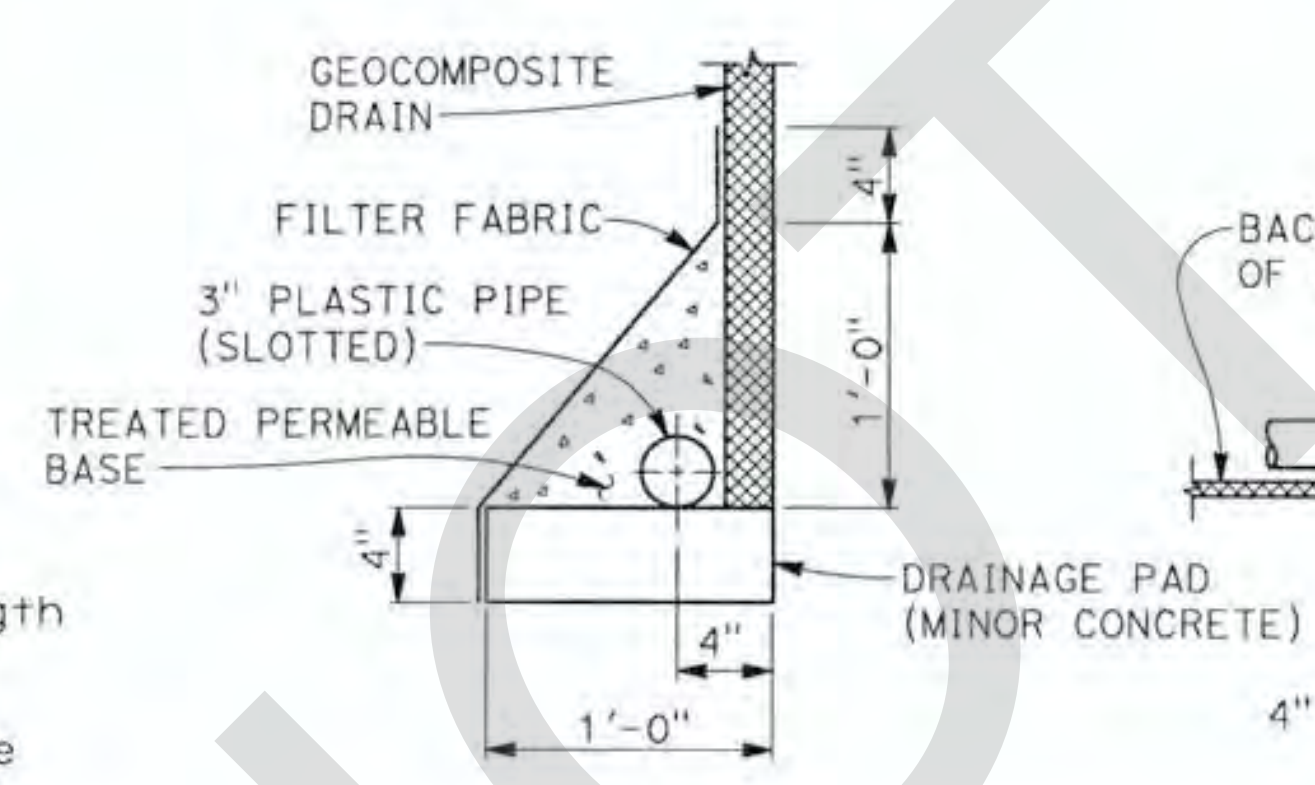


CONCRETE DEADMAN DETAIL
1 1/2" = 1'-0" S5

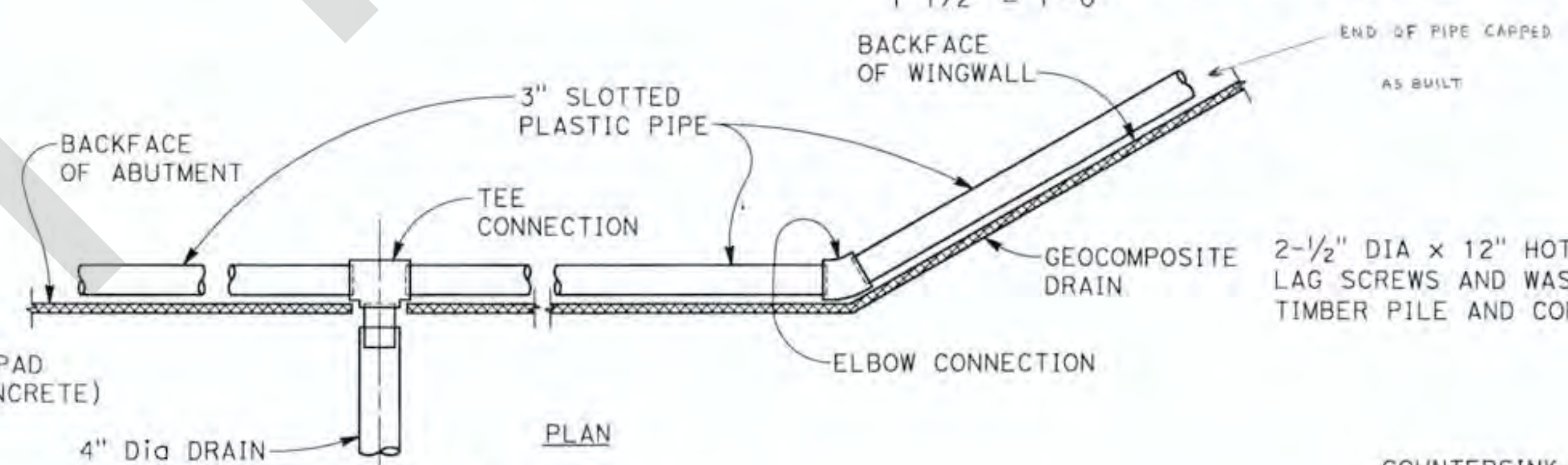


LAGGING DETAIL
1" = 1'-0" S5

- DEADMAN TIEBACK NOTES:**
1. Roadway approach and abutment must be backfilled up to the tieback rod elevation before starting deadman tieback construction.
 2. Excavate and place deadman reinforcing, tieback rod, washers and nuts. Pour deadman concrete and let cure 10 days or until concrete attains a compressive strength of at least 2,400 psi.
 3. Backfill the concrete deadman and up to the tieback rod elevation before tensioning and tightening the tieback nuts.
 4. Each threaded rod must be tensioned to snug tight, until all looseness and rod sag is removed.
 5. Peen rod threads beyond nuts to prevent loosening or removal.

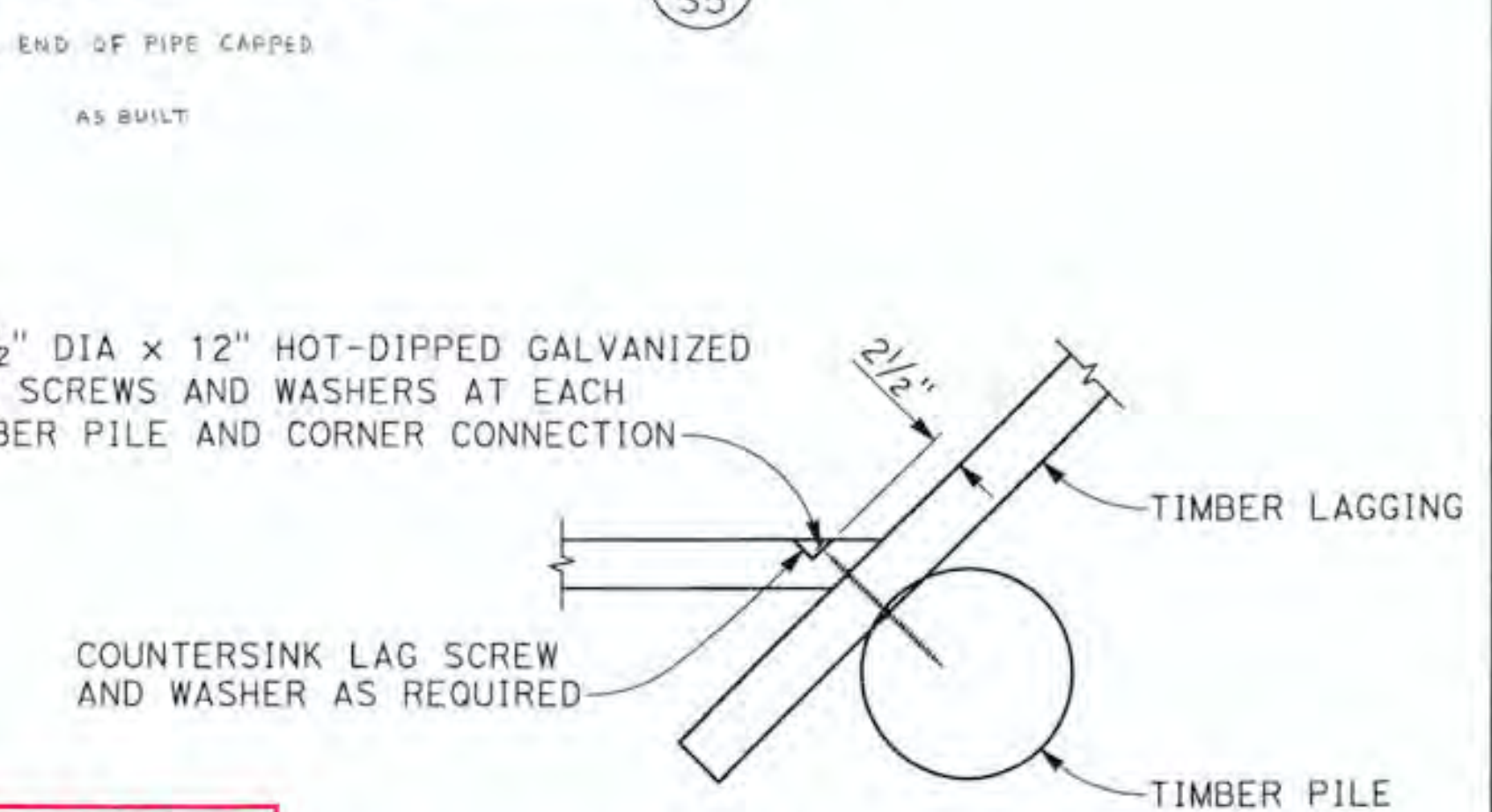


DRAINAGE DETAIL
1 1/2" = 1'-0" S5



TEE CONNECTION

- NOTES:**
1. Geocomposite drain, treated permeable base, and 3" dia slotted plastic pipe continuous behind abutment and wingwalls.
 2. Provide 'tee' connection at each 4" dia drain.
 3. 4" dia drain sloped to drain and outlet to daylight.



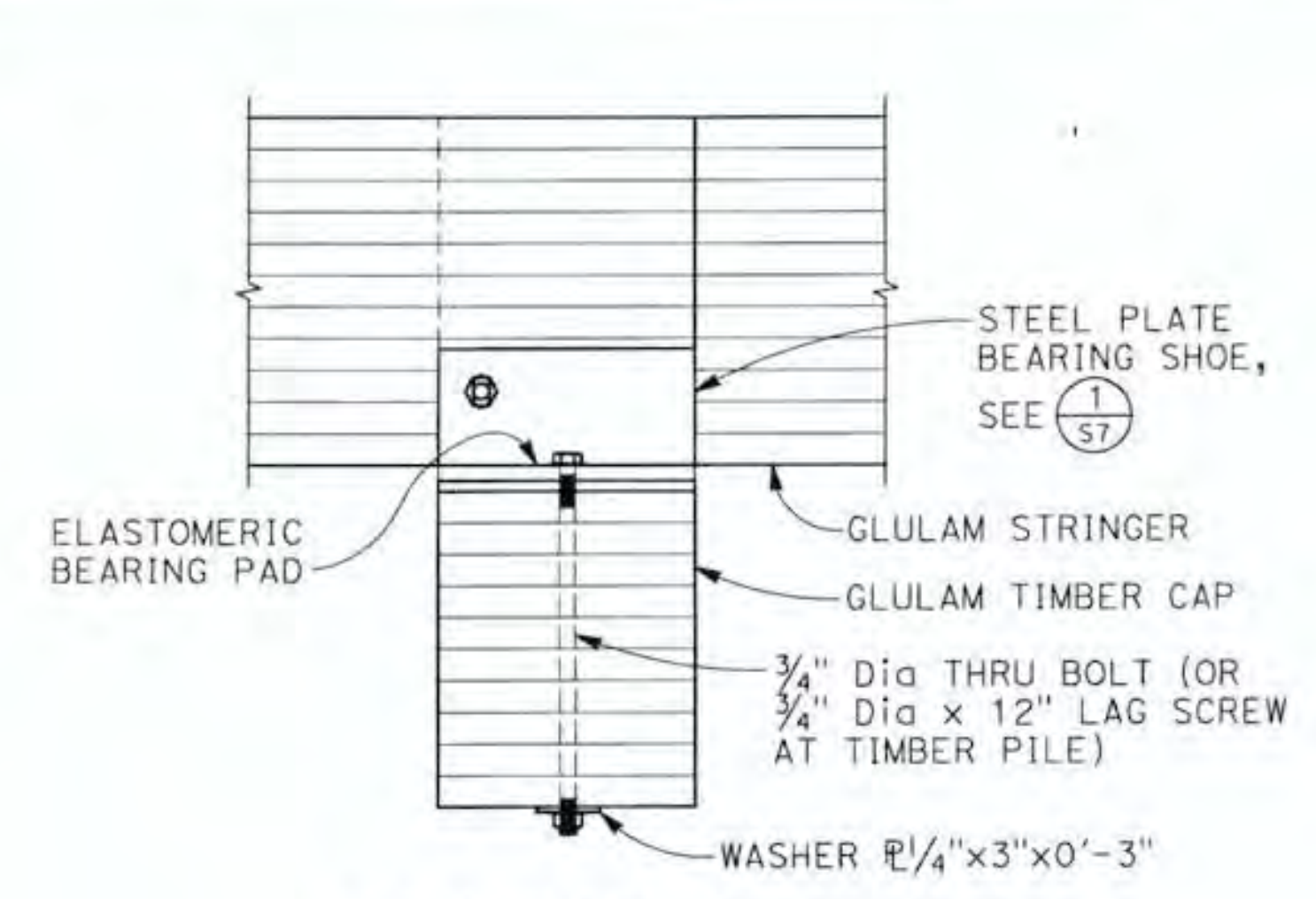
LAGGING DETAIL
1" = 1'-0" S5

LEGEND:
Indicates Rock Slope Protection

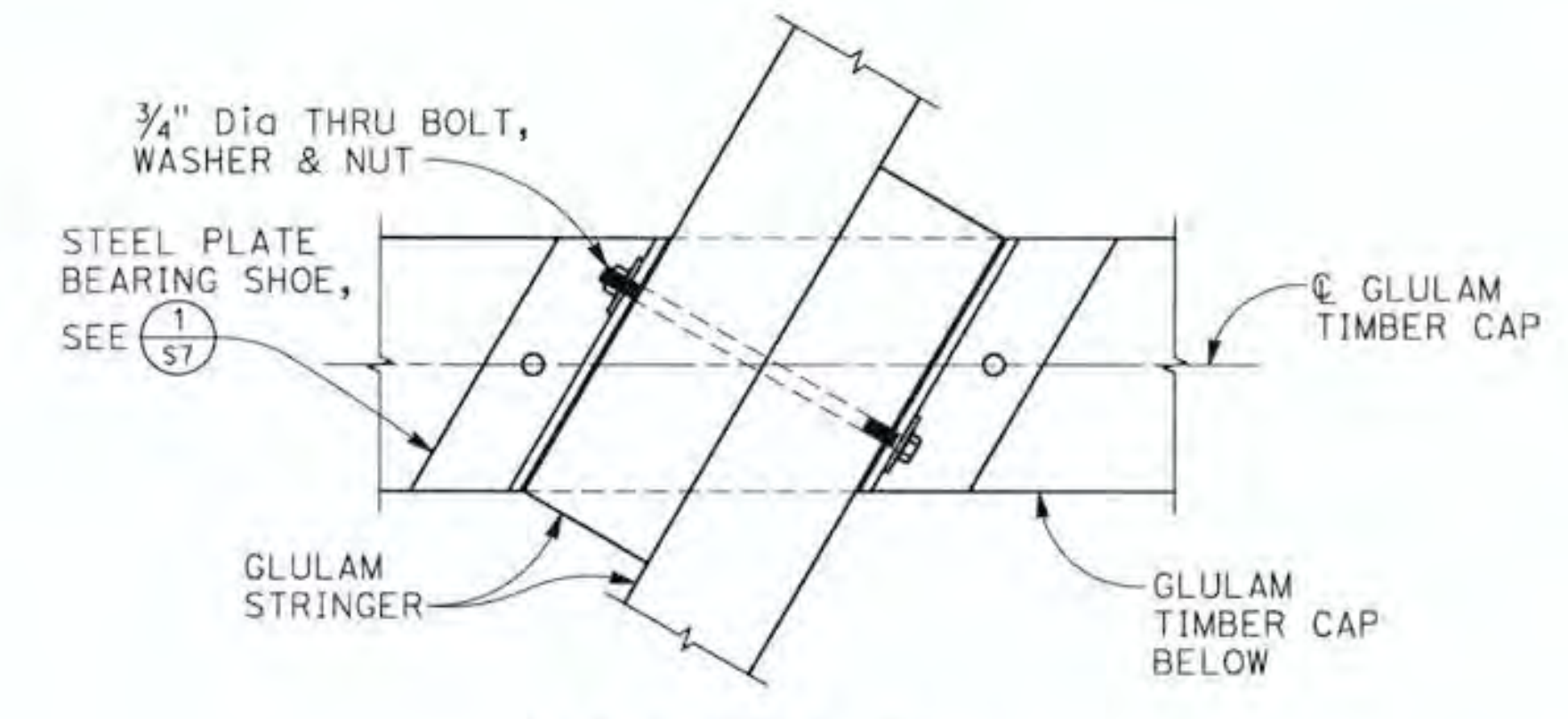
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NO CORRECTIONS THIS SHEET
BY TACIQ MARIK, P.E.
DATE COMPLETED 10-16-17

FILE NO. 586600 120

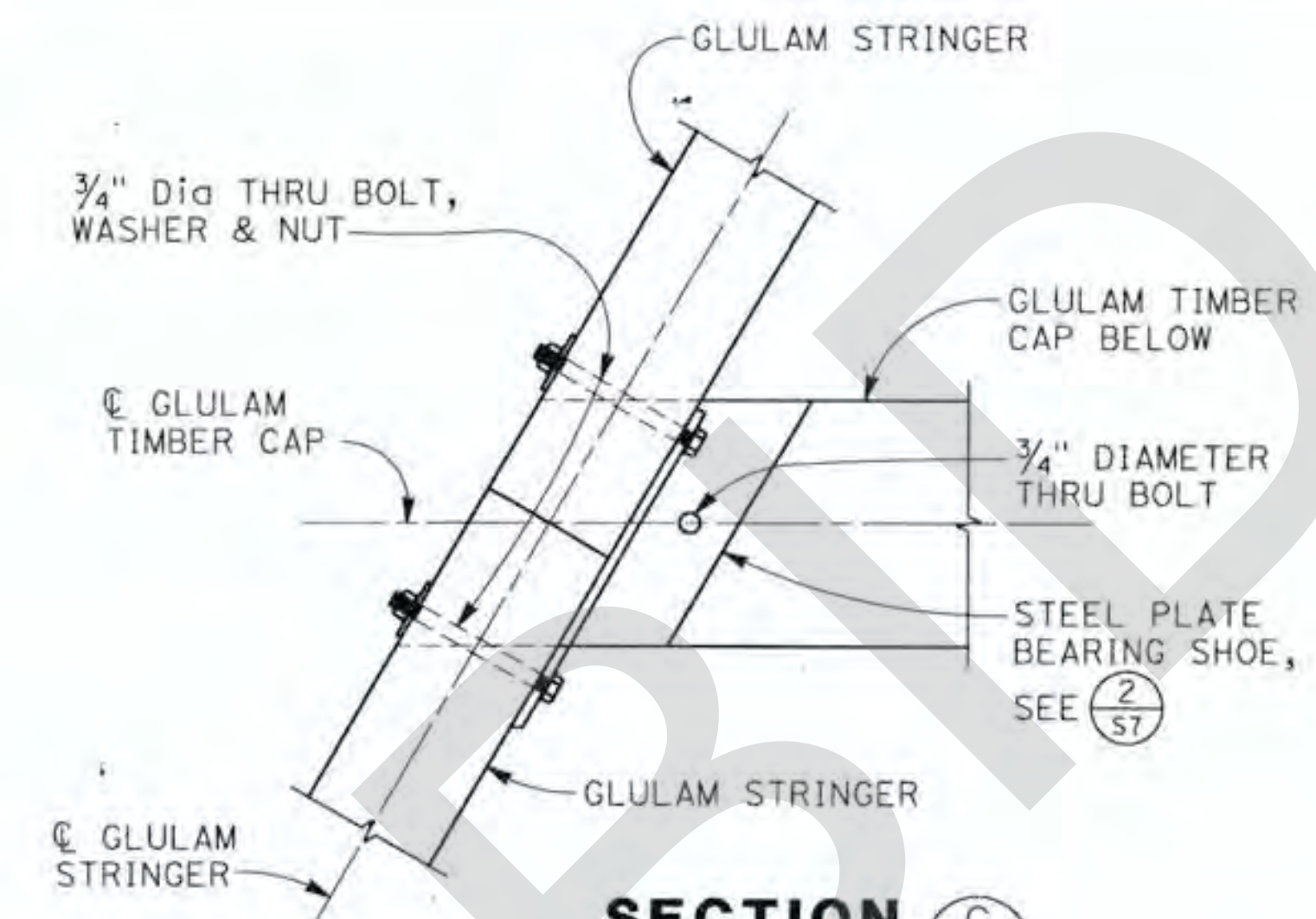
BIGGS CARDOSA ASSOCIATES, INC. APPROVED BY: [Signature] 4/4/16 DESIGNED BY: RBS DRAWN BY: DM CHECKED BY: GDD DATE: 3/4/16		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS REVIEWED BY: [Signature] 4/4/16 RECOMMENDED BY: [Signature] 4/4/16 APPROVED BY: [Signature] 4-9-2016 MAZIN KASEY, P.E., DEPUTY DIRECTOR		DOLA DITCH BRIDGE BRIDGE No. 54C0285 (COUNTY No. 81) ABUTMENT DETAILS	
PLANS PREPARED BY: BIGGS CARDOSA ASSOCIATES INC STRUCTURAL ENGINEERS 800 So. Main St. Suite 400 Orange, California 92668 714-550-4885 BCR		FIELD CHANGES NO CHANGES		J.L. REF. W.O. NO. SCALE DWG. NO. SHI. No. JL 10927 HF0025 AS SHOWN S5 14 OF 39 (2014142855) 2014142	



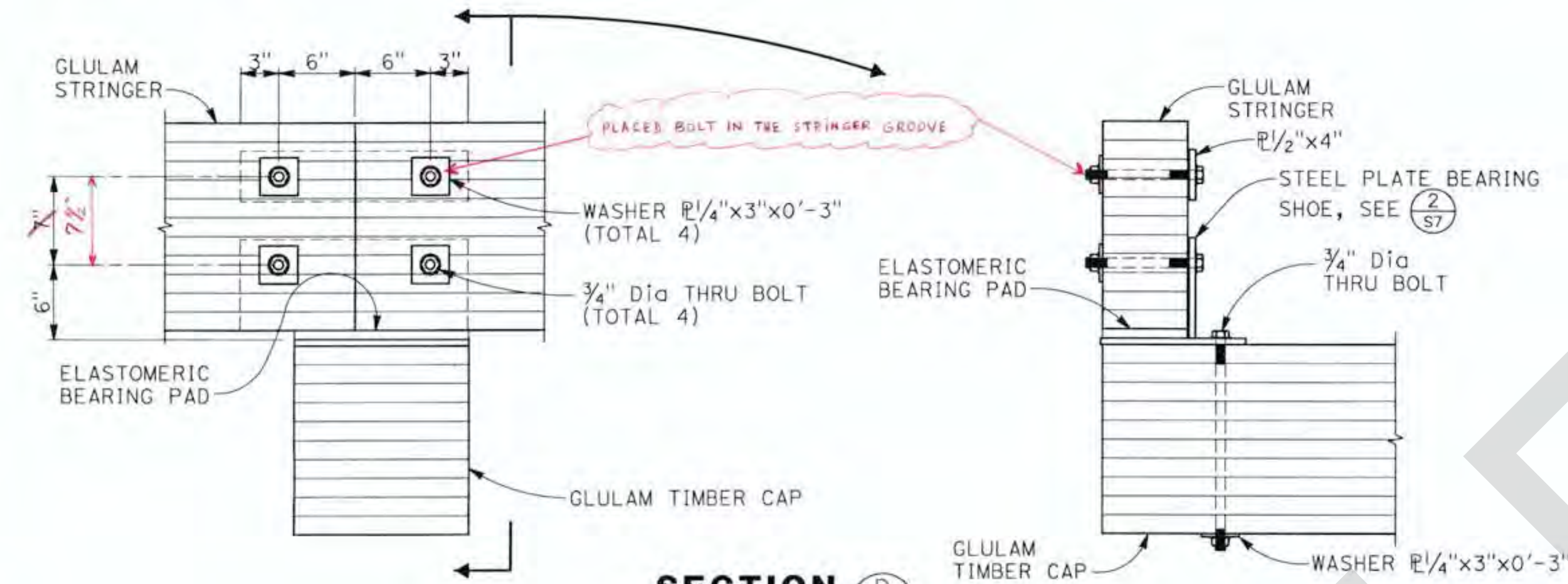
SECTION A
1 1/2" = 1'-0" S7



SECTION B
1 1/2" = 1'-0" S7

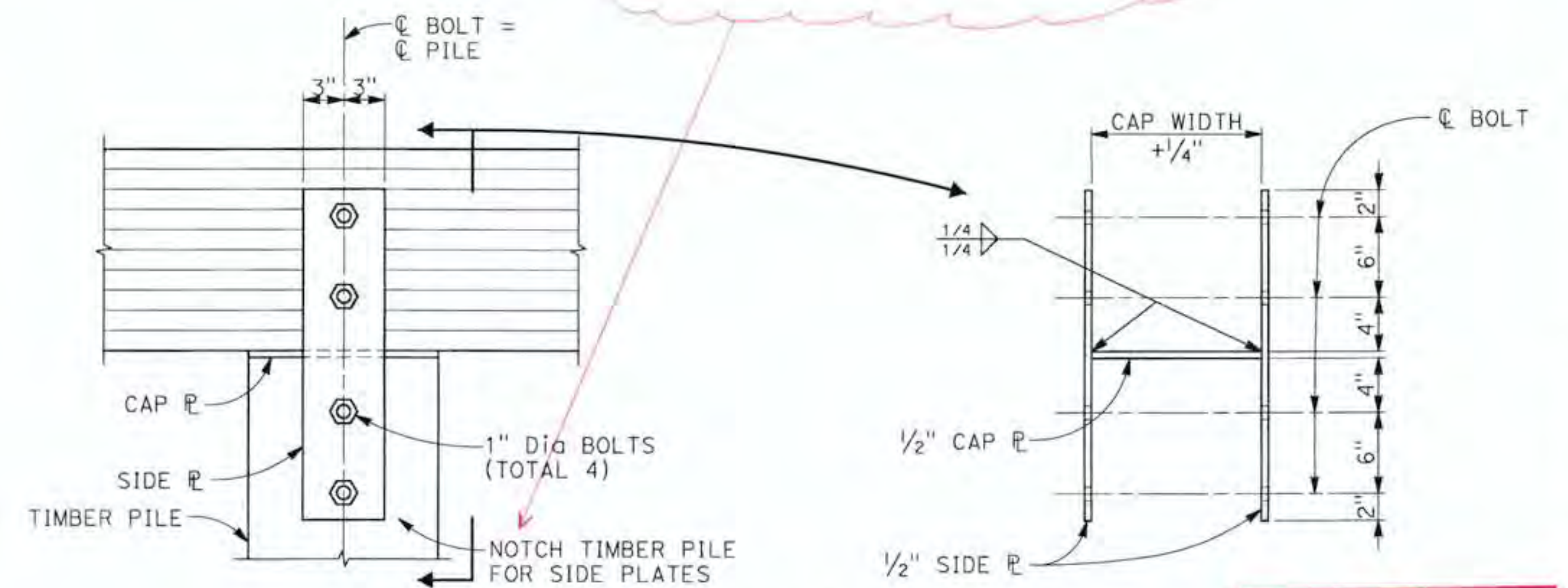
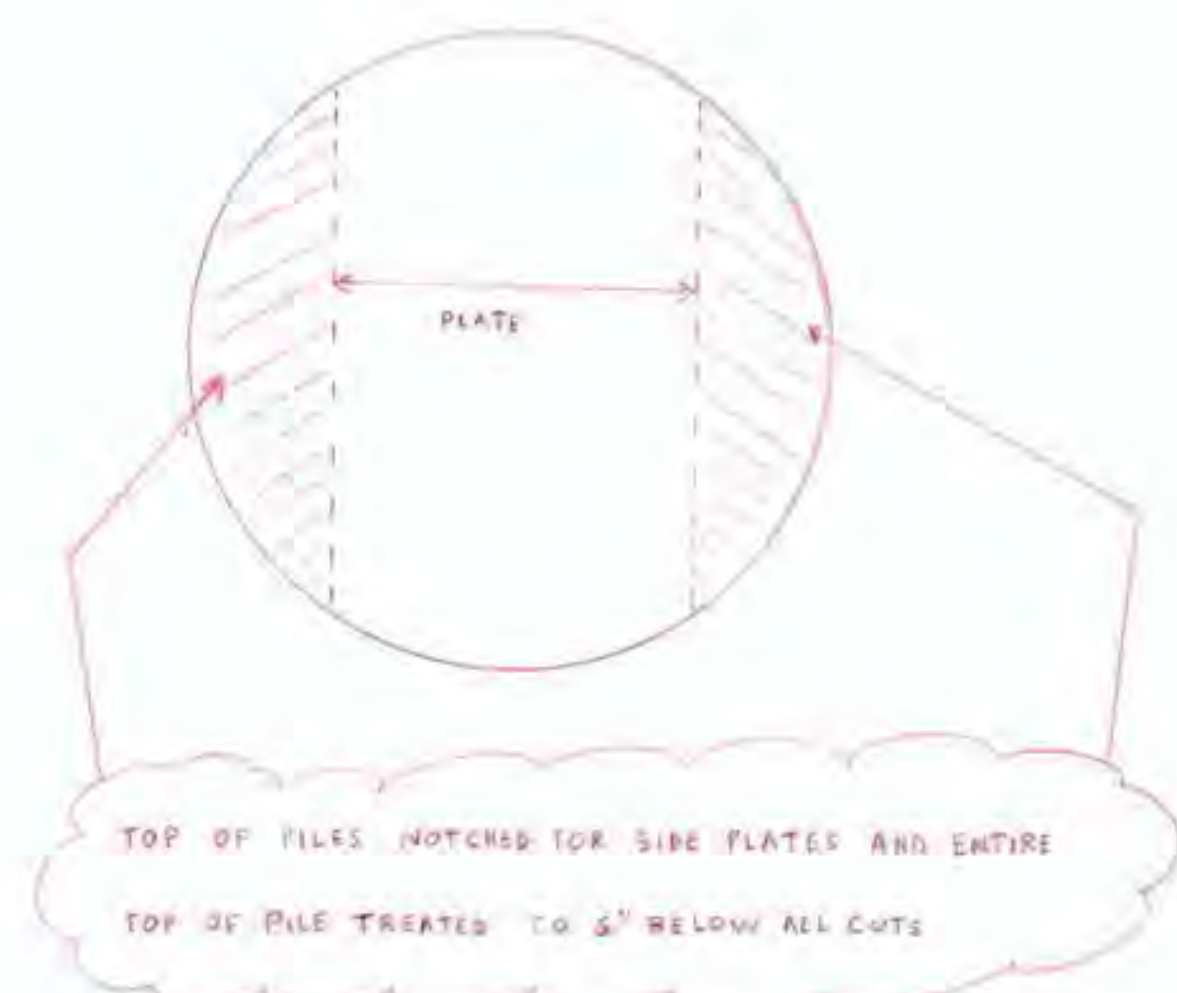


