

I-25: THE NEW PUEBLO FREEWAY PROJECT

CONCEPTUAL STRUCTURES REPORT

Prepared for

Colorado Department of Transportation



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Conceptual Structure Report

The I-25 “No Action” alternative consists of no improvements; existing deficiencies are not corrected. Structures that are structurally deficient and/or functionally obsolete would have no remedial action or correction of the geometric deficiencies. Data concerning the existing structures was compiled in the “Alternatives Analysis and Project Development Report” Appendix A – “Evaluation of Existing Conditions”.

Conceptual structure limits were determined for the conceptual level geometric layout of the “Existing I-25 Alignment” alternative and the “Modified I-25 Alignment” alternative. The “Existing I-25 Alignment” alternative proposes the reconstruction of I-25 to six lanes generally on its present alignment. Widening may occur and interchanges would be modified or removed to improve safety. Where related to the I-25 project, improvements to the local street system would also be included to enhance efficient traffic movement. The “Modified I-25 Alignment” alternative proposes rebuilding I-25 to six lanes, with some segments of I-25 be shifted to a new alignment to accommodate more efficient interchange designs; the existing portions of I-25 vacated by I-25 would become an extension of Santa Fe Avenue. The “Modified I-25 Alignment” alternative more than 1000 feet north of the Arkansas River is in the same configuration as the “Existing I-25 Alignment” alternative.

Conceptual structure limits were determined for both build I-25 alternatives. The horizontal alignment and vertical profile of roads over and under the bridges were considered in developing the conceptual structure limits. Railroad crossings over or under the roadways were treated similarly. Bridges over waterways were estimated without the benefit of a hydraulic analysis in this conceptual stage.

Conceptual bridge span configuration, structure depth and conceptual locations of abutments and piers were established to conform to the I-25 alignment alternatives. Basic relationships of span configuration and structure depth, for continuous and simple-span structures, were used to establish the conceptual limits of the bridges; structural calculations considering capacity or stiffness were beyond the scope of the conceptual work. Feasible structure types were considered in the conceptual layout, but an evaluation of structure type (usually conducted for preliminary design) was beyond the scope of the conceptual work. Vertical clearance was estimated for the assumed structure depth, but thorough vertical clearance calculations were beyond the scope of the conceptual work.

Conceptual Layout drawings were developed to show the conceptual bridge span configuration, structure depth and conceptual locations of abutments and piers. A General Layout drawing, as defined in the Colorado Department of Transportation Bridge Detailing Manual, and usually accompanies FIR submittals, is beyond the scope of work.

Structure numbers were not obtained because the planning study has multiple alignment alternatives. Later when a preferred I-25 alignment alternative is identified, structure numbers will be established for new or replacement bridges. The existing bridges have established structure numbers.

Concept-level construction cost estimates were developed using the bridge deck area and estimated construction costs per square foot; quantity take-offs of individual pay items was beyond the scope of the conceptual work. Estimated unit costs were developed from comparable bridge projects, including recent bridge projects let by CDOT Region 2.

The Conceptual Structure Report provides a brief summary of bridge site constraints, conceptual structure limits, span configurations, structure depths, location of abutments and piers, feasible structure types, and concept-level costs associated with the bridge structure and retaining wall requirements for the “Existing I-25 Alignment” alternative and the “Modified I-25 Alignment” alternative.

Existing Bridges versus Replacement Bridges

For the “Existing I-25 Alignment” alternative and the “Modified I-25 Alignment” alternative, most of the existing structures need to be replaced for geometric reasons. Many existing bridges do not provide adequate horizontal and/or vertical clearance for existing roadways, and are functionally obsolete for the existing condition, No Action alternative. Most of the older bridges have deteriorated condition, are structurally deficient, and have less than 25 years remaining life.

Many of the existing bridges do not conform to the horizontal and vertical geometry of the I-25 alignment alternatives. Where old existing bridges span over I-25, the existing bridges can not span a wider I-25 roadway, are functionally obsolete now, and can not accommodate additional width of I-25 as proposed and would be functionally obsolete for the alternative. Existing bridges that can not accommodate the horizontal and vertical geometry require replacement.

Many existing structures need to be replaced due to deteriorated condition. Some bridges have damage from over-height vehicles, deteriorated condition, have less than 25 years remaining life, or do not have adequate load carrying capacity; bridges in these categories require replacement.

The conceptual evaluation considered the feasibility of continuing to use the existing bridges to carry I-25 and related improvements. Bridges with more than 25 years remaining life, not functionally obsolete nor structurally deficient, can remain in place or be widened to accommodate the I-25 alignment alternative.

Existing bridges that conform to the horizontal and vertical geometry of the I-25 alignment alternatives, and are not functionally obsolete for I-25 alternatives, and are not structurally deficient, and have at least 25 years remaining life:

L-18-AS	I-25 over Bessemer Ditch, will remain in service in “Modified I-25 Alignment” as Santa Fe Ave over Bessemer Ditch
L-18-AW	UPRR over existing I-25, will remain in service in “Modified I-25 Alignment” as UPRR over Santa Fe Ave
K-18-AJ	I-25 over Arkansas River, will remain in service in “Modified I-25 Alignment” as Santa Fe Ave over Arkansas River
K-18-FF	Santa Fe Ave Northbound over Arkansas River; will remain in service in “Existing I-25 Alignment”; not needed for vehicle use in “Modified I-25 Alignment”, but adequate for pedestrian use in “Modified I-25 Alignment”
K-18-BV	east portion, historic arches 8 th Street over Fountain Creek, not affected geometrically by “Existing I-25 Alignment” or “Modified I-25 Alignment”, will remain in service

Replacement bridges are required for structure locations where the existing bridge does not conform to the required horizontal and vertical geometry of the roadway carried on the structure, or where the structural condition of the existing bridge is deficient and can not be corrected with remedial action. Most of the structure locations on the “Existing I-25 Alignment” alternative and the “Modified I-25 Alignment” alternative require replacement bridges, or bridges at new locations. The conceptual span configuration, structure depth and conceptual locations of abutments and piers were established to conform to the I-25 alignment alternatives.

Structure Configuration Determined from I-25 Alignment Geometry & Constraints

Conceptual structure limits and span configurations were developed to conform to the geometry of each I-25 alignment alternative. Bridges must span the established horizontal widths of the roadways and/or railroad underneath, and provide sufficient vertical clearance at all grade separations. Conceptual locations of piers and abutments were located beyond the constraint (horizontal and vertical envelope) under the bridge. The I-25 alignment geometry, including crossing roadways and railroads, were considered to define the structure length, width, conceptual location of abutments and piers, and span configurations that satisfy the horizontal and vertical clearance criteria. Bridges over waterways should provide adequate hydraulic opening to convey the water with freeboard.

The conceptual bridge limits assumed the most efficient structure configuration, using short integral abutments wherever feasible. Short integral abutments, even with slightly longer spans, are typically more cost efficient compared to bridges with tall abutments. Basic relationships of span configuration and structure depth, for continuous and simple-span bridges, were used to establish the conceptual limits. Feasible conceptual structure types were identified based on experience, considering the site constraints and span configuration. **Appendix B includes the Existing I-25 Alignment Alternative Conceptual Layout drawings. Appendix C includes the Modified I-25 Alignment Alternative Conceptual Layout drawings.**

Conceptual Decision at Each Bridge Location

The required action at each bridge location depends on the width and configuration of each I-25 alignment alternative. Each bridge location was evaluated to determine the required action, from this list:

- Functionally Obsolete and/or Structurally Deficient** primarily with No Action
- Adequate or Remain** no geometric conflicts, at least 25 years remaining life
- Widen**
- Remove** in the way of other improvements, or no longer needed
- Replace** primarily due to geometry; and/or condition or less than 25 years remaining life
- New Location**

The following table summarizes the Conceptual Decision at each bridge location for the three I-25 alignment alternatives:

BRIDGE STRUCTURES on I-25 ALIGNMENTS					
I-25 Alignment Sta.	Structure Location	Existing Structure Number	Conceptual Decision		
			Existing I-25 No Action	Existing I-25 Alignment	Modified I-25 Alignment
139	SH45 Pueblo Blvd over I-25	L-18-BA	Adequate	Replace	Replace
199	I-25 over Indiana Ave	L-18-M (NB) L-18-W (SB)	Functionally Obsolete, Functionally Obsolete	Replace	Replace

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BRIDGE STRUCTURES on I-25 ALIGNMENTS					
I-25 Alignment Sta.	Structure Location	Existing Structure Number	Conceptual Decision		
			Existing I-25 No Action	Existing I-25 Alignment	Modified I-25 Alignment
210	I-25 over UPRR (1)	-	-	-	New Location
221	I-25 (Existing) over Bessemer Ditch	L-18-AS	Adequate	Replace	Santa Fe Ave over Bessemer Ditch Adequate
221	I-25 (Modified) over Bessemer Ditch	-	-	-	New Location
221	UPRR over Bessemer Ditch	No CDOT number	Adequate	Replace	Adequate
238	Central Ave over I-25 (Existing)	L-18-CD	Adequate	Remove	Remove
245	Northern Ave over Elm St	-	-	New Location	-
245	Northern Ave over I-25 (Existing)	L-18-AQ	Functionally Obsolete	Replace	Northern Ave over Santa Fe Ave, UPRR Replace
245	Northern Ave over UPRR	-	-	New Location	-
245	Northern Ave over I-25 (Modified)	-	-	-	New Location
253	Mesa Ave over I-25 (Existing) and UPRR	L-18-AU	Functionally Obsolete	Replace	Mesa Ave over I-25, UPRR, Santa Fe Ave Replace
275	I-25 (Existing) over Abriendo Ave	L-18-AV	Functionally Obsolete	Replace	-
274	UPRR over Abriendo Ave	-	-	New Location	-
278	UPRR over US50 Business Santa Fe Drive	-	-	-	New Location
275	Santa Fe Ave over Abriendo Ave	-	-	New Location	-

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BRIDGE STRUCTURES on I-25 ALIGNMENTS					
I-25 Align- ment Sta.	Structure Location	Existing Structure Number	Conceptual Decision		
			Existing I-25 No Action	Existing I-25 Alignment	Modified I-25 Alignment
280	I-25 (Modified) over US50 Business Santa Fe Drive	-	-	-	New Location
282	UPRR over I-25 (Existing)	L-18-AW	Adequate	Replace	UPRR over US50 Business Santa Fe Ave Adequate
288	I-25 (Existing) over Arkansas River	K-18-AV (NB) K-18-AJ (SB)	Adequate	Replace	US50 Business Santa Fe Ave over Arkansas River Adequate
288	US50 Business (NB) Santa Fe Ave over Arkansas River	K-18-FF (NB)	Adequate	Adequate	Remove or Pedestrian use
288	US50 Business (SB) Santa Fe Ave over Arkansas River	K-18-R (SB)	Functionally Obsolete	Replace	Remove
288	I-25 (Modified) over Arkansas River	-	-	-	New Location
288	Ramp L over Arkansas River	-	-	-	New Location
288	Ramp K over Arkansas River	-	-	-	New Location
289	Stanton Ave over Arkansas River	-	-	-	New Location
293	I-25 (Existing) over US50 Business Santa Fe Ave	K-18-AX (NB) K-18-AY (SB)	Functionally Obsolete, Functionally Obsolete	Replace	US50 Business Santa Fe Ave over Locust St Replace
293	I-25 (Modified) over Locust St	-	-	-	New Location
303	I-25 (Existing) over Illex St	K-18-CK (NB) K-18-CL (SB)	Functionally Obsolete, Functionally Obsolete	Replace	-

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BRIDGE STRUCTURES on I-25 ALIGNMENTS					
I-25 Alignment Sta.	Structure Location	Existing Structure Number	Conceptual Decision		
			Existing I-25 No Action	Existing I-25 Alignment	Modified I-25 Alignment
306	I-25 (Modified) over Stanton Ave	K-18-CK (NB) K-18-CL (SB)	Functionally Obsolete, Functionally Obsolete	-	Replace
312	I-25 over UPRR (2)	K-18-CK (NB) K-18-CL (SB)	Functionally Obsolete, Functionally Obsolete	Replace	Replace
320	I-25 over UPRR (3)	K-18-CI (NB) K-18-CJ (SB)	Functionally Obsolete, Functionally Obsolete	Replace	Replace
327	I-25 over Kelly Ave	K-18-CI (NB) K-18-CJ (SB)	Functionally Obsolete, Functionally Obsolete	Replace	Replace
328	Ramp S over Kelly Ave	-	-	New Location	New Location
337	I-25 over 1 st St	K-18-CN (NB) K-18-CO (SB)	Functionally Obsolete, Functionally Obsolete	Replace	Replace
347	I-25 over SH96 4 th St	K-18-CR	Adequate	Replace	Replace
350	5 th St over I-25	K-18-CT	Functionally Obsolete	(affected geometrically by project) Remove	(affected geometrically by project) Remove
360	8 th St over I-25	K-18-BV west portion	Adequate	(affected geometrically by project) Remove	(affected geometrically by project) Remove
360	8 th St over I-25	K-18-BV center portion	Functionally Obsolete	(affected geometrically by project) Remove	(affected geometrically by project) Remove
360	8 th St over I-25	K-18-BV east portion, historic arches	Functionally Obsolete	(not affected geometrically by project) Remain	(not affected geometrically by project) Remain

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BRIDGE STRUCTURES on I-25 ALIGNMENTS					
I-25 Alignment Sta.	Structure Location	Existing Structure Number	Conceptual Decision		
			Existing I-25 No Action	Existing I-25 Alignment	Modified I-25 Alignment
360	8 th St over UPRR	K-18-BV	-	Replace	Replace
360	I-25 over 8 th St	-	-	New Location	New Location
376	I-25 over 13 th St	K-18-EN	Functionally Obsolete	Replace	Replace
407	US50 B over Fountain Creek	K-18-L	Functionally Obsolete	Replace	Replace
416	US50 B over UPRR	K-18-H	Functionally Obsolete	Replace	Replace
417	US50 B over I-25	K-18-J	Functionally Obsolete	Replace	Replace
418	Ramp X over I-25	-	-	New Location	New Location
450	I-25 over 29 th St	K-18-EA (NB) K-18-EB (SB)	Functionally Obsolete, Functionally Obsolete	Replace	Replace
TOTAL Number of Bridges	Functionally Obsolete and/or Structurally Deficient		25	-	-
	Remain (not affected by project)		-	1	1
	Adequate		8	1	4
	Widen or Rehabilitate		-	-	-
	Remove		-	3	5
	Replace		-	23	17
	New Location		-	7	13
	TOTAL Number of Bridges		33	35	40

Description of Bridges' Conceptual Structure Layout & Configuration

Conceptual structure limits and span configurations were developed to conform to the geometry of each I-25 alignment alternative. Bridges must span the established horizontal widths of the roadways and/or railroad underneath, and provide sufficient vertical clearance at all grade separations. Conceptual locations of piers and abutments were located beyond the constraint under the bridge. The I-25 alignment geometry, including crossing roadways and railroads, were considered to define the structure length, width, conceptual location of abutments and piers, and span configurations that satisfy the horizontal and vertical clearance criteria. Bridges over waterways should provide adequate hydraulic opening to convey the water with freeboard.

The conceptual bridge limits assumed the most efficient structure configuration, using short integral abutments wherever feasible. Short integral abutments, even with slightly longer spans, are typically more cost efficient compared to bridges with tall abutments. Basic relationships of span configuration and structure depth, for continuous and simple-span bridges, were used to establish the conceptual limits. Feasible conceptual structure types were identified based on experience, considering the site constraints and span configuration. Attached are conceptual structure span configurations and typical sections are shown in the Conceptual Layouts in Appendix B and Appendix C for the Existing and Modified I-25 alignments, respectively.

Existing I-25 Alignment south beginning to 2000' north of Arkansas River

The "Existing I-25 Alignment" alternative proposes the reconstruction of I-25 to six lanes generally on its present alignment. Widening may occur and interchanges would be modified or removed to improve safety. Where related to the I-25 project, improvements to the local street system would also be included to enhance efficient traffic movement.

The "Existing I-25 Alignment" from the south project beginning to 2000' north of the Arkansas River was evaluated to determine which structures are required. For each bridge site, the structure conceptual layout and configuration is described. Conceptual bridge span configuration, structure depth and conceptual locations of abutments and piers were established to conform to the "Existing I-25 Alignment" alternative. Basic relationships of span configuration and structure depth, for continuous and simple-span structures, were used to establish the conceptual limits of the bridges. Feasible structure types were considered in the conceptual layout, but an evaluation of structure type (usually conducted for preliminary design) was beyond the scope of the conceptual work.

Pueblo Blvd. Over I-25

Replace

Pueblo Boulevard crosses over I-25 on existing bridge Structure L-18-BA that spans the current width of I-25, but can not span the proposed width of I-25. The existing Pueblo Boulevard bridge over I-25 must be replaced because the existing bridge can not span the width of the proposed I-25 main lanes and ramp merge lane. The proposed bridge configuration consists of two spans and a total length of 257.5'. Span lengths of 127' are assumed. Pier is located at the center of I-25; piers and abutments are not skewed, which conforms to the I-25 alignment. Bridge width (out-to-out) is 87'. The abutments are setback to clear the existing bridge abutments. Since the new bridge is considerably wider than the existing structure, it should be feasible to avoid foundation conflict with the existing structure by placing the new columns outside the limits of the existing bridge and minimize conflicts with the existing foundations. Assumed structure depth is 6'-3" for the conceptual span configuration. Feasible structure types include

prestressed concrete bulb-tee girders, prestressed concrete tub girders, and cast-in-place post-tensioned concrete box girders, and steel plate girders.

I-25 over Indiana Ave.

Replace

The “Existing I-25 Alignment” crosses over Indiana Avenue on an improved horizontal and vertical alignment. Existing parallel bridge Structures L-18-M (NB) and L-18-W (SB) are functionally obsolete (I-25 width) and have less than 25 years remaining life. The existing I-25 bridges over Indiana Avenue must be replaced because the existing bridges can not conform to the improved horizontal and vertical alignment, and because the existing bridges have less than 25 years remaining life. The proposed bridge is located along the horizontal alignment within a horizontal curve of 4000’ radius. The proposed bridge configuration consists of one span and a total length of 220’. The one-span configuration best accommodates the single-point interchange located below the bridge for Indiana Ave. Abutments are skewed to conform to the Indiana Ave alignment. The bridge carries multiple lanes for I-25. Bridge width (out-to-out) is 125’. Feasible structure types include variable-depth cast-in-place post-tensioned concrete box girder superstructure, prestressed concrete tub girders, and steel plate girders.

I-25 over Bessemer Ditch

Replace

The “Existing I-25 Alignment” crosses over Bessemer Ditch on an improved horizontal and vertical alignment. Existing Structure L-18-AS over Bessemer Ditch must be replaced because the existing structure can not conform to the improved horizontal and vertical alignment. The proposed structure is located along the horizontal alignment within a horizontal curve of 3000’ radius. The proposed structure configuration consists of a three-cell box culvert consisting of three 10’x10’ cells with a total length of 33’. Since no hydraulic information is available for the Bessemer Ditch at this time, it is difficult to determine the required size of opening. The structure is skewed to conform to the Bessemer Ditch alignment. The structure carries multiple lanes for I-25. Bridge width (out-to-out) is 210’. Assumed cell opening depth is 10’-0” for the conceptual span configuration. Feasible structure types include concrete box culvert, prestressed concrete voided slabs, and steel plate girders.

UPRR over Bessemer Ditch

Replace

The “Existing I-25 Alignment” requires relocating the Union Pacific Railroad (UPRR) toward the east. The UPRR relocation crosses over Bessemer Ditch on a different horizontal alignment than the existing UPRR crossing of Bessemer Ditch. The existing railroad structure over Bessemer Ditch must be replaced because the existing structure can not conform to the revised horizontal alignment. The proposed structure configuration consists of a one-span bridge; also feasible is a three-cell box culvert consisting of three 10’x10’ cells with a total length of 33’. Since no hydraulic information is available for the Bessemer Ditch at this time, it is difficult to determine the required size of opening. The structure is skewed to conform to the Bessemer Ditch alignment. The structure carries multiple tracks for UPRR. Bridge width (out-to-out) is 41.5’. Assumed structure depth is 4’-0” plus 2’-0” for ballast, ties and rail, for the conceptual span configuration. For the box culvert option, assumed cell opening depth is 10’-0” for the conceptual span configuration. Feasible structure types include concrete box culvert, prestressed concrete box girders, and steel plate girders.