SECTION C
1 1/2" = 1'-0" S7



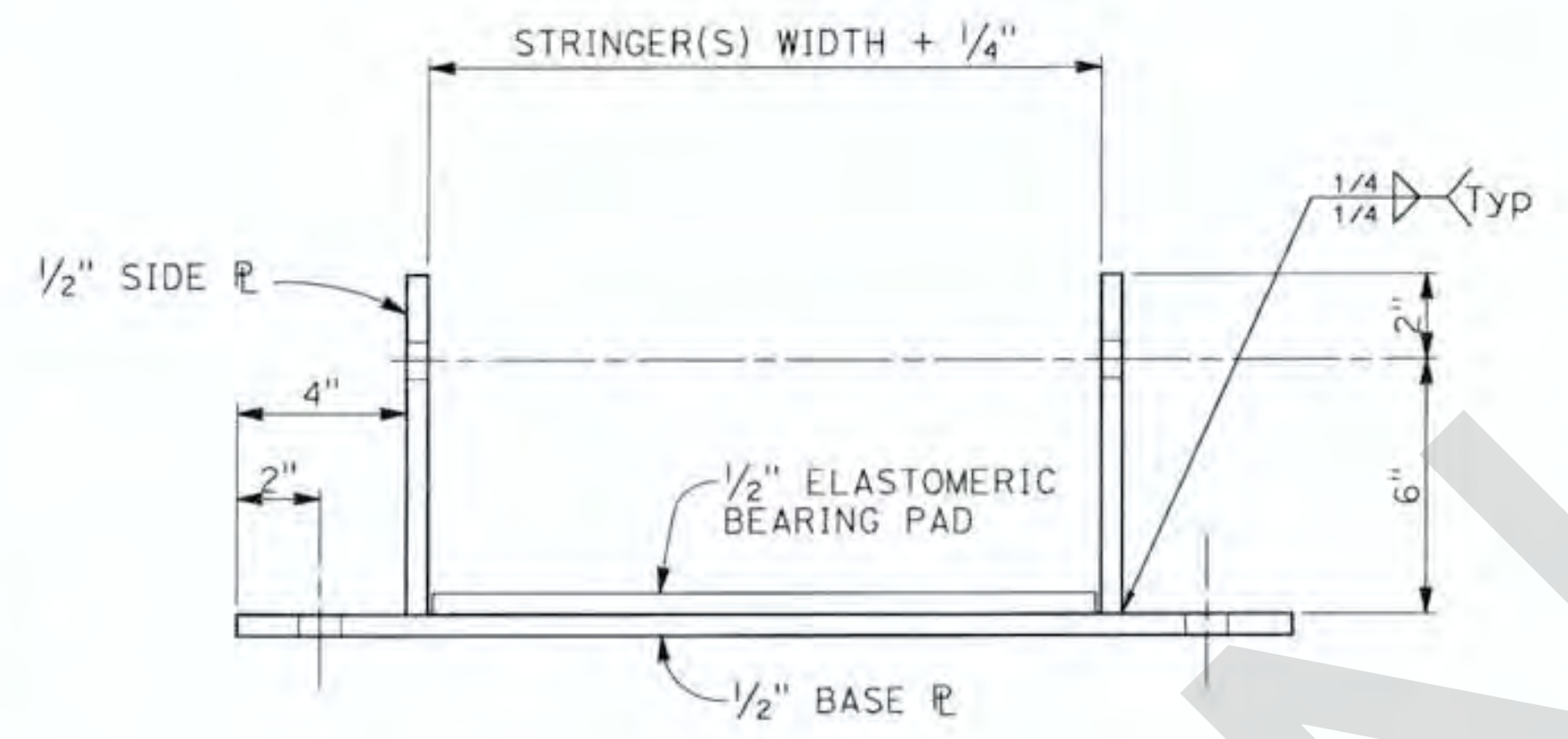
SECTION D
1 1/2" = 1'-0" S7

AS BUILT

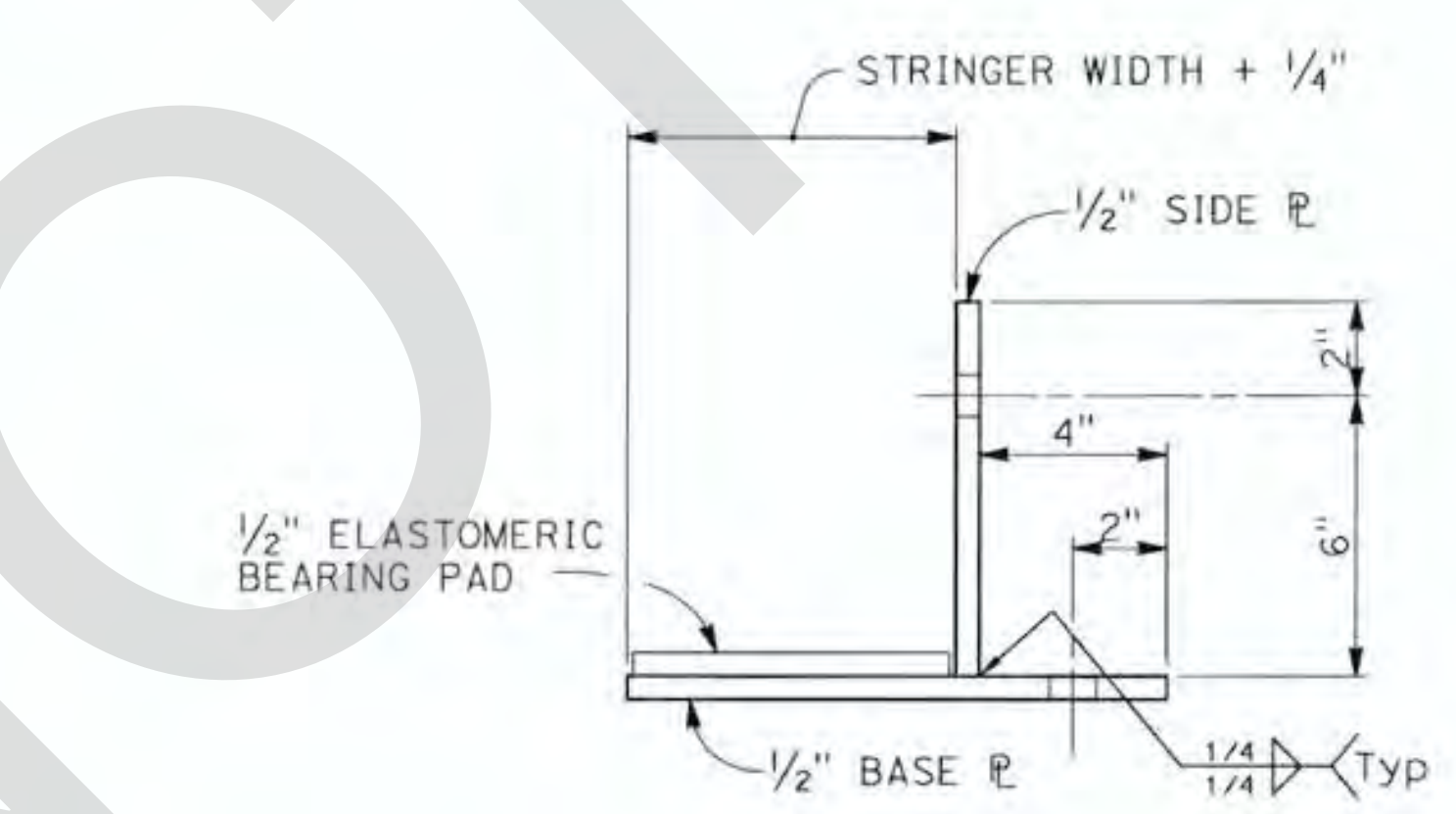


STEEL PLATE PILE CAP DETAIL
1 1/2" = 1'-0" S7

AS BUILT
CORRECTIONS BY THEIA MORIK, P.E.
CONTRACT NO. BCL5 5952 (093)
DATE 10-16-17



STEEL PLATE BEARING SHOE DETAIL 1
3" = 1'-0" S7

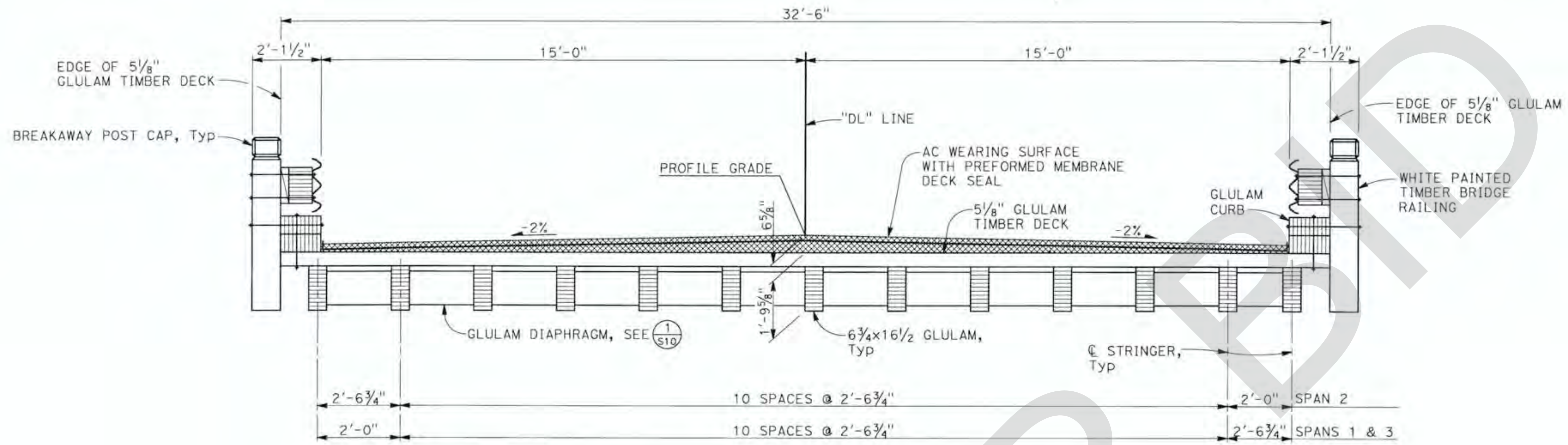


STEEL PLATE BEARING SHOE DETAIL 2
3" = 1'-0" S7

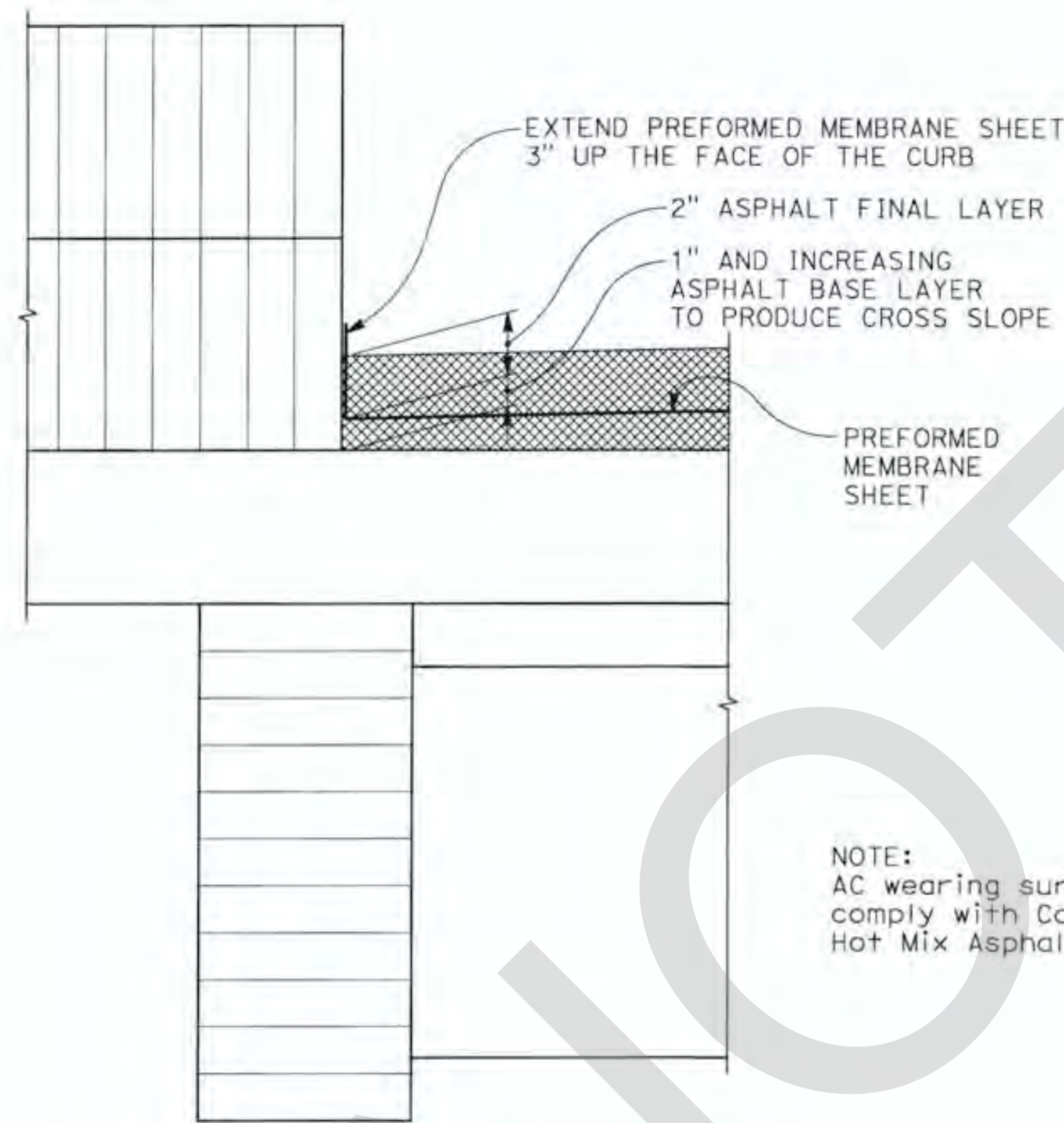
REVISIONS	APPR.	DATE

FILE NO. 586600 120

BIGGS CARDOSA ASSOCIATES, INC.		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS		DOLA DITCH BRIDGE BRIDGE No. 54C0285 (COUNTY No. 81) BENT DETAILS	
APPROVED BY: MICHAEL A. THOMAS REGISTERED PROFESSIONAL ENGINEER No. S4676 EXP. 9/30/16 STATE OF CALIFORNIA	PLANS PREPARED BY: BIGGS CARDOSA ASSOCIATES INC STRUCTURAL ENGINEERS 800 So. Main St, Suite 400 Orange, California 92668 714-550-4885 BCR	DESIGNED BY: RBS DRAWN BY: DM CHECKED BY: GDD DATE: 3/4/16	REVIEWED BY: ANDY SILVA DATE: 4/4/16	RECOMMENDED BY: MAZIN KASEY DATE: 4/4/16	APPROVED BY: MAZIN KASEY, P.E., DEPUTY DIRECTOR DATE: 4-4-2016
FIELD CHANGES		MERTAV N. MIKHAIL, P.E., TRANSPORTATION DESIGN, DIVISION CHIEF		J.L. REF. W.O. NO. SCALE DWG. NO. SHI. No.	
				JL 10927 HF0025 AS SHOWN S7 16 OF 39	



TYPICAL SECTION
1/2" = 1'-0"



PARTIAL TYPICAL SECTION
3" = 1'-0"

NOTE:
AC wearing surface with preformed membrane shall comply with Caltrans Standard Specifications 39-1.13 Hot Mix Asphalt on bridge decks and 54-5 Deck Seal.

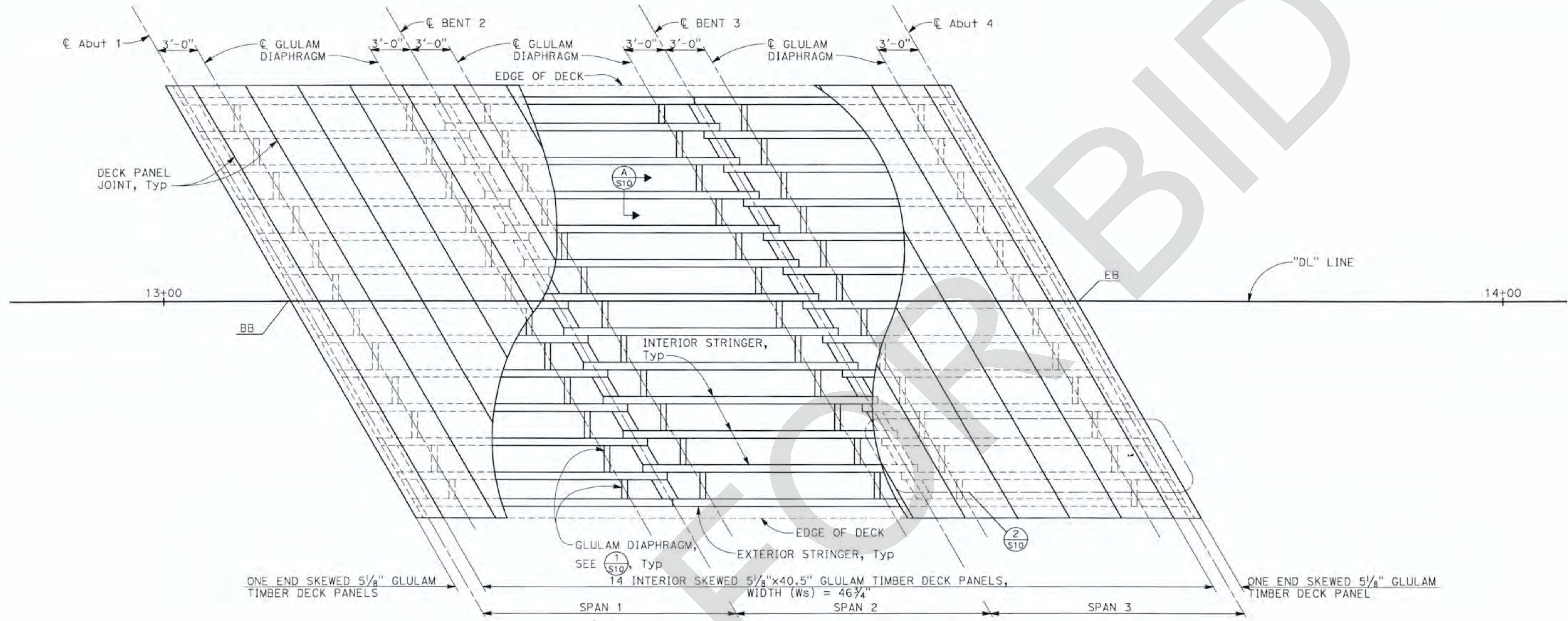
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NO CORRECTIONS THIS SHEET
BY *TARIQ MAJID, P.E.*
DATE COMPLETED 10-16-17

MARK	REVISIONS	APPR.	DATE

FILE NO. 586600 120

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

BIGGS CARDOSA ASSOCIATES, INC. APPROVED BY: <i>[Signature]</i> DATE: 4/4/16 PLANS PREPARED BY: BIGGS CARDOSA ASSOCIATES INC STRUCTURAL ENGINEERS 500 So. Main St, Suite 400 Orange, California 92668 714-550-4888 BCA		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS REVIEWED BY: <i>[Signature]</i> DATE: 4/9/16 RECOMMENDED BY: <i>[Signature]</i> DATE: 4/14/16 MERVAT N. MIKHAIL, P.E., TRANSPORTATION DESIGN, DIVISION CHIEF APPROVED BY: <i>[Signature]</i> DATE: 4-9-2016 MAZIN KASEY, P.E., DEPUTY DIRECTOR		DOLA DITCH BRIDGE BRIDGE No. 54C0285 (COUNTY No. 81) TYPICAL SECTION	
J.L. REF. W.O. NO. SCALE DWG. NO. SHT. NO. JL 10927 HF0025 AS SHOWN S8 17 OF 39		FIELD CHANGES			



STRINGER LAYOUT
1/4" = 1'-0"



NOTES:

1. During stringer placement, hand tighten all connections until all diaphragms are placed to allow for minor adjustment. After all diaphragms are placed and alignment is verified, connections should be securely tightened.
2. Each 5/8" glulam timber deck panel shall be connected per (2/S10) and (4/S10). Not all connections are shown for clarity.
3. Glulam deck panels should be placed after stringers and diaphragms are set and secured.
4. When placing glulam deck panels, brackets should be attached to stringers and nuts hand tightened. Nuts should not be tightened until all deck panels are in place and properly aligned.

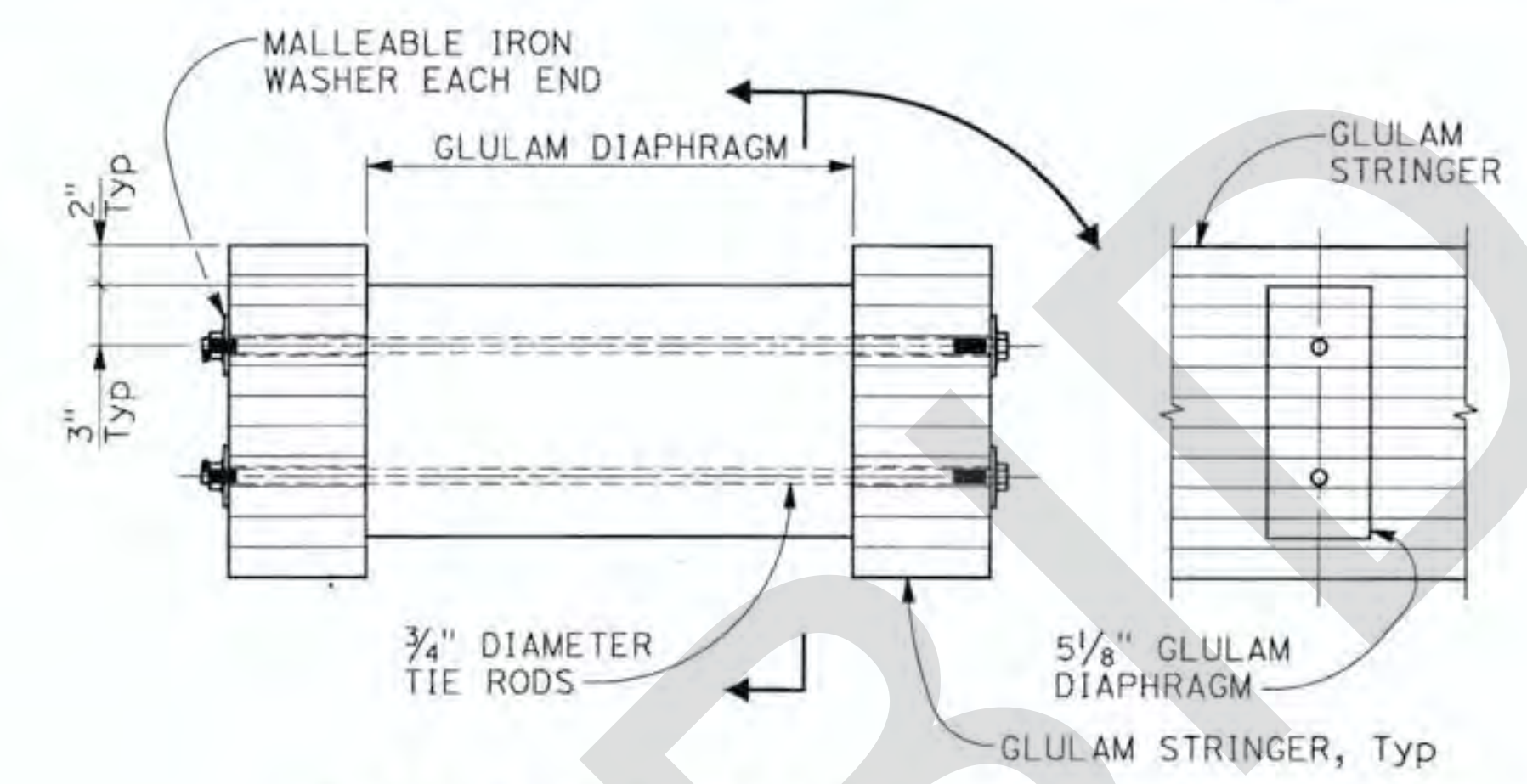
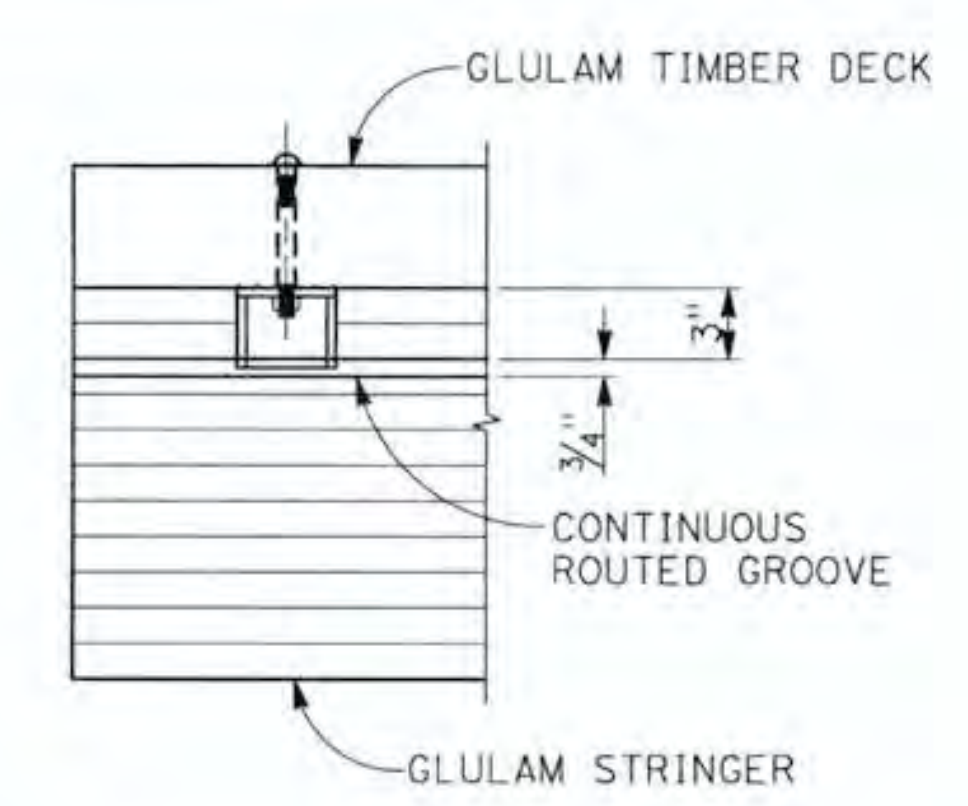
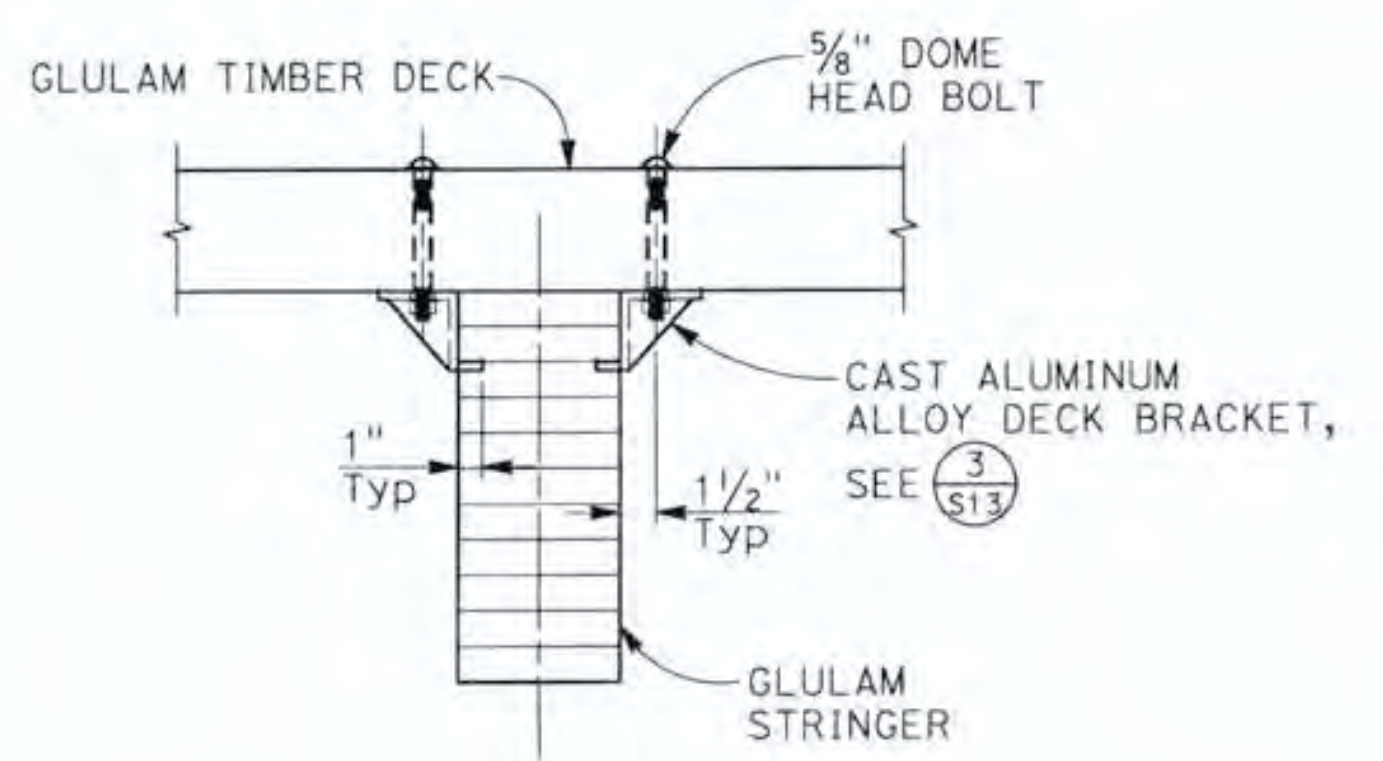
AS BUILT
NO CORRECTIONS THIS SHEET
BY *Tariq Malik, P.E.*
DATE COMPLETED: 10-16-17

MARK	REVISIONS	APPR.	DATE

FILE NO. 586600 120

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

APPROVED BY: <i>[Signature]</i> DATE: 4/4/16 NAME: 9/30/16 EXPIRES		PLANS PREPARED BY: BIGGS CARDOSA ASSOCIATES INC STRUCTURAL ENGINEERS 500 So. Main St. Suite 400 Orange, California 92665 714-550-4885 BCA		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS REVIEWED BY: <i>[Signature]</i> DATE: 4/9/16 RECOMMENDED BY: <i>[Signature]</i> DATE: 4/9/16 MERVAT N. MIKHAIL, P.E., TRANSPORTATION DESIGN, DIVISION CHIEF APPROVED BY: <i>[Signature]</i> DATE: 4-4-2016 MAZIN KASEY, P.E., DEPUTY DIRECTOR		DOLA DITCH BRIDGE BRIDGE No 54C0285 (COUNTY No. 81) STRINGER LAYOUT	
DESIGNED BY: RBS DRAWN BY: DM CHECKED BY: GOD DATE: 3/4/16		FIELD CHANGES MARK CHANGES NO CHANGES RESIDENT ENGINEER DATE		J.L. REF. W.O. NO. SCALE DWG. NO. SHT. No. JL 10927 HFO025 AS SHOWN S9 18 OF 39		(201414259) 2014142	

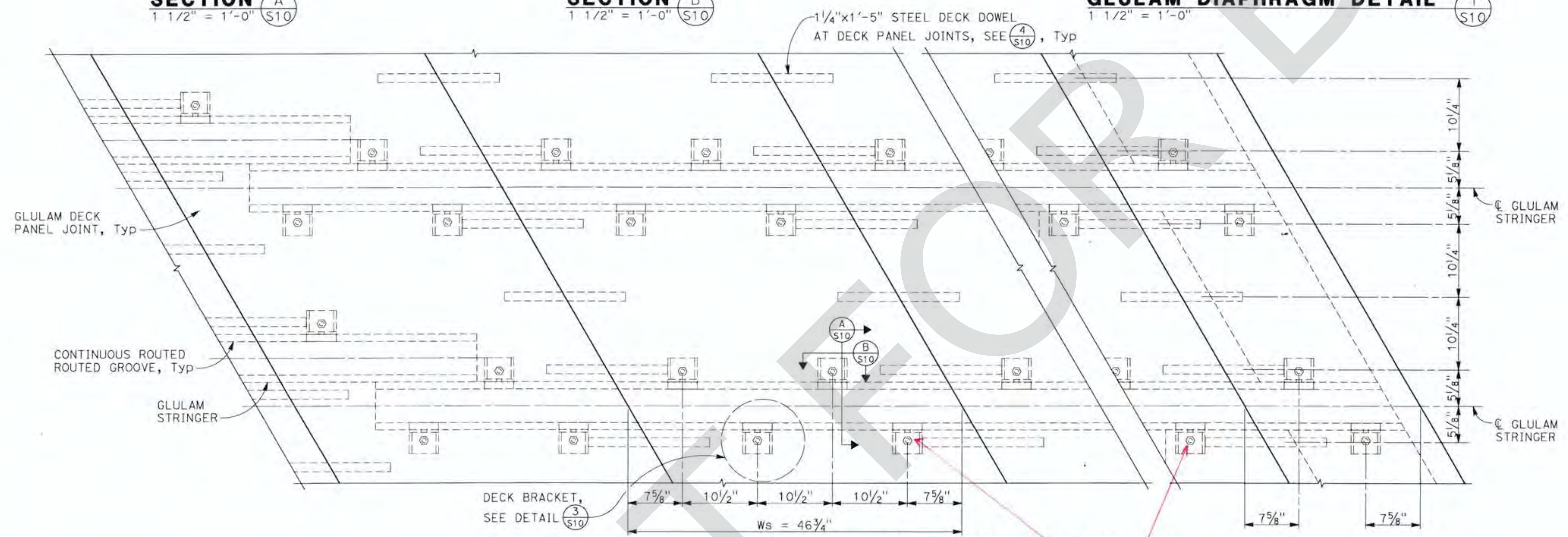


NOTE:
See notes on Sheet S9

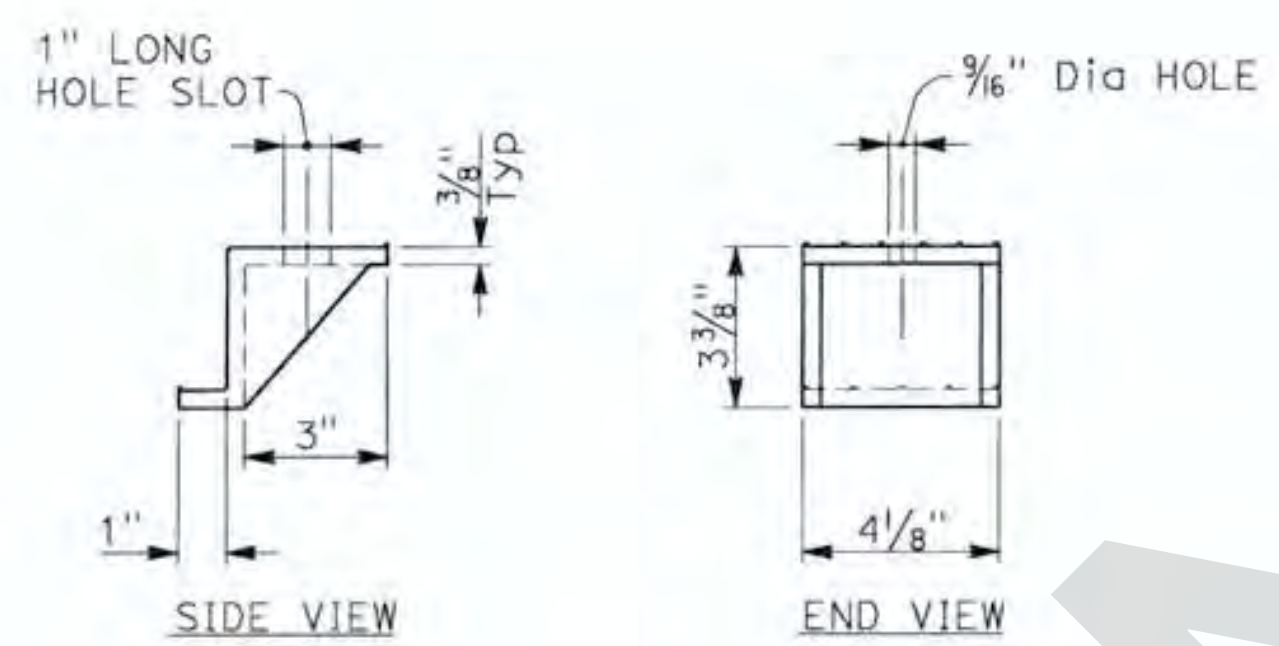
SECTION A
1 1/2" = 1'-0" S10

SECTION B
1 1/2" = 1'-0" S10

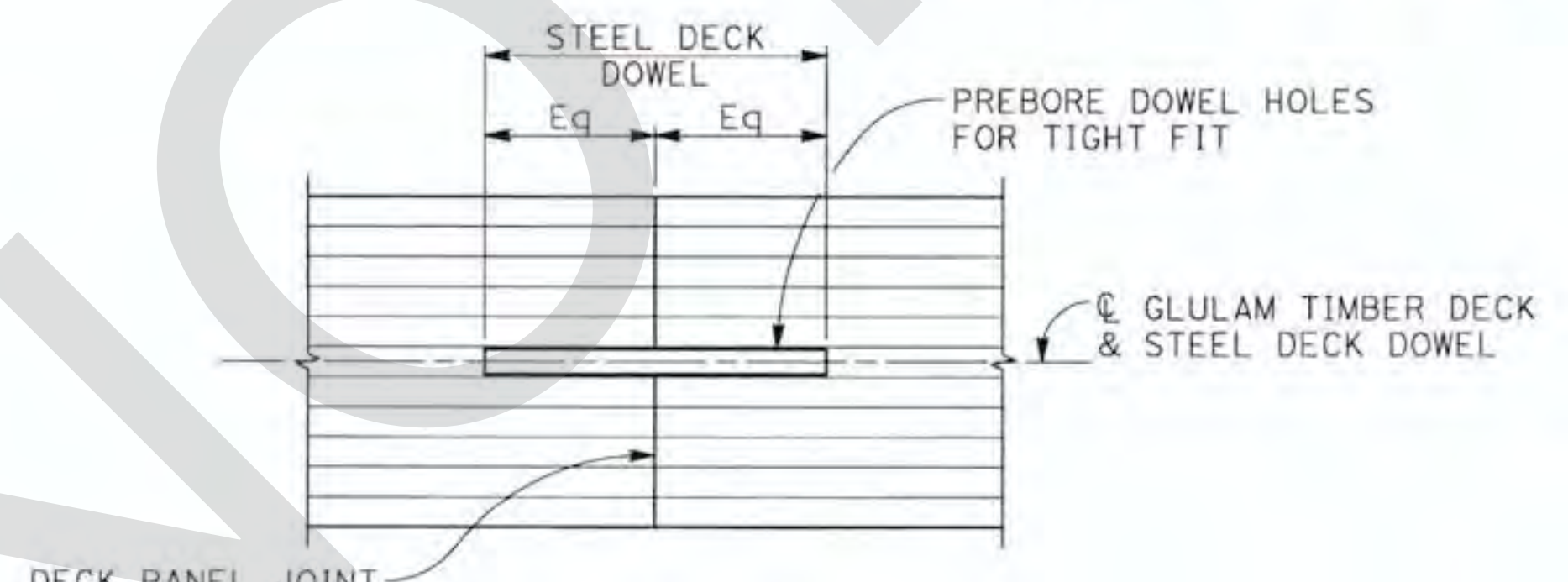
GLULAM DIAPHRAGM DETAIL
1 1/2" = 1'-0" S10