Northern Ave. over Elm St.

New Location

Northern Avenue crosses over Elm St at a new bridge location. The location is just west of the tight diamond interchange for Northern Ave over I-25. The bridge carries multiple lanes for Northern Ave. The Northern Ave intersection with Frontage Road M and Ramp N includes intersection geometry that

results in non-parallel bridge edges and variable width. Nominal bridge width (out-to-out) is 120' and increased width near the intersection. The proposed bridge configuration consists of one span and a total length of 90'. Stub abutments behind retaining walls, or tall abutments, are required with the one-span configuration. Assumed structure depth is 5'-6" for the conceptual span configuration. Feasible structure types include prestressed concrete bulb-tee girders, prestressed concrete tub girders, and cast-in-place post-tensioned concrete box girders, and steel plate girders.

Northern Ave. over I-25**Replace**

Existing Northern Avenue crosses over I-25 on existing bridge Structure L-18-AQ that spans the current width of I-25, but can not span the proposed width of I-25. Proposed Northern Ave crosses over I-25 on a shifted horizontal alignment. The existing Northern Avenue bridge over I-25 must be replaced because the existing bridge can not conform to the shifted horizontal alignment and revised vertical alignment, because the existing bridge can not span the width of proposed I-25, and because the existing bridge has less than 25 years remaining life. Northern Avenue crosses over I-25 within a tight diamond interchange. Northern Ave has closely-spaced intersections with Frontage Road M, Ramp M, Ramp J, and Frontage Road J. The close proximity of the intersections results in non-parallel bridge edges and variable width. Nominal bridge width (out-to-out) is 120' and increased width near the intersections (preliminary design should determine sight distance envelopes, and increases to the bridge deck if needed). The proposed bridge configuration consists of one span and a total length of 133'. Stub abutments behind retaining walls, or tall abutments, are required with the one-span configuration. Assumed structure depth is 6'-3" for the conceptual span configuration. Feasible structure types include prestressed concrete bulb-tee girders, prestressed concrete tub girders, and cast-in-place post-tensioned concrete box girders, and steel plate girders.

Northern Ave. over UPRR**New Location**

Northern Avenue crosses over Union Pacific Railroad (UPRR) at a new bridge location. The location is just east of the tight diamond interchange for Northern Ave over I-25. The bridge carries multiple lanes for Northern Ave. The Northern Ave intersection with Frontage Road J and Ramp J includes intersection geometry that results in non-parallel bridge edges and variable width. Nominal bridge width (out-to-out) is 120' and increased width near the intersection. The proposed bridge configuration consists of one span and a total length of 75'. Stub abutments behind retaining walls, or tall abutments, are required with the one-span configuration. Assumed structure depth is 5'-6" for the conceptual span configuration. Feasible structure types include prestressed concrete bulb-tee girders, prestressed concrete tub girders, and cast-in-place post-tensioned concrete box girders, and steel plate girders.

Mesa Ave. over I-25 and UPRR**Replace**

Mesa Avenue crosses over I-25 on existing bridge Structure L-18-AU that spans the current width of I-25, but can not span the proposed width of I-25. The existing bridge is functionally obsolete (I-25 width) and has less than 25 years remaining life. The existing Mesa Avenue bridge over I-25 and UPRR must be replaced because the existing bridge can not span the width of the proposed I-25 main lanes, frontage roads and mainline UPRR, and because the existing bridge has less than 25 years remaining life. The proposed bridge configuration consists of three spans and a total length of 405'. Span lengths of 134', 135' and 134' are assumed. Piers are located in the I-25 center median, and between I-25 and UPRR; piers and abutments are not skewed, and conform to the I-25 and UPRR alignments. A 25'-0" minimum lateral clearance has been used to meet current railroad requirements. The bridge carries two lanes for Mesa Ave. Assumed structure depth is 7'-0" for the conceptual span configuration. Feasible structure

types include prestressed concrete bulb-tee girders, prestressed concrete tub girders, and steel plate girders.

I-25 over Abriendo Ave

Replace

The “Existing I-25 Alignment” crosses over Abriendo Avenue on an improved horizontal and vertical alignment. Existing bridge Structure L-18-AV carries Abriendo Ave (previously identified as Eldorado St) over I-25, is functionally obsolete (I-25 width) and has less than 25 years remaining life. The existing Abriendo Avenue bridge over I-25 must be replaced because the existing bridge can not conform to the improved I-25 horizontal and vertical alignment, and because the existing bridge has less than 25 years remaining life. The proposed bridge is located along the “Existing I-25 Alignment” alignment where profile grade is approximately 25’ below existing grade. The proposed bridge configuration consists of two spans and a total length of 253’. Span lengths of 140’ and 110’ are assumed. Pier and abutments are skewed to conform to the Abriendo Avenue alignment. The bridge carries multiple lanes for I-25. Bridge width (out-to-out) is 125’. Feasible structure types include variable-depth cast-in-place post-tensioned concrete box girder superstructure, prestressed concrete tub girders, and steel plate girders. Cast-in-place construction can be extremely economic for this bridge, given that the superstructure formwork can be supported directly on the ground after partial excavation of the site. Round columns can be cast-in-place with Sonotube using drilled shaft construction techniques. After casting of the superstructure is complete, the excavation can be completed beneath the structure for Abriendo Avenue.

UPRR over Abriendo

New Location

UPRR crosses over Abriendo Avenue at a new bridge location along the extension of Abriendo Ave. The double-track UPRR is located within a 6 degree horizontal curve and on a vertical grade down from south to north. The railroad is benched into a hillside, with a top width of approximately 70’ for the bench. Bridge width (out-to-out) is 36’, which carries two tracks and side safety walkways. The proposed bridge configuration consists of two spans and a total length of 200’. Span lengths of 98.5’ are assumed. Pier is located in the Abriendo Ave center median; piers and abutments are skewed to conform to the Abriendo Ave alignments. Assumed structure depth is 6’-8” plus 2’-0” for ballast, ties and rail, for the conceptual span configuration. Straight girders could be used on chords. Feasible structure types include prestressed concrete bulb-tee girders, prestressed concrete tub girders, and cast-in-place post-tensioned concrete box girders, and steel plate girders.

Santa Fe Avenue over Abriendo

New Location

Santa Fe Avenue crosses over Abriendo Ave at a new bridge location along the extension of Abriendo Ave. The bridge carries multiple lanes for Santa Fe Avenue. The northbound and southbound lanes are diverging, so the bridge width (out-to-out) varies from 80’ to 88’. The proposed bridge configuration consists of two spans and a total length of 200’. Span lengths of 109’ and 89’ are assumed. Pier is located in the Abriendo Ave center median; piers and abutments are skewed to conform to the Abriendo Ave alignments. Assumed structure depth is 6’-3” for the conceptual span configuration. Feasible structure types include prestressed concrete bulb-tee girders, prestressed concrete tub girders, and cast-in-place post-tensioned concrete box girders, and steel plate girders. Cast-in-place construction can be extremely economic for this bridge, given that the superstructure formwork can be supported directly on the ground after partial excavation of the site. Round columns can be cast-in-place with Sonotube using drilled shaft construction techniques. After casting of the superstructure is complete, the excavation can be completed beneath the structure for Abriendo Avenue.

UPRR over I-25**Replace**

The “Existing I-25 Alignment” crosses under UPRR on an improved horizontal and vertical alignment. Existing Structure L-18-AW carrying UPRR over I-25 must be replaced because the existing structure can not accommodate the wider I-25 main lanes, Ramp K and Ramp L, and because the existing bridge can not accommodate the improved I-25 horizontal and vertical alignment. The proposed UPRR bridge over I-25 is located east of the existing bridge. The UPRR contains a double-track configuration, which will be carried on the bridge. Bridge width (out-to-out) is 36’, which carries two tracks and side safety walkways. A four span structure is proposed for this location, with spans of 91’-11”, 78’-3”, 84’-4”, and 124’-11”. The proposed bridge configuration consists of four spans and a total length of 382’. Span lengths of 92’, 78’, 84’, and 125’ are assumed. Piers and abutments are skewed to conform to the I-25 alignment. Piers are located at the I-25 center median and between the Ramps and I-25. Assumed structure depth in Spans 1-3 is 6’-8” plus 2’-0” for ballast, ties and rail, for the conceptual span configuration. Assumed structure depth in Span 4 is 7’-10” plus 2’-0” for ballast, ties and rail, for the conceptual span configuration. Straight girders could be used on chords. Feasible structure types include prestressed concrete adjacent box girders are suitable for the span lengths of less than 100’, and steel plate girders, for the 125’ span.

Construction sequence that keeps the railroad operational during construction is necessary. Track windows can be negotiated with Union Pacific to allow for short-duration closures during critical construction periods. Phasing is complicated by the fact that the current I-25 alignment is immediately west (100’-0”) of the proposed I-25 alignment and the existing railway structure over I-25 is a four span, double-track steel through plate girder bridge with a packed-floorbeam/ballasted deck system. This precludes transverse phasing of the bridge construction in-place and also requires the existing structure to be considered in the overall phasing plan for the I-25 mainline construction and the UPRR structures over proposed I-25 and Abriendo Avenue. These elements form a complex construction sequence. One solution for construction phasing is to build a parallel offset alignment to one side while maintaining rail traffic on the existing alignment. The new structures and track can be built in-place on the offset alignment. The existing bridge over I-25 can be rolled transversely onto new substructure within a short-duration track closure and the rail connections completed. This option saves construction of a costly temporary structure.

I-25 over Arkansas River**Replace**

The “Existing I-25 Alignment” crosses over Arkansas River on an improved horizontal and vertical alignment. Existing parallel bridge Structures K-18-AV (NB) and K-18-AJ (SB) are functionally obsolete (I-25 width). The existing I-25 bridges over Arkansas River must be replaced because the existing bridges can not conform to the improved horizontal and vertical alignment. The proposed bridge configuration consists of two spans and a total length of 323’-0”. Equal span layouts of 160’-0” were assumed. The bridge carries multiple lanes for I-25. The bridge width varies from 156’-0 5/8” to 184’-11 1/2” due to merging ramps for northbound and southbound traffic. Abutments are skewed to conform to the Arkansas River flow direction. Assumed structure depth is 8’-0” for the conceptual span configuration. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, and steel plate girders.

US50 Business NB Santa Fe Ave NB over Arkansas River **Adequate**

US 50 Business Northbound, also designated Santa Fe Ave Northbound, crosses over Arkansas River on an existing bridge designated Structure K-18-FF. The existing northbound bridge was constructed in 1978, is in good condition, and has at least 25 years remaining life. The “Existing I-25 Alignment” does not change the horizontal or vertical alignment of US 50 Business Northbound, Santa Fe Ave

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Northbound, over the Arkansas River; the existing bridge conforms to the “Existing I-25 Alignment” configuration for US 50 Business Northbound, Santa Fe Ave Northbound. The existing bridge configuration consists of two 145’ spans and a total length of 295’. Bridge width (out-to-out) is 50’. Bridge width between the barriers is 36’. Pier and abutments are skewed to conform to the Arkansas River flow direction. Structure type is welded steel plate girders, continuous and composite.

US50 Business SB Santa Fe Ave SB over Arkansas River* **Replace*

US 50 Business Southbound, also designated Santa Fe Ave Southbound, crosses over Arkansas River on an existing bridge designated Structure K-18-R. The existing bridge is functionally obsolete (width), is structurally deficient, and has less than 25 years remaining life. The existing bridge must be replaced because the existing bridge is functionally obsolete, is structurally deficient, and has less than 25 years remaining life. The “Existing I-25 Alignment” does not change the horizontal or vertical alignment of US 50 Business Southbound, Santa Fe Ave Southbound, over the Arkansas River. The proposed bridge configuration consists of two spans and a total length of 299’. Conceptual span lengths of 149’ and 146’ were assumed. The bridge carries multiple lanes for US 50 Business Southbound, Santa Fe Ave SB, and a trail. Bridge width (out-to-out) is 50’. Bridge width between the barriers is 36’. Pier and abutments are skewed to conform to the Arkansas River flow direction. Assumed structure depth is 8’-0” for the conceptual span configuration. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, and steel plate girders.

I-25 over US50 Business Santa Fe Avenue* **Replace*

The “Existing I-25 Alignment” crosses over US 50 Business Santa Fe Ave on an improved horizontal and vertical alignment. Existing parallel bridge Structures K-18-AX (NB) and K-18-AY (SB) are functionally obsolete (I-25 width) and have less than 25 years remaining life. The existing I-25 bridges over US 50 Business Santa Fe Ave must be replaced because the existing bridges can not conform to the improved horizontal and vertical alignment, and because the existing bridges have less than 25 years remaining life. The proposed bridge configuration consists of four spans and a total length of 357’. Span lengths of 75’, 100’, 100’ and 75’ are assumed. Assumed structure depth is 5’-6” for the conceptual span configuration. Piers and abutments are skewed to conform to the US 50 Business Santa Fe Ave alignment, resulting in significant skew. The bridge carries multiple lanes for I-25. Bridge width (out-to-out) is 137’. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, and steel plate girders.

I-25 over Ilex Street* **Replace*

The “Existing I-25 Alignment” crosses over Ilex Street on an improved horizontal and vertical alignment. Existing parallel bridge Structures K-18-CK (NB) and K-18-CL (SB), also known as the south viaducts, are functionally obsolete (I-25 width) and have less than 25 years remaining life. The existing I-25 bridges over Ilex Street must be replaced because the existing bridges can not conform to the improved horizontal and vertical alignment, and because the existing bridges have less than 25 years remaining life. The proposed bridge configuration consists of two spans and a total length of 219’. Span lengths of 108’ and 108’ are assumed. Assumed structure depth is 6’-3” for the conceptual span configuration. Pier and abutments are skewed to conform to the Ilex Street alignment. The bridge carries multiple lanes for I-25. Bridge width (out-to-out) is 137’. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, and steel plate girders.

Locations more than 2000' north of Arkansas River

“Existing I-25 Alignment” and “Modified I-25 Alignment” more than 2000 feet north of the Arkansas River are in the same configuration. Therefore, the structures more than 2000 feet north of the Arkansas River are the same for the “Existing I-25 Alignment” and “Modified I-25 Alignment”. These structures are addressed later in this document the “Existing I-25 Alignment” alternative.

Modified I-25 Alignment south beginning to 2000' north of Arkansas River

The proposed alignment will require the construction of twenty-eight (28) bridge structures. Five of these bridges, within this modified alignment, were studied by Kirkham-Michael. The remaining twenty-three structures were studied by CH2MHILL. The structures are given below along with a description of each location.

Pueblo Blvd. Over I-25**Replace**

Pueblo Boulevard crosses over I-25 on existing bridge Structure L-18-BA that spans the current width of I-25, but can not span the proposed width of I-25. The existing Pueblo Boulevard bridge over I-25 must be replaced because the existing bridge can not span the width of the proposed I-25 main lanes and ramp merge lane. The proposed bridge configuration consists of two spans and a total length of 257.5'. Span lengths of 127' are assumed. Pier is located at the center of I-25; piers and abutments are not skewed, which conforms to the I-25 alignment. Bridge width (out-to-out) is 87'. The abutments are setback to clear the existing bridge abutments. Since the new bridge is considerably wider than the existing structure, it should be feasible to avoid foundation conflict with the existing structure by placing the new columns outside the limits of the existing bridge and minimize conflicts with the existing foundations. Assumed structure depth is 6'-3" for the conceptual span configuration. Feasible structure types include prestressed concrete bulb-tee girders, prestressed concrete tub girders, and cast-in-place post-tensioned concrete box girders, and steel plate girders.

I-25 over Indiana Ave**Replace**

The “Modified I-25 Alignment” crosses over Indiana Avenue on an improved horizontal and vertical alignment. Existing parallel bridge Structures L-18-M (NB) and L-18-W (SB) are functionally obsolete (I-25 width) and have less than 25 years remaining life. The existing I-25 bridges over Indiana Avenue must be replaced because the existing bridges can not conform to the improved horizontal and vertical alignment, and because the existing bridges have less than 25 years remaining life. The proposed bridge configuration consists of one span and a total length of 150'. The one-span configuration best accommodates the single-point interchange located below the bridge for Indiana Ave. Abutments have been located to provide an adequate approach sight triangle for vehicles traveling down the ramp terminals and entering the right turn lanes. Case II “Yield Control” of at-grade intersections (Chapter 9) of the AASHTO PGDHS applies and this should be thoroughly checked during preliminary design, and then verify the span length. The bridge carries multiple lanes for I-25. Bridge width (out-to-out) is 125'. Feasible structure types include precast prestressed concrete bulb-tee girders, prestressed concrete tub girders, cast-in-place post-tensioned concrete box girder, and steel plate girders.

I-25 over UPRR (1)**New Location**

The “Modified I-25 Alignment” crosses over Union Pacific Railroad (UPRR) at a new bridge location on an improved horizontal and vertical alignment. The bridge carries multiple lanes for I-25, including merging Ramp G and exiting Ramp H. The existing railroad corridor contains 7 tracks. Tracks 1 and 2 (numbered from west to east) are spurs serving the large business that will be affected by the new alignment. Tracks 3 and 4 are mainlines. Track 5 is a passing siding of approximately 6000' length. Track 6 is a spur that extends northward from the crossing and makes a 90 degree turn to the east immediately south of Northern Avenue. Track 7 is a short spur. Based on preliminary coordination with the Union Pacific Railway, it is assumed that tracks 1, 2, 5, and 7 will be removed and tracks 3, 4, and 6 will remain in service. Current railway lateral clearance requirements from centerline of track to bridge piers are 18'-0” minimum with a crashwall or “heavy” pier construction, and 25'-0” without a crashwall or “heavy” pier construction. Applying these lateral clearances to the tracks that are to remain in service produces two separate corridors, one 56.5' wide and the other 43' wide, separated by a 4' buffer that is suitable for pier placement. Due to the extreme skew of the alignment and the proposed height of the structure, abutments have been located radially to the alignment and setback an appropriate distance to provide a reasonable span balance and avoid end span uplift. Piers have been located within the 4' buffer to significantly reduce the maximum span length. The resulting structure is 1190'-0” along I-25 HCL, with span lengths varying for each girder line. For the column layout shown in the conceptual layout, a maximum span length of 205' is proposed. In cross section, the structure width varies considerably. South of the railroad corridor, the I-25 mainlane structure width is 125'-0” out-out and Ramps H and G vary in width from 38'-1 ½” to 32'-0”. Where the ramp structures merge with the mainlane structure, maximum width of the overall bridge is 182', which tapers down to the width of 149'. Feasible structure types include a spliced prestressed concrete bulb-tee girders, spliced prestressed concrete tub girders, steel plate girders, and steel box girders. For example, the steel box girder system with transverse framing can accommodate the pier placement and minimize the number of girder lines required for the structure. The transverse steel framing is only required at locations where the transverse deck spans become large, and could be eliminated by using a transversely post-tensioned deck system, with final determination made during the preliminary design phase for the structure. The steel box girder system eliminates the need for any falsework that would be necessary to build integral bent caps at pier locations adjacent to the railway corridors for any other type of construction. The non-skewed layout eliminates costly fabrication from the steel box girders.

I-25 over Bessemer Ditch**New Location**

The “Modified I-25 Alignment” crosses over Bessemer Ditch on an improved horizontal and vertical alignment. Existing Structure L-18-AS over Bessemer Ditch must be replaced because the existing structure can not conform to the improved horizontal and vertical alignment. The proposed structure is located along the horizontal alignment within a horizontal curve of 3000' radius. The proposed bridge configuration consists of one span and a total length of 142'. The one-span configuration best accommodates the Ditch and maintenance road. Since no hydraulic information is available for the Bessemer Ditch at this time, it is difficult to determine the required size of opening. Assumed structure depth is 7'-0” for the conceptual span configuration. The structure is skewed to conform to the Bessemer Ditch alignment. The structure carries multiple lanes for I-25. Bridge width (out-to-out) is 149'. Feasible structure types include precast prestressed concrete bulb-tee girders, prestressed concrete tub girders, cast-in-place post-tensioned concrete box girder, steel plate girders, and multi-cell concrete box culvert.