DECK PANEL CONNECTION DETAIL
1 1/2" = 1'-0" S10



DECK BRACKET DETAIL
3" = 1'-0" S10



DETAIL
1 1/2" = 1'-0" S10

DECK BRACKET COUNTERSUNKED
ALONG R & L EDGE OF DECK
BELOW CURB & GUTTER

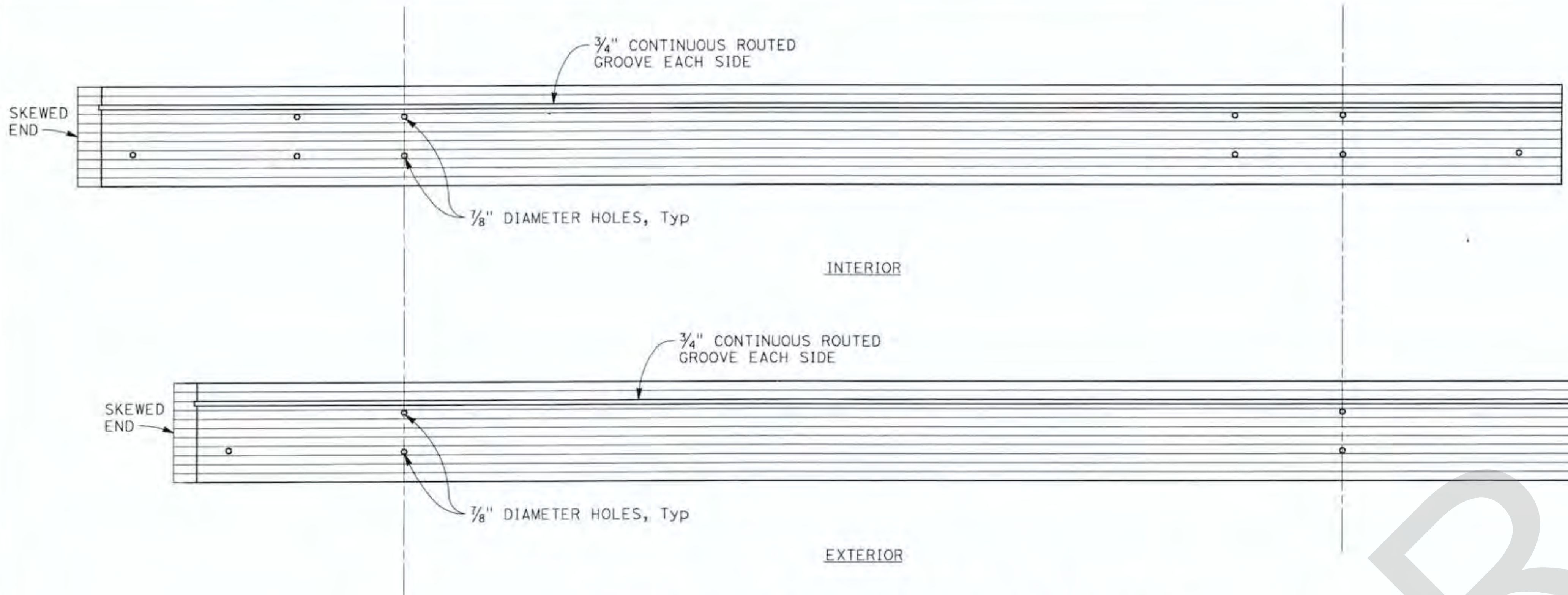
AS BUILT

AS BUILT
CORRECTIONS BY *THAD MULLER, PE*
CONTRACT NO. BRCS 595A (093)
DATE 10-16-17

MARK	REVISIONS	APPR.	DATE

FILE NO. 586600 120

BIGGS CARDOSA ASSOCIATES, INC. APPROVED BY: <i>[Signature]</i> DATE: 4/4/16 No. 54676 Exp. 9/30/16 REGISTERED PROFESSIONAL ENGINEER MICHAEL A. THOMAS STATE OF CALIFORNIA		PLANS PREPARED BY: BIGGS CARDOSA ASSOCIATES INC STRUCTURAL ENGINEERS 300 So. Main St., Suite 400 Orange, California 92668 714-550-4655 BCR		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS DESIGNED BY: RBS DRAWN BY: DM CHECKED BY: GOD DATE: 3/4/16		REVIEWED BY: <i>[Signature]</i> DATE: 4/9/16 RECOMMENDED BY: <i>[Signature]</i> DATE: 4/9/16 MERVAT N. MIKHAIL, P.E., TRANSPORTATION DESIGN, DIVISION CHIEF APPROVED BY: <i>[Signature]</i> DATE: 4-4-2016 MAZIN KASEY, P.E., DEPUTY DIRECTOR		DOLA DITCH BRIDGE BRIDGE No. 54C0285 (COUNTY No. 81) STRINGER DETAILS No. 1	
FIELD CHANGES				J.L. REF. W.O. NO. SCALE DWG. NO. SH. No. JL 10927 HF0025 AS SHOWN S10 19 OF 39 (2014142B510) 2014142		J.L. REF. W.O. NO. SCALE DWG. NO. SH. No. JL 10927 HF0025 AS SHOWN S10 19 OF 39 (2014142B510) 2014142			



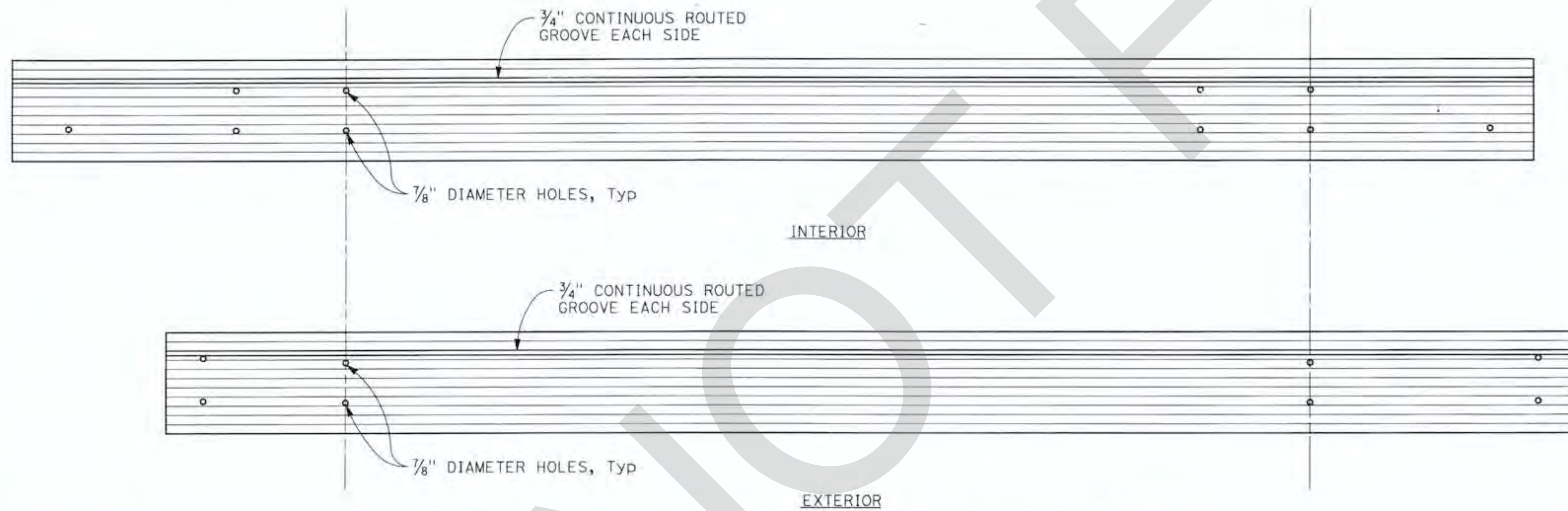
STRINGER ELEVATION - SPANS 1 & 3
NTS

GENERAL NOTES:
 Stringer Location & Name: See "STRINGER LAYOUT" for stringer location & name
 Combination Symbol: Refer to AASHTO LRFD Table 8.4.1.2.3-1
 Species Outer/Core: Refer to AASHTO LRFD Table 8.4.1.2.3-1
 Midspan Dead Load Camber: Glued laminated timber girders shall be cambered a minimum of 2x the dead load deflection at the service limit state, per AASHTO LRFD 8.12.1

SPAN	STRINGER LOCATION	COMBINATION SYMBOL	SPECIES OUTER/CORE	MIDSPAN DEAD LOAD CAMBER (INCHES)
SPAN 1 & 3	INTERIOR STRINGER	24F-1.8E, 24F-V4	DF/DF	1/4
	EXTERIOR STRINGER	24F-1.8E, 24F-V4	DF/DF	1/4
SPAN 2	INTERIOR STRINGER	24F-1.8E, 24F-V4	DF/DF	1/4
	EXTERIOR STRINGER	24F-1.8E, 24F-V4	DF/DF	1/4

FABRICATION NOTES:

- All glulam material shall be pressure impregnated with wood preservative in accordance with the requirements of AWPA U1 Commodity Specification F.
- Insofar as possible, all glulam material shall be cut, routed, drilled and otherwise fabricated prior to pressure treatment with wood preservatives.
- When boring or other fabrication is necessary after preservative treatment, exposed and untreated wood must be treated with creosote or copper naphthenate complying with AWPA Standard M4.
- Timber and Lumber must be accurately cut and framed to a close fit and must have even bearing over the entire contact surface. Do not use shimming in making joints.
- All glulam material must be kiln-dried solid stock lumber, factory laminated using adhesive for wet use, with tongue and groove edges.
- All cut ends must be coated with glue adhesive - 2 coats minimum.

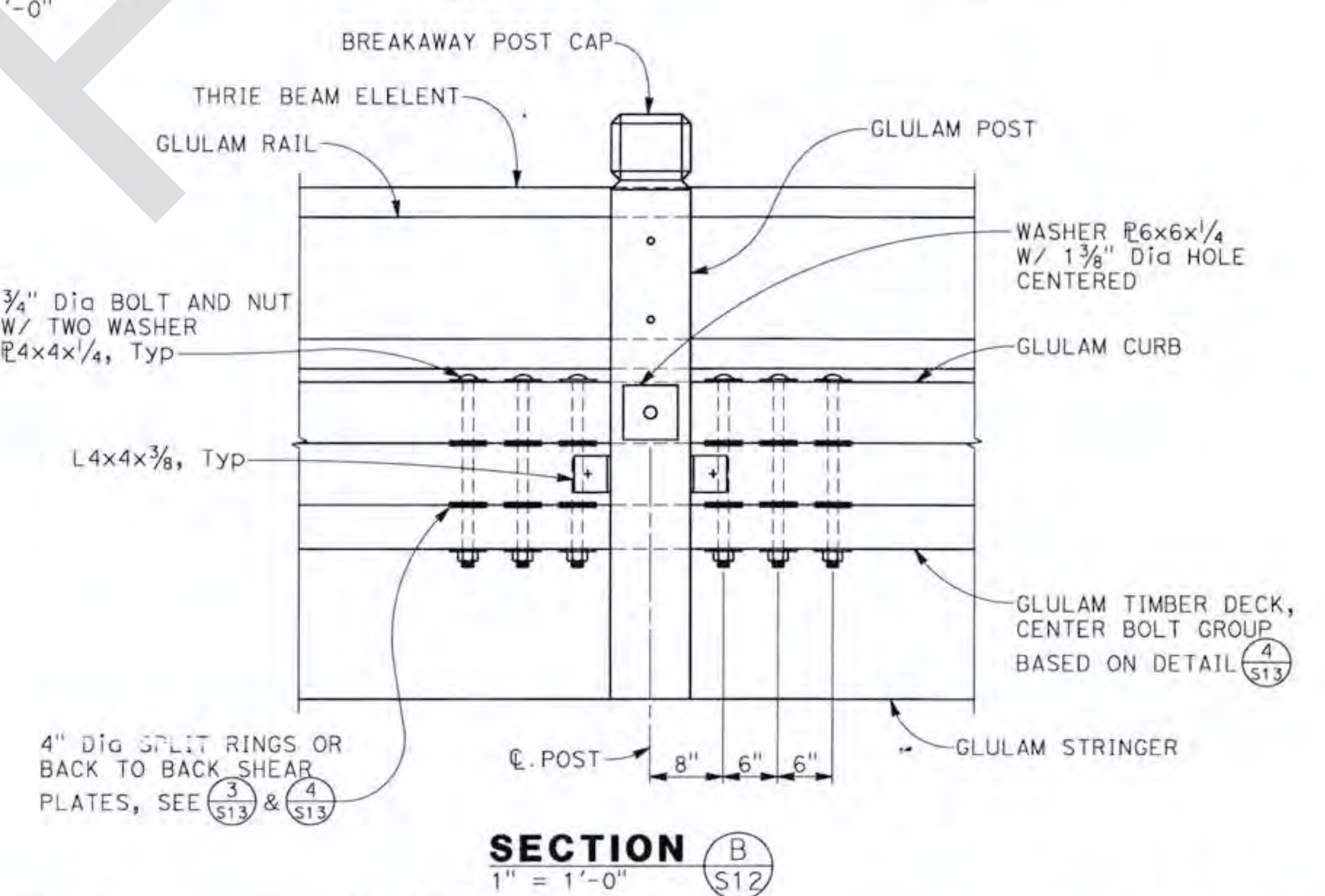
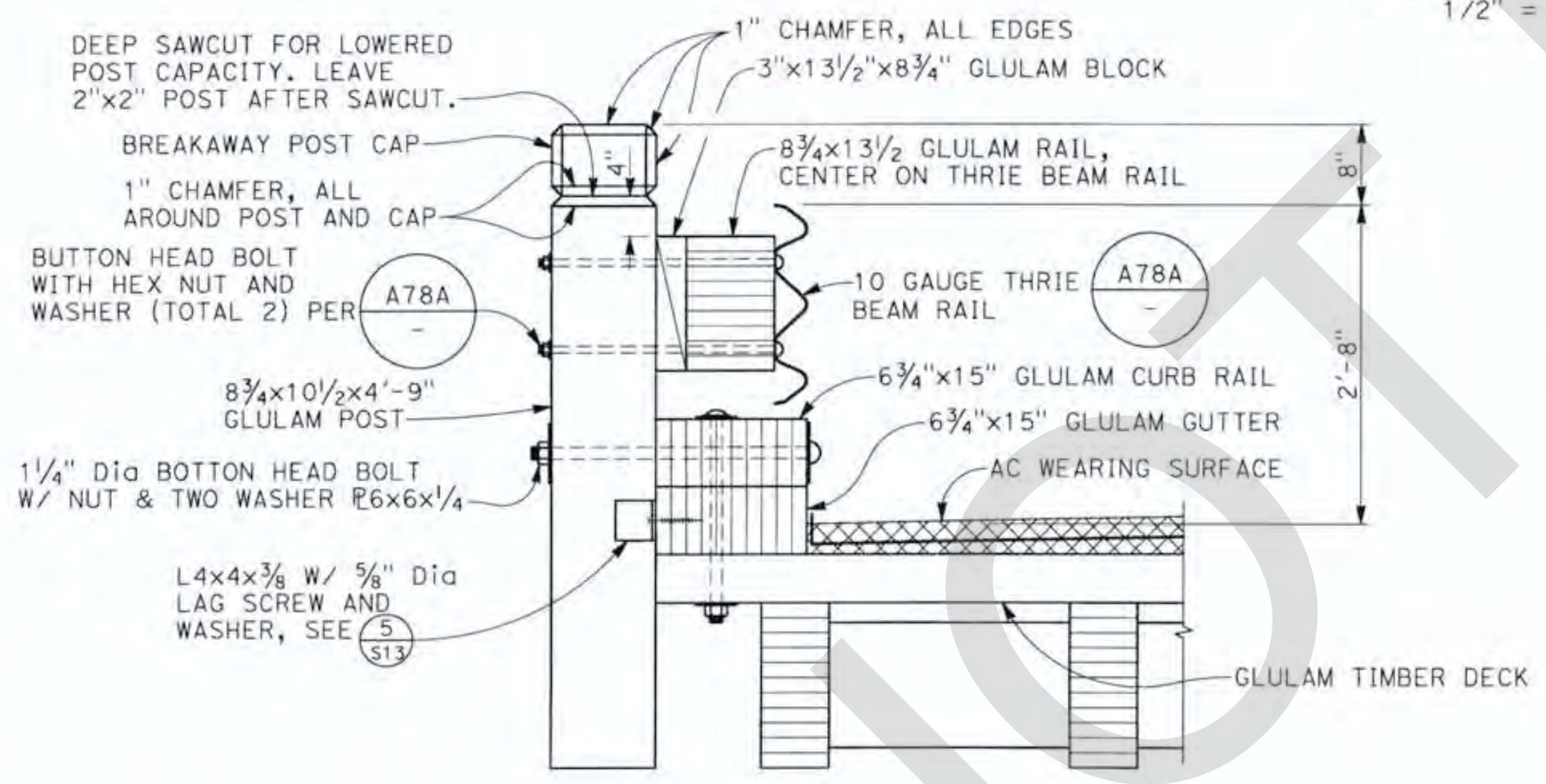
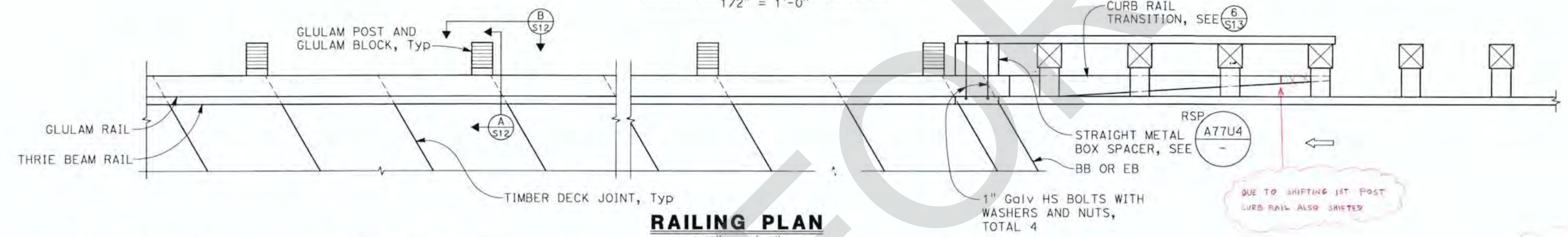
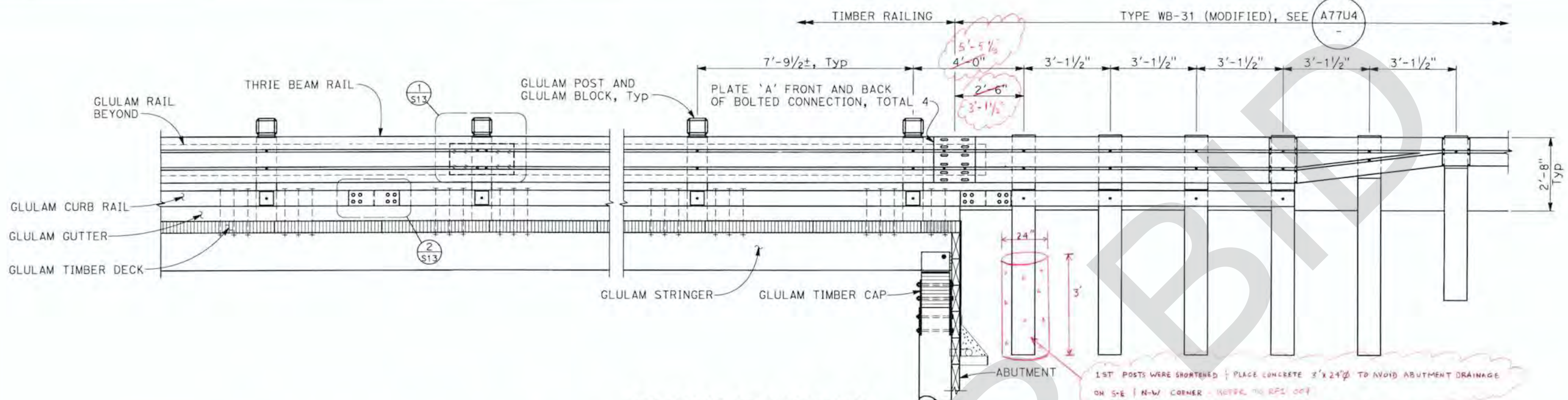


STRINGER ELEVATION - SPANS 2
NTS

AS BUILT
 NO CORRECTIONS THIS SHEET
 BY: TARIQ MAHMOUD, P.E.
 DATE COMPLETED: 10-16-17

MARK	REVISIONS	APPR.	DATE

APPROVED BY: MICHAEL A. THOMAS REGISTERED PROFESSIONAL ENGINEER No. 54676 EXP. 9/30/16 STATE OF CALIFORNIA EXPIRES: 9/30/16		PLANS PREPARED BY: BIGGS CARDOSA ASSOCIATES INC STRUCTURAL ENGINEERS 500 So. Main St. Suite 400 Orange, California 92668 714-550-4665 BCR		DESIGNED BY: RBS DRAWN BY: DM CHECKED BY: GDD DATE: 3/4/16		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS REVIEWED BY: MERVAT N. MIKHAIL, P.E., TRANSPORTATION DESIGN, DIVISION CHIEF DATE: 4/4/16		DOLA DITCH BRIDGE BRIDGE No. 54C0285 (COUNTY No. 81) STRINGER DETAILS No. 2	
BIGGS CARDOSA ASSOCIATES, INC.				FIELD CHANGES		APPROVED BY: MAZIN KASEY, P.E., DEPUTY DIRECTOR DATE: 9-9-2016		J.L. REF. W.O. NO. SCALE DWG. NO. SHT. No. JL 10927 HF0025 AS SHOWN S11 20 OF 39 (2014142511) 2014142	

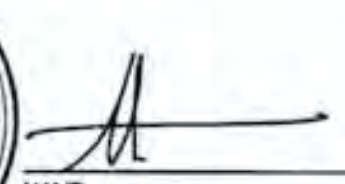

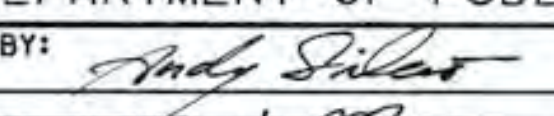
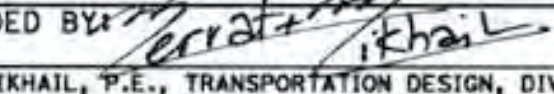



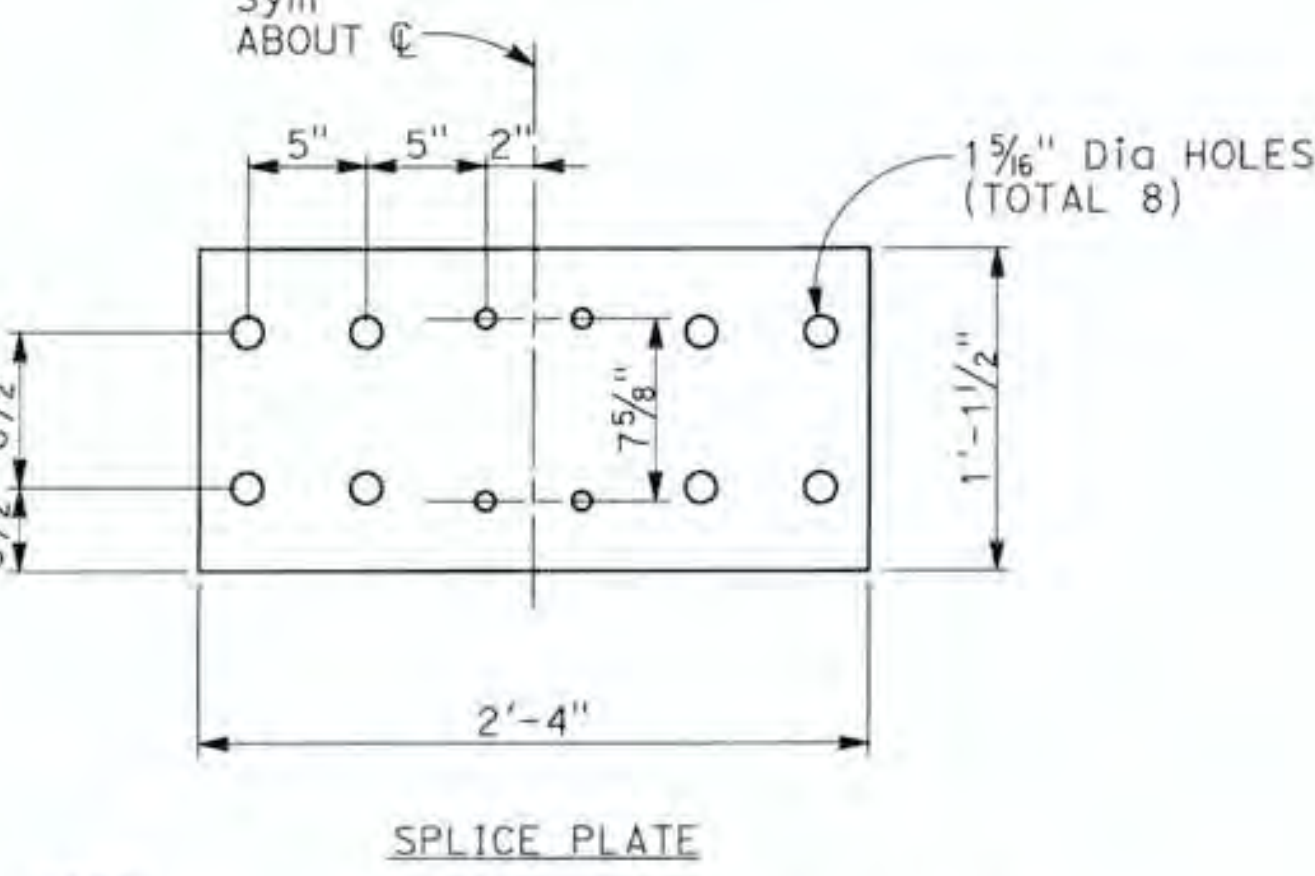
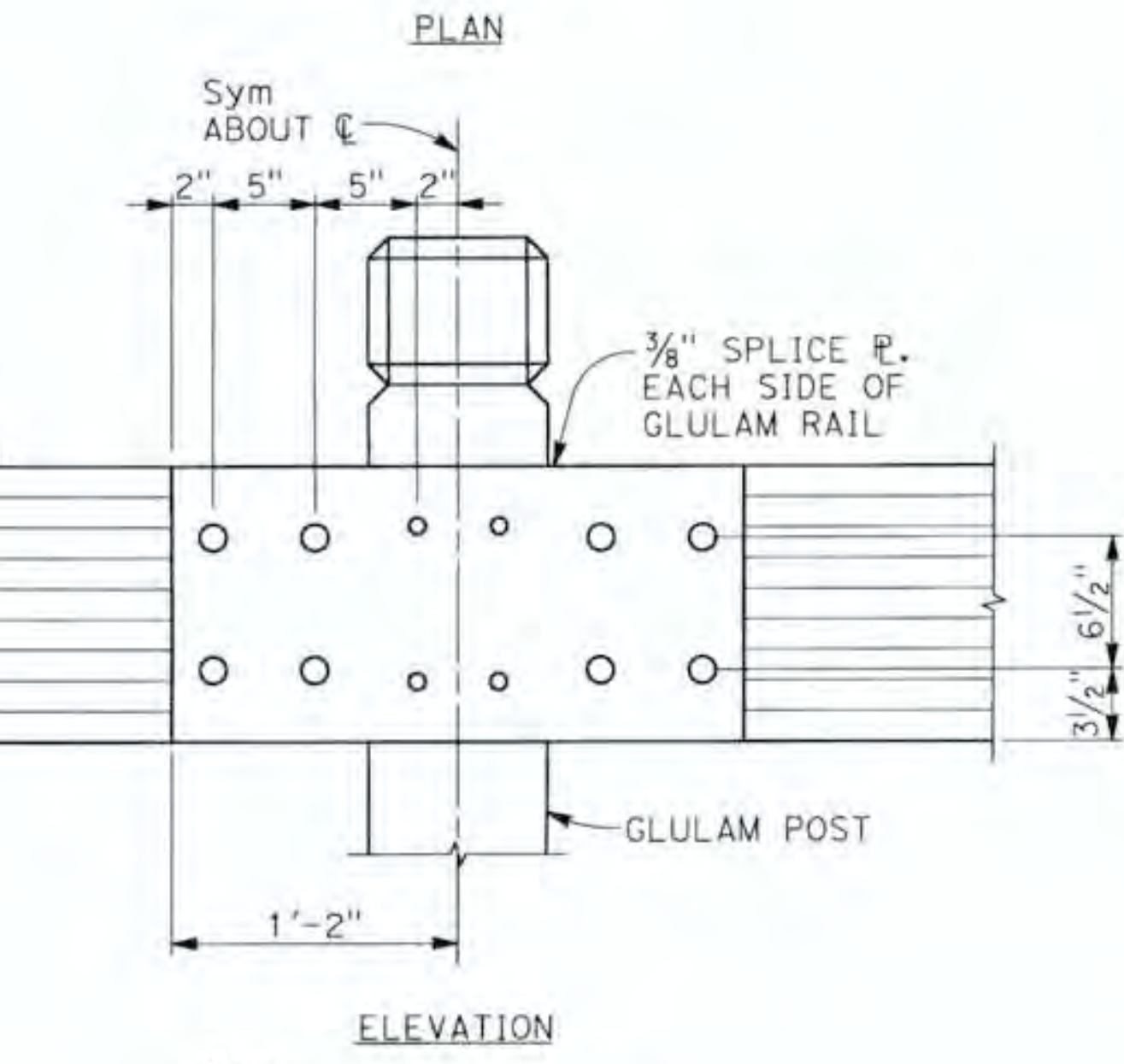
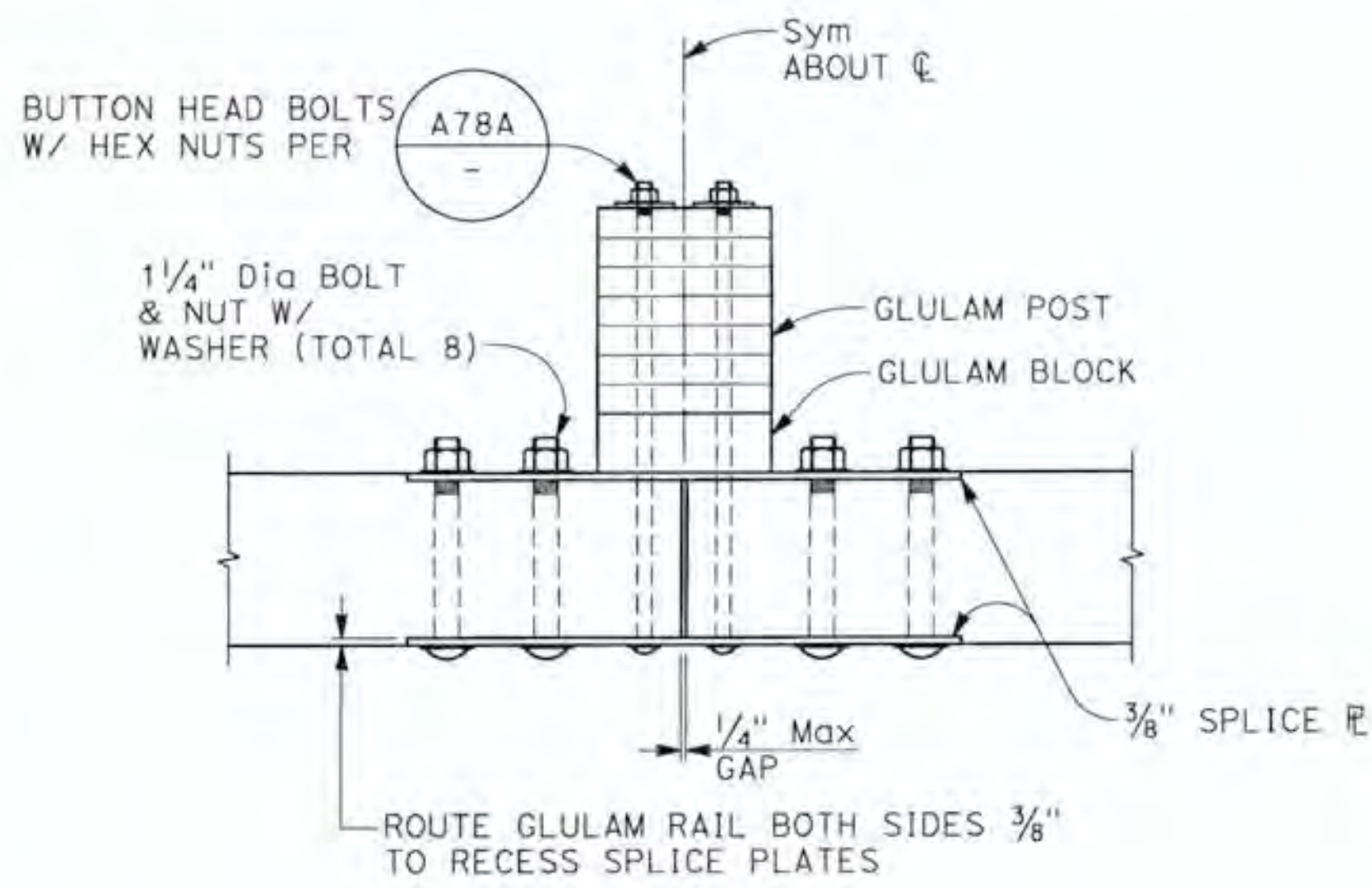
AS BUILT

AS BUILT
CORRECTIONS BY TARIQ MAHMOUD
CONTRACT NO. BRLS 5954 (023)
DATE 10-16-17

REVISIONS	DATE	APPR.