***Santa Fe Avenue (I-25 Existing) over Bessemer Ditch* Adequate**

Santa Fe Avenue over Bessemer Ditch is located where existing I-25 currently crosses Bessemer Ditch on Structure L-18-AS. The existing structure is in good condition and has at least 25 years remaining life. The existing structure conforms to the horizontal and vertical alignment of Santa Fe Avenue at the site, and provides adequate width. The existing structure is adequate to continue service for Santa Fe Avenue over Bessemer Ditch.

***UPRR over Bessemer Ditch* Adequate**

The “Modified I-25 Alignment” does not geometrically impact the existing Union Pacific Railroad (UPRR) bridge over Bessemer Ditch. The UPRR crosses over Bessemer Ditch on an existing timber bridge. The existing railroad structure over Bessemer Ditch is geometrically adequate since it is not geometrically impacted by the I-25 project.

***Northern Avenue over UPRR & Relocated Santa Fe Avenue* Replace**

The bridge configuration assumed for this location consists of five spans and a total length of 208'-9". Span layouts of 46'-0", 46'-0", 45'-6", 52'-3", and 16'-0" were chosen based on the railroad tracks as well as relocated Santa Fe Avenue passing underneath Northern Avenue. The bridge typical section consists of two 12'-0" lanes in the west direction, a 24'-0" median, five 12'-0" lanes in the east direction, and a 14'-6" curb/sidewalk section on each side. The total bridge width (out-to-out) is assumed at 140'-0" for spans one through four. For the fifth span, the bridge is assumed to vary from 140'-0" to 179'-4". The varying widths were placed to accommodate turning radii for the adjacent intersection. Due to the vertical profile design of Northern Avenue and the vertical clearance requirements of the railroad, a shallow superstructure height is required. A structure depth of 3'-0" is assumed for this location. Feasible structure types include rolled steel wide flange (I) girders, a cast-in-place post-tensioned concrete box girder, adjacent precast prestressed concrete box girders, and adjacent precast prestressed concrete voided slab girders. There will be zero skew on this bridge and the piers would be placed parallel with centerline of relocated Santa Fe Avenue. The location of this proposed structure is approximately in the same location as the existing Northern Avenue bridge over the railroad and existing I-25. Phasing concerns may arise in keeping Northern Avenue open but should be minimal. Since the bridge replacement is essentially in the same location, potential conflicts could exist in placing the new substructure on top of the existing substructure.

***Northern Avenue over I-25* New Location**

The bridge configuration assumed for this location consists of two spans and a total length of 175'-0". Two equal spans of 86'-0" are assumed. The bridge typical section consists of four 12'-0" lanes in each direction and a 14'-6" curb/sidewalk section on each side. The total bridge width (out-to-out) is assumed at 128'-0". There is sufficient vertical clearance at this location to allow the two-span configuration with reasonable structure depths. A structure depth of 5'-6" is assumed for this location. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, cast-in-place post-tensioned concrete box girders, and rolled steel wide flange (I) girders. There will be zero skew on this bridge and the pier would be placed in line with the centerline of I-25. The location of I-25 on this alignment alternative is east of the railroad and existing I-25. This location has no concerns with existing structures and would be considered new construction. Phasing concerns may arise in keeping Northern Avenue open but should be minimal.

Mesa Avenue over I-25, UPRR, & Santa Fe Avenue**Replace**

The bridge configuration assumed for this location consists of eight spans and a total length of 591'-9 7/8". Span layouts of 45'-0", 55'-0", 53'-0", 57'-0", 92'-9 5/8", 98'-0", 98'-0", and 90'-0" were chosen based on the railroad tracks as well as relocated Santa Fe Avenue passing underneath Mesa Avenue. The bridge typical section consists of a 12'-0" lane in each direction, a 12'-0" median, and a 14'-6" curb/sidewalk section on each side. The total bridge width (out-to-out) is assumed at 68'-0". Due to the vertical profile design of Mesa Avenue and the vertical clearance requirements of the railroad, a shallow superstructure height is required for the first four spans. A structure depth of 4'-0" is assumed for spans one through four. Feasible structure types include rolled steel wide flange (I) girders, a cast-in-place post-tensioned concrete box girder, adjacent precast prestressed concrete box girders, and adjacent precast prestressed concrete voided slab girders. Due to the width of I-25, a deeper structure depth is required to meet the standard span-to-depth ratios. A structure depth of 5'-6" is assumed for spans five through eight. Feasible structure types include prestressed concrete bulb-tee girders, prestressed concrete tub girders, and cast-in-place post-tensioned concrete box girders, and steel plate girders. There will be minimal skew on this bridge and the piers would be placed parallel with centerline of relocated Santa Fe Avenue, UPRR and I-25. The location of this proposed structure is approximately in the same location as the existing Mesa Avenue bridge over the railroad and existing I-25. Phasing concerns may arise in keeping Mesa Avenue open but should be minimal. Since the bridge replacement is essentially in the same location, potential conflicts could exist in placing the new substructure on top of the existing substructure.

I-25 over Santa Fe Drive**New Location**

A three-span bridge configuration is assumed for this location with a total length of 203'-0 1/2". Span layouts of 55'-0", 90'-0", and 55'-0" were assumed. The bridge typical section consists of three 12'-0" lanes and two 12'-0" shoulders each direction separated by a 2'-0" median barrier. Total bridge width (out-to-out) is assumed at 125'-0". There are no vertical clearance issues present to constrict the superstructure depth. A 4'-6" structure depth is assumed for this location. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, cast-in-place post-tensioned concrete box girders, and rolled steel wide flange (I) girders. There will be minimal skew on this bridge and the pier would be placed in line with the centerline of Santa Fe Drive. This location has no concerns with existing structures and would be considered new construction. Phasing concerns may arise in keeping Santa Fe Drive open.

Union Pacific Railroad over Santa Fe Drive**New Location**

The bridge configuration assumed for this location consists of two spans and a total length of 209'-9". Spans of 99'-6" and 106'-7 3/4" are assumed. The bridge typical section consists of two rail lines. Due to the bridge's location on a horizontal curve, the total bridge width (out-to-out) is assumed at 48'-0". There is sufficient vertical clearance at this location to allow the two-span configuration with reasonable structure depths. An 8'-6" structure depth is assumed at this location. Feasible structure types include structural steel plate girders and adjacent prestressed precast box girders. There will be moderate skew on this bridge and the pier would be placed in line with the centerline of Santa Fe Drive. This structure is located at a new unobstructed location so no phasing issues or existing structures should affect construction of this bridge. Potential issues do exist with construction of the new bridge and keeping the rail line open.

Union Pacific Railroad over relocated Santa Fe Avenue **Adequate**

The existing bridge at this location is in good shape. It is recommended this bridge continue to be utilized in its current configuration.

Relocated Santa Fe Avenue over Arkansas River **Adequate**

The existing bridge at this location is in decent shape. In an attempt to leave the city with a good bridge, bridge rehabilitation work needs to be done. Repainting of girders, new deck, and new bearings are the major items. We could also recommend shortening the bridge and place on new abutments in an attempt to increase the bridge's rating.

I-25 over Arkansas River **New Location**

The bridge configuration assumed for this location consists of five spans and a total length of 543'-0 1/2". Span layouts of 100'-0", 110'-0", 110'-0", 110'-0", and 110'-0" (from south to north) were assumed. The bridge typical section consists of 12'-0" exterior and interior shoulders as well as three 12'-0" lanes in each direction with a 2'-0" median barriers separating each direction. Total bridge width (out-to-out) is assumed to be 125'-0". The assumed layout places two piers in the Arkansas River. There are also pier locations located in the drainage channel into Runyon Lake. For the south end of the bridge, the abutment and pier locations will be skewed to match the flow line of the Arkansas River. Towards the north end of the bridge, the piers will be rotated so they are normal to the centerline of I-25. Pier locations need to be approved by the hydraulics engineer. Freeboard should not be an issue at this location and should allow reasonable structure depths. A 6'-3" structure depth is assumed at this location. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, and cast-in-place post-tensioned concrete box girders. The location of this bridge will be new construction and should not present any phasing issues. There is an existing pedestrian bridge in this location but should present any construction problems.

Ramp L over Arkansas River **New Location**

The bridge configuration assumed for this location consists of five spans and a total length of 498'-0 3/8". Span layouts of 100'-0", 100'-0", 95'-0", 100'-0", and 100'-0" are assumed. The bridge typical section consists of one 15'-0" lane with an 8'-0" exterior shoulder. The interior shoulder is 4'-0" with a 2'-0" offset to the barrier rail. Total bridge width (out-to-out) is assumed at 32'-0". A 5'-6" structure depth is assumed at this location. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, cast-in-place post-tensioned concrete box girders, and rolled steel wide flange (I) girders. The assumed layout places two piers in the Arkansas River. There are also pier locations located in the drainage channel into Runyon Lake. For the south end of the bridge, the abutment and pier locations will be skewed to match the flow line of the Arkansas river. Towards the north end of the bridge, the piers will be rotated so they are normal to the centerline of I-25. Pier locations need to be approved by the hydraulics engineer. Freeboard should not be an issue at this location and should allow reasonable structure depths.

Ramp K over Arkansas River**New Location**

The bridge configuration assumed for this location consists of six spans and a total length of 628'-1 3/4". Span layouts of 110'-0", 115'-0", 115'-0", 115'-0", 90'-0", and 80'-0" are assumed. The bridge typical section consists of one 15'-0" lane with an 8'-0" exterior shoulder. The interior shoulder is 4'-0" with a 2'-0" offset to the barrier rail. Total bridge width (out-to-out) is assumed at 32'-0". A 6'-3" structure depth is assumed at this location. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, cast-in-place post-tensioned concrete box girders, and rolled steel wide flange (I) girders. The assumed layout places two piers in the Arkansas River. There are also pier locations located in the drainage channel into Runyon Lake. For the south end of the bridge, the abutment and pier locations will be skewed to match the flow line of the Arkansas River. Towards the north end of the bridge, the piers will be rotated so they are normal to the centerline of I-25. Pier locations need to be approved by the hydraulics engineer. Freeboard should not be an issue at this location and should allow reasonable structure depths.

Stanton Avenue over Arkansas River**New Location**

A six-span bridge configuration is assumed for this location with a total length of 653'-1 1/4". Span layouts of 100'-0", 110'-0", 110'-0", 110'-0", 110'-0", and 110'-0" (from south to north) were assumed. The bridge typical section consists of a 12'-6" curb/sidewalk section and two 12'-0" lanes in each direction. Total bridge width (out-to-out) is assumed to be 76'-0". The assumed layout places two piers in the Arkansas River. There are also pier locations located in the drainage channel into Runyon Lake. For the south end of the bridge, the abutment and pier locations will be skewed to match the flow line of the Arkansas River. Towards the north end of the bridge, the piers will be rotated so they are normal to the centerline of Stanton Avenue. Pier locations need to be approved by the hydraulics engineer. Freeboard should not be an issue at this location and should allow reasonable structure depths. A 6'-3" structure depth is assumed at this location. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, and cast-in-place post-tensioned concrete box girders. The location of this bridge will be new construction and should not present any phasing issues.

Relocated Santa Fe Avenue over Locust Street**Replace**

The bridge configuration assumed for this location consists of three spans and a total length of 148'-0". Span layouts of 45'-0", 55'-0", and 45'-0" are assumed. The bridge typical section consists of two 12'-0" lanes in each direction separated by a 12'-0" median and 8'-0" exterior shoulders. Total bridge width (out-to-out) is assumed at 79'-0". A 4'-6" structure depth is assumed at this location. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, cast-in-place post-tensioned concrete box girders, and rolled steel wide flange (I) girders. There will be minimal skew on this bridge and the pier would be placed in line with the centerline of Locust Street. The location of this bridge will be new construction and should not present any phasing issues.

I-25 over Locust Street**New Location**

The bridge configuration assumed for this location consists of three spans and a total length of 168'-0". Three equal spans of 55'-0" are assumed. The bridge typical section consists of the standard mainline section and two varying width lanes/shoulders to accommodate the merging ramps. Total bridge width

(out-to-out) is assumed to vary from 183'-5 1/2" to 157'-6 7/8" (from south to north). There is sufficient vertical clearance at this location to allow the two-span configuration with reasonable structure depths. A 4'-6" structure depth is assumed at this location. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, cast-in-place post-tensioned concrete box girders, and rolled steel wide flange (I) girders. There will be minimal skew on this bridge and the pier would be placed in line with the centerline of Locust Street. The location of this bridge will be new construction and should not present any phasing issues.

I-25 over Stanton Avenue

Replace

A three-span bridge configuration is assumed for this location with a total length of 213'-6 3/4". Span layouts of 55'-0", 100'-0", and 55'-0" (from south to north) are assumed. The bridge typical section consists of three 12'-0" lanes with two 12'-0" shoulders in the southbound direction and four 12'-0" lanes with two 12'-0" shoulders in the northbound direction separated by a 2'-0" median barrier. Total bridge width (out-to-out) is assumed to be 137'-0". A 6'-3" structure depth is assumed at this location. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, and cast-in-place post-tensioned concrete box girders. Pier locations were chosen so there would be little or no conflict with the existing piers. This bridge configuration will have heavily skewed piers.

Existing I-25 Alignment and Modified I-25 Alignment 2000' north of Arkansas River to north ending

"Existing I-25 Alignment" and "Modified I-25 Alignment" more than 2000 feet north of the Arkansas River are in the same configuration. Therefore, the structures more than 2000 feet north of the Arkansas River are the same for the "Existing I-25 Alignment" and "Modified I-25 Alignment".

I-25 over Union Pacific Railroad (2)

Replace

A three-span bridge configuration is assumed for this location with a total length of 344'-0 1/2". Span layouts of 110'-0", 120'-0", and 110'-0" are assumed. The bridge typical section consists of three 12'-0" lanes with two 12'-0" shoulders in the southbound direction and four 12'-0" lanes with two 12'-0" shoulders in the northbound direction separated by a 2'-0" median barrier. Total bridge width (out-to-out) is assumed to be 137'-0". A 6'-3" structure depth is assumed at this location. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, and cast-in-place post-tensioned concrete box girders. Pier locations were chosen so there would be little or no conflict with the existing piers. This bridge configuration will have moderately skewed piers.

I-25 over Union Pacific Railroad (3)

Replace

The bridge configuration assumed for this location consists of three spans and a total length of 313'-3 3/4". Span layouts of 100'-0", 110'-0", and 100'-0" are assumed. The bridge typical section varies due to ramps for southbound traffic. The bridge typical section consists of four 12'-0" lanes with two 12'-0" shoulders in the northbound direction. For the southbound direction, the section consists of 12'-0" interior shoulders and 8'-0" exterior shoulders with three 12'-0" lanes and a 15'-0" ramp lane which merges with the exterior lane. The northbound and southbound lanes are separated with a 2'-0" median

barrier. Total bridge width (out-to-out) is assumed to vary approximately from 140'-9" to 157'-11 1/4". A 6'-3" structure depth is assumed at this location. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, and cast-in-place post-tensioned concrete box girders. Pier locations were chosen so there would be little or no conflict with the existing piers. This bridge configuration will have skewed piers.

I-25 over Kelly Avenue

Replace

The bridge configuration assumed for this location consists of three spans and a total length of 253'-5 1/2". Span layouts of 80'-0", 90'-0", and 80'-0" are assumed. The bridge typical section varies for the northbound traffic. The southbound section consists of 12'-0" exterior and interior shoulders with three 12'-0" lanes. The northbound lane configuration has a 12'-0" interior shoulder with three 12'-0" lanes and a varying width shoulder which separates the exit ramp. The northbound exit ramp typical sections consist of two 12'-0" lanes with a varying width interior shoulder and an 8'-0" exterior shoulder. Total bridge width (out-to-out) is assumed to vary approximately from 156'-8 1/4" to 169'-2". A 5'-6" structure depth is assumed at this location. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, and cast-in-place post-tensioned concrete box girders. Pier locations were chosen so there would be little or no conflict with the existing piers. This bridge configuration will have skewed piers.

Ramp S over Kelly Avenue

New Location

The bridge configuration assumed for this location consists of three spans and a total length of 273'-8 1/4". Equal span lengths of 90'-0" are assumed. The bridge typical section consists of 4'-0" interior and 8'-0" exterior shoulders. A 2'-0" offset area from the interior shoulder is also required due to CDOT design standards. Total bridge width (out-to-out) varies from 41'-0" to 34'-8 5/8". A 5'-6" structure depth is assumed at this location. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, and cast-in-place post-tensioned concrete box girders. Pier locations were chosen so there would be little or no conflict with the existing piers. This bridge configuration will have skewed piers.

I-25 over 1st Street

Replace

A three-span bridge configuration is assumed for this location with a total length of 203'-0". Span layouts of 59'-6", 81'-0", and 59'-6" are assumed. The bridge typical section consists of three 12'-0" lanes and two 12'-0" shoulders per direction separated by a 2'-0" median barrier. Total bridge width (out-to-out) is assumed at 125'-0". A 4'-6" structure depth is assumed at this location. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, cast-in-place post-tensioned concrete box girders, and rolled steel wide flange (I) girders. There will be minimal skew on this bridge and the pier would be placed in line with the centerline of 1st Street. The proposed I-25 alignment for this alternative is east of the existing I-25 which should present no phasing issues.

I-25 over SH 96 / 4th Street**Replace**

The bridge configuration assumed for this location consists of three spans and a total length of 217'-0". Span layouts of 59'-0", 96'-0", and 59'-0" are assumed. The bridge typical section consists of three 12'-0" lanes with two 12'-0" shoulders in the southbound direction and four 12'-0" lanes with two 12'-0" shoulders in the northbound direction separated by a 2'-0" median barrier. Total bridge width (out-to-out) is assumed at 137'-0". A 5'-6" structure depth is assumed at this location. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, cast-in-place post-tensioned concrete box girders, and rolled steel wide flange (I) girders. There will be minimal skew on this bridge and the pier would be placed in line with the centerline of 4th Street. The proposed I-25 alignment for this alternative is east of the existing I-25 which should present no phasing issues.

I-25 over 8th Street**New Location**

A three-span bridge configuration is assumed for this location with a total length of 202'-0". Span layouts of 52'-0", 95'-0", and 52'-0" are assumed. The bridge typical section consists of four 12'-0" lanes with two 12'-0" shoulders in the southbound direction and three 12'-0" lanes with two 12'-0" shoulders in the northbound direction separated by a 2'-0" median barrier. Total bridge width (out-to-out) is assumed at 137'-0". A 5'-6" structure depth is assumed at this location. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, cast-in-place post-tensioned concrete box girders, and rolled steel wide flange (I) girders. There will be minimal skew on this bridge and the pier would be placed in line with the centerline of 8th Street. The proposed I-25 alignment for this alternative is west of the existing I-25. Phasing issues may arise when trying to keep 8th Street open. 8th Street currently goes over I-25 but will be altered to go underneath new I-25.

8th Street over Union Pacific Railroad**Replace**

The bridge configuration assumed for this location consists of six spans and a total length of 357'-6 1/2". Equal span layouts of 70'-0" are assumed for the first five spans and a cantilevered sixth span of 6'-0". The bridge typical section consists of a 6'-6" curb/sidewalk section, a 2'-0" offset, and two 12'-0" lanes in each direction separated by a 12'-0" median. Total bridge width (out-to-out) is assumed at 80'-0". A 4'-6" structure depth is assumed at this location. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, and cast-in-place post-tensioned concrete box girders. Most of the piers will be skewed so they are in line with the railroad tracks. The last pier, closest to the existing concrete arch bridge, will be placed parallel with the existing abutment for an equal cantilevered length across the width of the new structure. The concrete arch bridge's width is only 58'-0". The new bridge maintains its 80'-0" width up to the tie in point with the existing bridge. A monument or guardrail object will have to be constructed on the new bridge to have safe pedestrian flow between new and old sidewalks.

I-25 over 13th Street**Replace**

A single-span bridge configuration is assumed for this location with a total length of 163'-1 3/4". A simple span of 160'-0" was assumed. The bridge typical section consists of three 12'-0" lanes with two 12'-0" shoulders in the each direction separated by a 2'-0" median barrier. Total bridge width (out-to-out) is assumed at 125'-0". An 8'-0" structure depth is assumed at this location. Feasible structure types

include cast-in-place post-tensioned box girders or precast prestressed tub girders. Due to the makeup of the existing bridge, the only phasing which will allow full traffic flow on the interstate is one which closes 13th Street.

US 50 B over I-25**Replace**

The bridge configuration chosen for this location consists of two spans and a total length of 163'-4 1/2". Equal span layouts of 80'-0" were assumed. The bridge typical section consists of a 12'-6" sidewalk/curb section with two 12'-0" lanes in the eastbound direction and two 12'-0" lanes with a 2'-6" exterior curb in the westbound direction separated by a 16'-0" median. Total bridge width (out-to-out) is assumed at 82'-0". A 5'-6" structure depth is assumed at this location. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, and cast-in-place post-tensioned concrete box girders. The pier will be skewed so it is in line with I-25. This location is in an unobstructed location. There should be no phasing concerns.

Frontage Road Access Ramp X over I-25**New Location**

A two-span bridge configuration was assumed for this location with a total length of 214'-1 3/4". Span layouts of 137'-0" and 74'-0" (from west to east) were assumed. The bridge typical section consists of a 15'-0" lane with a 4'-0" interior shoulder, a 2'-0" offset, and an 8'-0" exterior shoulder. Total bridge width (out-to-out) is assumed at 32'-0". A 7'-6" structure depth is assumed at this location. Feasible structure types include horizontally curved cast-in-place post-tensioned concrete box girders, horizontally curved steel plate girders, and horizontally curved steel box girders. The pier will be skewed so it is in line with I-25. This location is in an unobstructed location. There should be no phasing concerns.

US 50 B over Union Pacific Railroad**Replace**

The bridge configuration assumed for this location consists of a three spans and a total length of 189'-7 5/8". Span layouts of 50'-3", 85'-6", and 50'-3" (from west to east) were assumed. The bridge typical section consists of a 12'-6" sidewalk/curb section and three 12'-0" lanes in each direction separated by a 16'-0" median. The total bridge width (out-to-out) is assumed vary from 123'-9" to 127'-6". A 5'-6" structure depth is assumed at this location. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, and cast-in-place post-tensioned concrete box girders. The abutments will be skewed so they are in line with the railroad tracks. This location is in an unobstructed location. There should be no phasing concerns.

US 50 B over Fountain Creek**Replace**

A six-span bridge configuration was chosen for this location with a total length of 588'-6". Span layouts of 100'-0", 100'-0", 100'-0", 100'-0", 100'-0", and 85'-0" (from west to east) are assumed. The bridge typical section consists of a 12'-6" sidewalk/curb section and three 12'-0" lanes in each direction separated by a varying width median (16'-0" to 24'-10"). Due to the varying width median, the total

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bridge width (out-to-out) is assumed to vary from 116'-0" to 124'-10". A 5'-6" structure depth is assumed at this location. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, and cast-in-place post-tensioned concrete box girders. The abutments and piers will be placed parallel so they are in line with the general flow of Fountain Creek. Pier locations need to be approved by the hydraulics engineer. Freeboard should not be an issue at this location. The proposed bridge location is almost exactly in the same location as the existing. Phasing issues may arise due to this but should still allow two lanes of traffic to remain open (one lane each direction).

I-25 over 29th Street

Replace

The bridge configuration chosen for this location consists of two spans and a total length of 183'-1 3/4". Equal span layouts of 90'-0" were assumed. The bridge typical section consists of four 12'-0" lanes with two 12'-0" shoulders on each side in the northbound direction. The southbound consists of three 12'-0" lanes with two 12'-0" shoulders as well as a diverging ramp lane. The ramp lane has a 15'-0" lane with an 8'-0" exterior shoulder and a varying width interior shoulder. The northbound and southbound lanes are separated by a 2'-0" median barrier. Total bridge width (out-to-out) is assumed at 168'-0". A 5'-6" structure depth is assumed at this location. Feasible structure types include precast prestressed concrete bulb-tee girders, precast prestressed spread box girders, and cast-in-place post-tensioned concrete box girders. Phasing issues should not be a major concern.

Retaining Walls

Retaining Walls are required where insufficient width exists to fit an embankment slope at a roadway edge. Right-of-way lines or other physical constraints sometimes preclude an embankment slope. Adjacent roadways with different elevations also require a retaining wall to retain the difference in grade.

Generally, roadways supported on embankments are more efficient and less costly than roadways supported by retaining walls. Settlement of the embankment or retaining wall should be evaluated in the preliminary design and final design phase by involving a geotechnical investigation and foundation engineering.

The economics of bridge versus retained fill should be studied in preliminary design. Extremely tall MSE walls become more expensive than a bridge at some height. This height can be determined by preparation of a detailed cost comparison that incorporates the cost of the wall facing, retained fill, traffic railing, and pavement section. Unit prices for retained fill need to be raised to account for select backfill comprising a significant percentage of the total volume and also for short fill sections between multiple structures where conventional mass-earthwork equipment such as rubber-tired scrapers will have to be supplemented with front-end loaders or backhoes.

Feasible retaining wall types for Fill configurations include:

- mechanically stabilized earth (MSE) retaining walls
- reinforced concrete cantilever retaining walls

Feasible retaining wall types for Cut configurations include:

- mechanically stabilized earth (MSE) retaining walls
- reinforced concrete cantilever retaining walls
- soil nail or ground nail retaining walls

Retaining Wall type selection occurs during preliminary design for projects that have a build alternative selected.

Conceptual retaining wall locations are identified where retaining walls are required. **Appendix D includes the Conceptual Retaining Wall Plans.** The following table identifies the conceptual retaining walls:

RETAINING WALL STRUCTURES on I-25 ALIGNMENTS						
I-25 Alignment Sta.	Structure Location	Retain. Wall number on Existing I-25 Alignment	Retain. Wall number on Modified I-25 Alignment	Configuration Cut or Fill	Length (ft)	Exposed Height (ft)
465	I-25 SB	1	1	Fill	550 ft	0-3 ft
450	I-25 NB	2	2	Fill	1450 ft	0-28 ft
448	I-25 NB	3	3	Fill	850 ft	6-33 ft
449	I-25 SB	4	4	Fill	500 ft	3-14 ft

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RETAINING WALL STRUCTURES on I-25 ALIGNMENTS						
I-25 Alignment Sta.	Structure Location	Retain. Wall number on Existing I-25 Alignment	Retain. Wall number on Modified I-25 Alignment	Configuration Cut or Fill	Length (ft)	Exposed Height (ft)
435	Frontage Rd V	5	5	Fill	2400 ft	0-18 ft
434	I-25 SB	6	6	Fill	2550 ft	0-30 ft
421	Ramp X	7	7	Fill	250 ft	3-5 ft
419	Ramp X	8	8	Fill	150 ft	19-25 ft
418	Ramp X	9	9	Fill	150 ft	19-25 ft
413	US 50 B EB	10	10	Fill	200 ft	28-34 ft
406	US 50 B EB	10a	10a	Fill	200 ft	0-18 ft
392	I-25 SB	11	11	Fill	1650 ft	0-15 ft
390	I-25 NB	12	12	Fill	3500 ft	0-10 ft
380	I-25 NB	13	13	Fill	500 ft	3-17 ft
373	Frontage Rd Q	14	14	Fill	150 ft	3-4 ft
364	I-25 SB	15	15	Fill	400 ft	11-32 ft
362	8 th St	16	16	Fill	100 ft	23-29 ft
361	8 th St	17	17	Fill	150 ft	20-29 ft
358	Ramp R	18	18	Fill	600 ft	4-20 ft
356	Ramp R	19	19	Fill uphill	250 ft	0-15 ft
353	Ramp O	20	20	Cut/Fill	200 ft	1-6 ft
351	I-25 NB	21	21	Fill	400 ft	0-10 ft
344	I-25 NB	22	22	Fill	850 ft	17-20 ft
344	I-25 SB	23	23	Fill	850 ft	3-19 ft
343	Frontage Rd Q	24	24	Fill	650 ft	0-30 ft
338	1 st St	25	25	Fill	250 ft	0-2 ft
332	I-25 SB	E26	M26	Fill	400 ft	0-3 ft

CONCEPTUAL STRUCTURES REPORT

RETAINING WALL STRUCTURES on I-25 ALIGNMENTS						
I-25 Alignment Sta.	Structure Location	Retain. Wall number on Existing I-25 Alignment	Retain. Wall number on Modified I-25 Alignment	Configuration Cut or Fill	Length (ft)	Exposed Height (ft)
332	I-25 NB	E27	M27	Fill	850 ft	1-23 ft
324	Ramp S	E28	M28	Fill	550 ft	43-50 ft
316	I-25 NB	E29	M29	Fill	650 ft	16-19 ft
304	I-25 SB	-	M30	Fill	250 ft	13-30 ft
298	Santa Fe Ave SB	-	M31	Fill	750 ft	0-22 ft
298	Santa Fe Ave NB	-	M32	Fill	750 ft	0-21 ft
298	I-25 NB	-	M33	Fill	450 ft	0-9 ft
295	I-25 NB	E30	-	Fill	300 ft	8-12 ft
292	I-25 SB	E31	-	Fill	400 ft	2-20 ft
290	I-25 NB	E32	-	Fill	100 ft	13-19 ft
280	I-25 NB	E33	-	Fill	550 ft	3-13 ft
280	I-25 SB	E34	-	Fill	500 ft	1-11 ft
278	Stanton Ave	-	M34	Fill	250 ft	0-30 ft
275	Frontage Rd J	-	M35	Fill	800 ft	0-14 ft
272	Frontage Rd M	-	M36	Cut	950 ft	0-36 ft
272	Frontage Rd M	E35	-	Cut	1500 ft	0-50 ft
265	I-25 NB	E36	-	Fill	2050 ft	2-42 ft
260	Frontage Rd J	E36a	-	Cut	850 ft	0-12 ft
265	I-25 SB	E37	-	Fill	1850 ft	0-25 ft
258	UPRR	E38	-	Cut	700 ft	7-15 ft
258	Frontage Rd M	E39	-	Cut	850 ft	13-21 ft
262	Santa Fe Ave	-	M37	Cut	250 ft	3-4 ft
257	Frontage Rd M	-	M38	Cut	600 ft	5-23 ft

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RETAINING WALL STRUCTURES on I-25 ALIGNMENTS						
I-25 Alignment Sta.	Structure Location	Retain. Wall number on Existing I-25 Alignment	Retain. Wall number on Modified I-25 Alignment	Configuration Cut or Fill	Length (ft)	Exposed Height (ft)
250	I-25 NB	-	M39	Cut	650 ft	13-17 ft
250	I-25 SB	-	M40	Cut	650 ft	18-25 ft
250	Frontage Rd M	-	M41	Cut	600 ft	20-30 ft
250	UPRR	E40	-	Cut	750 ft	12-16 ft
250	Frontage Rd J	E41	-	Cut	700 ft	5-35 ft
250	I-25 NB	E42	-	Fill uphill	750 ft	2-27 ft
250	I-25 SB	E43	-	Fill uphill	750 ft	0-28 ft
253	Frontage Rd M	E44	-	Cut	250 ft	0-12 ft
241	Ramp J	E45	-	Fill	1050 ft	0-14 ft
242	I-25 NB	E46	-	Fill uphill	800 ft	0-27 ft
242	I-25 SB	E47	-	Fill uphill	750 ft	0-26 ft
244	Ramp M	E48	-	Fill	200 ft	17-24 ft
240	Ramp J	-	M42	Fill	2350 ft	0-32 ft
242	I-25 NB	-	M43	Fill uphill	750 ft	0-13 ft
242	I-25 SB	-	M44	Fill uphill	900 ft	0-32 ft
243	Ramp M	-	M45	Fill	500 ft	6-28 ft
222	I-25 SB	E49	-	Fill	50 ft	3-4 ft
221	I-25 SB	E50	-	Fill	50 ft	3-4 ft
216	I-25 NB	-	M46	Fill	1050 ft	0-32 ft
217	I-25 SB	-	M47	Fill	600 ft	23-30 ft
203	I-25 NB	-	M48	Fill	550 ft	2-25 ft
204	I-25 SB	-	M49	Fill	850 ft	0-26 ft
212	Ramp H	E51	-	Cut	1050 ft	0-17 ft

CONCEPTUAL STRUCTURES REPORT

RETAINING WALL STRUCTURES on I-25 ALIGNMENTS						
I-25 Alignment Sta.	Structure Location	Retain. Wall number on Existing I-25 Alignment	Retain. Wall number on Modified I-25 Alignment	Configuration Cut or Fill	Length (ft)	Exposed Height (ft)
206	I-25 NB	E52	-	Fill	1050 ft	0-20 ft
206	I-25 SB	E53	-	Fill	800 ft	0-15 ft
193	I-25 NB	-	M50	Fill	850 ft	0-24 ft
193	I-25 SB	-	M51	Fill	750 ft	0-25 ft
194	I-25 SB	E54	-	Fill	700 ft	0-11 ft
194	I-25 NB	E55	-	Fill	800 ft	0-23 ft
185	I-25 NB	E56	-	Fill	2150 ft	0-9 ft
185	I-25 NB	-	M52	Fill	2200 ft	0-10 ft
154	Ramp D	E57	M53	Fill	450 ft	5-7 ft

APPENDIX A

CONCEPTUAL STRUCTURES COST ESTIMATE

Modified I-25 Alignment Alternative : Conceptual Structures

I-25 Mile	Structure Location	Existing Structure Number	Existing Structure Widening, Rehab, Replacement	Bridge Length (feet)	Bridge Width (feet)	Bridge Area (ft2)	Estimated Unit Cost (\$/ ft ²)	Concept Cost (\$)
94.769	SH 45 Pueblo Blvd over I-25	L-18-BA	Remove	217	78.5	17,035	\$ 15	\$ 255,518
			Replace	257.5	87	22,403	\$ 90	\$ 2,016,225
95.901	I-25 over Indiana Avenue	L-18-M (NB)	Remove	126	34	4,284	\$ 15	\$ 64,260
		L-18-W (SB)	Remove	126	34	4,284	\$ 15	
			Replace	150	125	18,750	\$ 90	\$ 1,687,500
	I-25 over Union Pacific Railroad		New	1190	171.5	204,085	\$ 105	\$ 21,428,925
	I-25 over Bessemer Ditch		New	141.58	149	21,095	\$ 90	\$ 1,898,588
96.336	Santa Fe Avenue (Existing I-25) over Bessemer Ditch	L-18-AS	Remain	22	102.33	2,251	\$ -	\$ -
96.673	Central Ave over Existing I-25	L-18-CD	Remove	212	44.5	9,434	\$ 15	\$ 141,510
96.809	Northern Avenue over Existing I-25	L-18-AQ	Remove	298	56	16,688	\$ 15	\$ 250,320
	Northern Avenue over Union Pacific RR & Santa Fe Avenue		Replace	208.75	155.1	32,377	\$ 95	\$ 3,075,827
	Northern Avenue over I-25		New	175	128	22,400	\$ 95	\$ 2,128,000
96.947	Mesa Avenue over Existing I-25	L-18-AU	Remove	261	52	13,572	\$ 15	
	Mesa Avenue over Union Pacific RR & Santa Fe Avenue & I-25		Replace	591.82	68	40,244	\$ 95	\$ 3,823,157
97.447	Abriendo Ave over existing I-25	L-18-AV	Remove	206	62	12,772	\$ 15	\$ 191,580
	Union Pacific RR over US 50 Bus. Santa Fe Drive		New	209.75	48	10,068	\$ 100	\$ 1,006,800
	I-25 over US 50 Business Santa Fe Drive		New	203	125	25,375	\$ 85	\$ 2,156,875
97.529	Union Pacific RR over US 50 Bus. Santa Fe Avenue (existing I-25)	L-18-AW	Remain	184	32	5,888	\$ -	\$ -
			-	0	0	0	\$ -	\$ -
97.585	US 50 Business Santa Fe Avenue (existing I-25) over Arkansas River	K-18-AJ	Remain	335	88	29,480	\$ -	\$ -
			-	0	0	0	\$ -	\$ -

Modified I-25 Alignment Alternative : Conceptual Structures

I-25 Mile	Structure Location	Existing Structure Number	Existing Structure Widening, Rehab, Replacement	Bridge Length (feet)	Bridge Width (feet)	Bridge Area (ft2)	Estimated Unit Cost (\$/ ft ²)	Concept Cost (\$)
	Pedestrian (existing NB US 50 Business Santa Fe Avenue) over Arkansas River	K-18-FF	Remove or Pedestrian Use	296	48	14,208	\$ 15	\$ 213,120
	Existing SB US 50 Business Santa Fe Avenue over Arkansas River	K-18-R	Remove	286	41	11,726	\$ 40	\$ 469,040
	Ramp L over Arkansas River		New	498	32	15,936	\$ 85	\$ 1,354,560
	I-25 over Arkansas River		New	543	125	67,875	\$ 85	\$ 5,769,375
	Ramp K over Arkansas River		New	628.15	32	20,101	\$ 85	\$ 1,708,568
	Stanton Avenue over Arkansas River		New	653.1	76	49,636	\$ 85	\$ 4,219,026
	I-25 over Locust Street		New	168	170.45	28,636	\$ 85	\$ 2,434,026
97.691	Existing I-25 over US 50 Business / Santa Fe Avenue	K-18-AX (NB)	Remove	240	34	8,160	\$ 15	\$ 122,400
		K-18-AY (SB)	Remove	240	34	8,160	\$ 15	\$ 122,400
	US 50 Business Santa Fe Avenue over Locust St		Replace	148	79	11,692	\$ 85	\$ 993,820
97.909	I-25 over Stanton Avenue & Union Pacific RR	K-18-CK (NB)	Remove	1075	34	36,550	\$ 15	\$ 548,250
		K-18-CL (SB)	Remove	1075	34	36,550	\$ 15	\$ 548,250
	I-25 over Stanton Avenue		Replace	213.56	137	29,258	\$ 95	\$ 2,779,483
	I-25 over Union Pacific RR (2)		Replace	344	137	47,128	\$ 95	\$ 4,477,160
98.225	I-25 over Union Pacific RR & Kelly Avenue	K-18-CI (NB)	Remove	917	34	31,178	\$ 15	\$ 467,670
		K-18-CJ (SB)	Remove	972	34	33,048	\$ 15	\$ 495,720
	I-25 over Union Pacific RR (3)		Replace	313.31	149.29	46,774	\$ 95	\$ 4,443,535
	I-25 over Kelly Avenue		Replace	253.46	163.19	41,362	\$ 95	\$ 3,929,403
	Ramp S over Kelly Avenue		New	273.69	37.61	10,293	\$ 95	\$ 977,881
98.545	I-25 over 1st Street	K-18-CN (NB)	Remove	156	34	5,304	\$ 15	\$ 79,560
		K-18-CO (SB)	Remove	156	34	5,304	\$ 15	\$ 79,560
			Replace	203	125	25,375	\$ 85	\$ 2,156,875
98.742	I-25 over SH 96 4th Street	K-18-CR	Remove	166	140.5	23,323	\$ 15	\$ 349,845
			Replace	217	137	29,729	\$ 85	\$ 2,526,965
98.806	I-25 over 5th Street	K-18-CT	Remove	155	110.25	17,089	\$ 15	\$ 256,331
99.007	8th Street over Existing I-25, Union Pacific RR	K-18-BV	Remove	708	59.67	42,246	\$ 15	\$ 633,695

Modified I-25 Alignment Alternative : Conceptual Structures

I-25 Mile	Structure Location	Existing Structure Number	Existing Structure Widening, Rehab, Replacement	Bridge Length (feet)	Bridge Width (feet)	Bridge Area (ft2)	Estimated Unit Cost (\$/ ft ²)	Concept Cost (\$)
	8th Street over Union Pacific RR		Replace	357.54	80	28,603	\$ 95	\$ 2,717,304
	I-25 over 8th Street		New	202	137	27,674	\$ 85	\$ 2,352,290
99.334	I-25 over 13th Street	K-18-EN	Remove	140	86.5	12,110	\$ 15	\$ 181,650
			Replace	163.14	125	20,393	\$ 95	\$ 1,937,288
99.950	US 50 B over I-25	K-18-J	Remove	206	60	12,360	\$ 15	\$ 185,400
			Replace	163.38	82	13,397	\$ 90	\$ 1,205,744
	Ramp X over I-25		New	222.25	32	7,112	\$ 120	\$ 853,440
	US 50 B over Union Pacific RR	K-18-H	Remove	163	76.5	12,470	\$ 15	\$ 187,043
			Replace	189.64	127.10	24,103	\$ 95	\$ 2,289,808
	US 50 B over Fountain Creek	K-18-L	Remove	404	68	27,472	\$ 15	\$ 412,080
			Replace	588.5	117.64	69,231	\$ 90	\$ 6,230,803
100.681	I-25 over 29th Street	K-18-EA (NB)	Remove	155	34	5,270	\$ 15	\$ 79,050
		K-18-EB (SB)	Remove	155	34	5,270	\$ 15	\$ 79,050
			Replace	183.16	169.25	31,000	\$ 90	\$ 2,789,985

Summary of Bridge Impacts for Modified I-25 Alignment Alternative: Conceptual Structures

17	Bridge Replacements (with removing existing bridge)*
13	New Bridges
5	Bridge Removals (without bridge replacement)*
1	Remain
1	Adequate
<hr/>	
40	Total Bridges affected

Structures Subtotal Cost (3 signif. digits)	\$	103,800,000
20% Contingency (2 significant digits)	\$	20,800,000
Structures Total Cost	\$	124,600,000

* Parallel structures located at the same intersection were counted as one bridge.