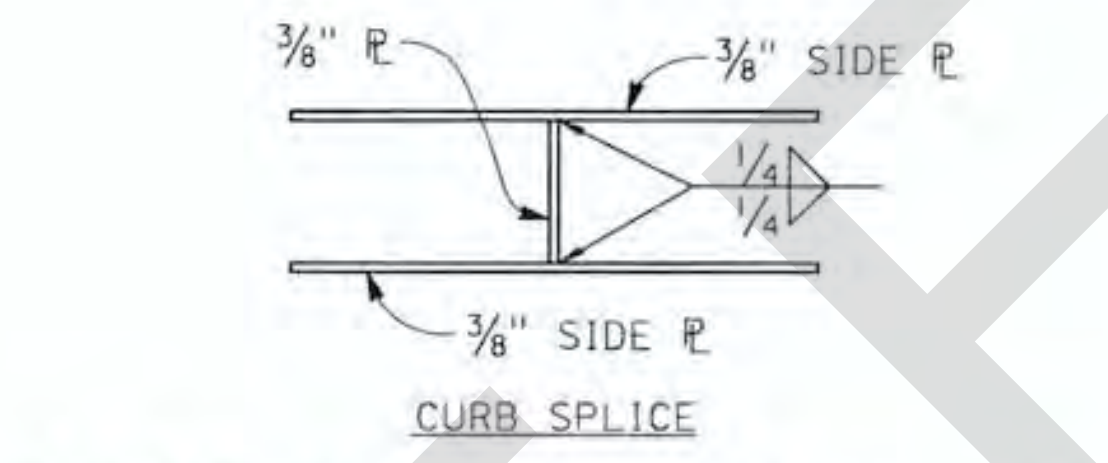
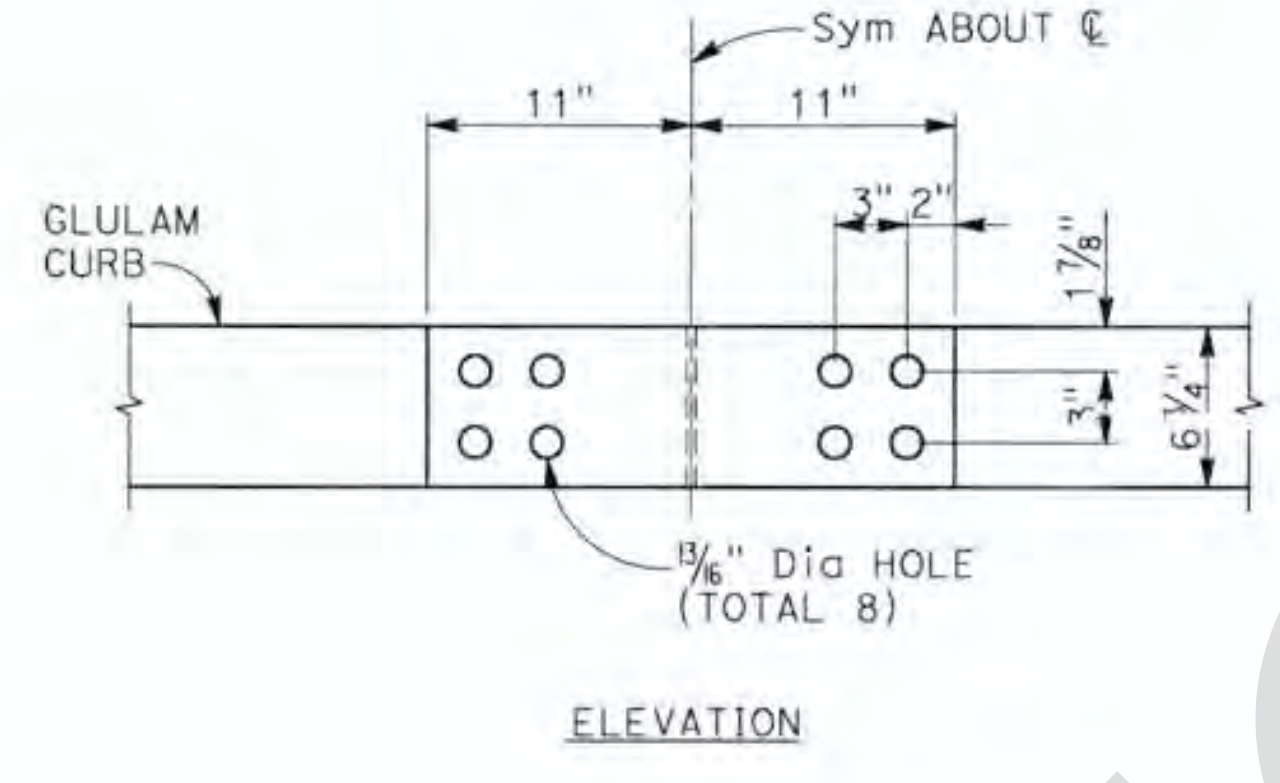
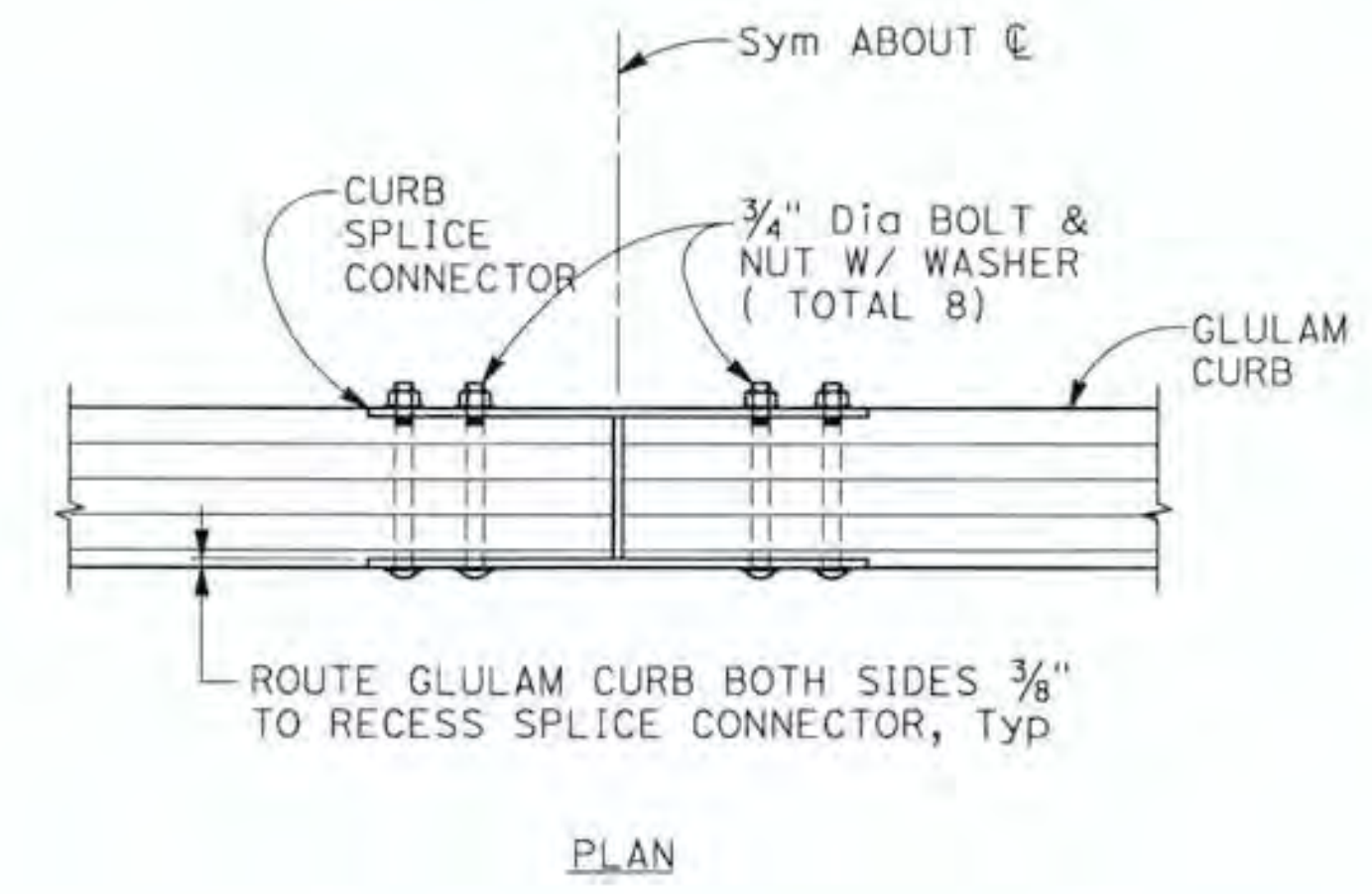
FILE NO. 586600 120

BIGGS CARDOSA ASSOCIATES, INC. APPROVED BY:  DATE: 4/4/16 PLANS PREPARED BY: BIGGS CARDOSA ASSOCIATES INC STRUCTURAL ENGINEERS 800 So. Main St, Suite 400 Orange, California 92668 714-550-4665 		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS REVIEWED BY:  DATE: 4/16 RECOMMENDED BY:  DATE: 4/16 MERVAT N. MIRHAIL, P.E., TRANSPORTATION DESIGN, DIVISION CHIEF APPROVED BY:  DATE: 4-1-2016 MAZIN KASEY, P.E., DEPUTY DIRECTOR		DOLA DITCH BRIDGE BRIDGE No. 54C0285 (COUNTY 81) RAILING DETAILS No. 1 J.L. REF. W.O. NO. SCALE DWG. NO. SHT. No. JL 10927 HF0025 AS SHOWN S12 21 OF 39 (20141428512) 2014142	
DESIGNED BY: RBS DRAWN BY: DM CHECKED BY: GDD DATE: 3/4/16		FIELD CHANGES MARK CHANGES NO CHANGES RESIDENT ENGINEER DATE		DATE: 3/4/16	

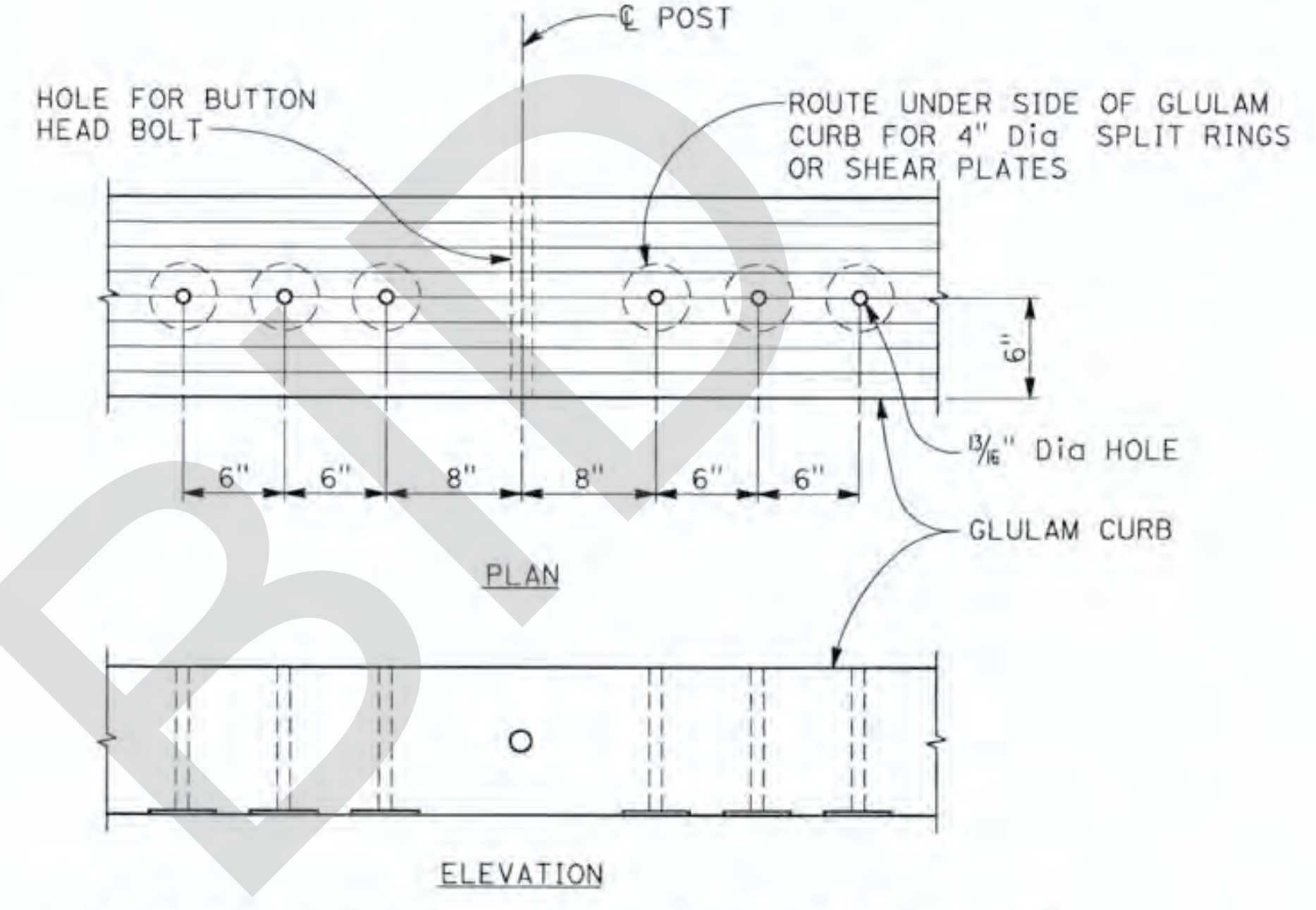


RAIL SPLICE DETAIL ①
1 1/2" = 1'-0"

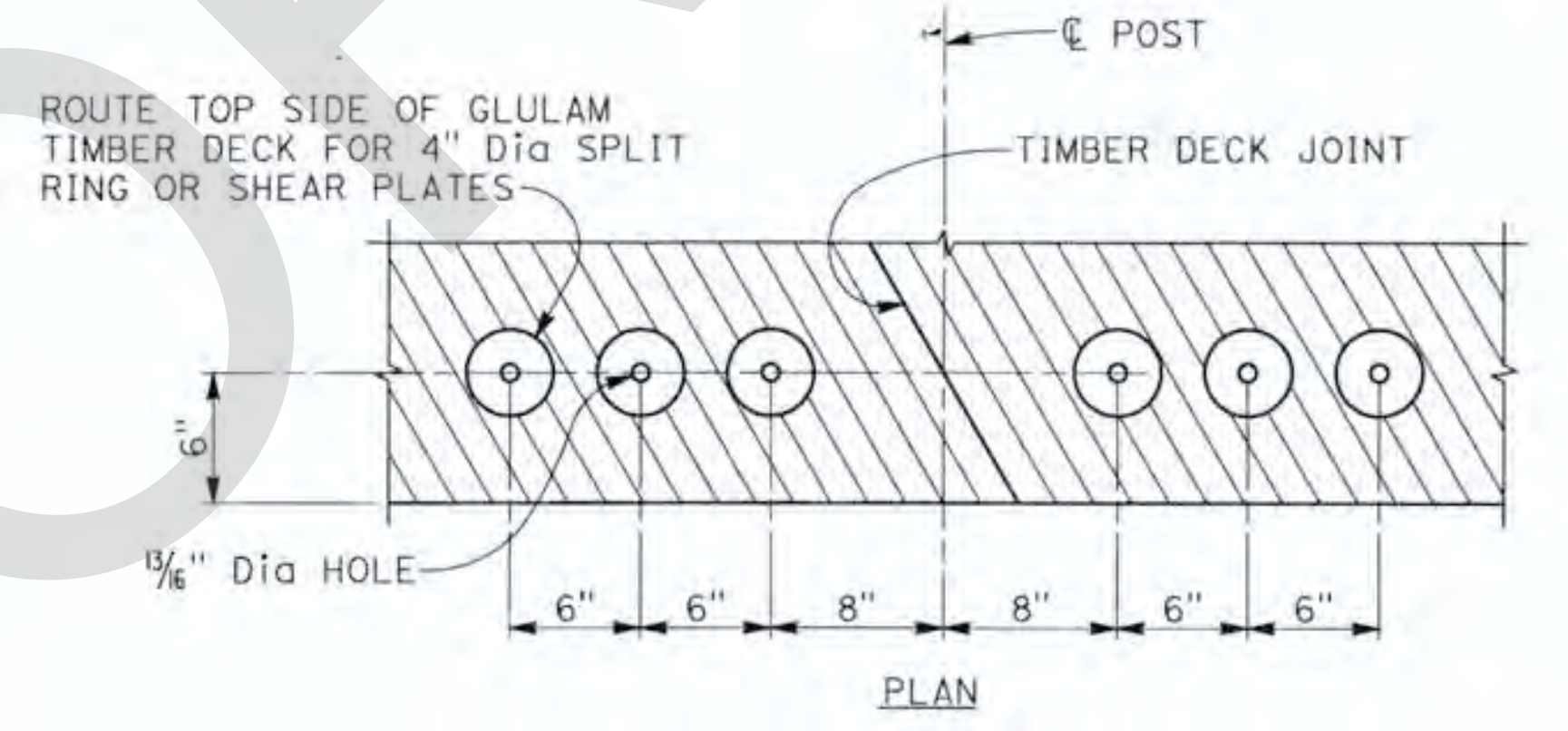
NOTE:
THREE BEAM ELEMENT NOT SHOWN FOR CLARITY



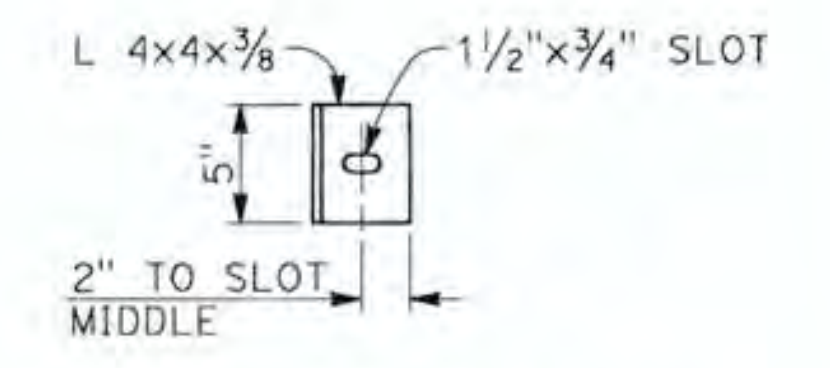
CURB SPLICE DETAIL ②
1 1/2" = 1'-0"



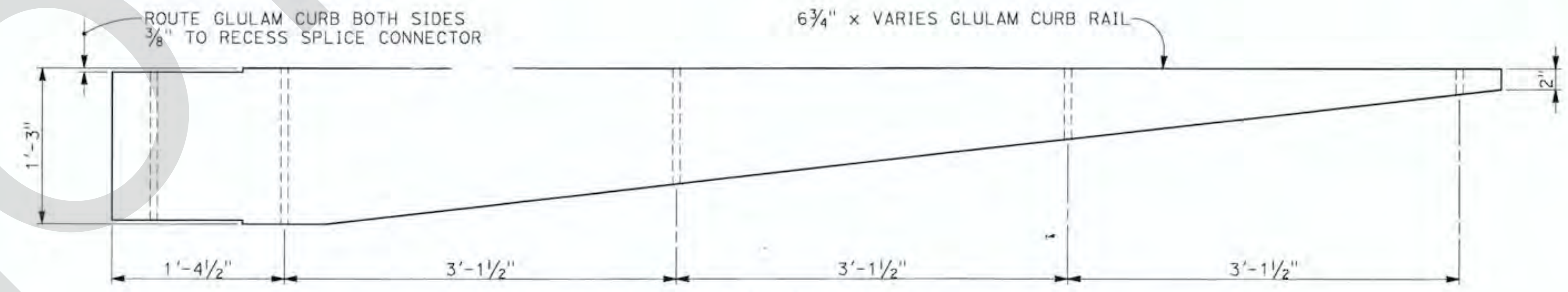
CURB RAIL AND GUTTER DETAIL ③
1 1/2" = 1'-0"



DECK DETAIL ④
1 1/2" = 1'-0"



ANGLE DETAIL ⑤
1 1/2" = 1'-0"



CURB RAIL TRANSITION ⑥
1 1/2" = 1'-0"

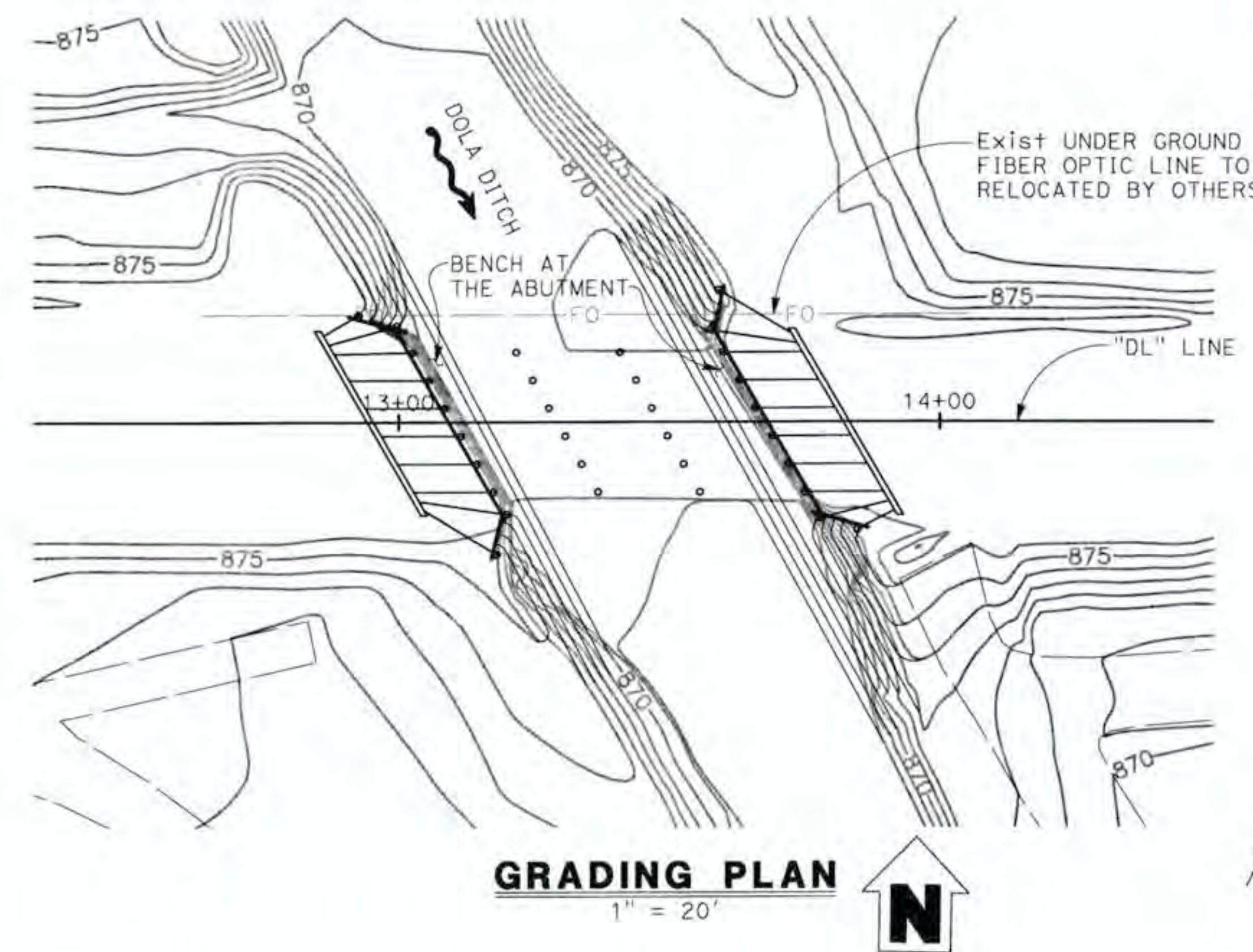
AS BUILT
NO CORRECTIONS THIS SHEET
BY: *TARIC MARIK, P.E.*
DATE COMPLETED: 10-16-17

MARK	REVISIONS	APPR.	DATE
MARK	REVISIONS	APPR.	DATE

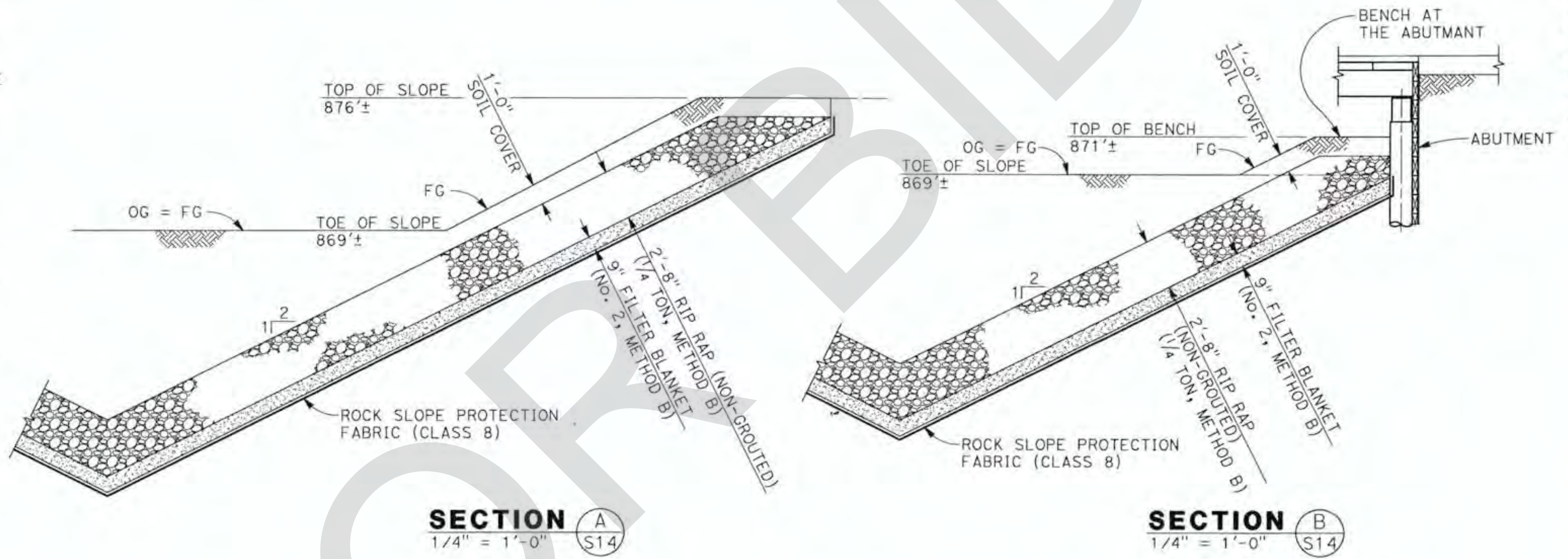
FILE NO. 586600 120

BIGGS CARDOSA ASSOCIATES, INC. APPROVED BY: <i>[Signature]</i> DATE: 4/4/16 NAME: 9/30/16 EXPIRES:		PLANS PREPARED BY: BIGGS CARDOSA ASSOCIATES INC STRUCTURAL ENGINEERS 800 So. Main St, Suite 400 Orange, California 92668 714-550-4885 BCA		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS DESIGNED BY: RBS DRAWN BY: DM CHECKED BY: GDD DATE: 3/4/16		REVIEWED BY: <i>[Signature]</i> DATE: 4/9/16 RECOMMENDED BY: <i>[Signature]</i> DATE: 4/14/16 MERVAT N. MIKHAIL, P.E., TRANSPORTATION DESIGN, DIVISION CHIEF APPROVED BY: <i>[Signature]</i> DATE: 4-9-2016 MAZIN KASEY, P.E., DEPUTY DIRECTOR		DOLA DITCH BRIDGE BRIDGE No. 54C0285 (COUNTY No. 81) RAILING DETAILS No. 2 J.L. REF. W.O. NO. SCALE DWG. NO. SHI. No. JL 10927 HF0025 AS SHOWN S13 22 OF 39 (20141428513) 2014142	
FIELD CHANGES									

NOTE:
The information for rock slope protection is based on the report titled "DOLA AND LANZIT DITCH BRIDGES UNGROUTED RIP RAP DESIGN PARAMETERS", prepared by San Bernardino County Water Resources Division.