Existing I-25 Alignment Alternative : Conceptual Structures

I-25 Mile	Structure Location	Existing Structure Number	Existing Structure Widening, Rehab, Replacement	Bridge Length (feet)	Bridge Width (feet)	Bridge Area (ft ²)	Estimated Unit Cost (\$/ ft ²)	Concept Cost (\$)
94.769	SH 45 Pueblo Blvd over I-25	L-18-BA	Remove	217	78.5	17,035	\$ 15	\$ 255,518
			Replace	257.5	87	22,403	\$ 90	\$ 2,016,225
95.901	I-25 over Indiana Avenue	L-18-M (NB)	Remove	126	34	4,284	\$ 15	\$ 64,260
		L-18-W (SB)	Remove	126	34	4,284	\$ 15	\$ 64,260
			Replace	220	125	27,500	\$ 90	\$ 2,475,000
96.336	I-25 over Bessemer Ditch	L-18-AS	Remove	22	102.33	2,251	\$ 15	\$ 33,769
			Replace	30	210	6,300	\$ 80	\$ 504,000
96.336	UPRR over Bessemer Ditch	L-18-?	Remove	22	67	1,474	\$ 15	\$ 22,110
			Replace	67.5	41.5	2,801	\$ 95	\$ 266,119
96.673	Central Ave over I-25	L-18-CD	Remove	212	44.5	9,434	\$ 15	\$ 141,510
96.809	Northern Avenue over I-25	L-18-AQ	Remove	298	56	16,688	\$ 15	\$ 250,320
			Replace	132.92	120	15,950	\$ 95	\$ 1,515,288
	Northern Avenue over Elm St.		New	90	120	10,800	\$ 90	\$ 972,000
	Northern Avenue over Union Pacific Railroad		New	74.58	120	8,950	\$ 90	\$ 805,464
96.947	Mesa Avenue over I-25 & Union Pacific Railroad	L-18-AU	Remove	261	52	13,572	\$ 15	\$ 203,580
			Replace	405	68	27,540	\$ 90	\$ 2,478,600
	Santa Fe Avenue over Abriendo		New	200	83.79	16,758	\$ 85	\$ 1,424,430
	Union Pacific Railroad over Abriendo Avenue		New	200	36	7,200	\$ 300	\$ 2,160,000
	I-25 over Abriendo Avenue		Replace	253	125	31,625	\$ 90	\$ 2,846,250
97.447	Abriendo Ave over I-25	L-18-AV	Remove	206	62	12,772	\$ 15	\$ 191,580
97.529	Union Pacific Railroad over I-25	L-18-AW	Remove	184	32	5,888	\$ 15	\$ 88,320
			Replace	382.5	36	13,770	\$ 300	\$ 4,131,000
	Union Pacific Railroad over I-25		Temporary	200	40	8,000	\$ 250	\$ 2,000,000
97.585	I-25 over Arkansas River	K-18-AJ	Remove	335	88	29,480	\$ 15	\$ 442,200
			Replace	323	168.53	54,435	\$ 95	\$ 5,171,343

Existing I-25 Alignment Alternative : Conceptual Structures

I-25 Mile	Structure Location	Existing Structure Number	Existing Structure Widening, Rehab, Replacement	Bridge Length (feet)	Bridge Width (feet)	Bridge Area (ft ²)	Estimated Unit Cost (\$/ ft ²)	Concept Cost (\$)
	NB US 50 B / Santa Fe Avenue over Arkansas River	K-18-FF	Remain	296	48	14,208	\$ -	\$ -
			New	299.33	50	14,967	\$ 95	\$ 1,421,818
	SB US 50 B / Santa Fe Avenue over Arkansas River	K-18-R	Remove	286	41	11,726	\$ 40	\$ 469,040
97.691	I-25 over US 50 Business / Santa Fe Avenue	K-18-AX (NB)	Remove	240	34	8,160	\$ 15	\$ 122,400
		K-18-AY (SB)	Remove	240	34	8,160	\$ 15	\$ 122,400
			Replace	357.17	137	48,932	\$ 90	\$ 4,403,906
97.909	I-25 over East D Street & Union Pacific Railroad	K-18-CK (NB)	Remove	1075	34	36,550	\$ 15	\$ 548,250
		K-18-CL (SB)	Remove	1075	34	36,550	\$ 15	\$ 548,250
	I-25 over Ilex Street		Replace	219.08	137	30,014	\$ 95	\$ 2,851,326
	I-25 over Union Pacific RR (2)		Replace	344	137	47,128	\$ 95	\$ 4,477,160
98.225	I-25 over Union Pacific Railroad & Kelly Avenue	K-18-CI (NB)	Remove	917	34	31,178	\$ 15	\$ 467,670
		K-18-CJ (SB)	Remove	972	34	33,048	\$ 15	\$ 495,720
	I-25 over Union Pacific RR (3)		Replace	313.31	149.29	46,774	\$ 95	\$ 4,443,535
	I-25 over Kelly Avenue		Replace	253.46	163.19	41,362	\$ 95	\$ 3,929,403
	Ramp S over Kelly Avenue		New	273.69	37.61	10,293	\$ 95	\$ 977,881
98.545	I-25 over 1st Street	K-18-CN (NB)	Remove	156	34	5,304	\$ 15	\$ 79,560
		K-18-CO (SB)	Remove	156	34	5,304	\$ 15	\$ 79,560
			Replace	203	125	25,375	\$ 85	\$ 2,156,875
98.742	I-25 over SH 96 4th Street	K-18-CR	Remove	166	140.5	23,323	\$ 15	\$ 349,845
			Replace	217	137	29,729	\$ 85	\$ 2,526,965
98.806	I-25 over 5th Street	K-18-CT	Remove	155	110.25	17,089	\$ 15	\$ 256,331
99.007	8th Street over Existing I-25, Union Pacific RR	K-18-BV	Remove	708	59.67	42,246	\$ 15	\$ 633,695
	8th Street over Union Pacific RR		Replace	357.54	80	28,603	\$ 95	\$ 2,717,304
	I-25 over 8th Street		New	202	137	27,674	\$ 85	\$ 2,352,290
99.334	I-25 over 13th Street	K-18-EN	Remove	140	86.5	12,110	\$ 15	\$ 181,650
			Replace	163.14	125	20,393	\$ 95	\$ 1,937,288

Existing I-25 Alignment Alternative : Conceptual Structures

I-25 Mile	Structure Location	Existing Structure Number	Existing Structure Widening, Rehab, Replacement	Bridge Length (feet)	Bridge Width (feet)	Bridge Area (ft2)	Estimated Unit Cost (\$/ ft ²)	Concept Cost (\$)
99.950	US 50 B over I-25	K-18-J	Remove	206	60	12,360	\$ 15	\$ 185,400
			Replace	163.38	82	13,397	\$ 90	\$ 1,205,744
	Ramp X over I-25		New	222.25	32	7,112	\$ 120	\$ 853,440
	US 50 B over Union Pacific RR	K-18-H	Remove	163	76.5	12,470	\$ 15	\$ 187,043
			Replace	189.64	127.10	24,103	\$ 95	\$ 2,289,808
	US 50 B over Fountain Creek	K-18-L	Remove	404	68	27,472	\$ 15	\$ 412,080
			Replace	588.5	117.64	69,231	\$ 90	\$ 6,230,803
100.681	I-25 over 29th Street	K-18-EA (NB)	Remove	155	34	5,270	\$ 15	\$ 79,050
			Remove	155	34	5,270	\$ 15	\$ 79,050
			Replace	183.16	169.25	31,000	\$ 90	\$ 2,789,985

Summary of Bridge Impacts for Existing I-25 Alignment Alternative: Conceptual Structures

- 23 Bridge Replacements (with removing existing bridge)***
- 7 New Bridges**
- 3 Bridge Removals (without bridge replacement)***
- 1 Remain**
- 1 Adequate**

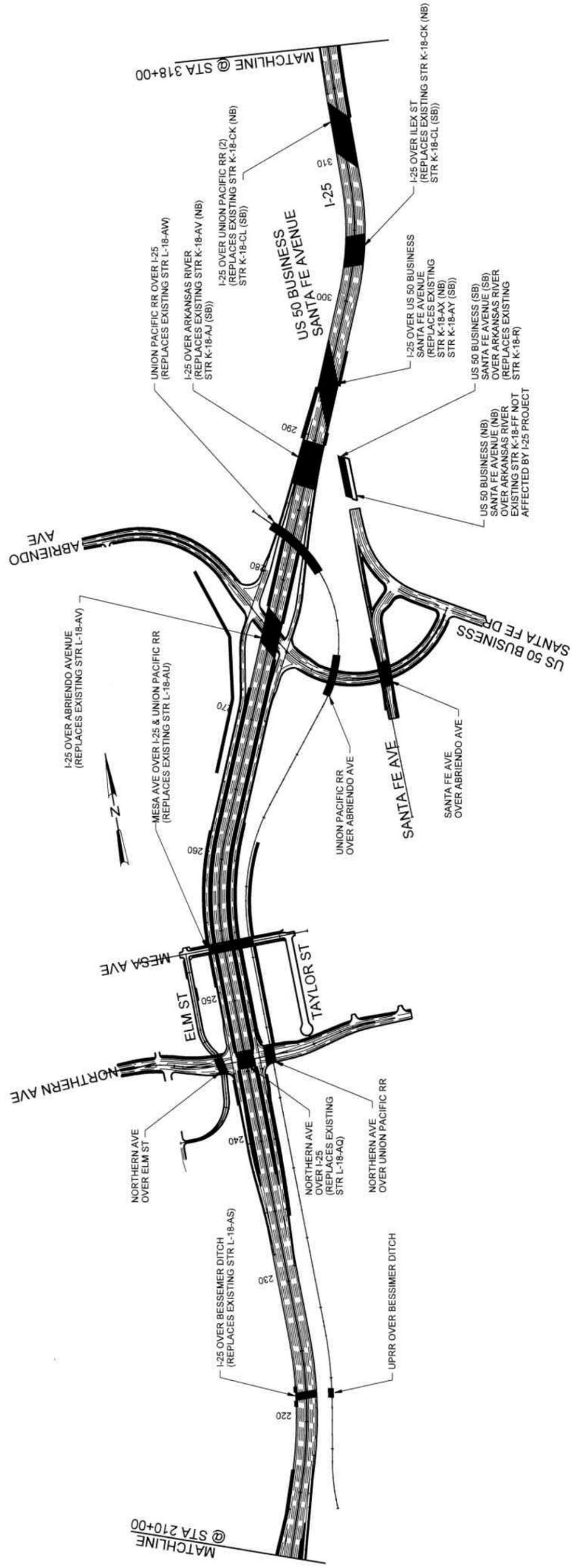
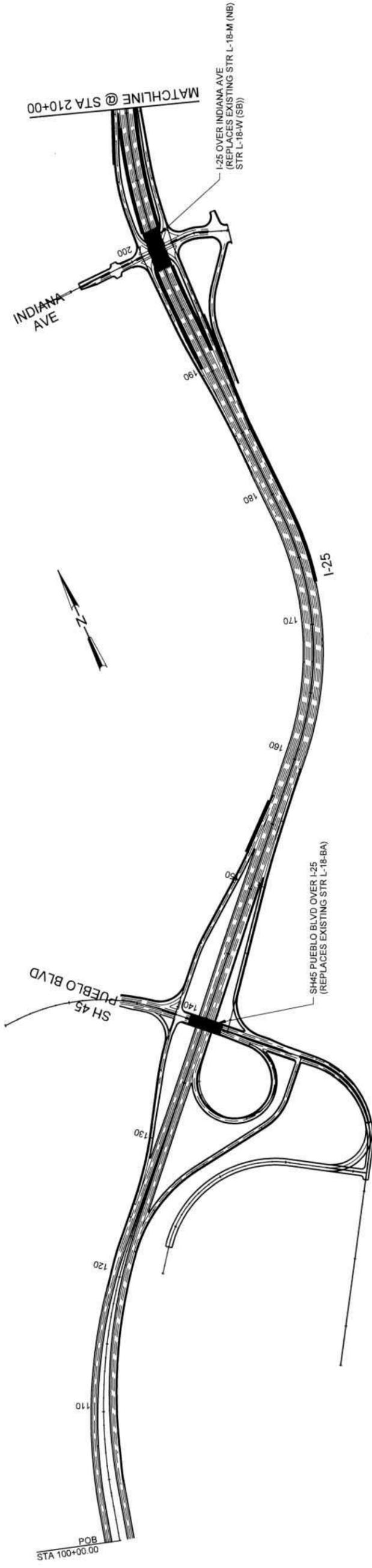
35 Total Bridges affected

Structures Subtotal Cost (3 signif. digits)	\$	83,400,000
20% Contingency (2 significant digits)	\$	16,700,000
Structures Total Cost	\$	100,100,000

* Parallel structures located at the same intersection were counted as one bridge.

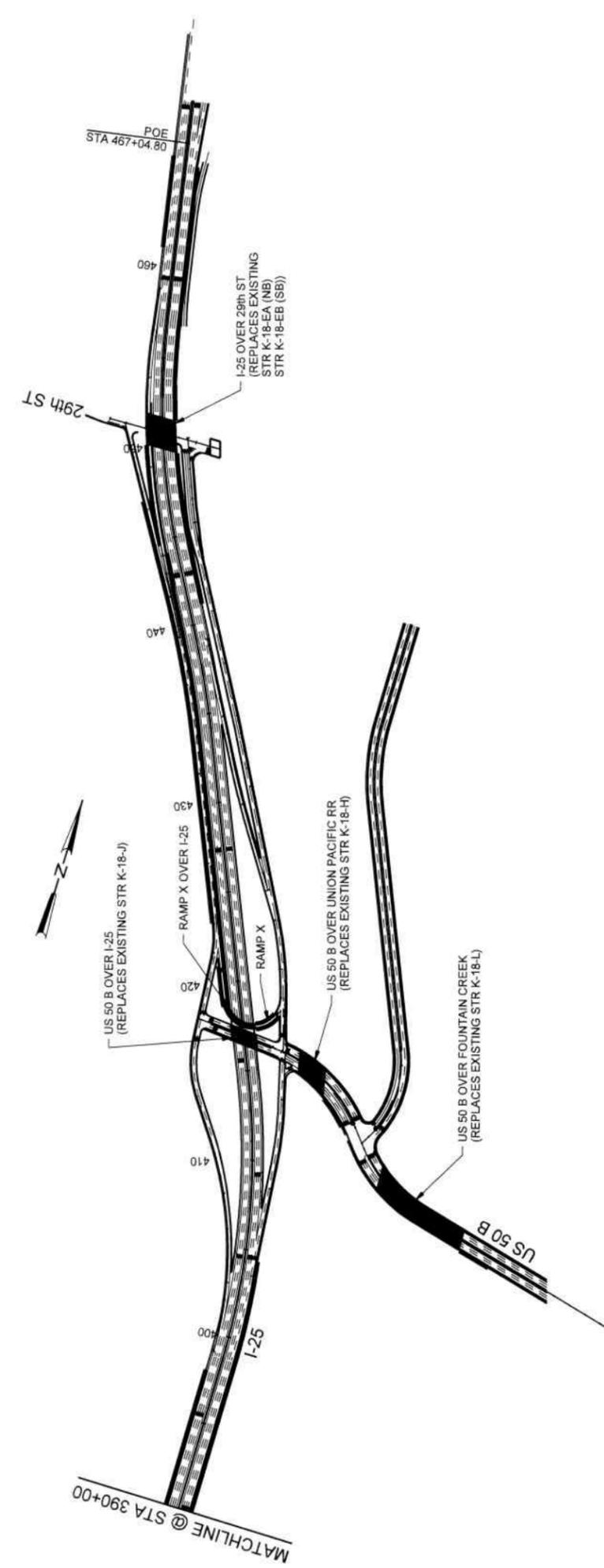
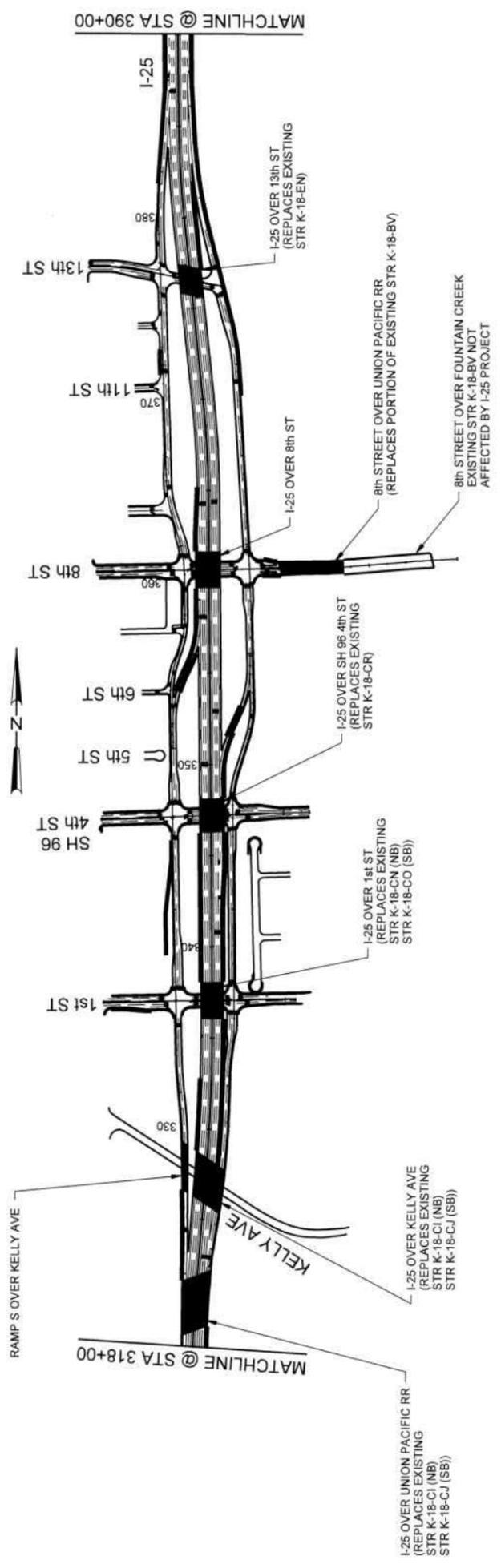
APPENDIX B

EXISTING I-25 ALIGNMENT ALTERNATIVE CONCEPTUAL LAYOUT DRAWINGS

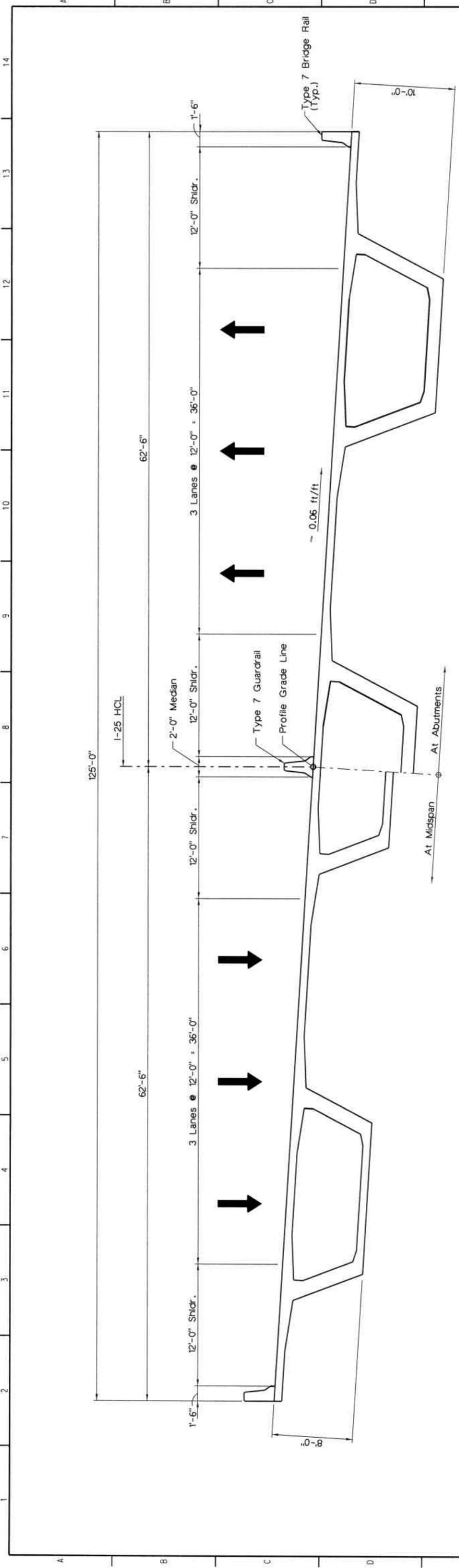


the New Pueblo Freeway

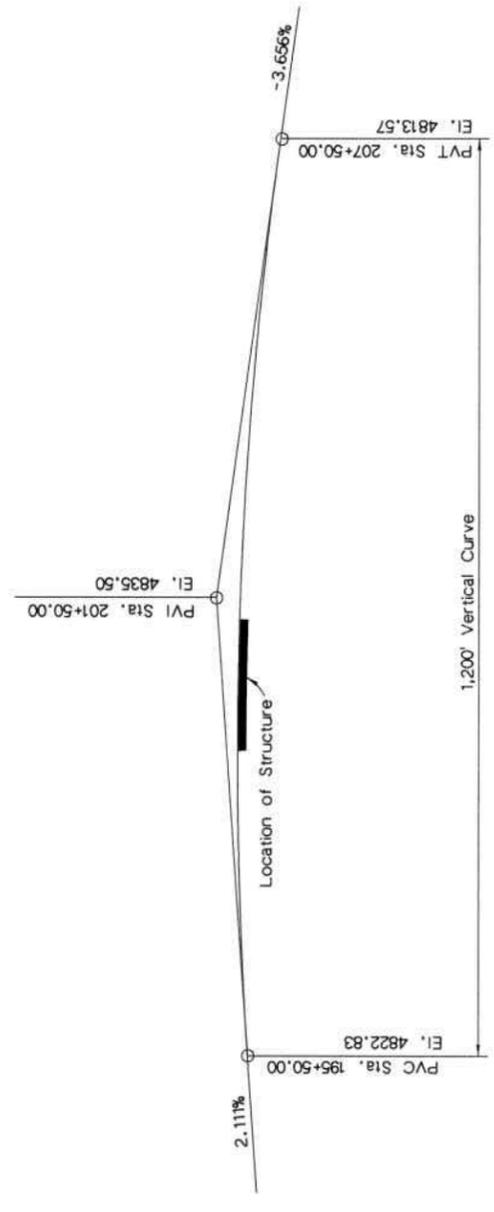
EXISTING I-25 ALIGNMENT ALTERNATIVE: BRIDGES



EXISTING I-25 ALIGNMENT ALTERNATIVE: BRIDGES



TYPICAL SECTION



PROFILE GRADE

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Revision Dates (Preliminary Stage Only)	

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COLORADO DEPARTMENT OF TRANSPORTATION
REGION 2

KIRKHAM & MICHAEL
CONSULTING ENGINEERS

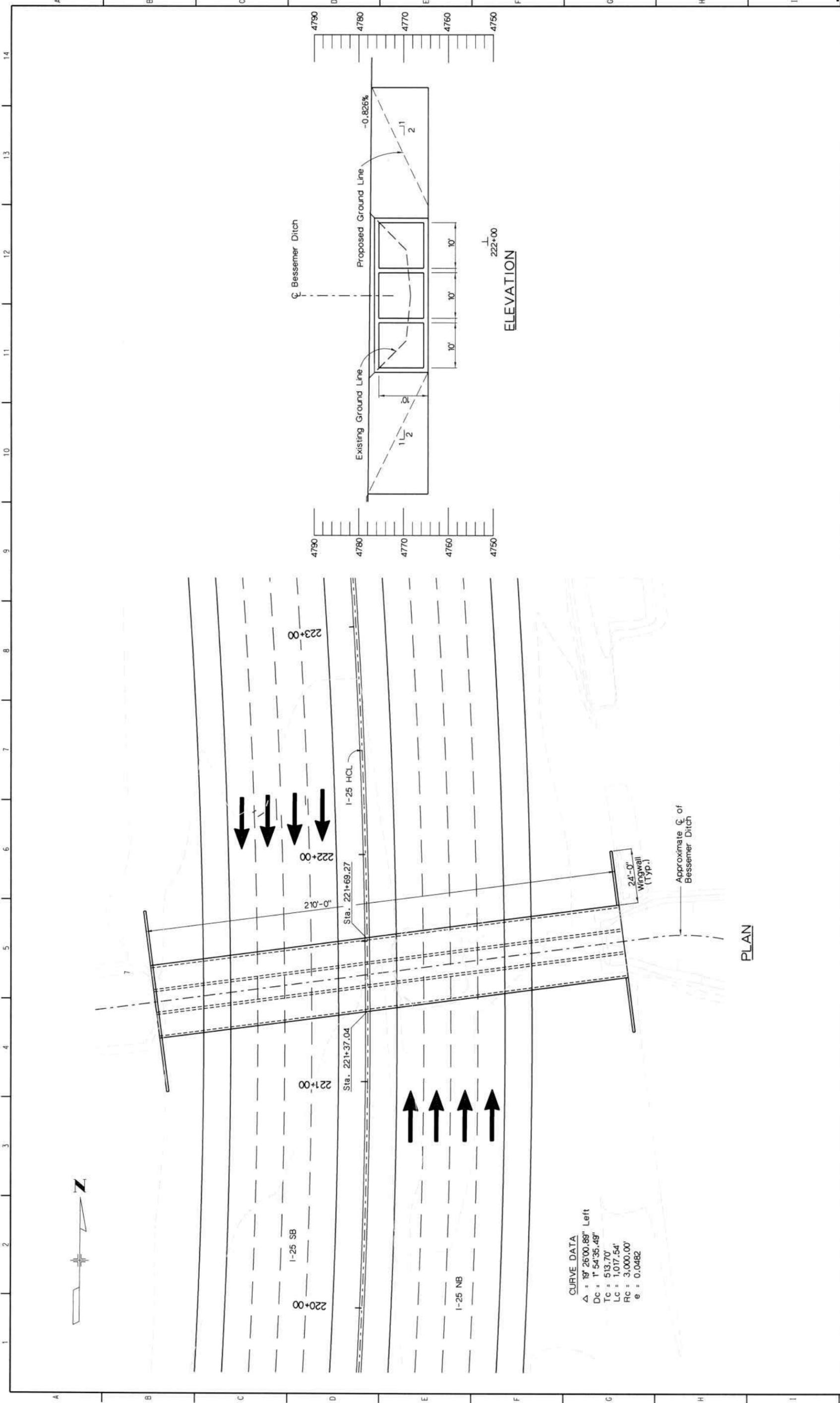
5600 South Quebec Street
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Greenwood Village, Co. 80111
Phone: 303-694-2300

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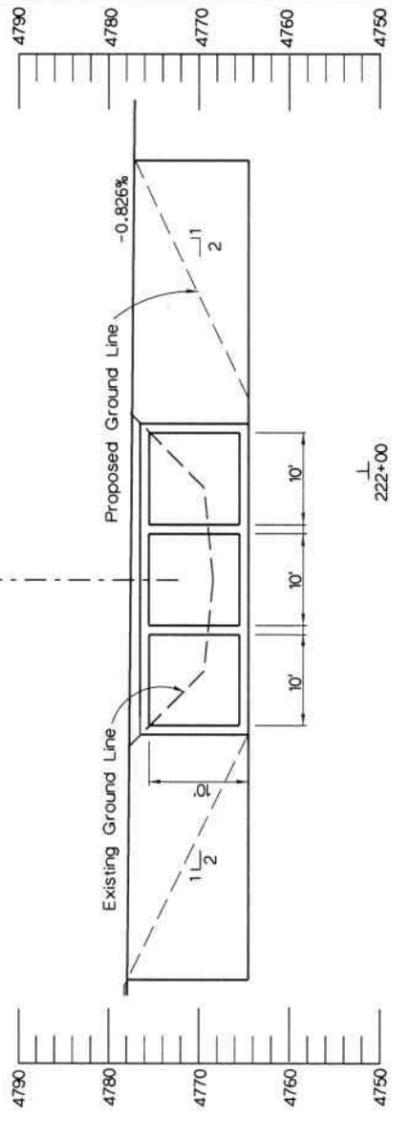
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Detailer: K. Saindon	Subset Sheets:
Sheet Subsets:	Sheet Number

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ELEVATION



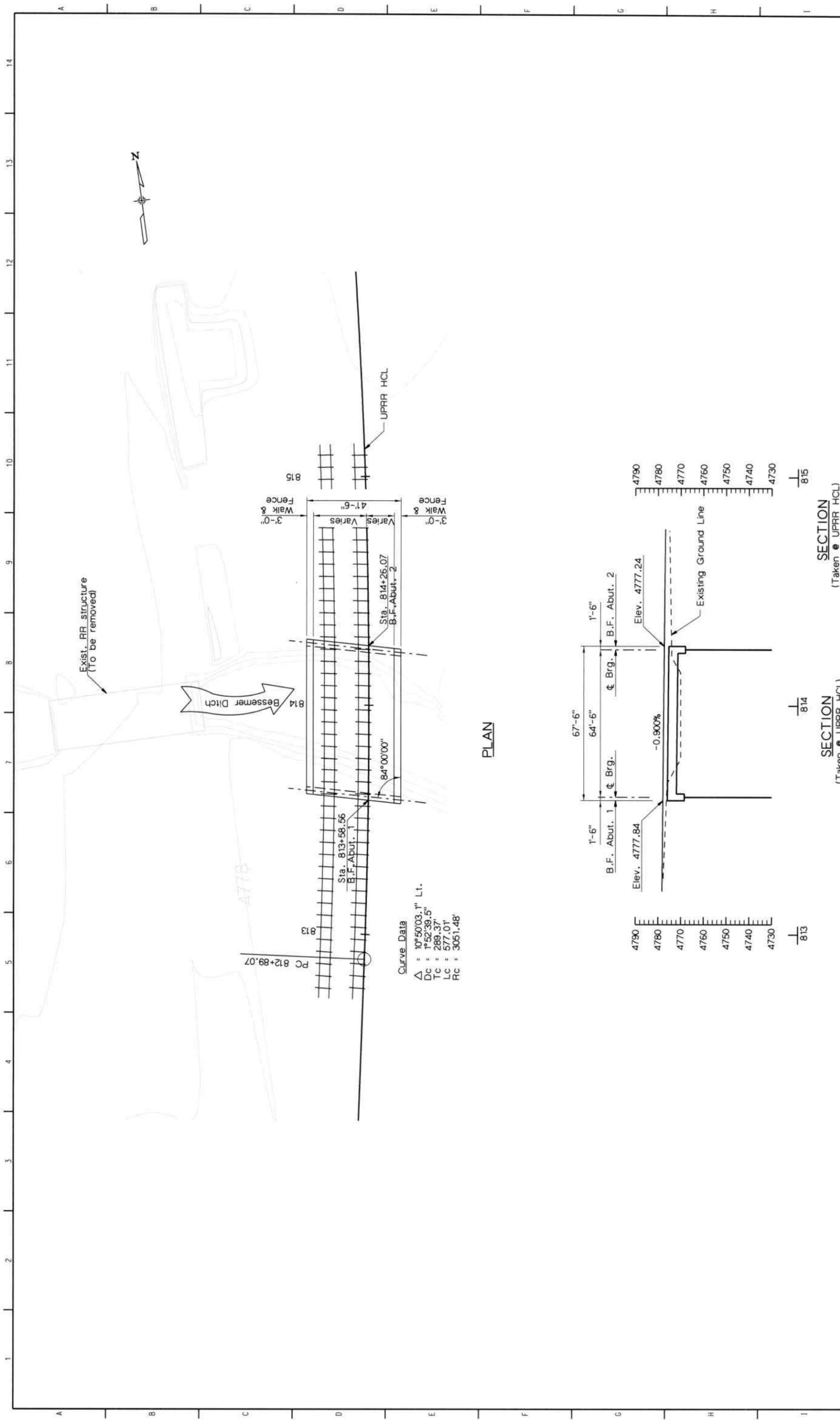
PLAN



CURVE DATA
 $\Delta = 19^\circ 26'00.88''$ Left
 $Dc = 1' 54'35.49''$
 $Tc = 513.70'$
 $Lc = 1,017.54'$
 $Rc = 3,000.00'$
 $e = 0.0482$

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Drawing File Name:						Designer: K. Saindon Detailer: P. Haas	Structure Numbers
Acad Ver.	Scale:	Units:	English			Sheet Subset:	Sheet Number



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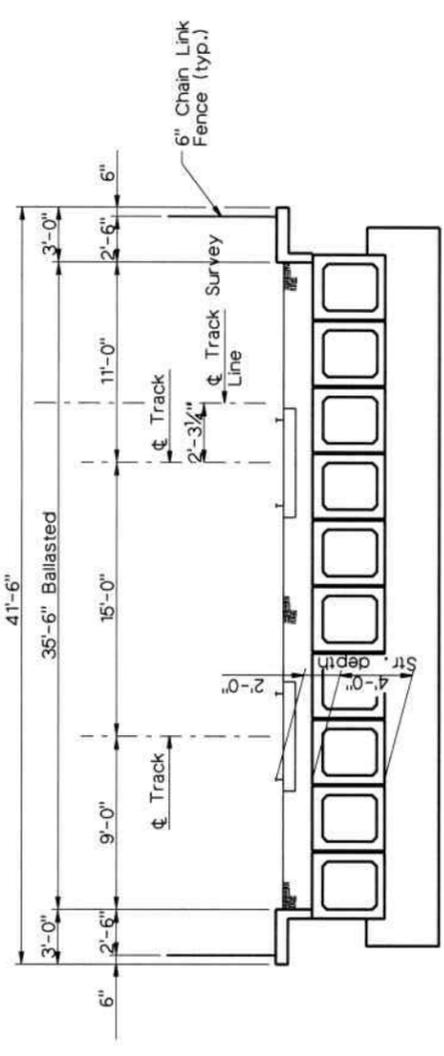
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The New Pueblo Freeway
 COLORADO DEPARTMENT OF TRANSPORTATION
 REGION 2

UPRR OVER BESSEMER DITCH	UPRR HCL	UPRR HCL
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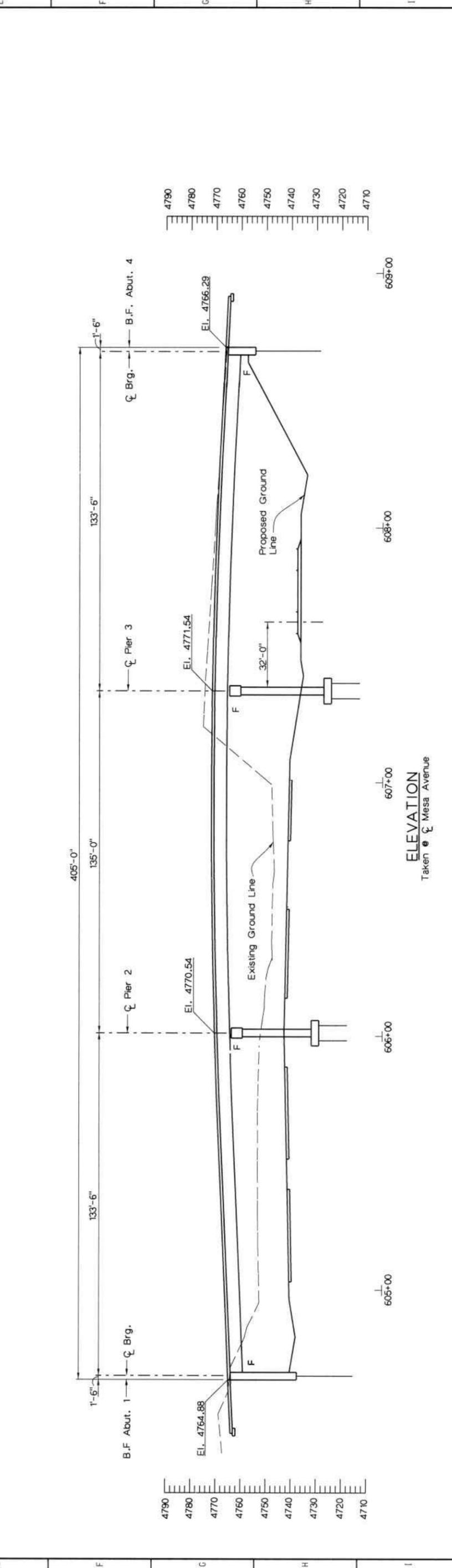
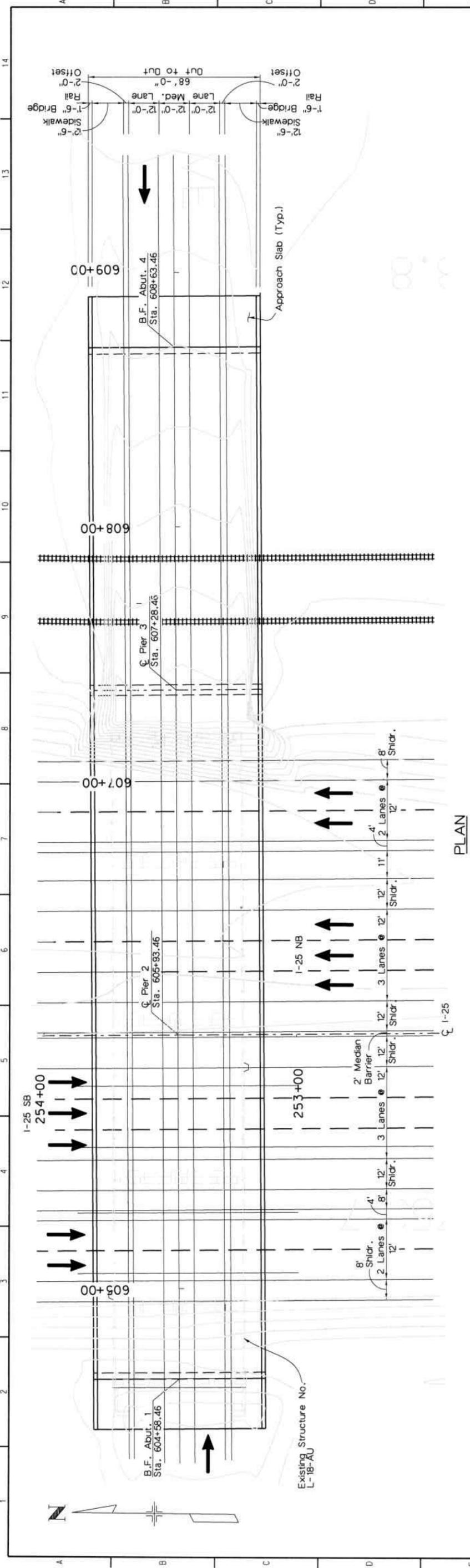
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TYPICAL SECTION