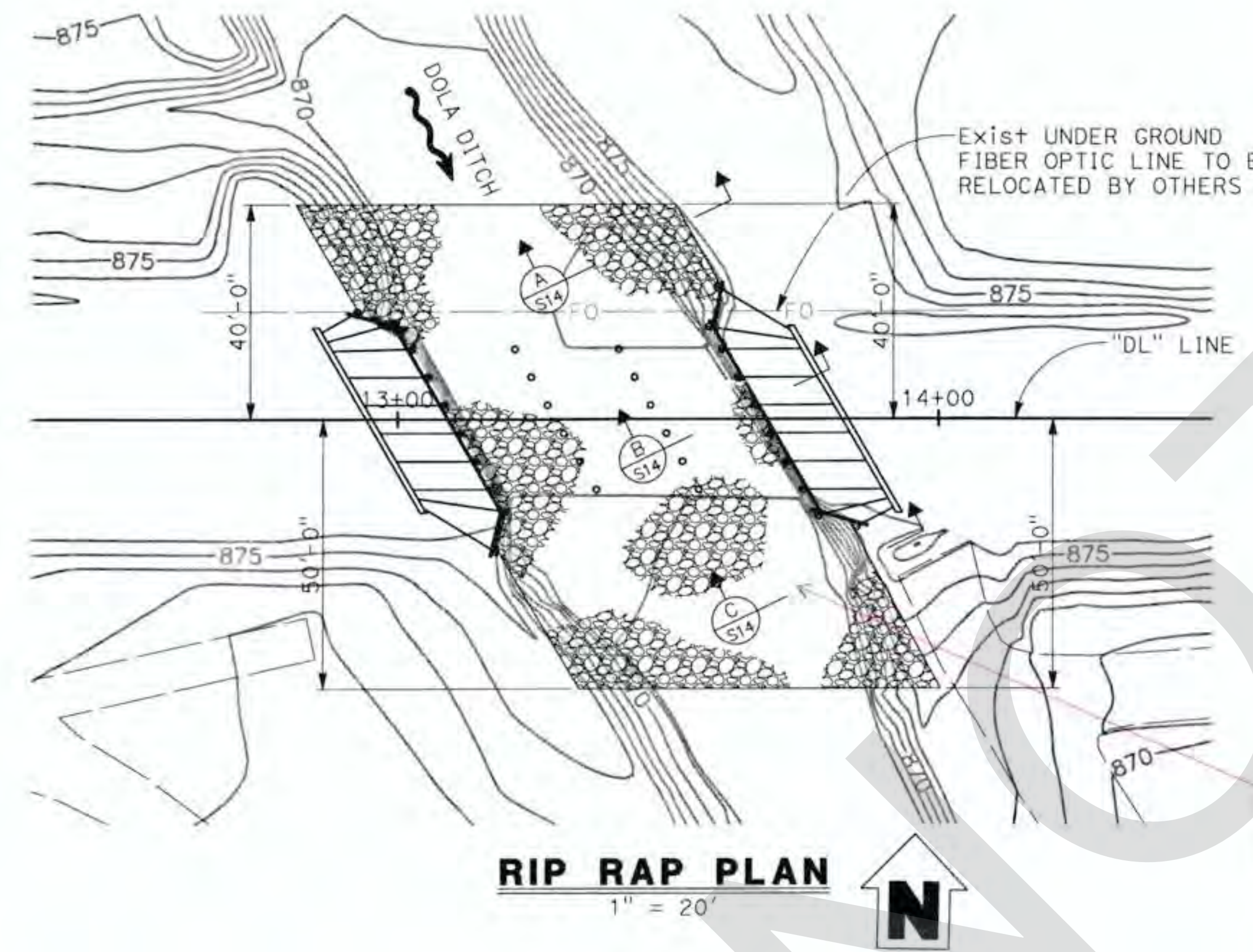


GRADING PLAN
1" = 20'

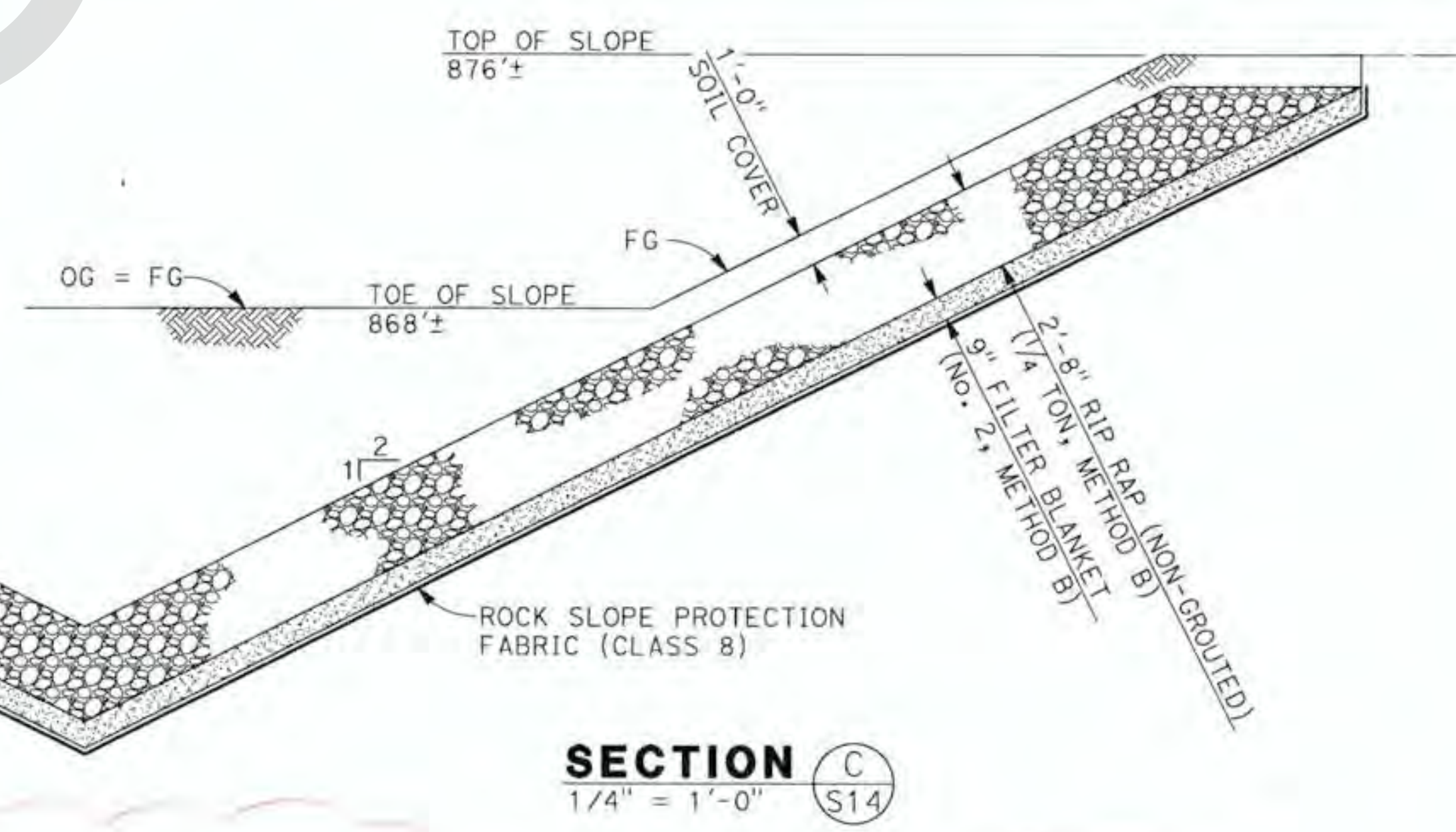


SECTION A
1/4" = 1'-0" S14

SECTION B
1/4" = 1'-0" S14



RIP RAP PLAN
1" = 20'



SECTION C
1/4" = 1'-0" S14

QUANTITIES FOR ROCK SLOPE PROTECTION (1/4T, METHOD B) WAS INCREASED FROM 510 CY TO 635 CY
QUANTITIES FOR ROCK SLOPE PROTECTION (NO.2, METHOD B) WAS INCREASED FROM 145 CY TO 190 CY

AS BUILT

AS BUILT
CORRECTIONS BY *Tania Malik, P.E.*
CONTRACT NO. BLS S252 (093)
DATE 10-16-17

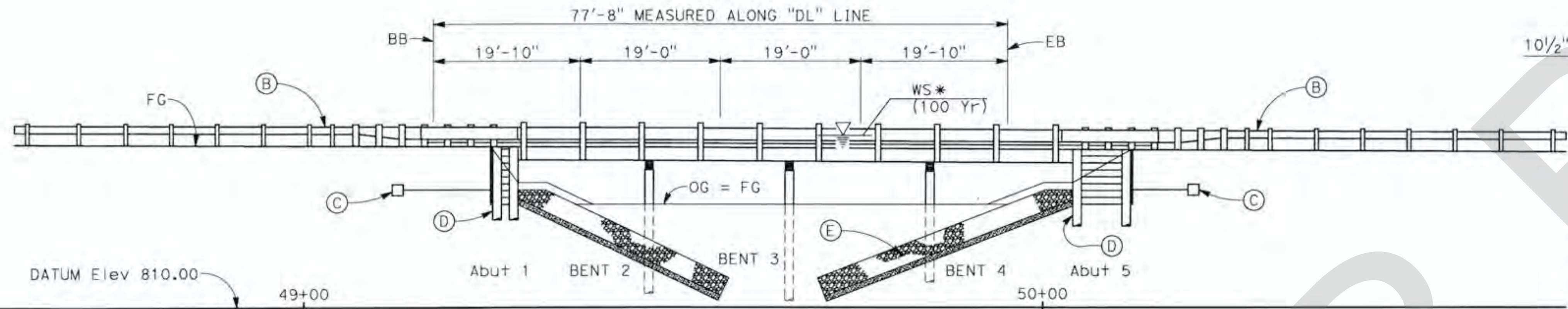
MARK	REVISIONS	APPR.	DATE

FILE NO. 586600 120

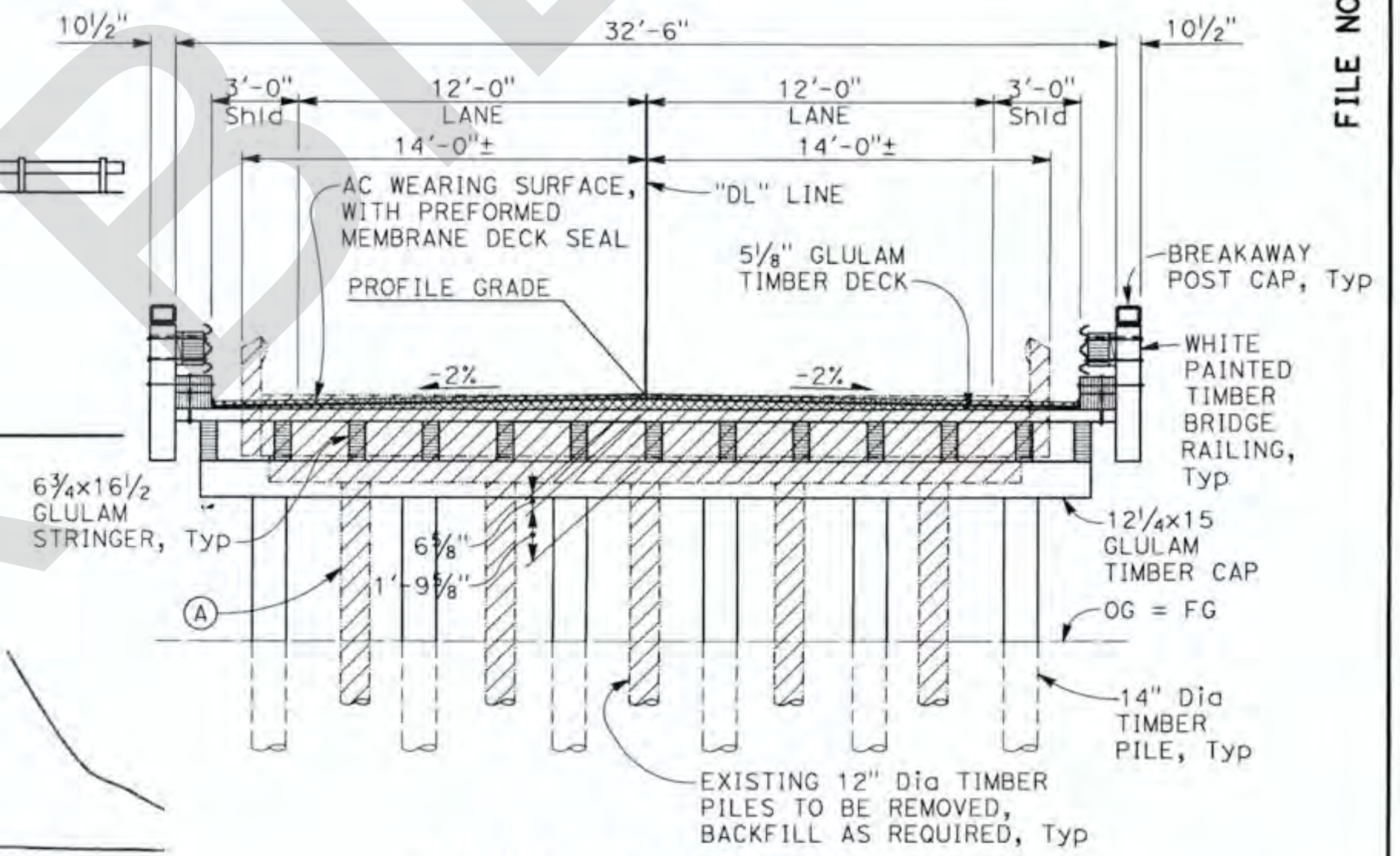
BIGGS CARDOSA ASSOCIATES, INC. APPROVED BY: <i>[Signature]</i> DATE: 4/4/16 No. 54676 Exp. 9/30/16 REGISTERED PROFESSIONAL ENGINEER MICHAEL A. THOMAS STATE OF CALIFORNIA		PLANS PREPARED BY: BIGGS CARDOSA ASSOCIATES INC STRUCTURAL ENGINEERS 900 So. Main St. Suite 400 Orange, California 92668 714-550-4665 BCA		DESIGNED BY: RBS DRAWN BY: DM CHECKED BY: GDD DATE: 3/4/16		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS REVIEWED BY: <i>[Signature]</i> DATE: 4/4/16 RECOMMENDED BY: <i>[Signature]</i> DATE: 4/4/16 APPROVED BY: <i>[Signature]</i> DATE: 4-4-2016 MAZIN KASEY, P.E., DEPUTY DIRECTOR		DOLA DITCH BRIDGE BRIDGE No. 54C0285 (COUNTY No. 81) ROCK SLOPE PROTECTION		J.L. REF. W.O. NO. SCALE DWG. NO. SH. NO. JL 10927 HF0025 AS SHOWN S14 23 OF 39 (2014142514) 2014142
---	--	---	--	---	--	---	--	---	--	--



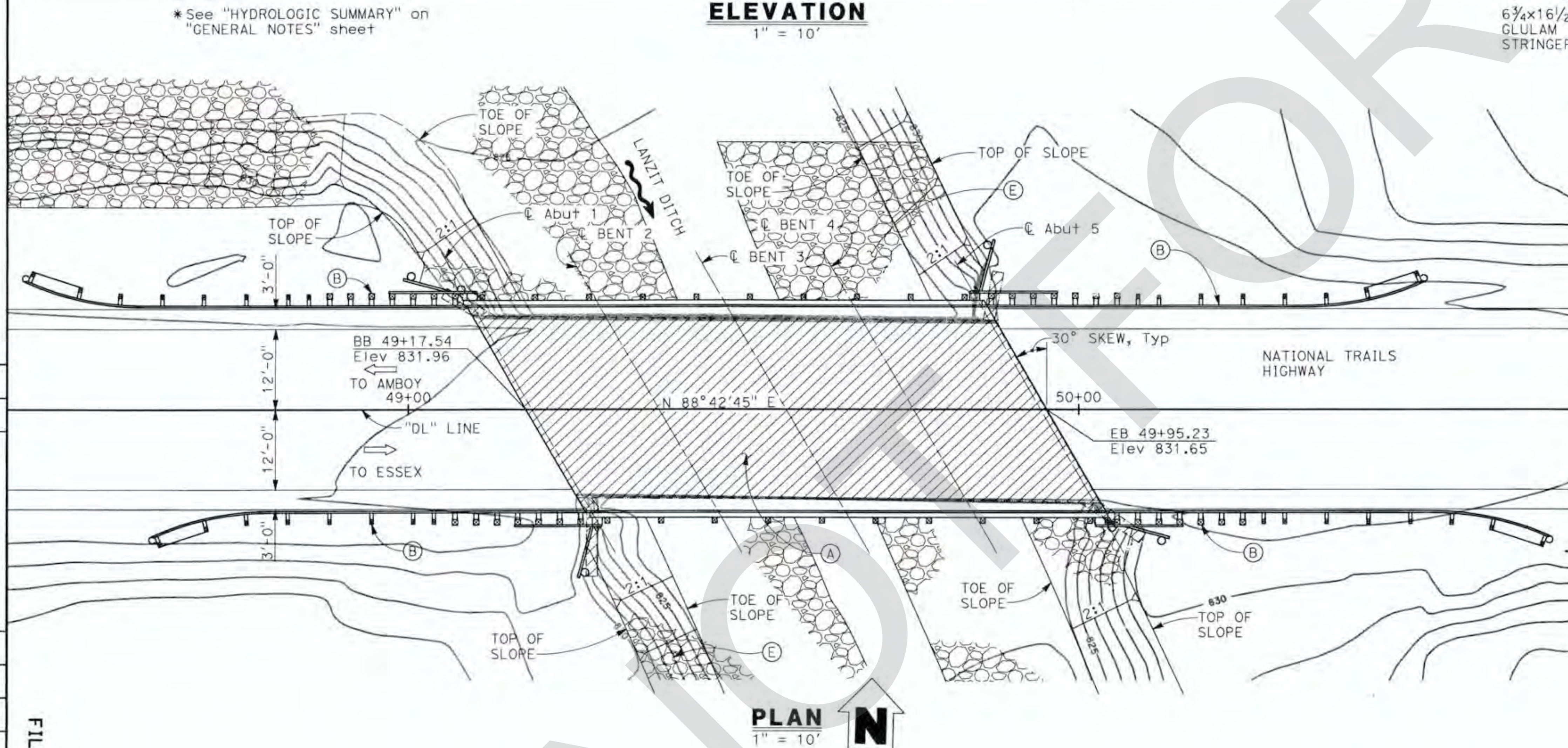
PROFILE GRADE
NO SCALE



ELEVATION
1" = 10'



TYPICAL SECTION
1/4" = 1'-0"



PLAN
1" = 10'

NOTES:

- (A) Remove existing bridge (No. 54C0286)
 - (B) Midwest Guardrail System, see "ROADWAY PLANS"
 - (C) Deadman Tieback
 - (D) Closed-end and backfilled timber pile strutted abutment
 - (E) Rock Slope Protection see "ROCK SLOPE PROTECTION" sheet
1. For General Notes, Index to Bridge Plans, and Pile Data Table, see "GENERAL NOTES" sheet.

LEGEND:

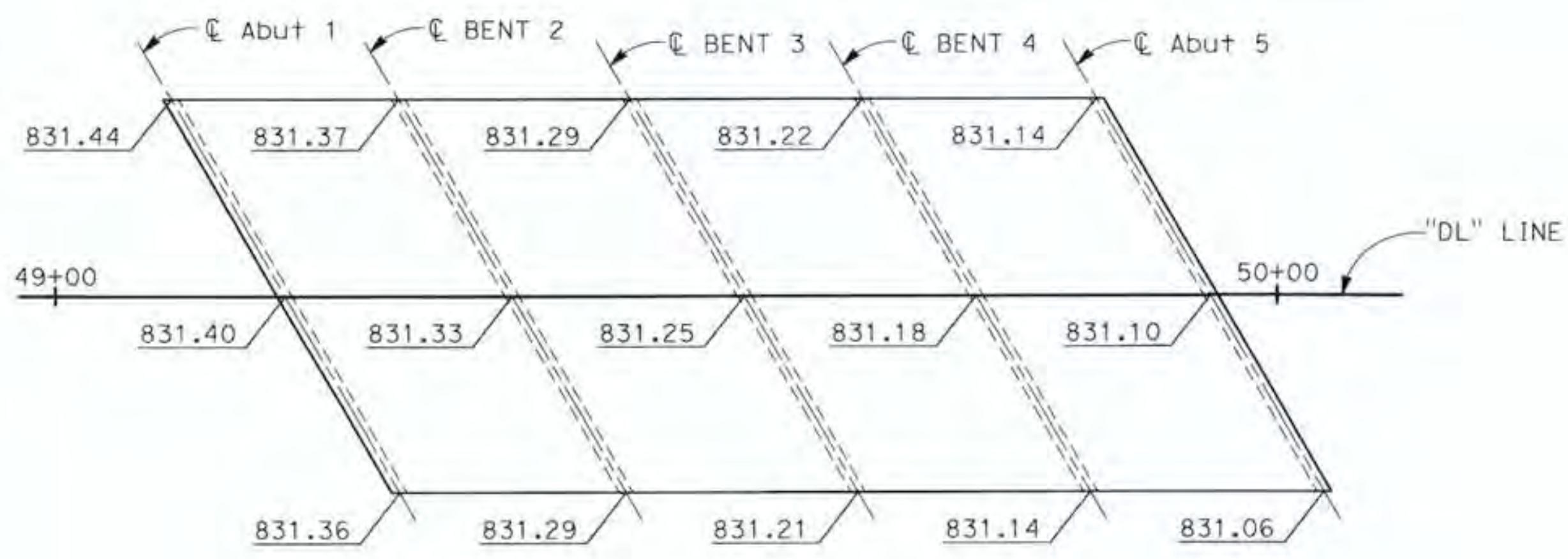
- Indicates Bridge Removal
- Indicates Rock Slope Protection
- Indicates Existing Structure
- Indicates Traffic Direction
- (B7-11) Indicates Caltrans Standard Plan sheet No.
- (U42) Indicates Detail No.
- (A 55) Indicates sheet No. shown on
- (1 56) Indicates sheet No. shown on

AS BUILT
NO CORRECTIONS THIS SHEET
BY: *TARIQ MAHMOUD, P.E.*
DATE COMPLETED: 10-16-17

FILE NO. 586600 120

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

<p>BIGGS CARDOSA ASSOCIATES, INC.</p> <p>APPROVED BY: <i>[Signature]</i> DATE: 4/4/16</p> <p>PLANS PREPARED BY: BIGGS CARDOSA ASSOCIATES INC STRUCTURAL ENGINEERS 500 So. Main St, Suite 400 Orange, California 92668 714-550-4885</p>		<p>DESIGNED BY: RBS</p> <p>DRAWN BY: DM</p> <p>CHECKED BY: GDD</p> <p>DATE: 3/4/16</p>		<p>COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS</p> <p>REVIEWED BY: <i>[Signature]</i> DATE: 4/9/16</p> <p>RECOMMENDED BY: <i>[Signature]</i> DATE: 4/4/16</p> <p>APPROVED BY: <i>[Signature]</i> DATE: 4-4-2016</p> <p>MERVAT N. MIKHAIL, P.E., TRANSPORTATION DESIGN, DIVISION CHIEF</p> <p>MAZIN KASEY, P.E., DEPUTY DIRECTOR</p>		<p>LANZIT DITCH BRIDGE</p> <p>BRIDGE No. 54C0286* (County No. 82)</p> <p>GENERAL PLAN</p>	
<p>REGISTERED PROFESSIONAL ENGINEER MICHAEL A. THOMAS No. 54676 Exp. 9/30/16 STRUCTURAL STATE OF CALIFORNIA</p>		<p>FIELD CHANGES</p>		<p>J.L. REF. W.O. NO. SCALE DWG. NO. SH. NO. JL 10927 HF0026 AS SHOWN S1 24 OF 39</p>		<p>(201414251) 2014142</p>	



NOTE:
All elevations are to the top of glulam timber deck.

DECK ELEVATIONS PLAN
1" = 10'

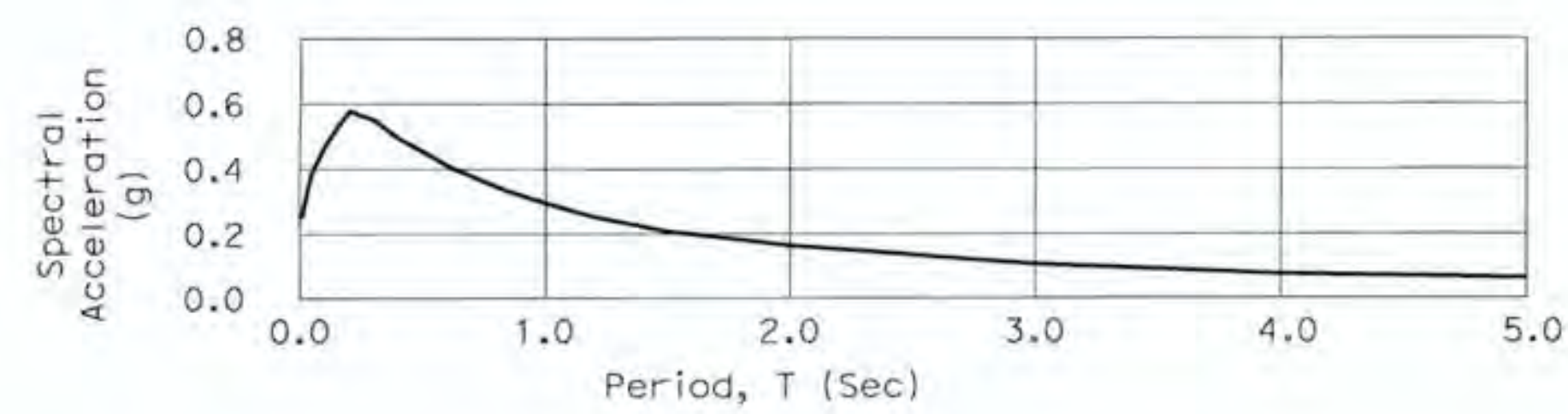
HYDROLOGIC SUMMARY
(PROVIDED BY SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT - HEC RAS STUDY 3/31/16)

	DESIGN FLOOD	BASE FLOOD
DRAINAGE AREA: 26.33 SQUARE MILES	50	100
FREQUENCY (YEARS)	4008.40	4545.46
DISCHARGE (CUBIC FEET PER SECOND)	836.12	836.49
WATER SURFACE (ELEVATION AT BRIDGE)	4.61	4.95
VELOCITY (FEET PER SECOND)		

FLOOD PLAIN DATA ARE BASED UPON INFORMATION AVAILABLE WHEN THE PLANS WERE PREPARED AND ARE SHOWN TO MEET FEDERAL REQUIREMENTS. THE ACCURACY OF SAID INFORMATION IS NOT WARRANTED BY BIGGS CARDOSA ASSOCIATES AND INTERESTED OR AFFECTED PARTIES SHOULD MAKE THEIR OWN INVESTIGATION.

GENERAL NOTES
LOAD & RESISTANCE FACTOR DESIGN

- DESIGN: AASHTO LRFD Bridge Design Specifications, 6th Edition and Caltrans Amendments, preface dated Jan. 2014
- SEISMIC DESIGN: AASHTO LRFD Bridge Design Specifications, 6th Edition and Design Basis Memorandum for Seismic Design of Timber Bridges, April 2015.
- DEAD LOAD: Includes 35 psf for future wearing surface.
- LIVE LOAD: HL93 with Low-Boy and permit design load
- SEISMIC LOAD: Soil profile: D, $V_{s30} = 310$ m/s
Moment magnitude: M6.5
Peak ground acceleration: 0.25g



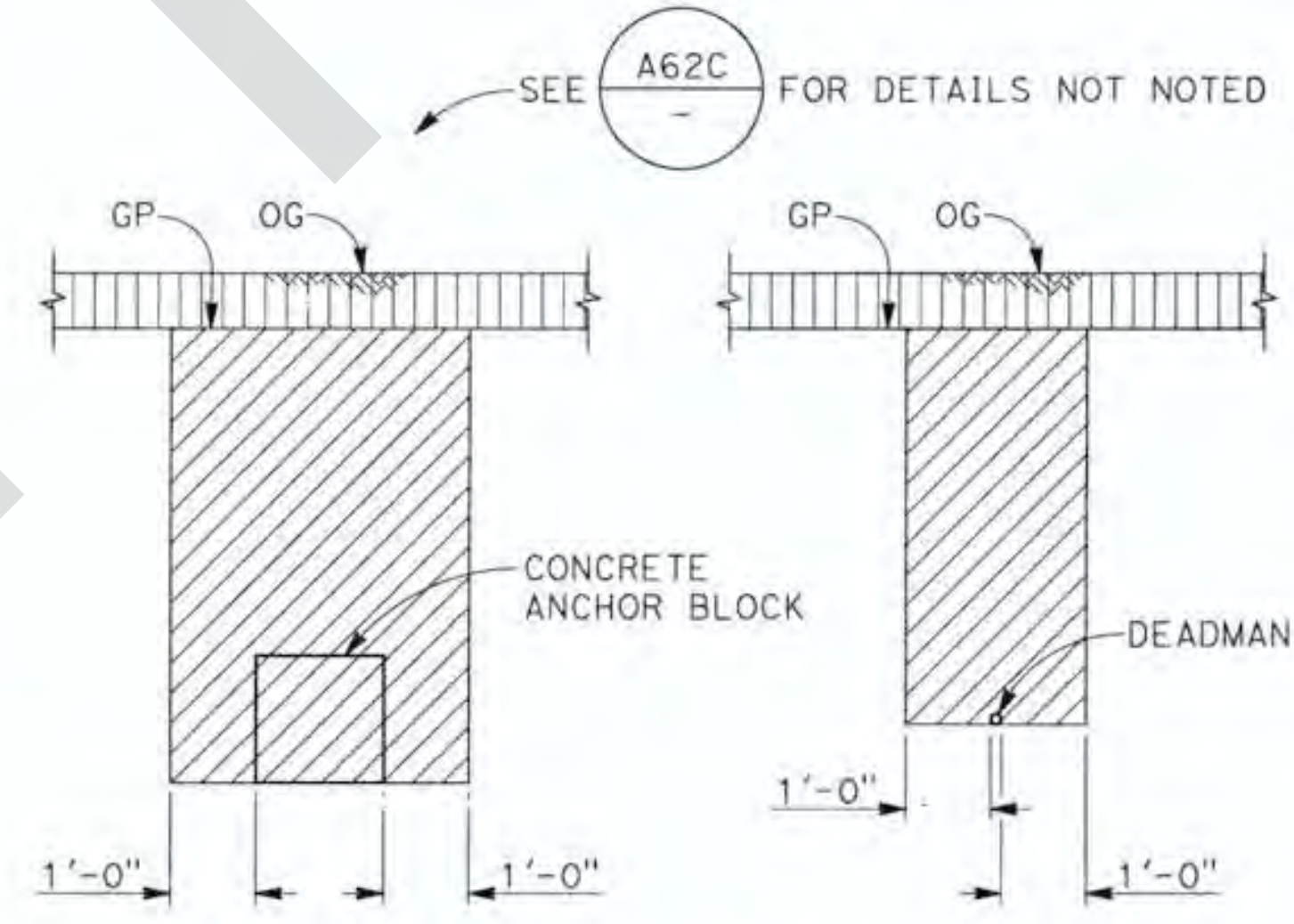
- CONCRETE: $f_y = 60$ ksi, $f'_c = 3.6$ ksi, $n = 8$
- TIMBER (TREATED LUMBER):
Timber railing, abutment and bent timber cap: 24F-1.8E, 24F-V8 Glulam (DF/DF)
Stringers, timber deck and all other glulam members: 24F-1.8E, 24F-V4 Glulam (DF/DF)
Timber piles: Pacific Coast DF, $F_{co} = 1.25$ ksi, $F_{bo} = 2.45$ ksi, $F_{cpo} = 0.23$ ksi, $F_{vo} = 0.115$ ksi, $E_o = 1500$ ksi
Abutment timber lagging and all other sawn members: DF-L No. 1: $F_{co} = 0.92$ ksi, $F_{bo} = 1.35$ ksi, $F_{cpo} = 0.625$ ksi, $F_{vo} = 0.17$ ksi, $E_o = 1600$ ksi, $F_{to} = 0.675$ ksi
- MISCELLANEOUS METAL (GALVANIZED):
Steel bars, dowels, plates and shapes: ASTM A36, A575 OR A576 (AISI OR M Grades)
Bolts and studs: ASTM A307
Anchor bolts and tie rod: ASTM A307
Nuts: ASTM A563
Washers: ASTM F436

CALTRANS 2010 STANDARD PLANS

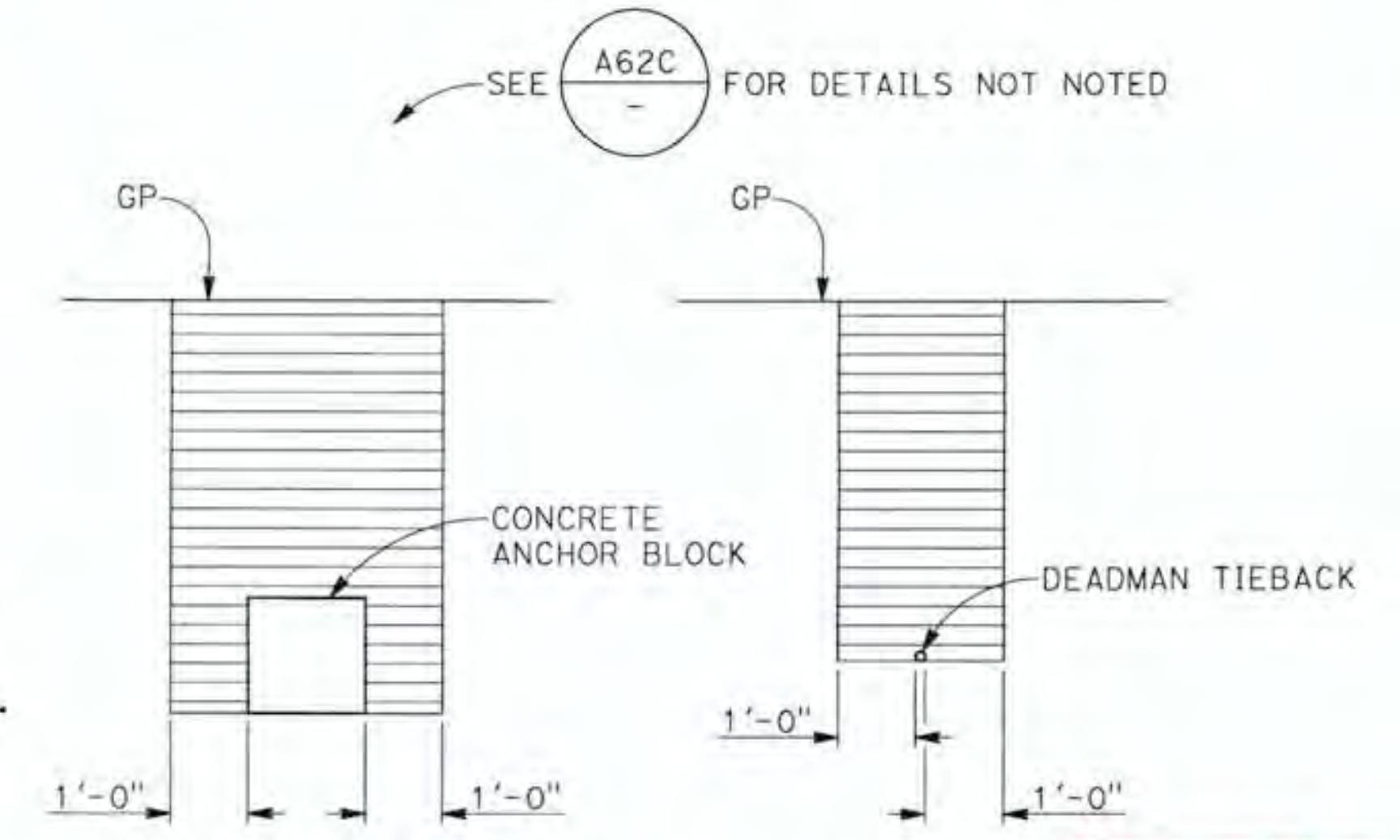
- A10A ABBREVIATIONS (SHEET 1 OF 2)
- A10B ABBREVIATIONS (SHEET 2 OF 2)
- A10C LINES AND SYMBOLS (SHEET 1 OF 3)
- A10D LINES AND SYMBOLS (SHEET 2 OF 3)
- A10E LINES AND SYMBOLS (SHEET 3 OF 3)
- A10F IFGEND - SOIL (SHEET 1 OF 2)
- A10G LEGEND - SOIL (SHEET 2 OF 2)
- A10H LEGEND - ROCK
- A62B LIMITS OF PAYMENT FOR EXCAVATION AND BACKFILL - BRIDGE SURCHARGE AND WALL
- A62C LIMITS OF PAYMENT FOR EXCAVATION AND BACKFILL - BRIDGE

INDEX TO BRIDGE PLANS

DRAWING No.	TITLE
S1	GENERAL PLAN
S2	GENERAL NOTES
S3	FOUNDATION PLAN
S4	ABUTMENT LAYOUT
S5	ABUTMENT DETAILS
S6	BENT LAYOUT
S7	BENT DETAILS
S8	TYPICAL SECTION
S9	STRINGER LAYOUT
S10	STRINGER DETAILS No. 1
S11	STRINGER DETAILS No. 2
S12	RAILING DETAILS No. 1
S13	RAILING DETAILS No. 2
S14	ROCK SLOPE PROTECTION



LIMITS OF PAYMENT FOR EXCAVATION BRIDGE
NO SCALE

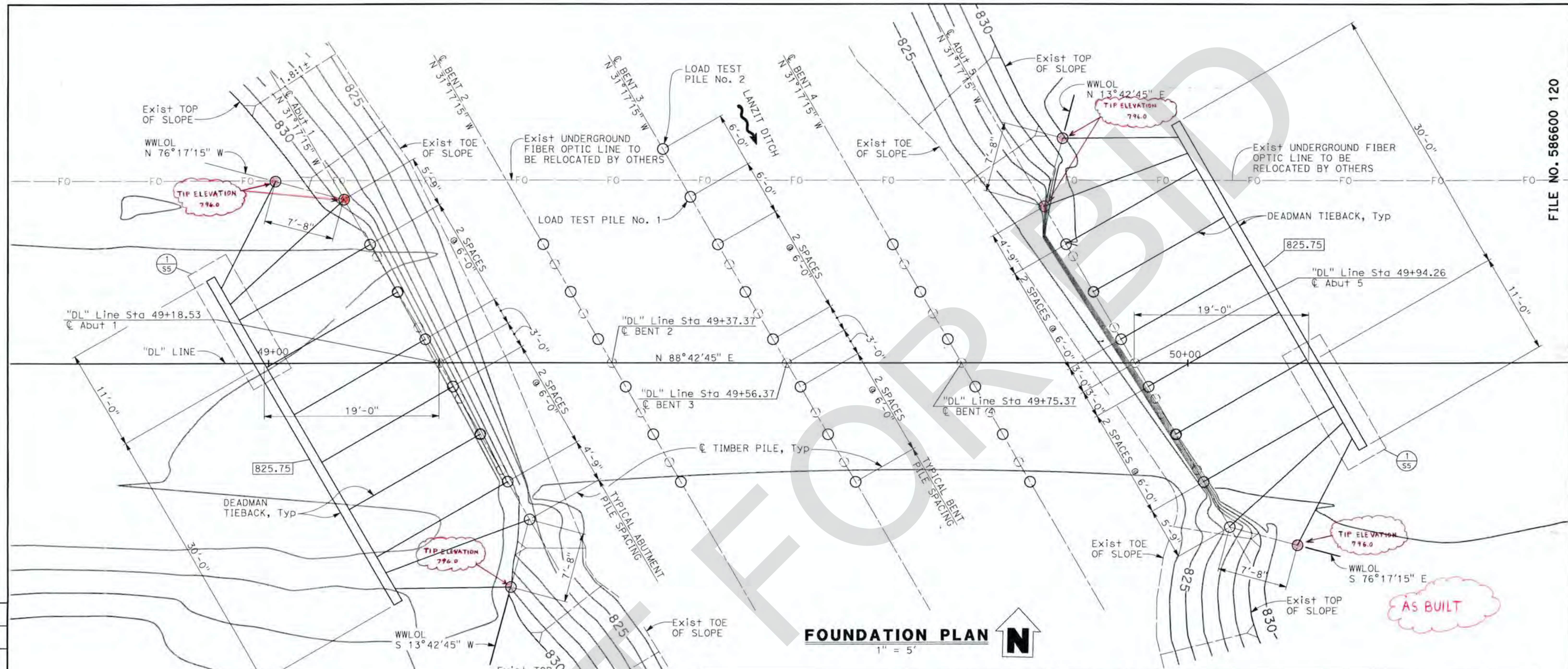


LIMITS OF PAYMENT FOR BACKFILL BRIDGE
NO SCALE

AS BUILT
NO CORRECTIONS THIS SHEET
BY: *TABIB MAMUN, P.E.*
DATE COMPLETED: 10-16-17

APPROVED BY: <i>[Signature]</i> DATE: 4/4/16 MICHAEL A. TROMBLY REGISTERED PROFESSIONAL ENGINEER STATE OF CALIFORNIA No. S4676 EXP. 9/30/16		PLANS PREPARED BY: BIGGS CARDOSA ASSOCIATES INC STRUCTURAL ENGINEERS 500 So. Main St. Suite 400 Orange, California 92668 714-550-4885		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS REVIEWED BY: <i>[Signature]</i> DATE: 4/9/16 RECOMMENDED BY: <i>[Signature]</i> DATE: 4/14/16 MERVAT N. MIKHAIL, P.E., TRANSPORTATION DESIGN, DIVISION CHIEF APPROVED BY: <i>[Signature]</i> DATE: 4-9-2016 MAZIN KASEY, P.E., DEPUTY DIRECTOR		LANZIT DITCH BRIDGE BRIDGE No. 54C0286 (County No. 82) GENERAL NOTES	
BIGGS CARDOSA ASSOCIATES, INC.		DESIGNED BY: RBS DRAWN BY: DM CHECKED BY: GDD DATE: 3/4/16		FIELD CHANGES		J.L. REF. W.O. NO. SCALE DWG. NO. SHT. No. JL 10927 HF0026 AS SHOWN S2 25 OF 39	

MARK	REVISIONS	APPR.	DATE



FOUNDATION PLAN
1" = 5'

LOCATION	PILE TYPE	NOMINAL RESISTANCE		DESIGN TIP Elev (ft)	SPECIFIED TIP Elev (ft)	NOMINAL DRIVING RESISTANCE (kips)
		COMPRESSION	TENSION			
ABUTMENT/WINGWALL 1	14" Dia TIMBER PILES	90 kips	0 kips	794.0 (a): 816.0 (c): 811.0 (d)	794.0	300
BENT 2	14" Dia TIMBER PILES	130 kips	0 kips	793.0 (a): 817.0 (c): 806.5 (d)	793.0	300
BENT 3	14" Dia TIMBER PILES	130 kips	0 kips	793.0 (a): 817.0 (c): 806.5 (d)	793.0	300
BENT 4	14" Dia TIMBER PILES	130 kips	0 kips	793.0 (a): 817.0 (c): 806.5 (d)	793.0	300
ABUTMENT/WINGWALL 5	14" Dia TIMBER PILES	90 kips	0 kips	794.0 (a): 816.0 (c): 811.0 (d)	794.0	300

BENCH MARK AND DATUM				
MONUMENT	COORDINATES		ELEVATION	DESCRIPTION/LOCATION
	NORTHING	EASTING		
POINT #6	2,035,169.09	7,285,834.53	828.59'	FOUND D.O.T. CONCRETE "C" R/W MONUMENT, UP 0.50', PER CSFB 4234/12, ELEVATION ESTABLISHED PER GPS CONTROL PROCEDURES. PROJECT BASIS OF BEARING IS THE CENTERLINE OF NATIONAL TRAILS HWY PER CS 3145/6-8 BEING N88°42'45"E.