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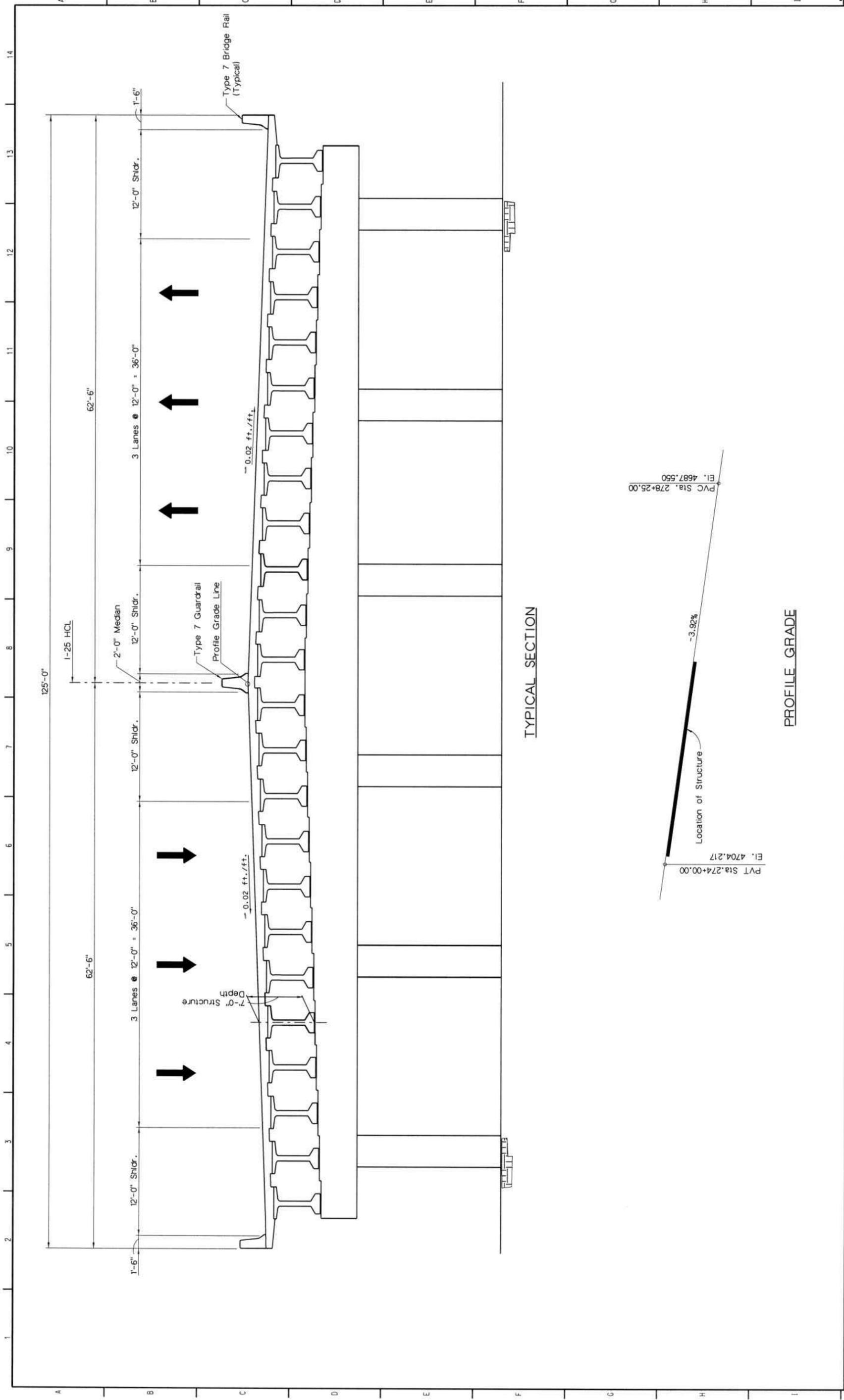
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Revision Dates	(Preliminary Stage Only)

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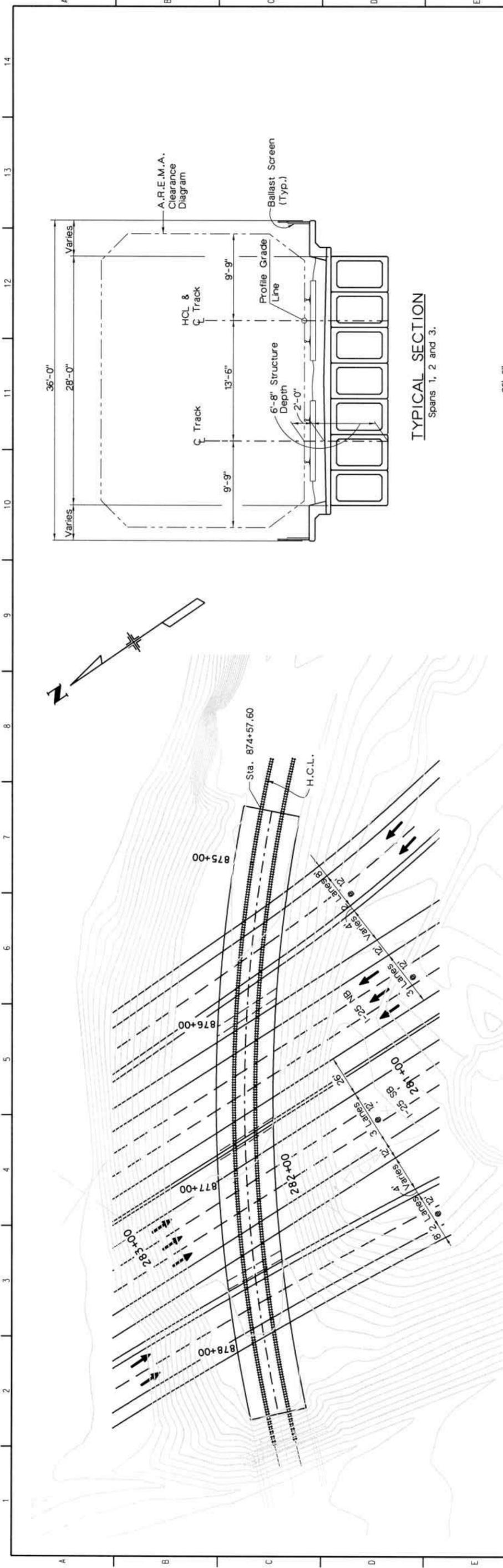
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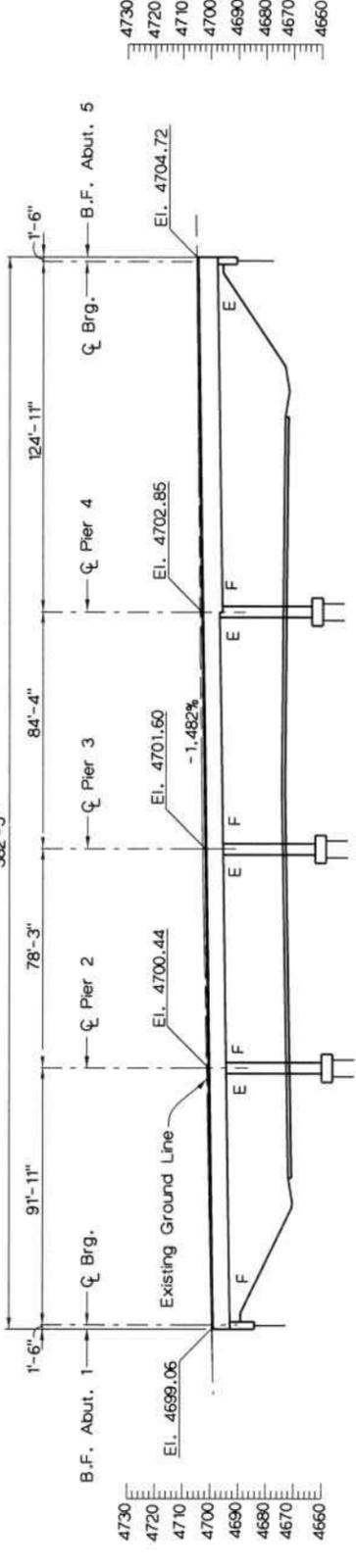
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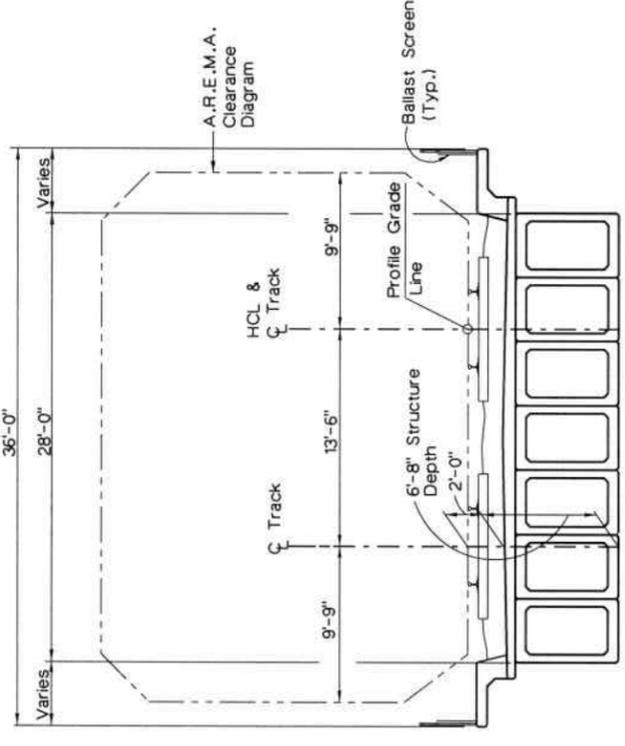
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The New Pueblo Freeway I-25 over ABRRIENDO AVENUE EXISTING I-25 ALIGNMENT		Project No./Code																					
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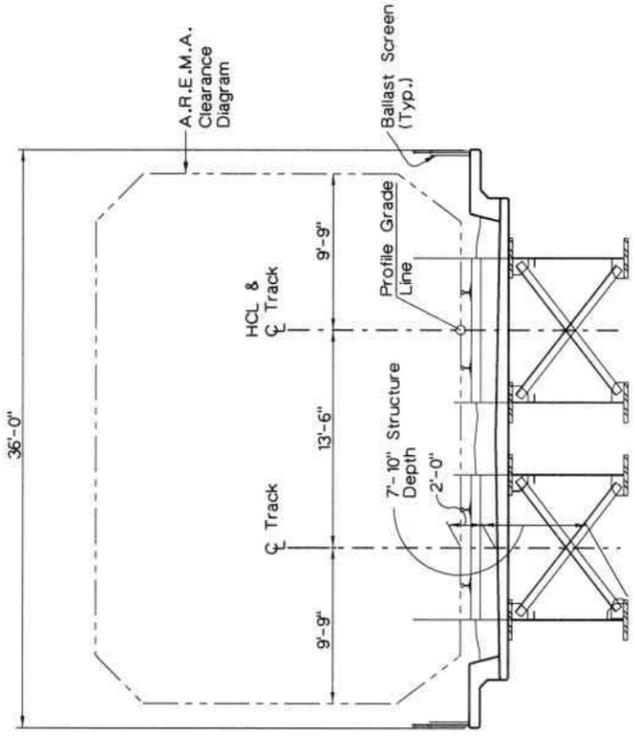
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ELEVATION
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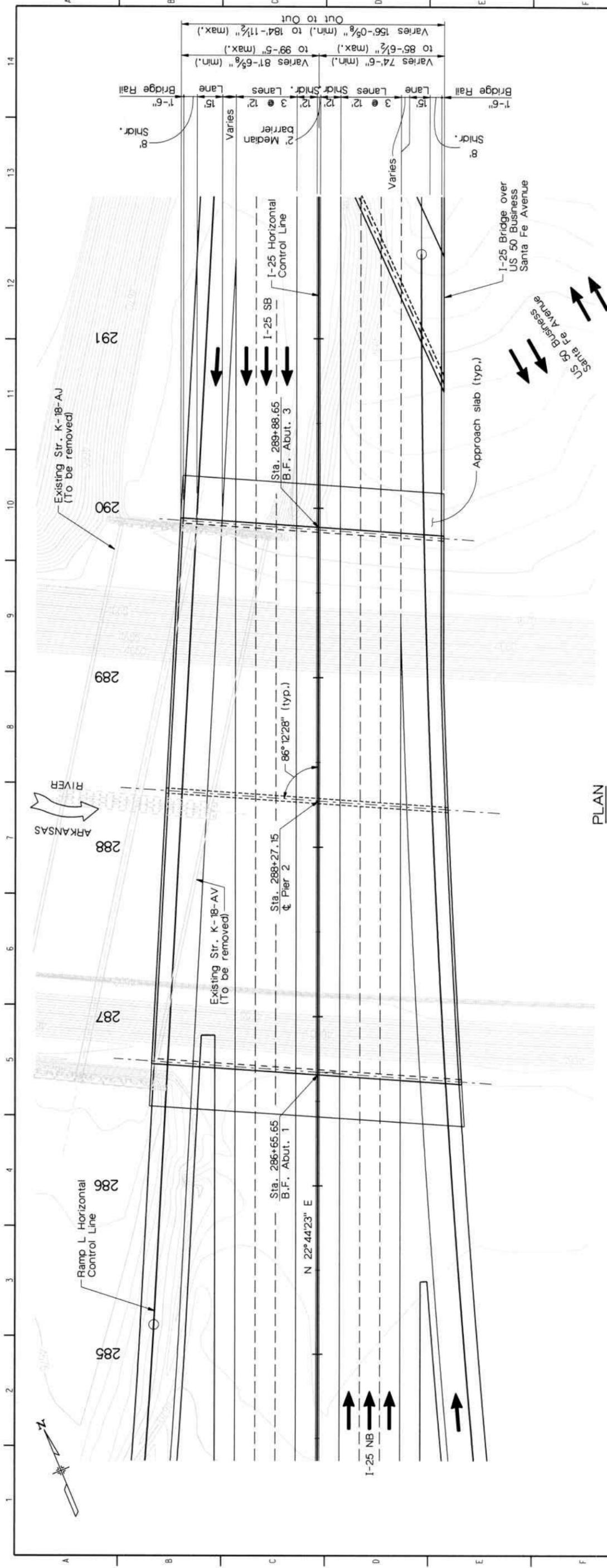


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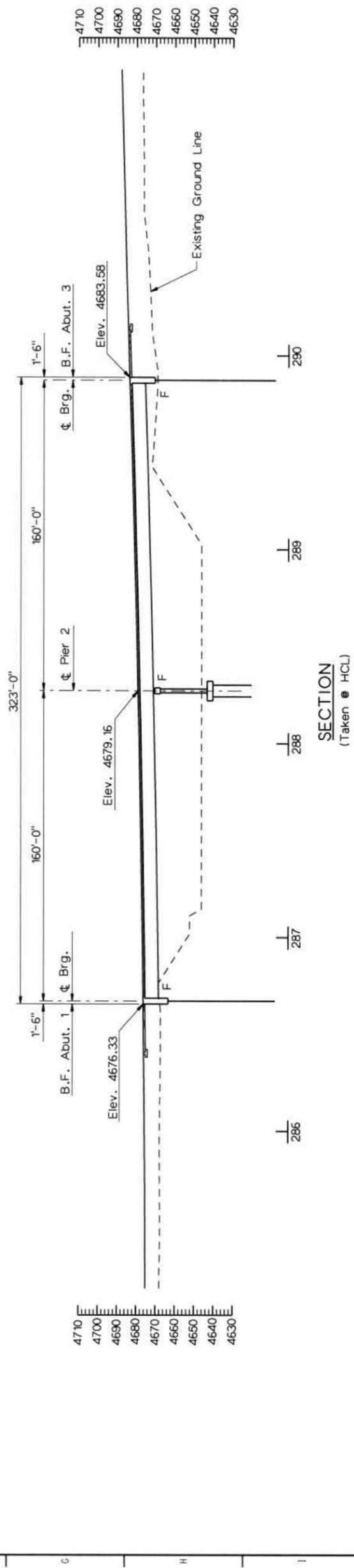
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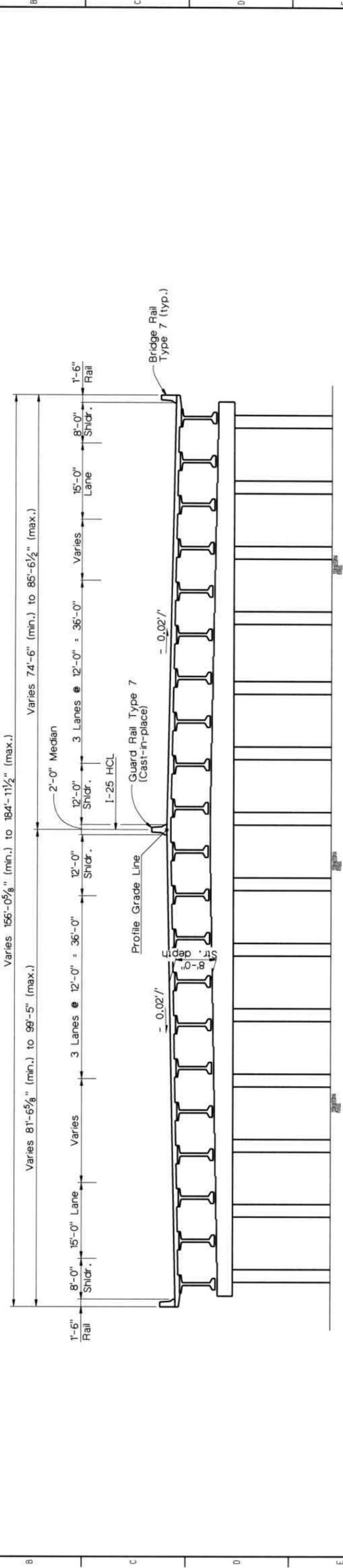
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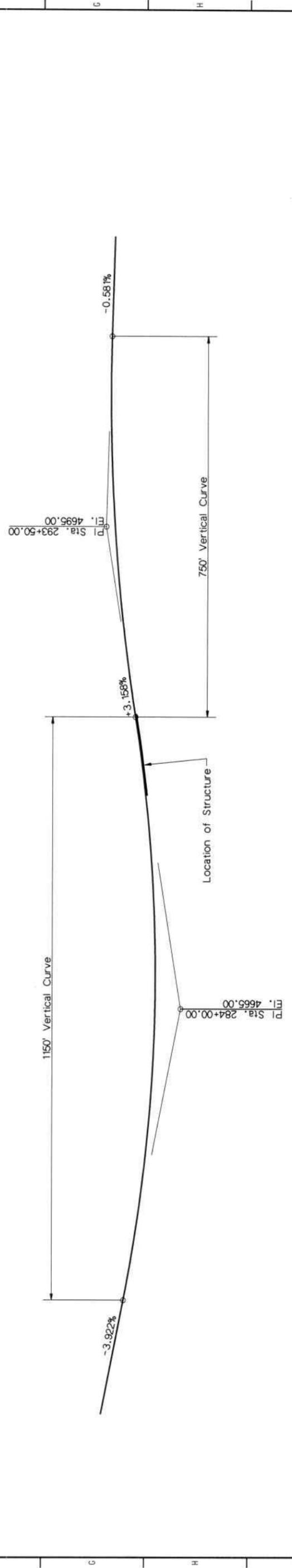
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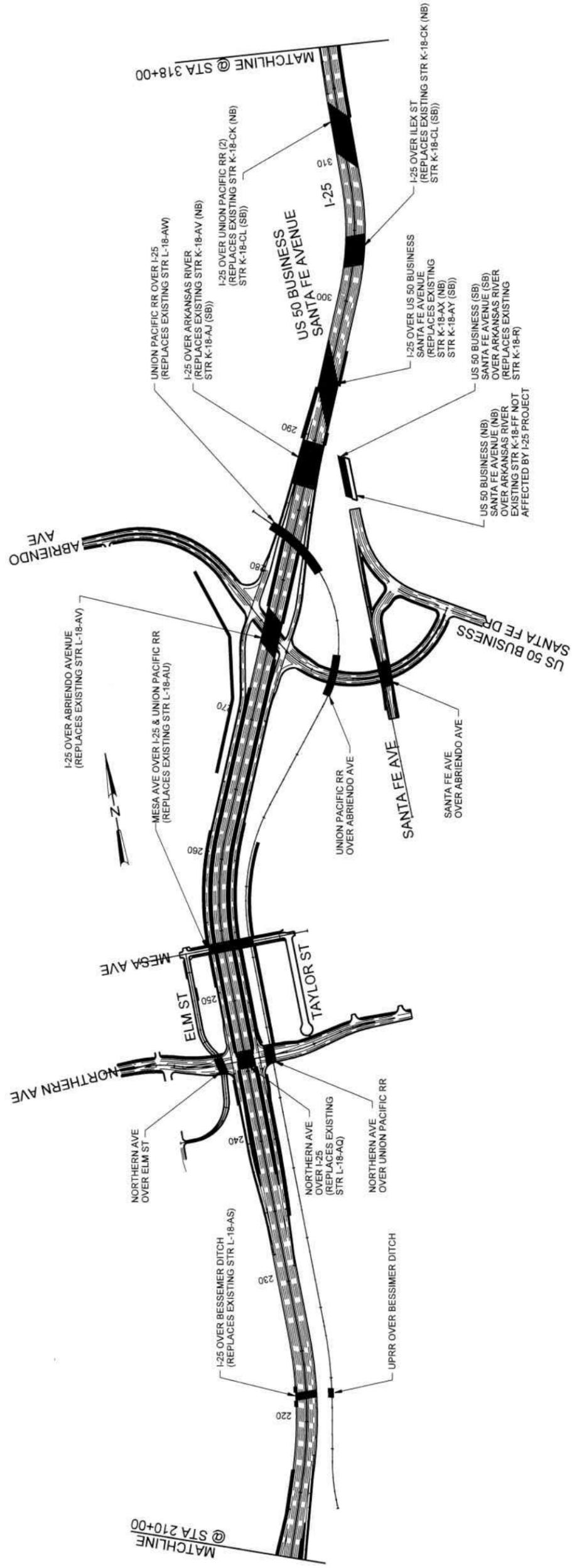
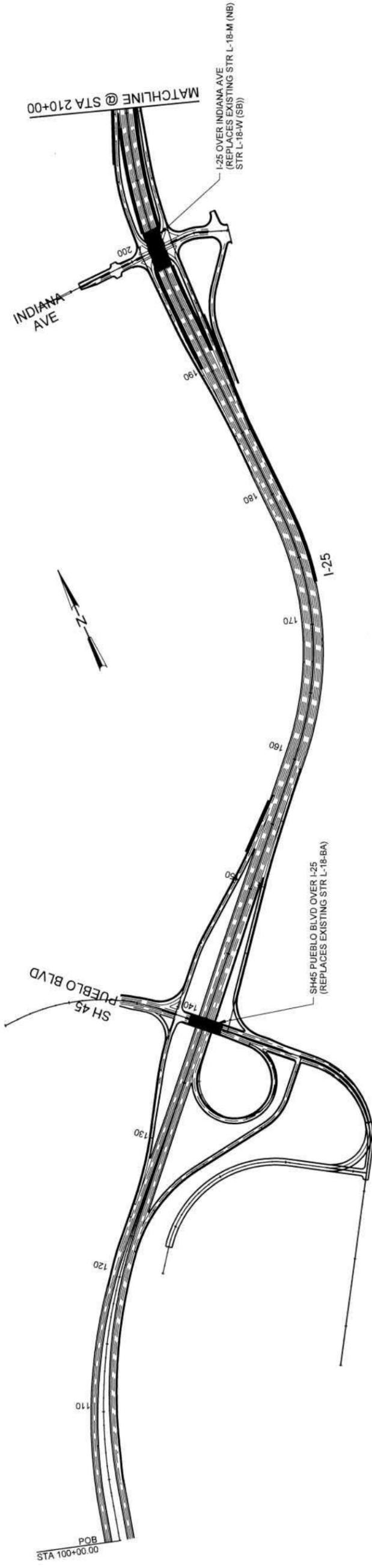