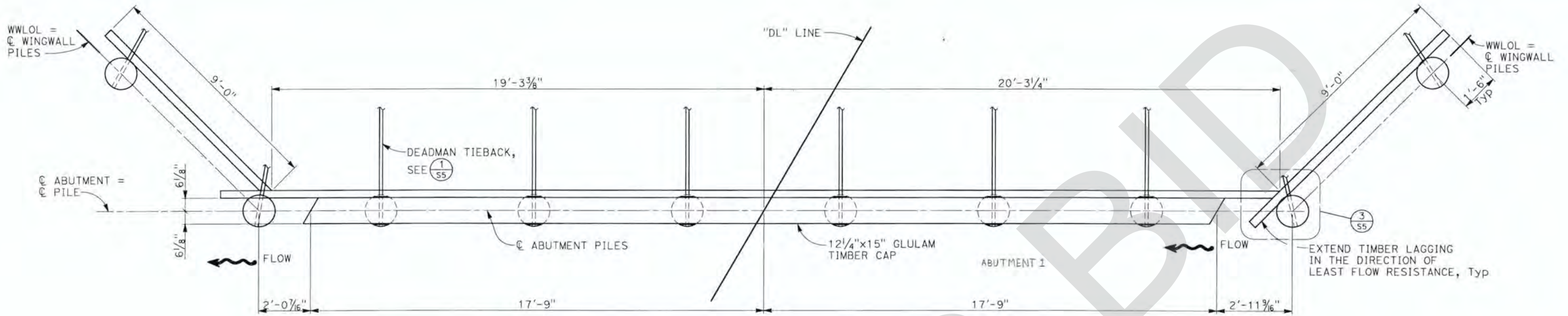
- LEGEND:**
- Indicates bottom of concrete elevation
 - 825 Indicates elevation
 - Indicates pile
 - Indicates existing pile to be removed
- NOTES:**
1. Verify utility locations with "ROAD PLANS".
 2. For WWLOL, see "ABUTMENT LAYOUT" sheet.
 3. Grading and Rock Slope Protection not shown for clarity. See "ROCK SLOE PROTECTION" sheet.

AS BUILT
CORRECTIONS BY: *Theresa M.../PC*
CONTRACT NO: *Bas 5954 (034)*
DATE: *10-16-17*

FILE NO. 586600 120

BIGGS CARDOSA ASSOCIATES, INC. APPROVED BY: <i>[Signature]</i> DATE: 4/4/16 PLANS PREPARED BY: BIGGS CARDOSA ASSOCIATES INC STRUCTURAL ENGINEERS 900 So. Main St, Suite 400 Orange, California 92668 714-550-4665 BCA		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS REVIEWED BY: <i>[Signature]</i> DATE: 4/4/16 RECOMMENDED BY: <i>[Signature]</i> DATE: 4/1/16 MERVAT N. MIKHAIL, P.E., TRANSPORTATION DESIGN, DIVISION CHIEF APPROVED BY: <i>[Signature]</i> DATE: 4-4-2016 MAZIN KASEY, P.E., DEPUTY DIRECTOR		LANZIT DITCH BRIDGE BRIDGE No. 54C0286 (County No. 82) FOUNDATION PLAN J.L. REF. W.O. NO. SCALE DWG. NO. SH. No. JL 10927/HFO026 AS SHOWN S3 26 OF 39 (201414253) 2014142	
DESIGNED BY: RBS DRAWN BY: DM CHECKED BY: GOD DATE: 3/4/16		FIELD CHANGES MARK CHANGES NO CHANGES RESIDENT ENGINEER DATE			

REVISIONS	DATE	APPROVAL



ABUTMENT PLAN

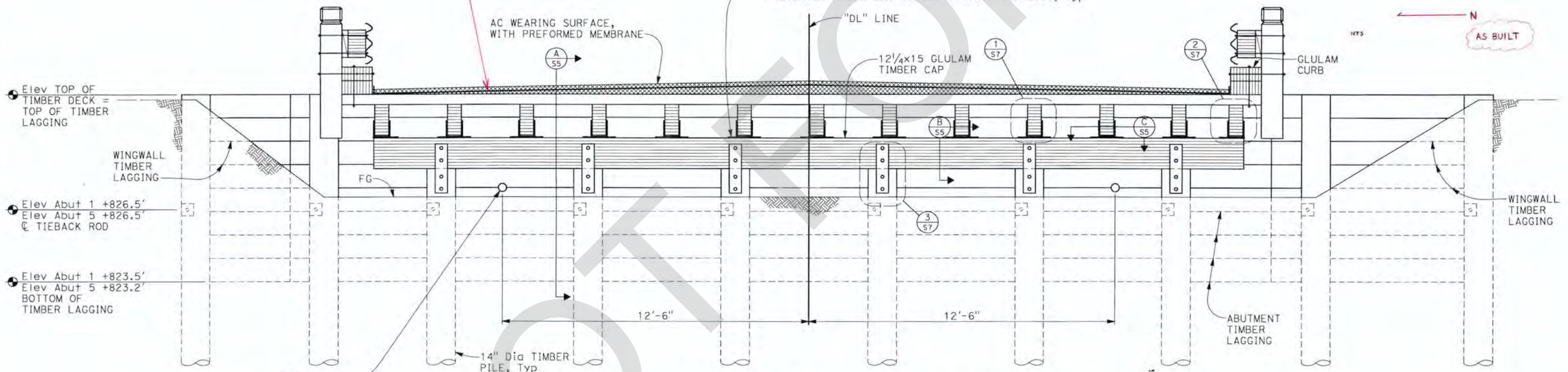
1/2" = 1'-0"

NOTE:
ABUTMENT 1 SHOWN,
ABUTMENT 5 SIMILAR.

EXTENDED WATER PROOF MEMBRANE
12" BEYOND ABUTMENTS

WHERE STEEL PLATE BEARING SHOE LAG SCREW
CONFLICTS WITH STEEL PLATE PILE CAP BOLTS,
SLIGHTLY ANGLE LAG SCREW TO AVOID CONFLICT, Typ

AC WEARING SURFACE,
WITH PREFORMED MEMBRANE



ABUTMENT ELEVATION

1/2" = 1'-0"

NOTE:
ABUTMENT 1 SHOWN,
ABUTMENT 5 SIMILAR.

Elev TOP OF
TIMBER DECK =
TOP OF TIMBER
LAGGING

Elev Abut 1 +826.5'
Elev Abut 5 +826.5'
CL TIEBACK ROD

Elev Abut 1 +823.5'
Elev Abut 5 +823.2'
BOTTOM OF
TIMBER LAGGING

AS BUILT

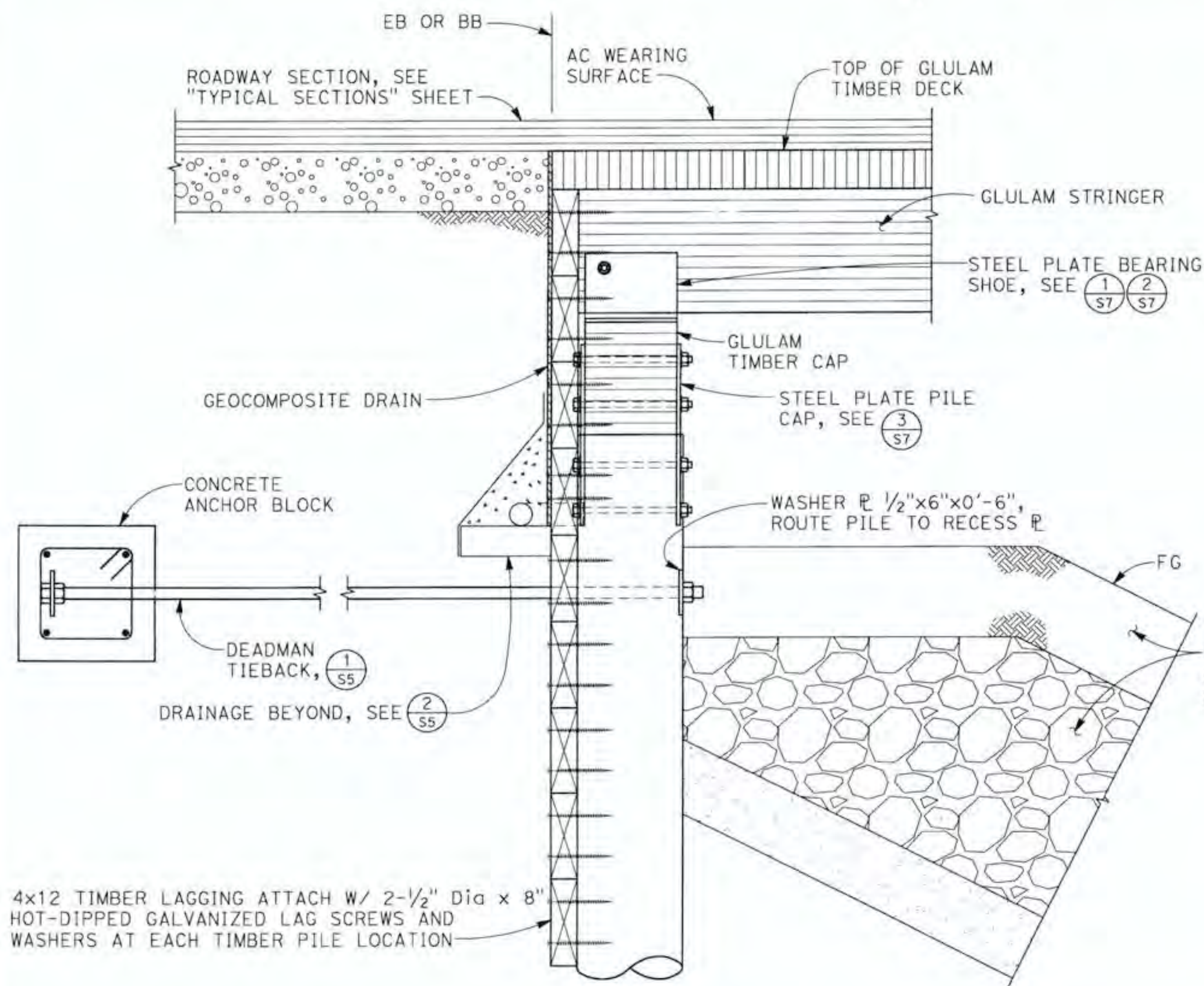
CORRECTIONS BY TOLIQ MARIE, PE
CONTRACT NO. BELS 5754 (034)
DATE 10-16-17

MARK	REVISIONS	DATE

FILE NO. 586600 120

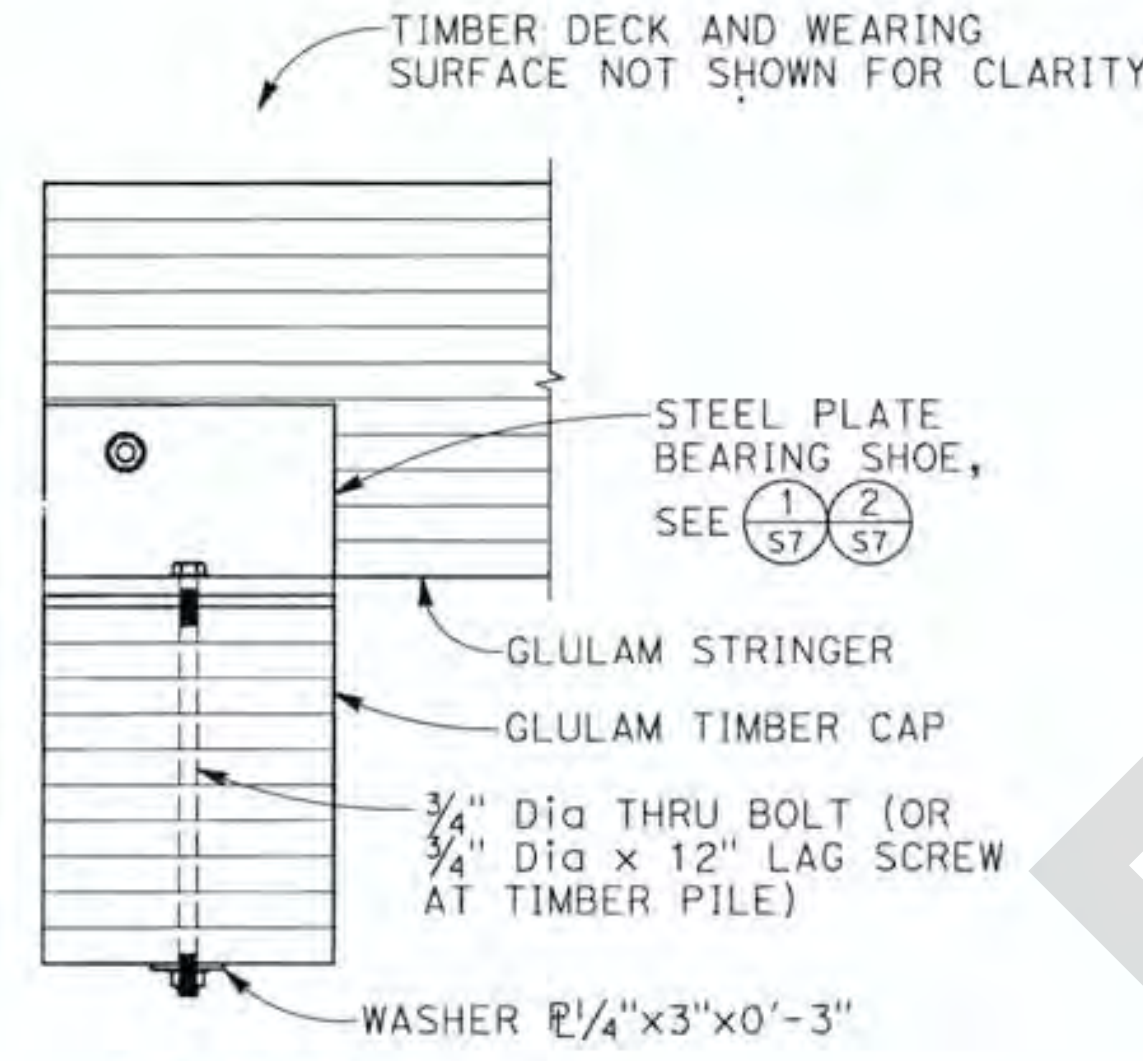
NOTE:
THE CONTRACTOR SHALL VERIFY ALL
CONTROLLING FIELD DIMENSIONS BEFORE
ORDERING OR FABRICATING ANY MATERIAL.

APPROVED BY: REGISTERED PROFESSIONAL ENGINEER MICHAEL A. TROVATI No. 54676 Exp. 9/30/16 STATE OF CALIFORNIA EXPIRES 9/30/16		PLANS PREPARED BY: BIGGS CARDOSA ASSOCIATES, INC. STRUCTURAL ENGINEERS 500 So. Main St. Suite 400 Orange, California 92668 714-550-4665 BCA		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS REVIEWED BY: DATE 9/9/16 RECOMMENDED BY: DATE 4/14/16 MERVAT N. MIKHAEL, P.E., TRANSPORTATION DESIGN, DIVISION CHIEF APPROVED BY: DATE 4-1-2011 MAZIN KASEY, P.E., DEPUTY DIRECTOR		LANZIT DITCH BRIDGE BRIDGE No. 54C0286 (County No. 82) ABUTMENT LAYOUT	
FIELD CHANGES MARK CHANGES NO CHANGES RESIDENT ENGINEER DATE				J.L. REF. W.O. NO. SCALE DWG. NO. SH. NO. JL 10927 HF0026 AS SHOWN S4 27 of 39 (201414254) 2014142			

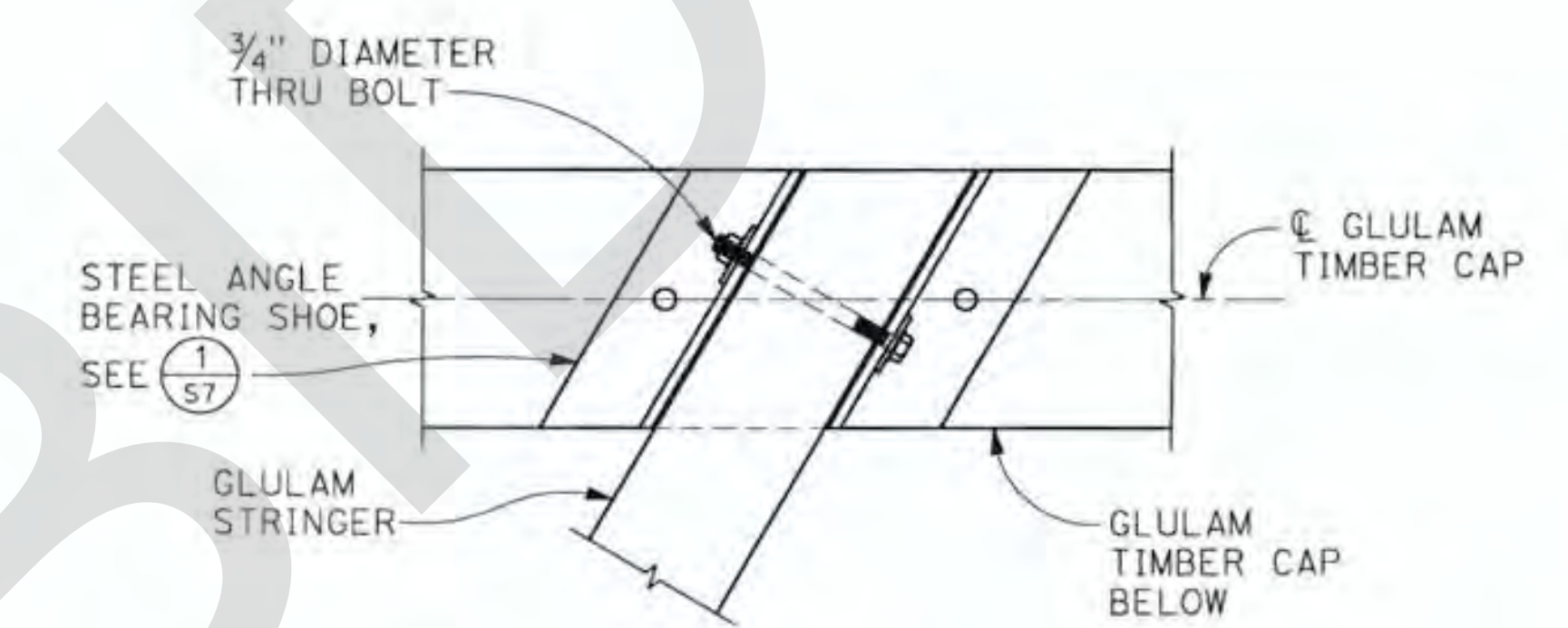


SECTION A
1" = 1'-0" S5

4x12 TIMBER LAGGING ATTACH W/ 2-1/2" Dia x 8" HOT-DIPPED GALVANIZED LAG SCREWS AND WASHERS AT EACH TIMBER PILE LOCATION

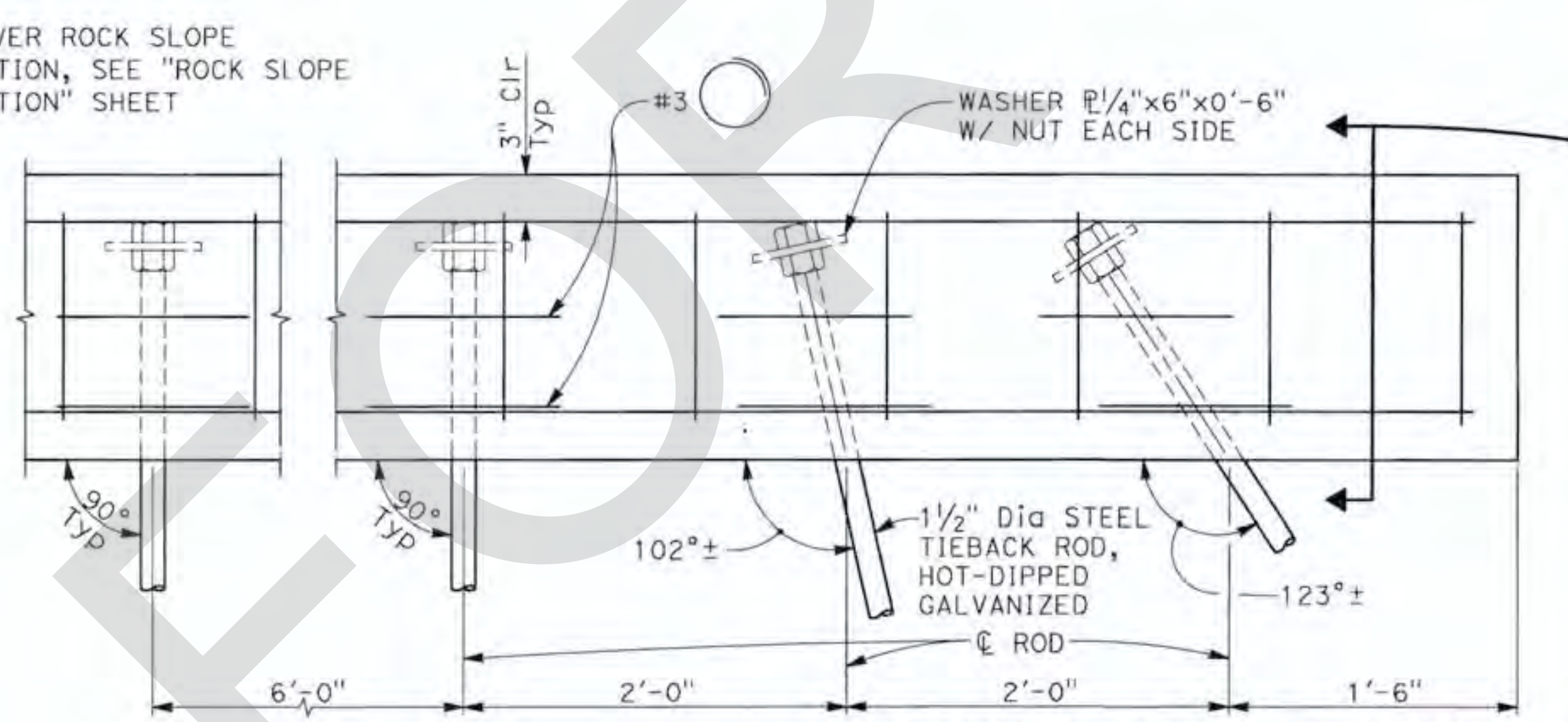


SECTION B
1 1/2" = 1'-0" S5

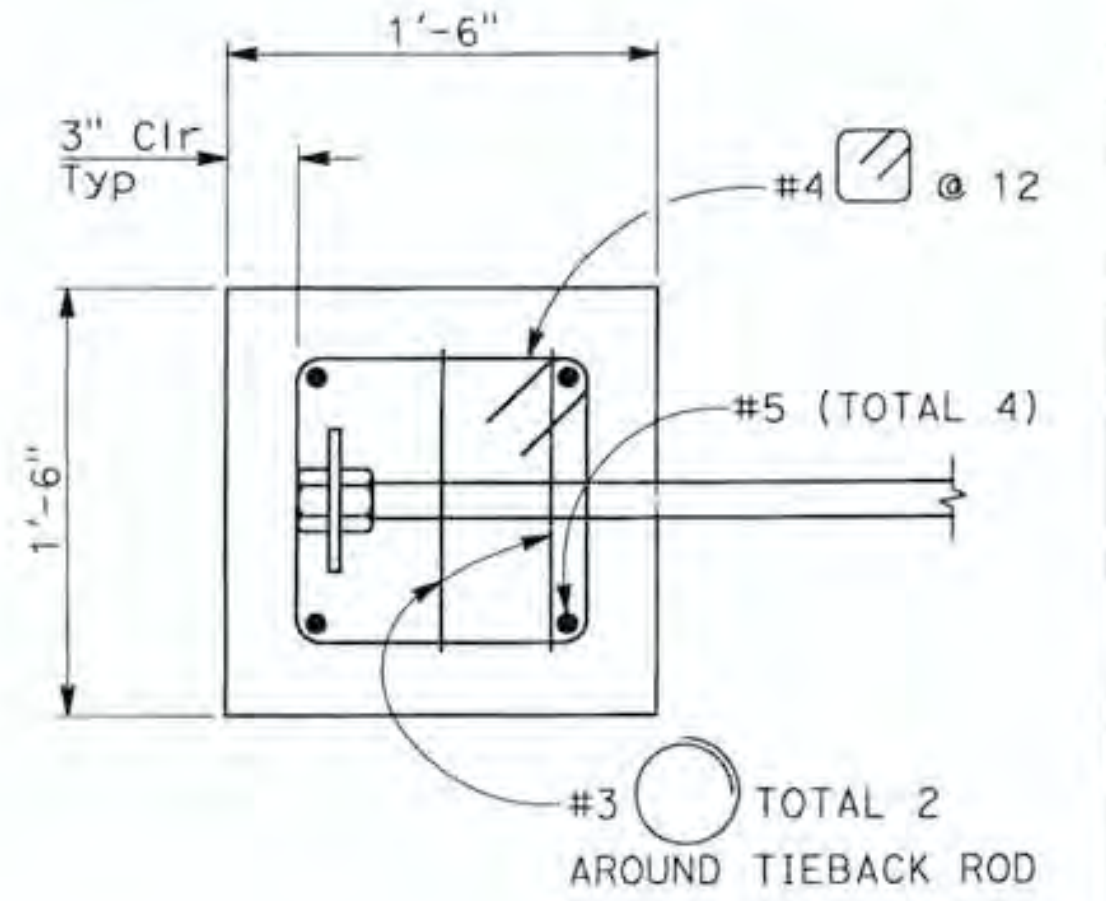


SECTION C
1 1/2" = 1'-0" S5

NOTE: INTERIOR GLULAM STRINGER SHOWN EXTERIOR GLULAM STRINGER SIMILAR



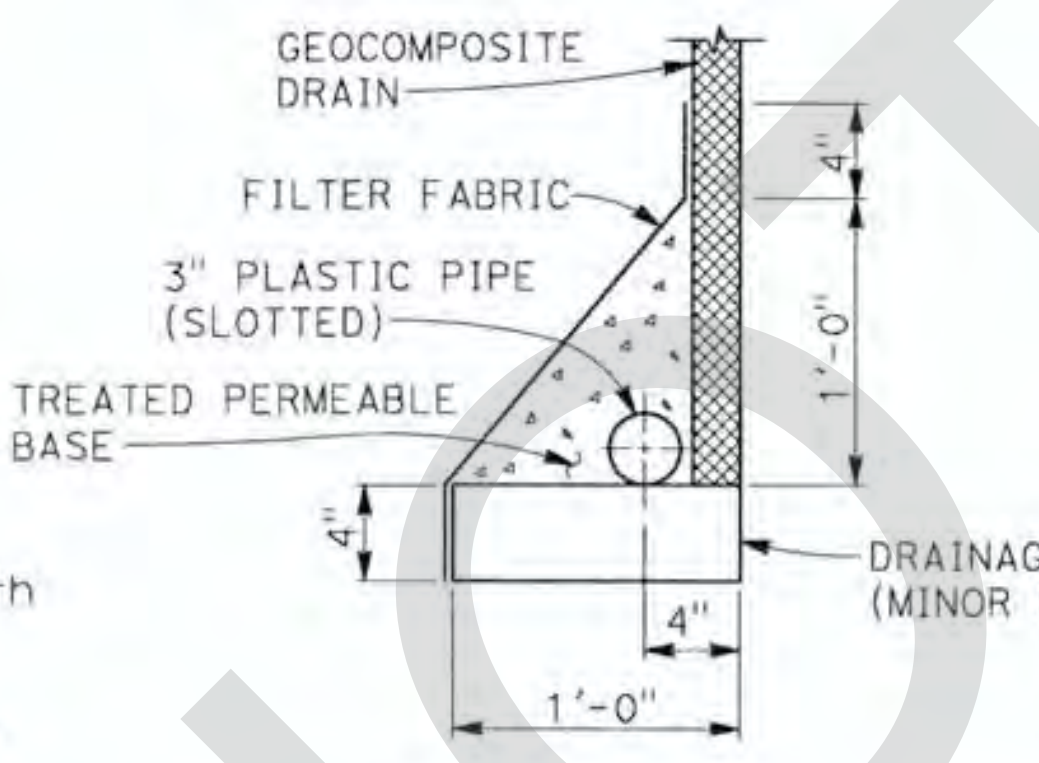
CONCRETE DEADMAN DETAIL
1 1/2" = 1'-0" S5



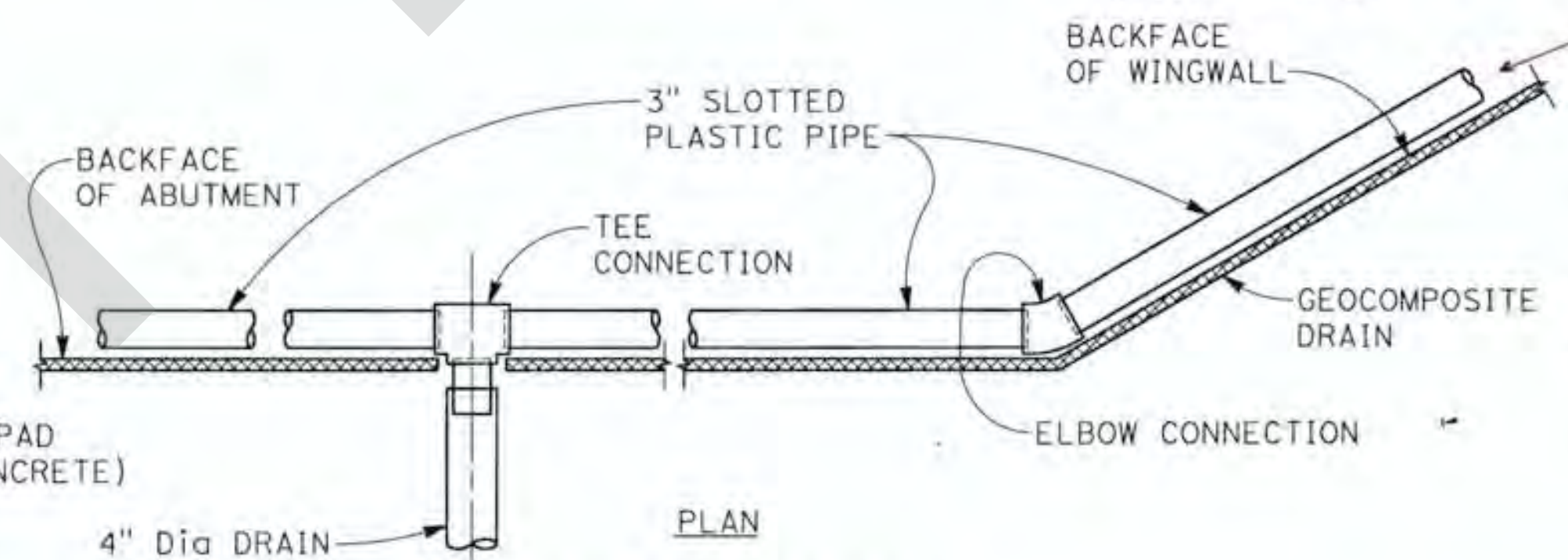
LAGGING DETAIL
1" = 1'-0" S5

- DEADMAN TIEBACK NOTES:**
- Roadway approach and abutment must be backfilled up to the tieback rod elevation before starting deadman tieback construction.
 - Excavate and place deadman reinforcing, tieback rod, washers and nuts. Pour deadman concrete and let cure 10 days or until concrete attains a compressive strength of at least 2,400 psi.
 - Backfill the concrete deadman and up to the tieback rod elevation before tensioning and tightening the tieback nuts.
 - Each threaded rod must be tensioned to snug tight, until all looseness and rod sag is removed.
 - Peen rod threads beyond nuts to prevent loosening or removal.

LEGEND:
Indicates Rock Slope Protection



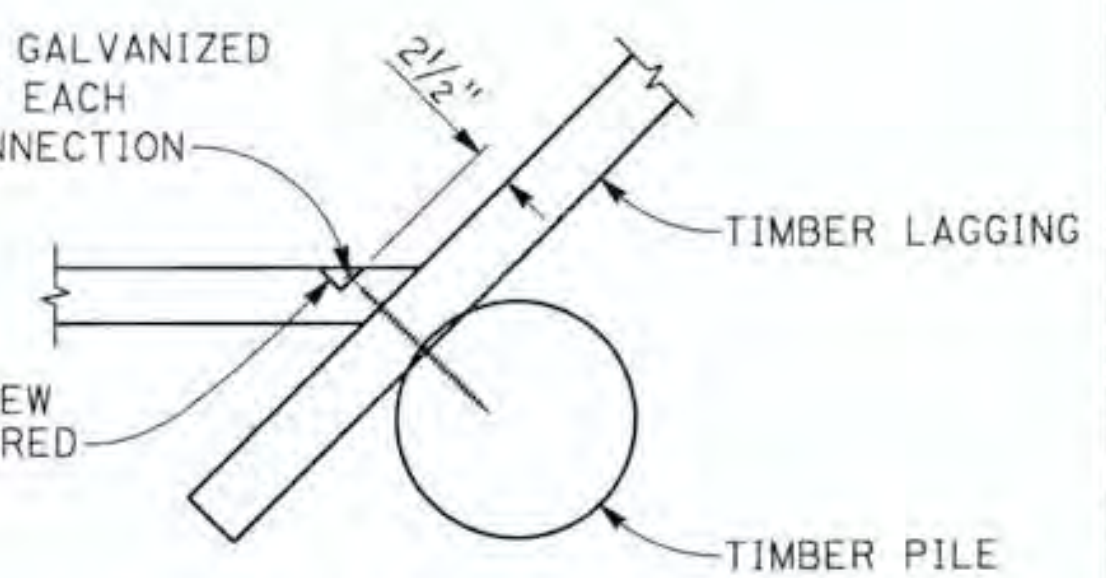
DRAINAGE DETAIL
1 1/2" = 1'-0" S5



TEE CONNECTION

- NOTES:**
- Geocomposite drain, treated permeable base, and 3" dia slotted plastic pipe continuous behind abutment and wingwalls.
 - Provide 'tee' connection at each 4" dia drain.
 - 4" dia drain sloped to drain and outlet to daylight.

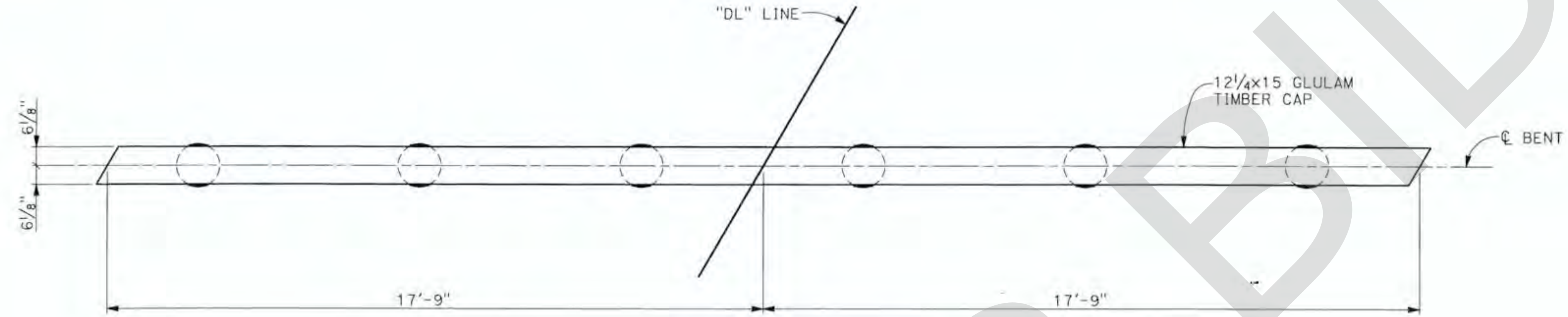
AS BUILT
CORRECTIONS BY TARIQ MIKHAEL, P.E.
CONTRACT NO. BCS 5754 (074)
DATE 10-16-17



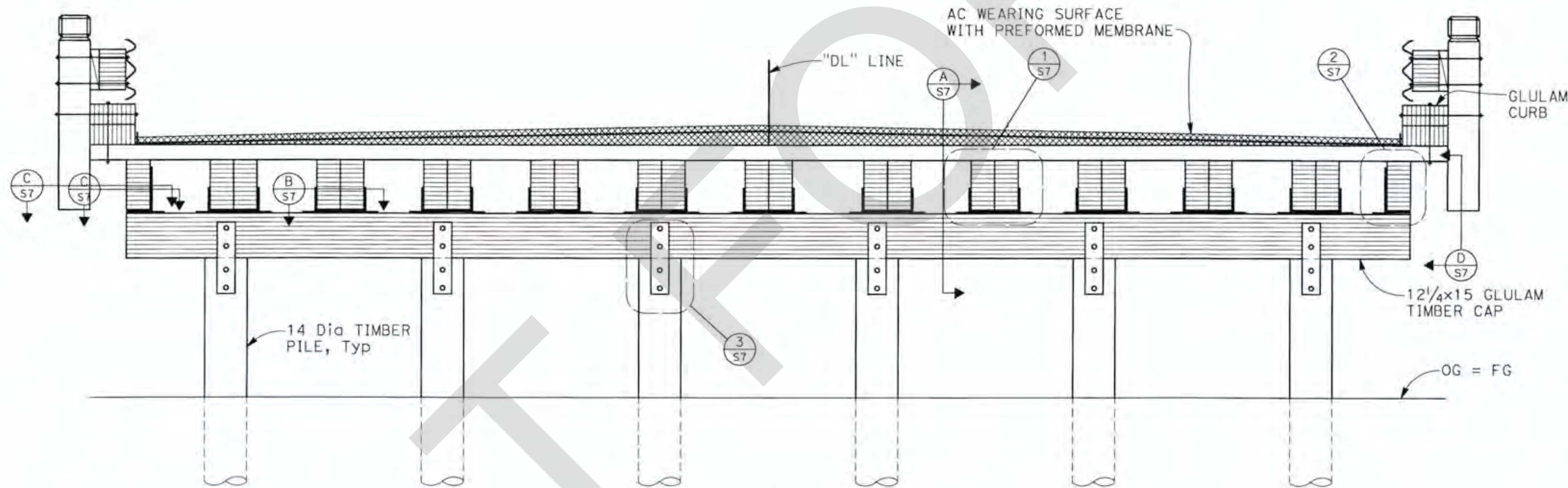
COUNTERSINK LAG SCREW AND WASHER AS REQUIRED

BIGGS CARDOSA ASSOCIATES, INC. APPROVED BY: [Signature] DATE: 4/4/16 PLANS PREPARED BY: BIGGS CARDOSA ASSOCIATES INC STRUCTURAL ENGINEERS 500 So. Main St, Suite 400 Orange, California 92665 714-550-4885 BCR		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS REVIEWED BY: [Signature] DATE: 4/9/16 RECOMMENDED BY: [Signature] DATE: 4/1/16 APPROVED BY: [Signature] DATE: 4-4-2016 MAZIN KASEY, P.E., DEPUTY DIRECTOR		LANZIT DITCH BRIDGE BRIDGE No. 54C0286 (County No. 82) ABUTMENT DETAILS	
DESIGNED BY: RBS DRAWN BY: DM CHECKED BY: GOD DATE: 3/4/16		FIELD CHANGES MARK CHANGES NO CHANGES RESIDENT ENGINEER DATE		J.L. REF. W.O. NO. SCALE DWG. NO. SHT. No. JL 10927 HF0026 AS SHOWN S5 28 OF 39 (201414255) 2014142	

MARK	REVISIONS	APPR.	DATE



BENT PLAN
1/2" = 1'-0"



BENT ELEVATION
1/2" = 1'-0"

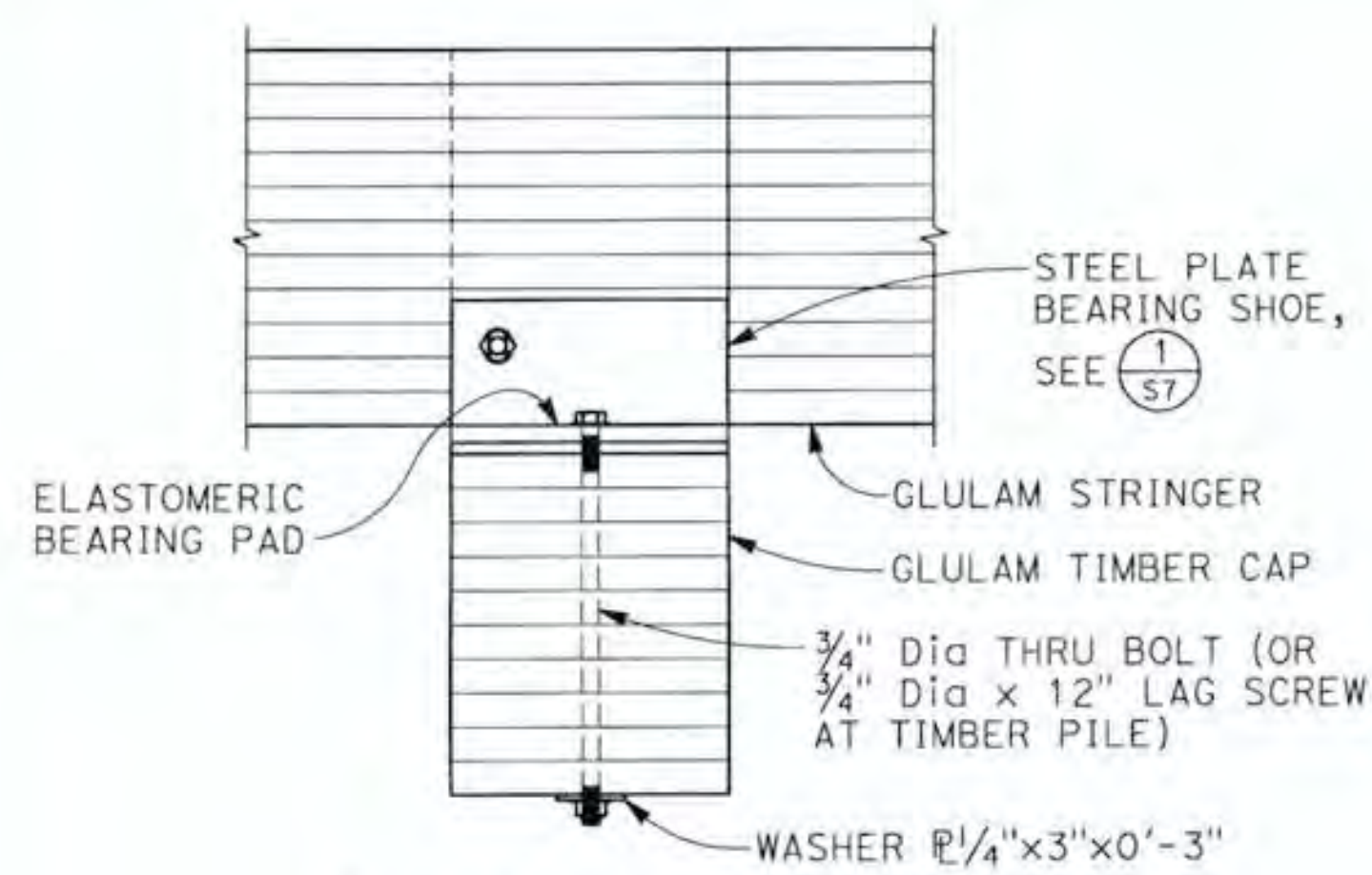
MARK	REVISIONS	APPR.	DATE

FILE NO. 586600 120

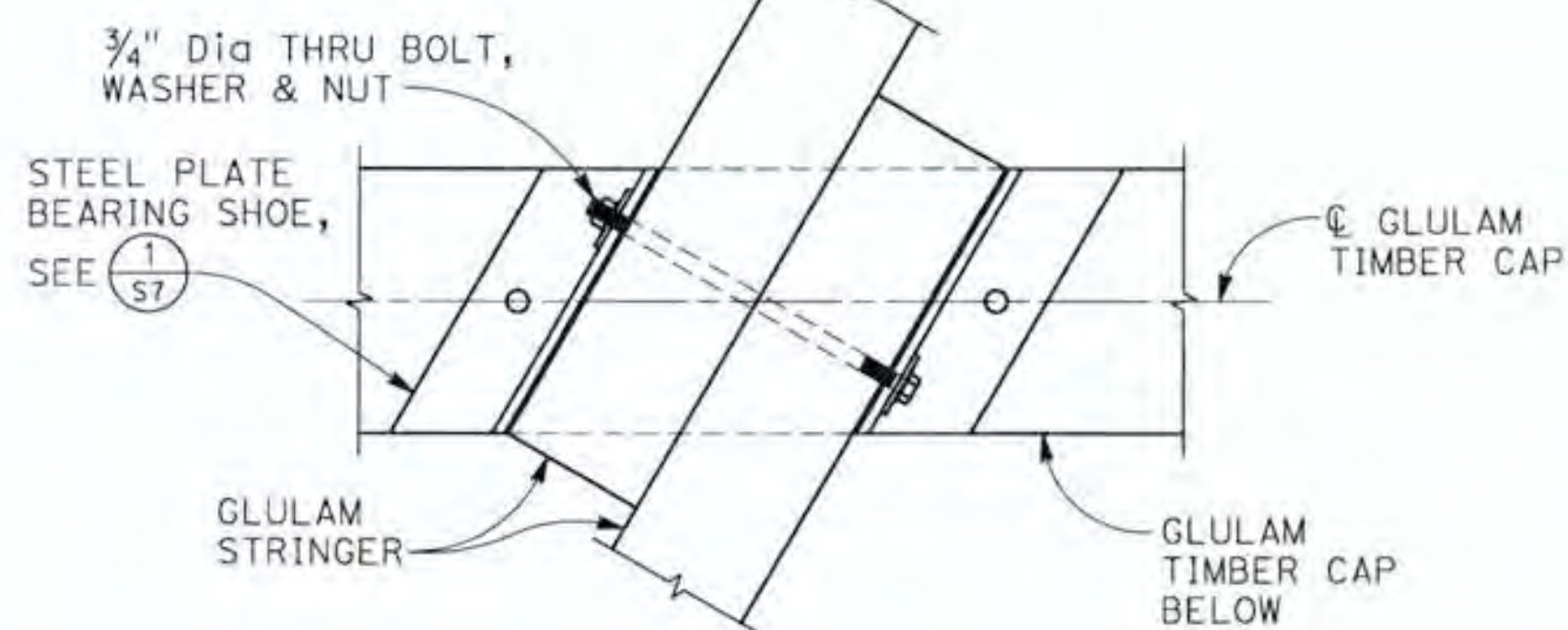
NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

AS BUILT
NO CORRECTIONS THIS SHEET
BY: *Tahir Malik, PE*
DATE COMPLETED: 10-16-17

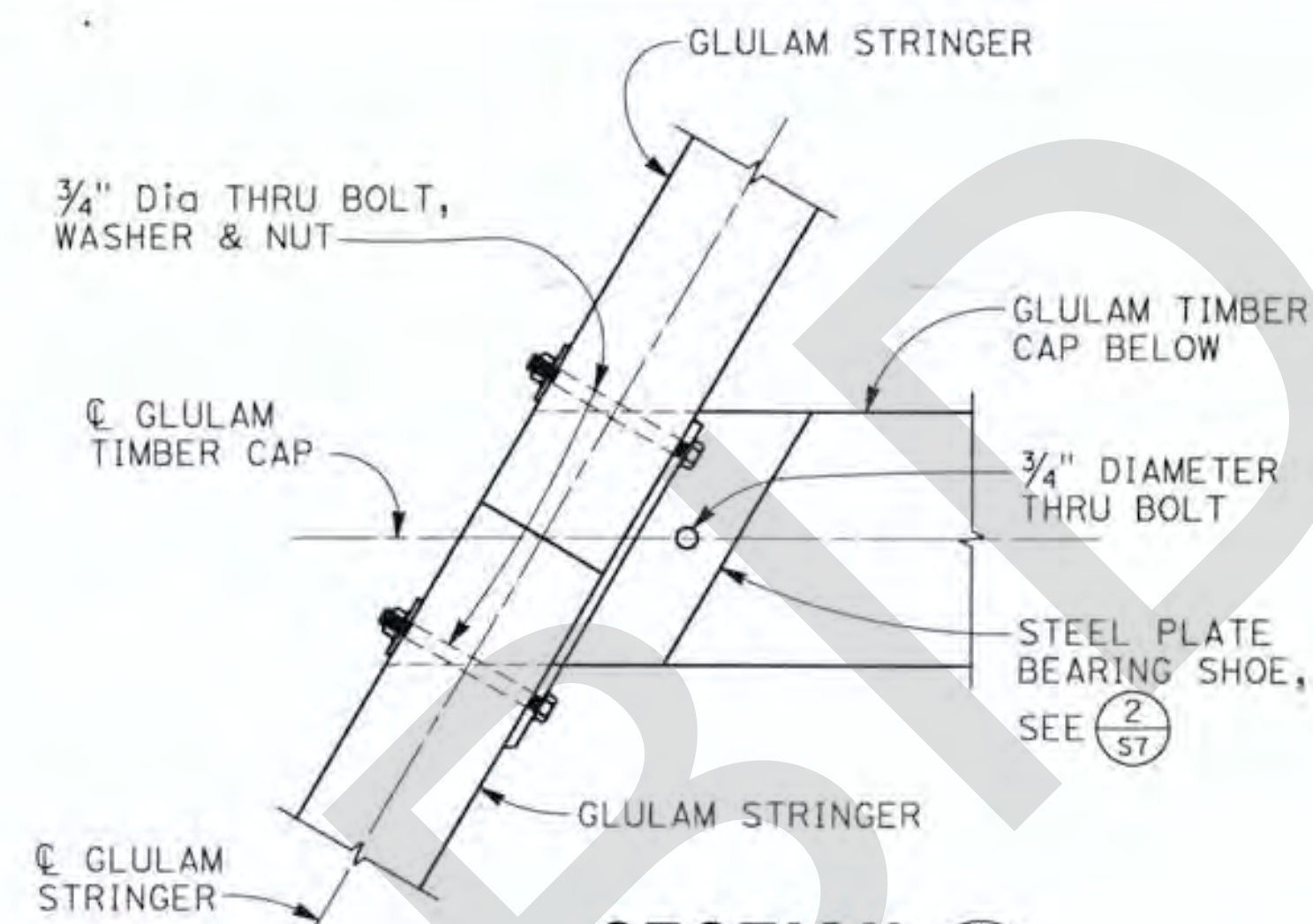
BIGGS CARDOSA ASSOCIATES, INC. APPROVED BY: <i>[Signature]</i> 4/4/16 PLANS PREPARED BY: BIGGS CARDOSA ASSOCIATES INC STRUCTURAL ENGINEERS 500 So. Main St, Suite 400 Orange, California 92668 714-520-4865 BCA		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS REVIEWED BY: <i>[Signature]</i> 4/4/16 RECOMMENDED BY: <i>[Signature]</i> 4/4/16 MERVAT N. MIKHAIL, P.E., TRANSPORTATION DESIGN, DIVISION CHIEF APPROVED BY: <i>[Signature]</i> 4-4-2016 MAZIN KASEY, P.E., DEPUTY DIRECTOR		LANZIT DITCH BRIDGE BRIDGE No. 54C0286 (County No. 82) BENT LAYOUT	
DESIGNED BY: RBS DRAWN BY: DM CHECKED BY: GDD DATE: 3/4/16		FIELD CHANGES NO CHANGES RESIDENT ENGINEER DATE		J.L. REF. W.O. NO. SCALE DWG. NO. SHT. No. JL 10927 HF0026 AS SHOWN S6 29 of 39 (201414256) 2014142	



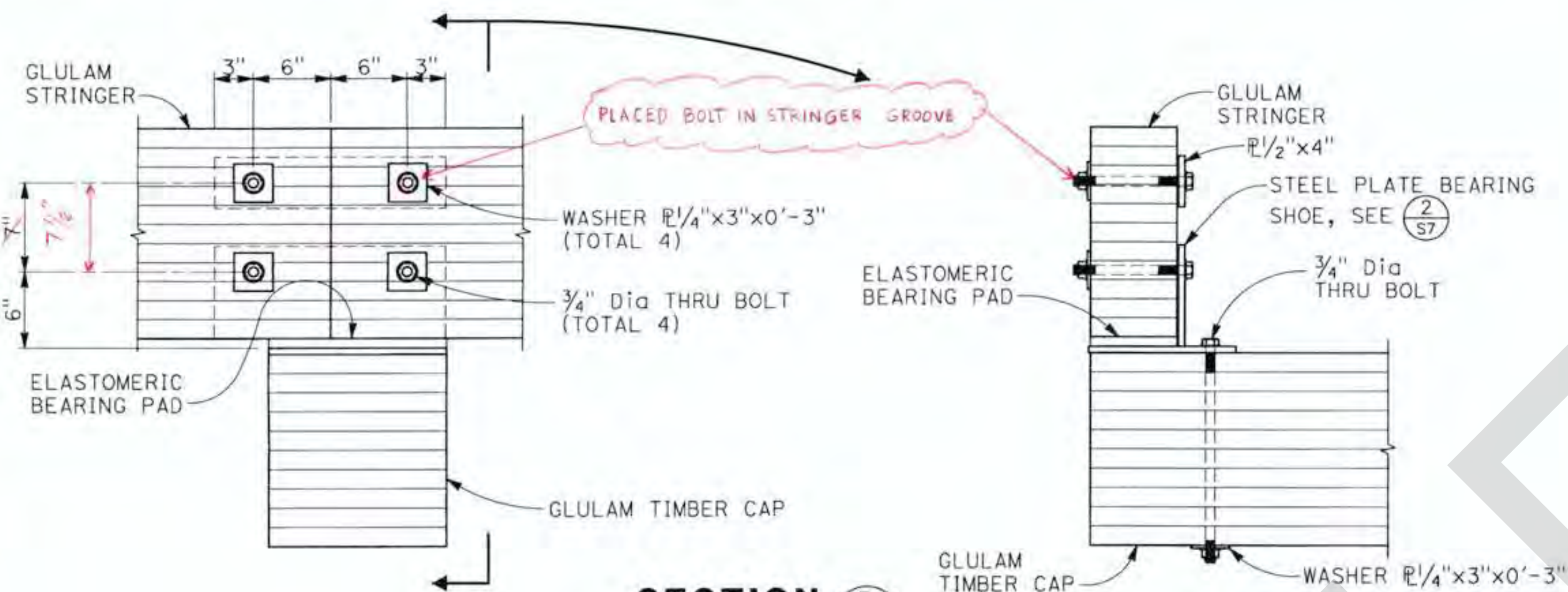
SECTION A
1 1/2" = 1'-0" (S7)



SECTION B
1 1/2" = 1'-0" (S7)



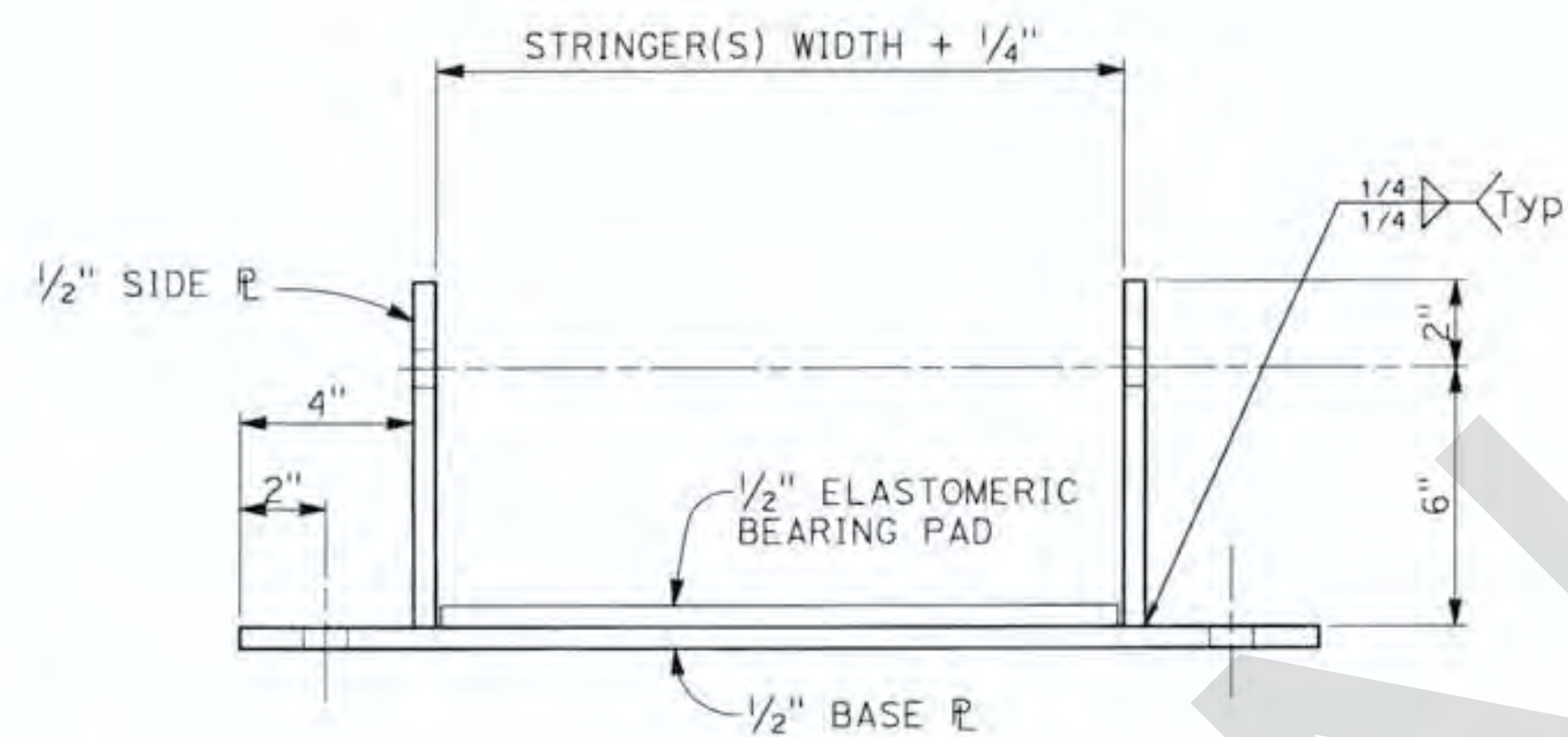
SECTION C
1 1/2" = 1'-0" (S7)



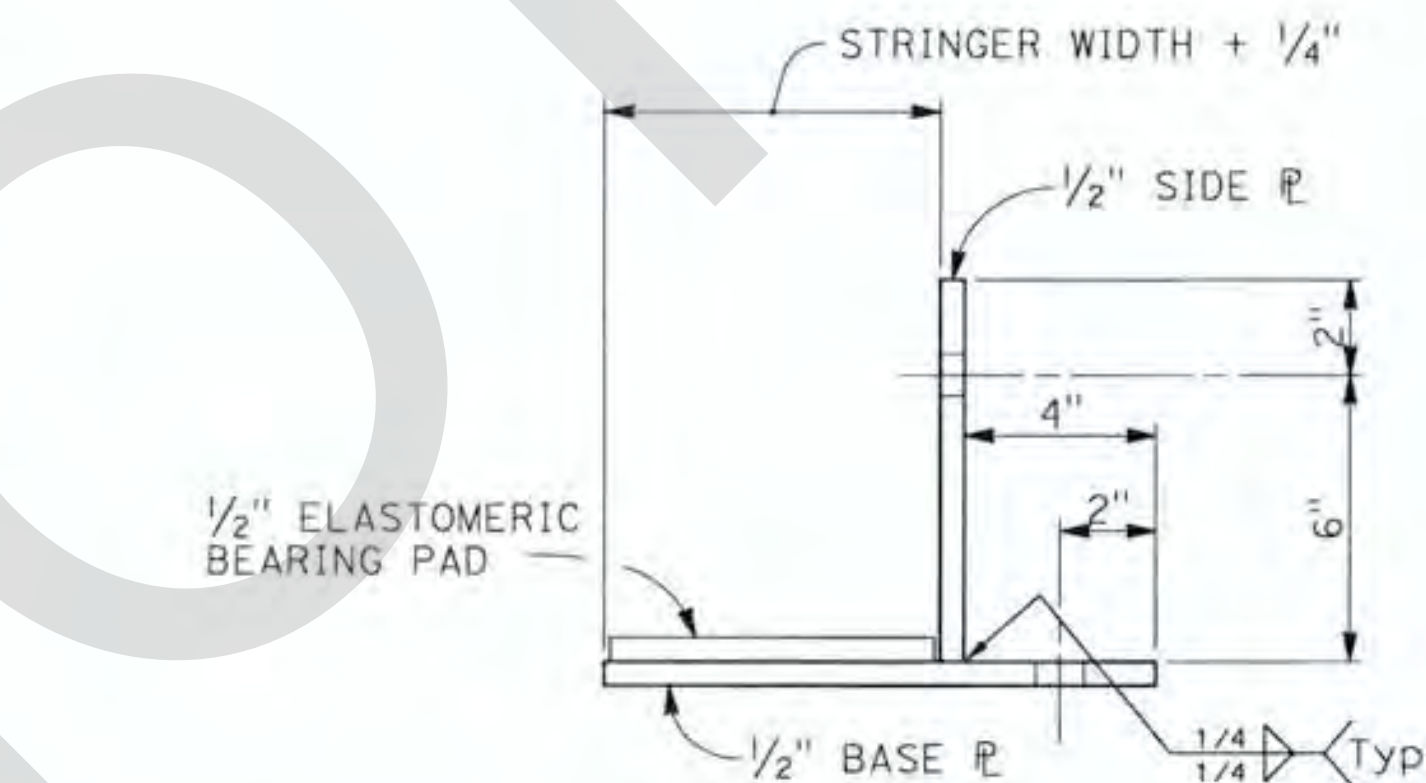
SECTION D
1 1/2" = 1'-0" (S7)

AS BUILT

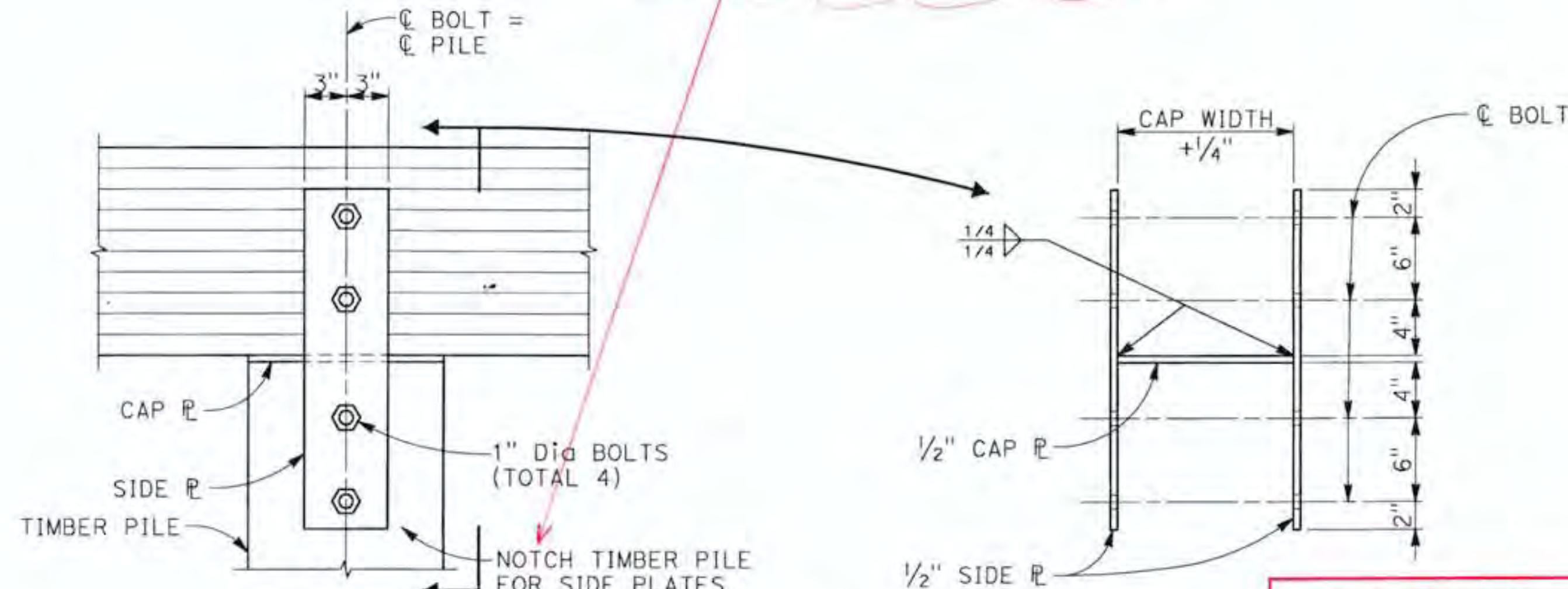
TOP OF PILES NOTCHED FOR SIDE PLATES AND ENTIRE TOP OF PILES TREATED TO 6" BELOW ALL CUTS



STEEL PLATE BEARING SHOE DETAIL (1)
3" = 1'-0" (S7)



STEEL PLATE BEARING SHOE DETAIL (2)
3" = 1'-0" (S7)

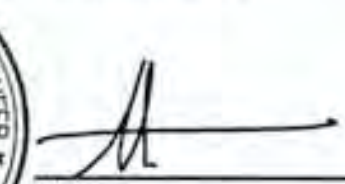

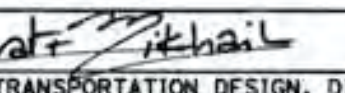
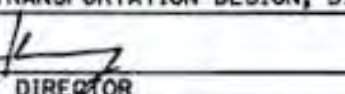


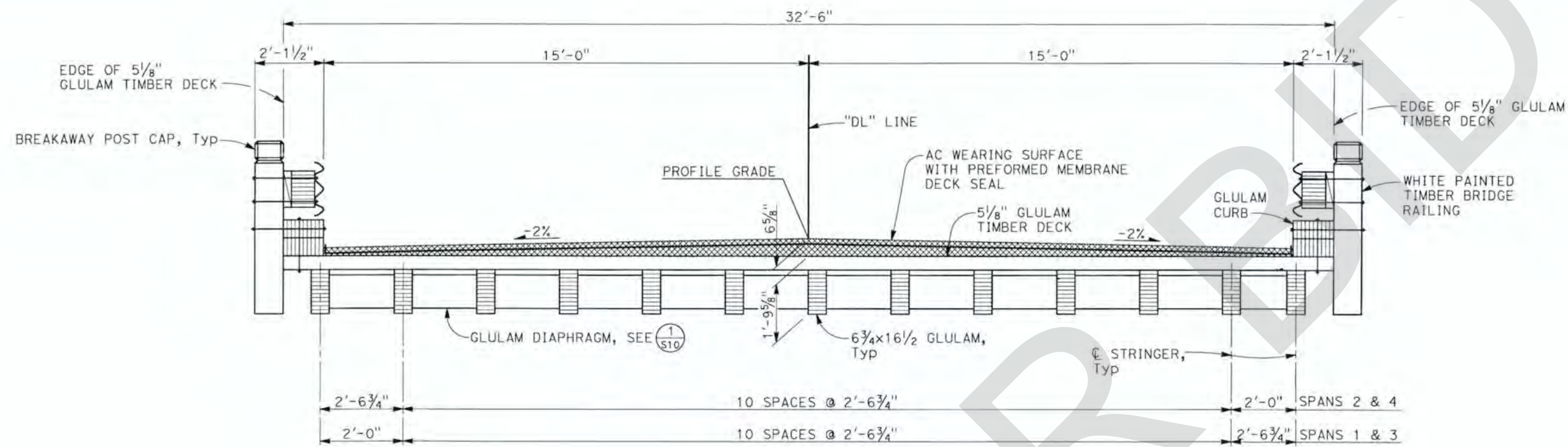
STEEL PLATE PILE CAP DETAIL (3)
1 1/2" = 1'-0" (S7)

AS BUILT
CORRECTIONS BY MICHAEL A. THOMAS, P.E.
CONTRACT NO. BELS 5959 (079)
DATE 10-16-17

FILE NO. 586600 120

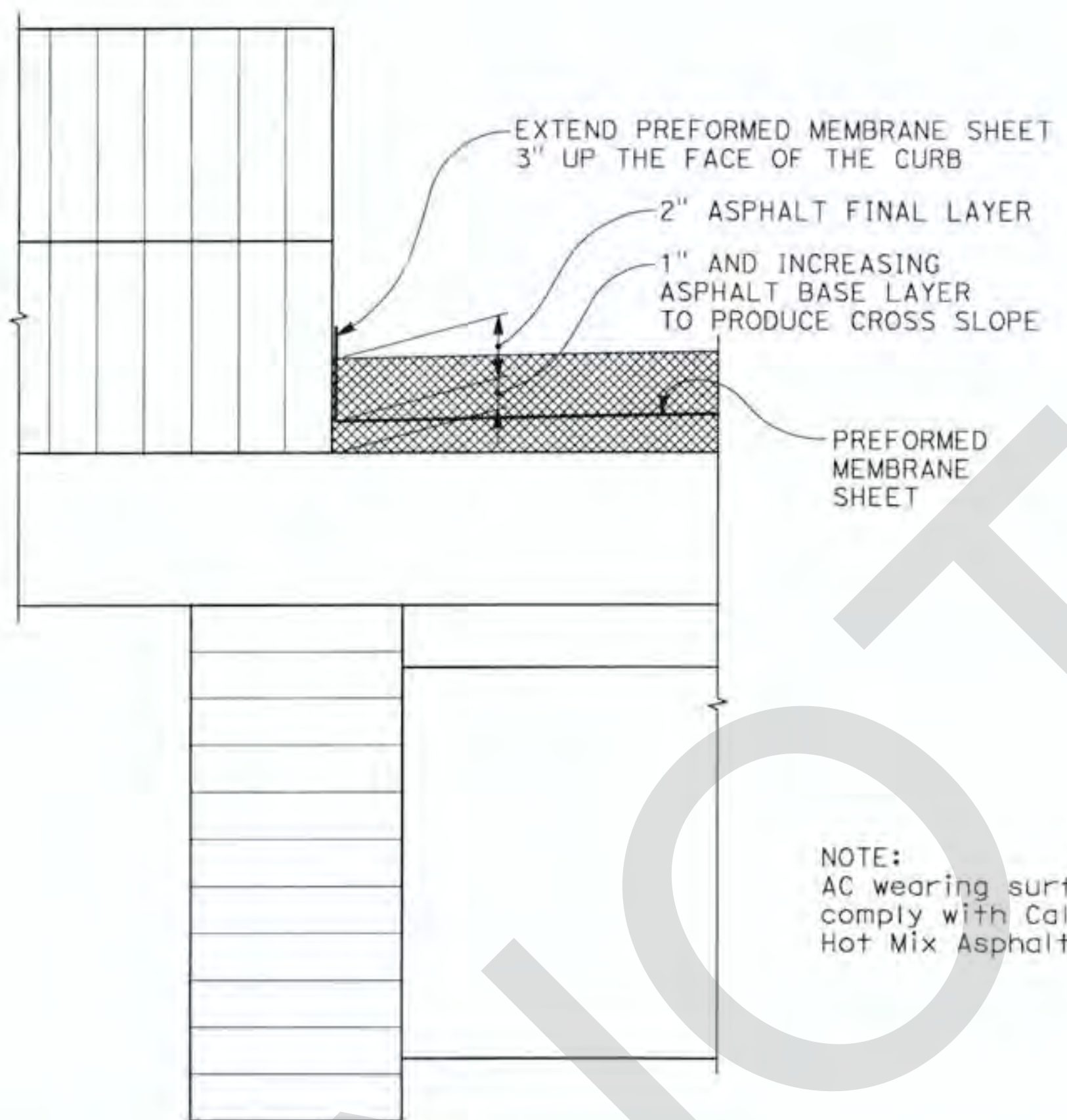
MARK	REVISIONS	APPR.	DATE

APPROVED BY:  9/30/16 EXPIRES		PLANS PREPARED BY: BIGGS CARDOSA ASSOCIATES, INC. STRUCTURAL ENGINEERS 500 So. Main St, Suite 400 Orange, California 92668 714-550-4665 BCA		DESIGNED BY: RBS DRAWN BY: DM CHECKED BY: GDD DATE: 3/4/16		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS REVIEWED BY:  DATE: 4/9/16 RECOMMENDED BY:  DATE: 4/1/16 APPROVED BY:  DATE: 4-4-2016 MAZIN KASEY, P.E., DEPUTY DIRECTOR		LANZIT DITCH BRIDGE BRIDGE No. 54C0286 (County No. 82) BENT DETAILS	
BIGGS CARDOSA ASSOCIATES, INC.				FIELD CHANGES		J.L. REF. W.O. NO. SCALE DWG. NO. SHIT. No. JUL 10927 HF0026 AS SHOWN S7 30 of 39			



TYPICAL SECTION

1/2" = 1'-0"



PARTIAL TYPICAL SECTION

3" = 1'-0"

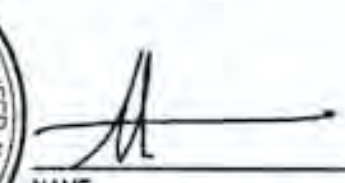


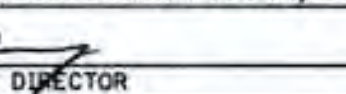
NOTE:
AC wearing surface with preformed membrane shall comply with Caltrans Standard Specifications 39-1.13 Hot Mix Asphalt on bridge decks and 54-5 Deck Seal.

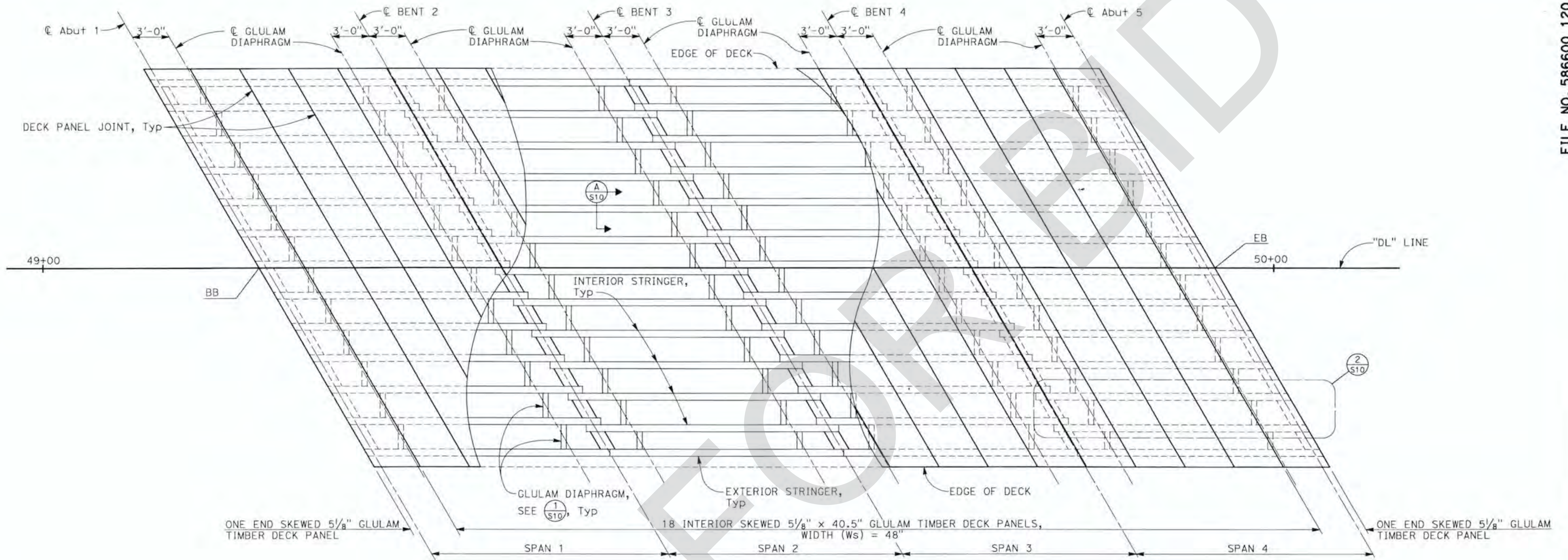
AS BUILT
NO CORRECTIONS THIS SHEET
BY TARIA MALIK, P.E.
DATE COMPLETED 10-16-17

MARK	REVISIONS	DATE

FILE NO. 586600 120

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

APPROVED BY:  MICHAEL A. THOMAS REGISTERED PROFESSIONAL ENGINEER No. 54676 Exp. 9/30/16 STATE OF CALIFORNIA DATE: 4/4/16 EXPIRES: 9/30/16		PLANS PREPARED BY: BIGGS CARDOSA ASSOCIATES INC STRUCTURAL ENGINEERS 500 So. Main St. Suite 400 Orange, California 92668 714-550-4885 BCA		DESIGNED BY: RBS DRAWN BY: DM CHECKED BY: GOD DATE: 3/4/16		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS REVIEWED BY:  DATE: 4/4/16 RECOMMENDED BY:  MERVAT N. MIKHAIL, P.E., TRANSPORTATION DESIGN, DIVISION CHIEF DATE: 4/4/16 APPROVED BY:  MAZIN KASEY, P.E., DEPUTY DIRECTOR DATE: 4-4-2016		LANZIT DITCH BRIDGE BRIDGE No. 54C0286 (County No. 82) TYPICAL SECTION	
FIELD CHANGES				J.L. REF. W.O. NO. SCALE DWG. NO. SHI. No. JL 10927 HF0026 AS SHOWN S8 31 of 39		(201414258) 2014142			



STRINGER LAYOUT
1/4" = 1'-0"

- NOTES:
1. During stringer placement, hand tighten all connections until all diaphragms are placed to allow for minor adjustment. After all diaphragms are placed and alignment is verified, connections should be securely tightened.
 2. Each 5 1/8" glulam timber deck panel shall be connected per $\frac{2}{S10}$ and $\frac{4}{S10}$. Not all connections are shown for clarity.
 3. Glulam deck panels should be placed after stringers and diaphragms are set and secured.
 4. When placing glulam deck panels, brackets should be attached to stringers and nuts hand tightened. Nuts should not be tightened until all deck panels are in place and properly aligned.

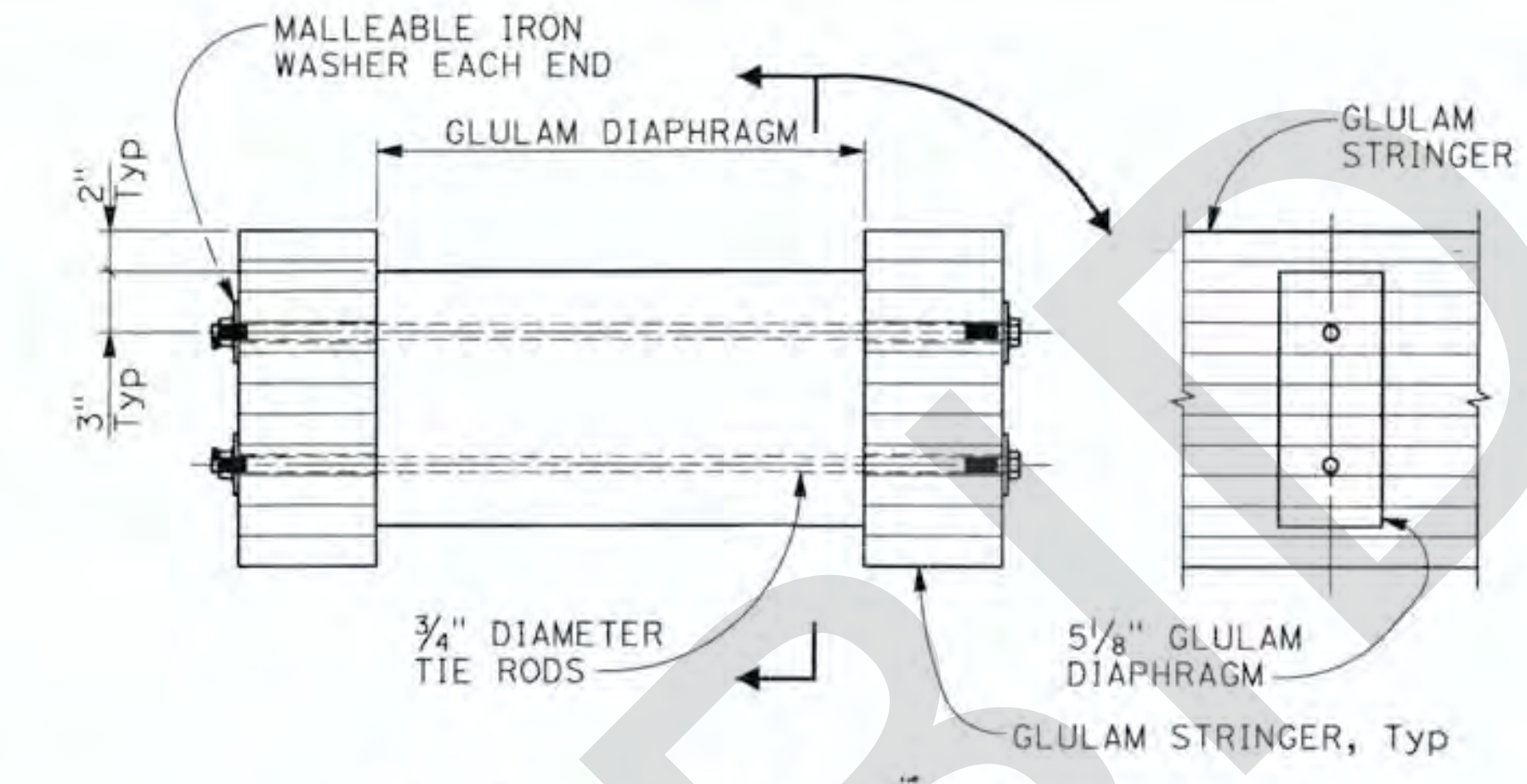
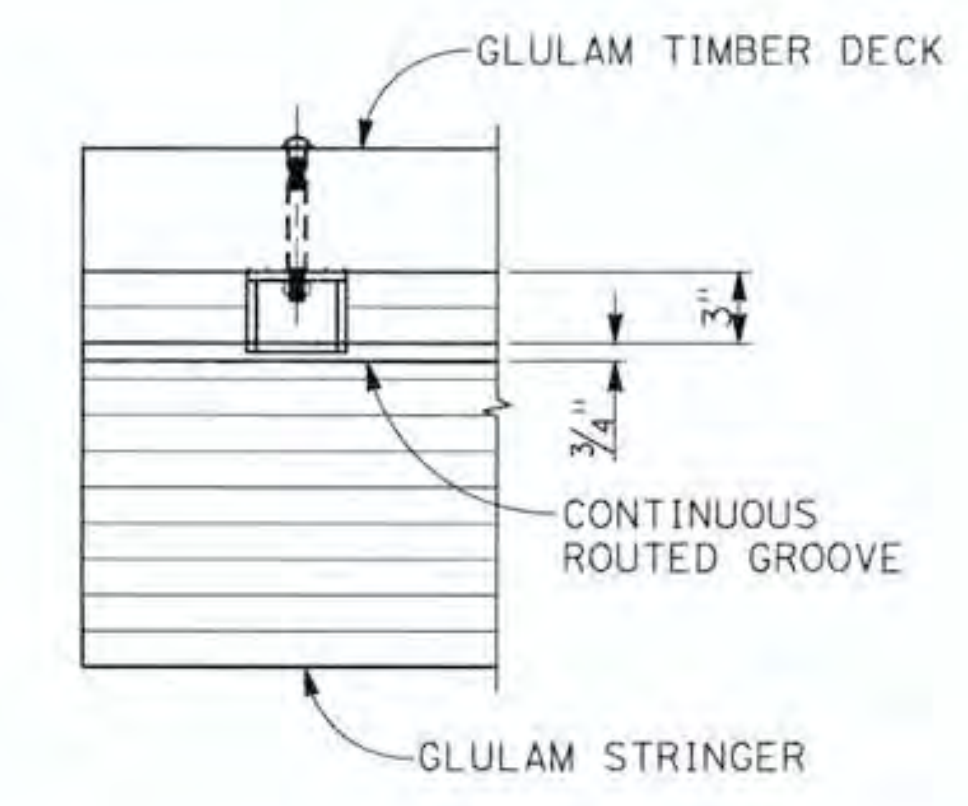
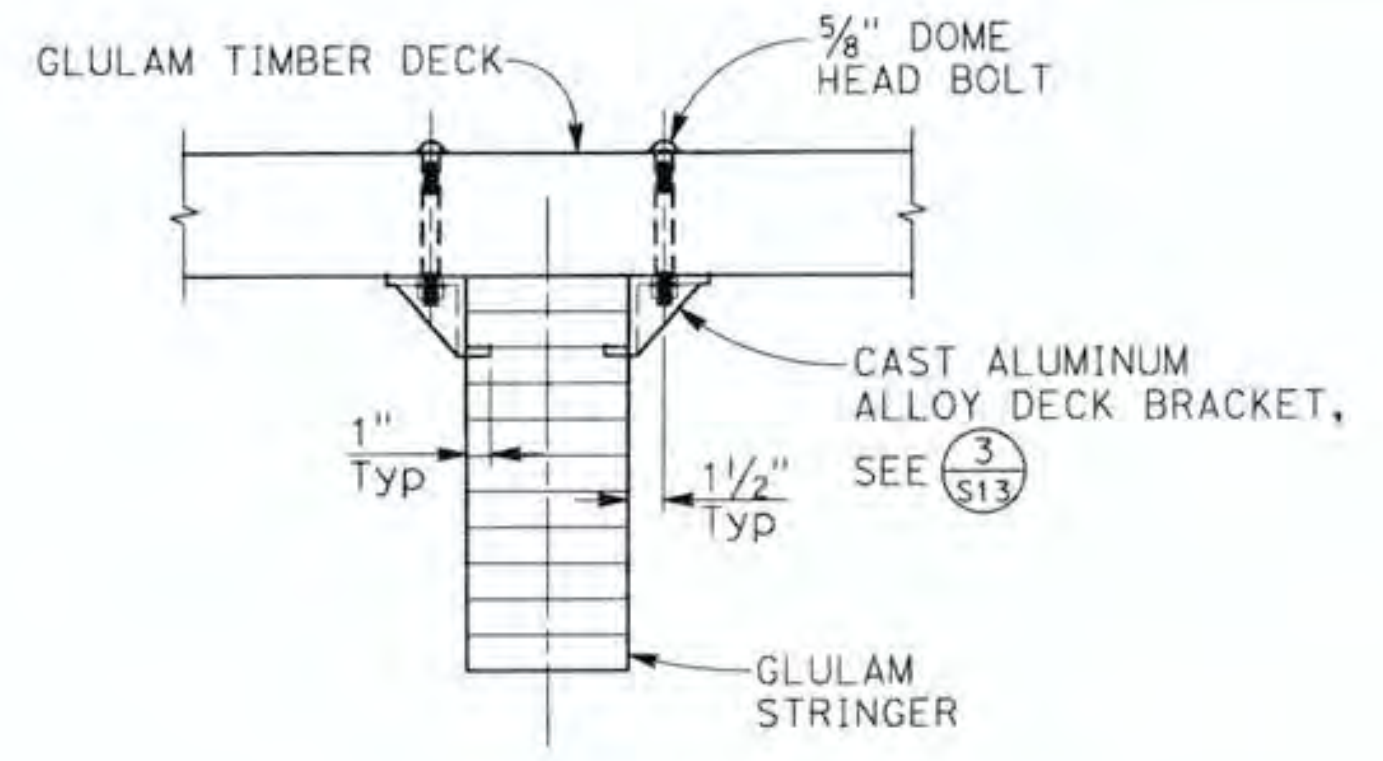
AS BUILT
NO CORRECTIONS THIS SHEET
BY: TARIQ MAHMOUD, P.E.
DATE COMPLETED: 10-16-17

MARK	REVISIONS	APPR.	DATE

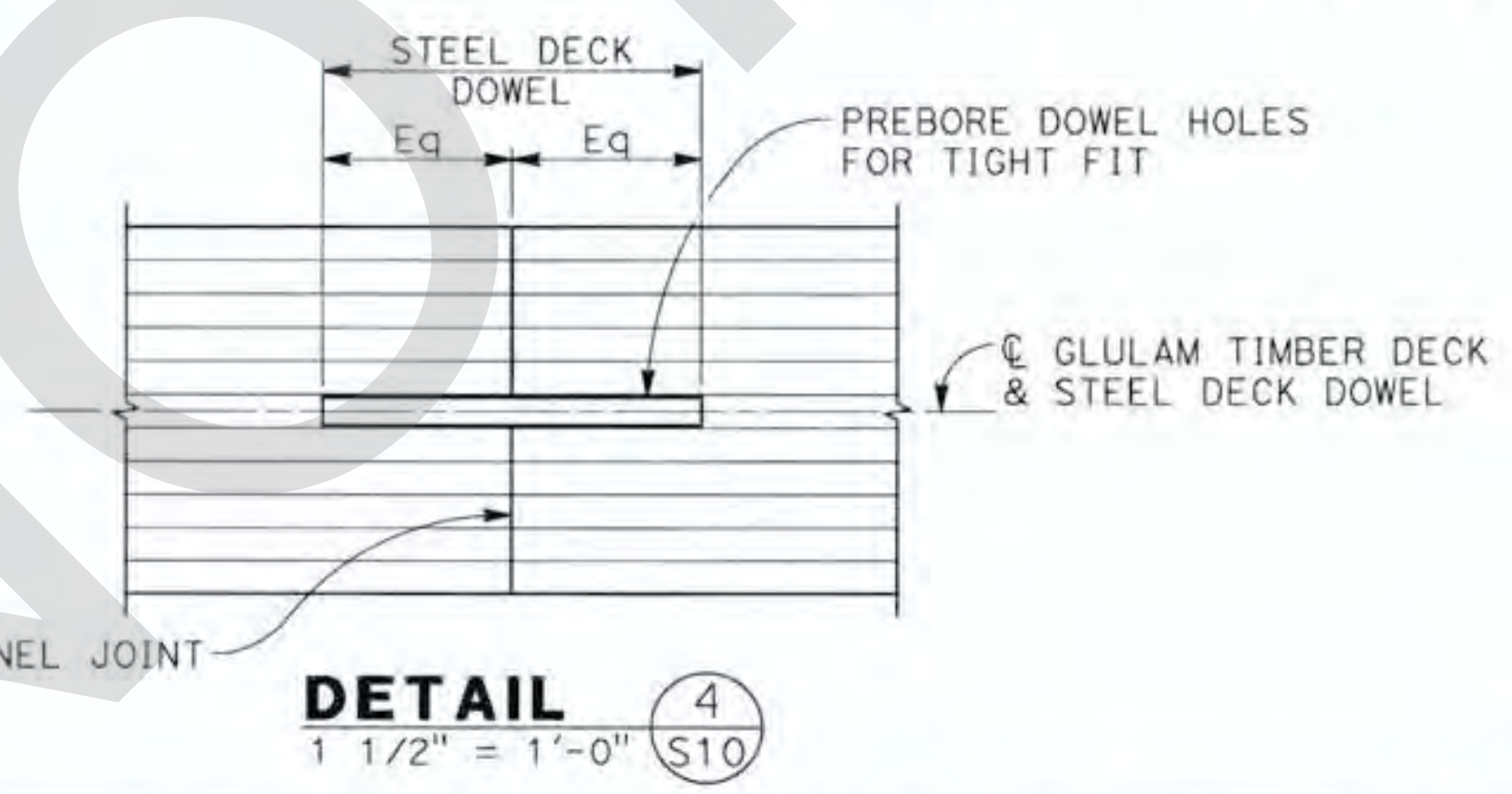
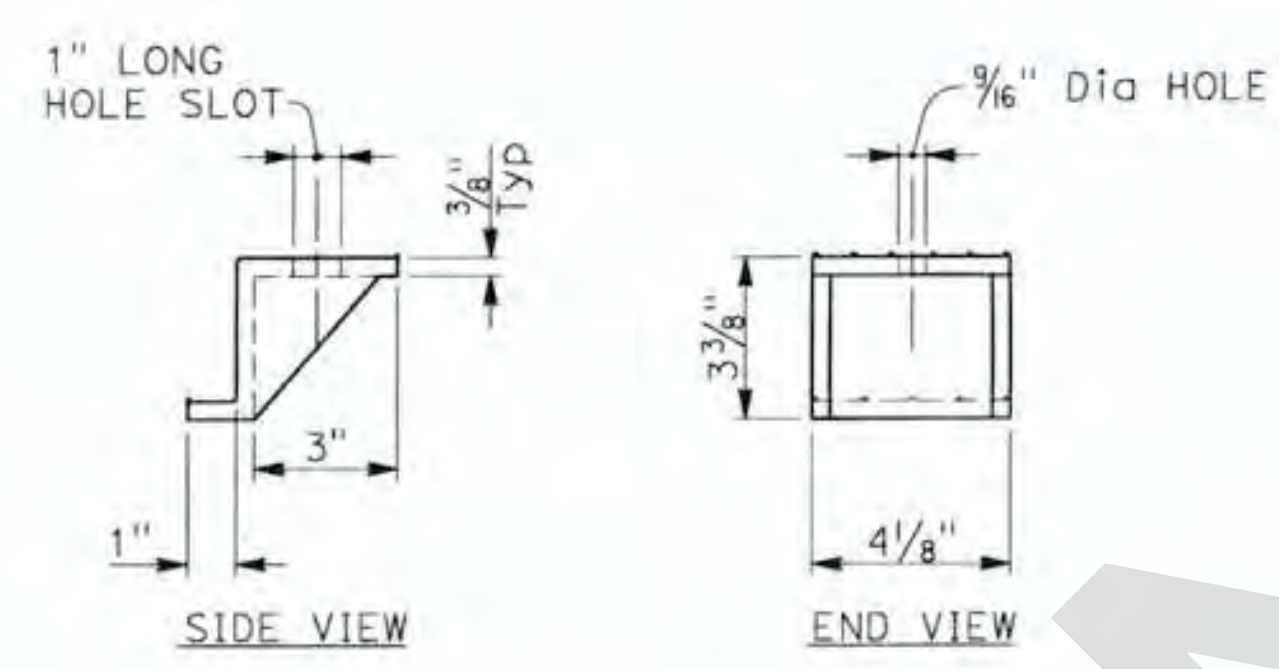
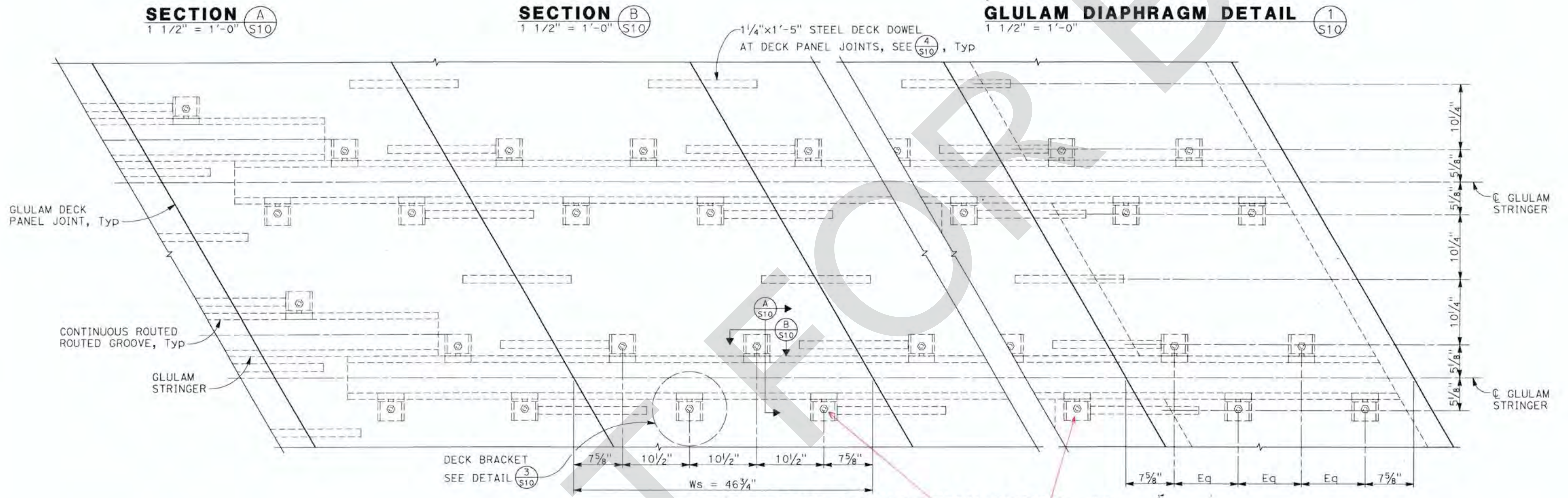
FILE NO. 586600 120

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

APPROVED BY: REGISTERED PROFESSIONAL ENGINEER MICHAEL A. THOMAS No. 54676 Exp. 9/30/16 STATE OF CALIFORNIA EXPIRES: 9/30/16		PLANS PREPARED BY: BIGGS CARDOSA ASSOCIATES, INC. STRUCTURAL ENGINEERS 500 So. Main St, Suite 400 Orange, California 92668 714-550-4665 BCA		DESIGNED BY: RBS DRAWN BY: DM CHECKED BY: GDD DATE: 3/4/16		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS REVIEWED BY: DATE: 9/9/16 RECOMMENDED BY: DATE: 4/4/16 MERVAT N. MIRMAIL, P.E., TRANSPORTATION DESIGN, DIVISION CHIEF APPROVED BY: DATE: 4-4-2016 MAZIN KASEY, P.E., DEPUTY DIRECTOR		LANZIT DITCH BRIDGE BRIDGE No. 54C0286 (County No. 82) STRINGER LAYOUT	
FIELD CHANGES MARK CHANGES NO CHANGES				J.L. REF. W.O. NO. SCALE DWG. NO. SMT. No. JL 10927 HF0026 AS SHOWN S9 32 OF 39		(201414259) 2014142			



NOTE:
See notes on Sheet S9



DECK BRACKET COUNTERSINKED
ALONG R & L EDGE OF DECK
BELOW CURB & GUTTER

AS BUILT

AS BUILT
CORRECTIONS BY TALIB M. ALI, P.E.
CONTRACT NO. BCLS 5757 (024)
DATE 10-16-17

REVISIONS	DATE	APPR.

FILE NO. 586600 120

BIGGS CARDOSA ASSOCIATES, INC. APPROVED BY: REGISTERED PROFESSIONAL ENGINEER No. S4676 Exp. 9/30/16 STATE OF CALIFORNIA DATE: 4/4/16		PLANS PREPARED BY: BIGGS CARDOSA ASSOCIATES INC STRUCTURAL ENGINEERS 500 So. Main St., Suite 400 Orange, California 92668 714-550-4865 BCR		COUNTY OF SAN BERNARDINO DEPARTMENT OF PUBLIC WORKS REVIEWED BY: DATE: 9/9/16 RECOMMENDED BY: DATE: 4/4/16 APPROVED BY: DATE: 9-4-2016 MAZIN KASEY, P.E., DEPUTY DIRECTOR		LANZIT DITCH BRIDGE BRIDGE No. 54C0286 (County No. 82) STRINGER DETAILS No. 1	
DESIGNED BY: RBS DRAWN BY: DM CHECKED BY: GDD DATE: 3/4/16		FIELD CHANGES MARK CHANGES RESIDENT ENGINEER DATE NO CHANGES		J.L. REF. W.O. NO. SCALE DWG. NO. SHT. NO. JL 10927 HF0026 AS SHOWN S10 33 OF 39 (2014142510) 2014142		J.L. REF. W.O. NO. SCALE DWG. NO. SHT. NO. JL 10927 HF0026 AS SHOWN S10 33 OF 39 (2014142510) 2014142	