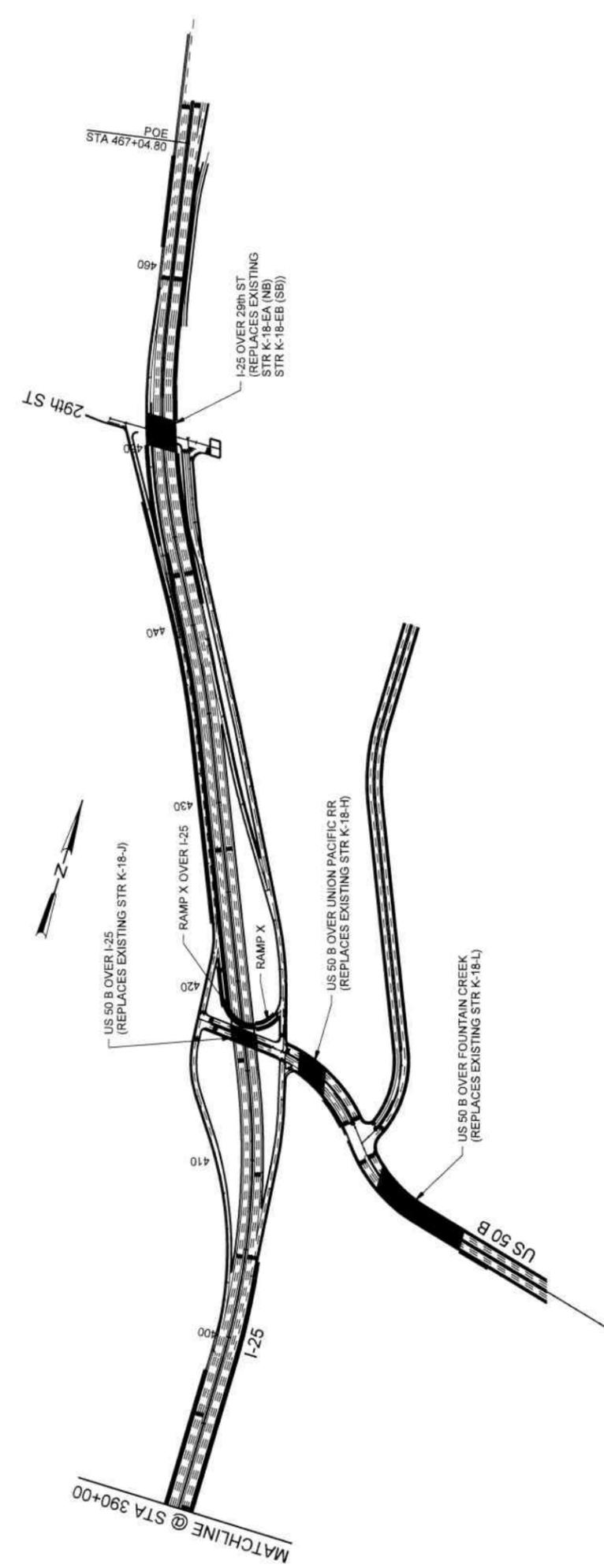
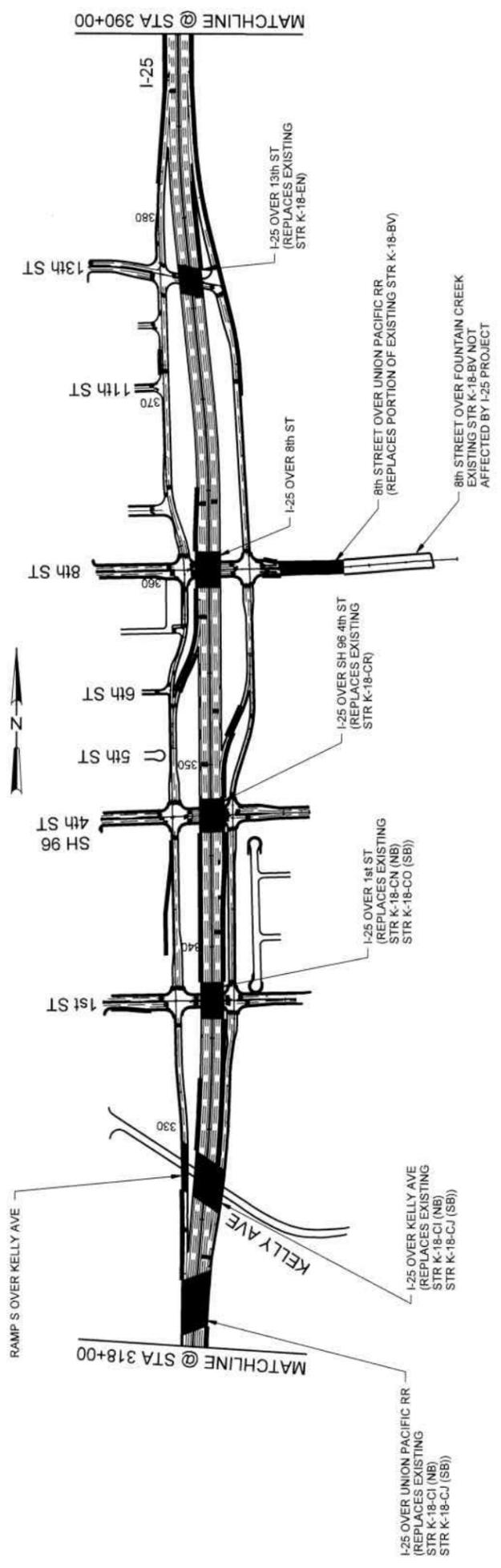
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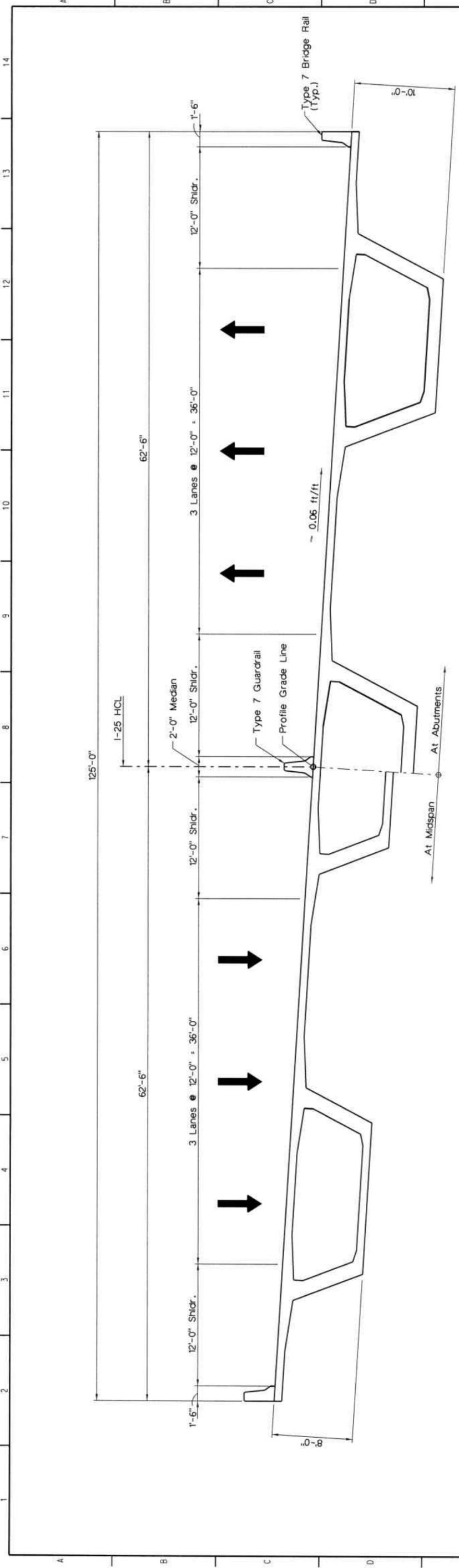
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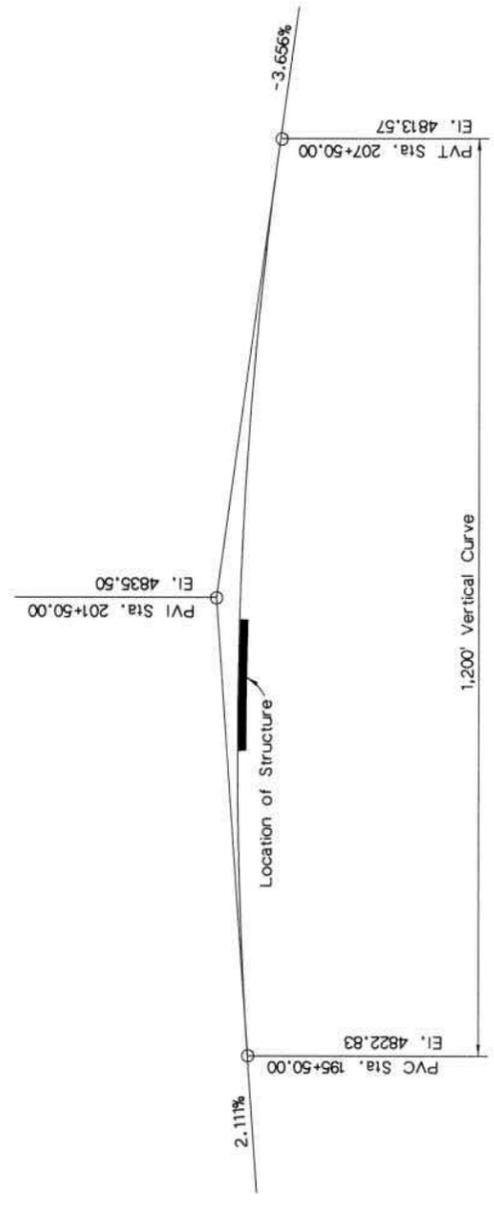




EXISTING I-25 ALIGNMENT ALTERNATIVE: BRIDGES



TYPICAL SECTION



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Index of Revisions

No.	Description

COLORADO DEPARTMENT OF TRANSPORTATION
REGION 2

KIRKHAM & MICHAEL
CONSULTING ENGINEERS

5600 South Quebec Street
Suite 2000
Greenwood Village, Co. 80111
Phone: 303-694-2300

As Constructed

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Revised: _____

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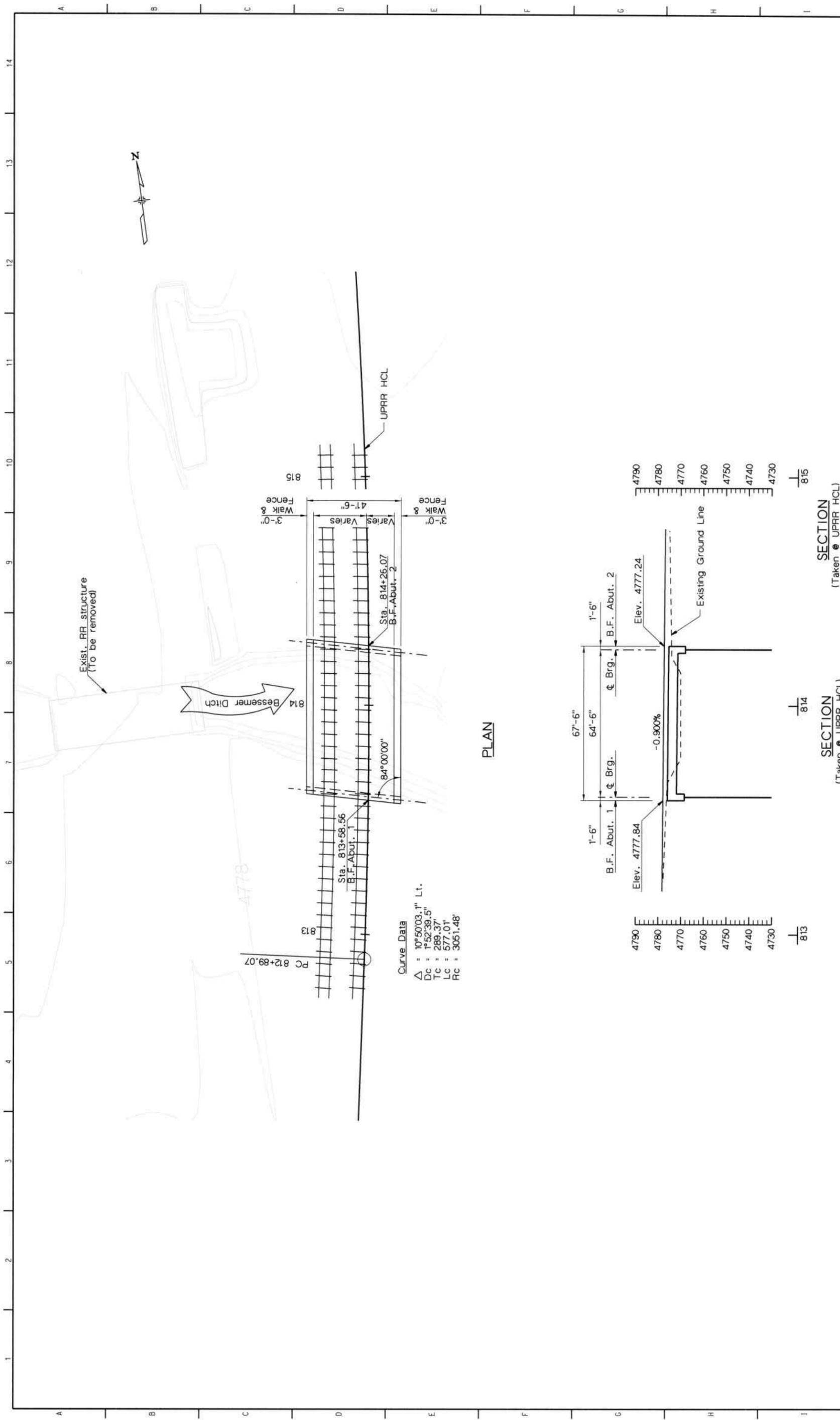
The New Pueblo Freeway
I-25 OVER INDIANA AVENUE
EXISTING I-25 ALIGNMENT

Designer: K. Saindon
Detailer: K. Saindon

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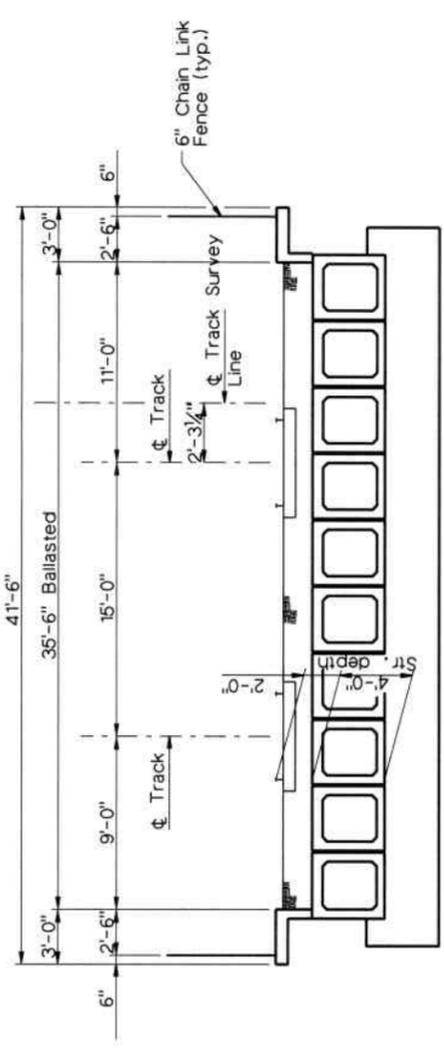
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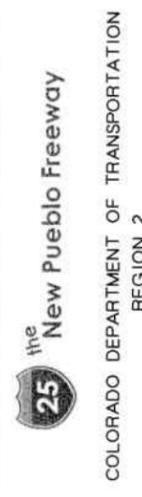


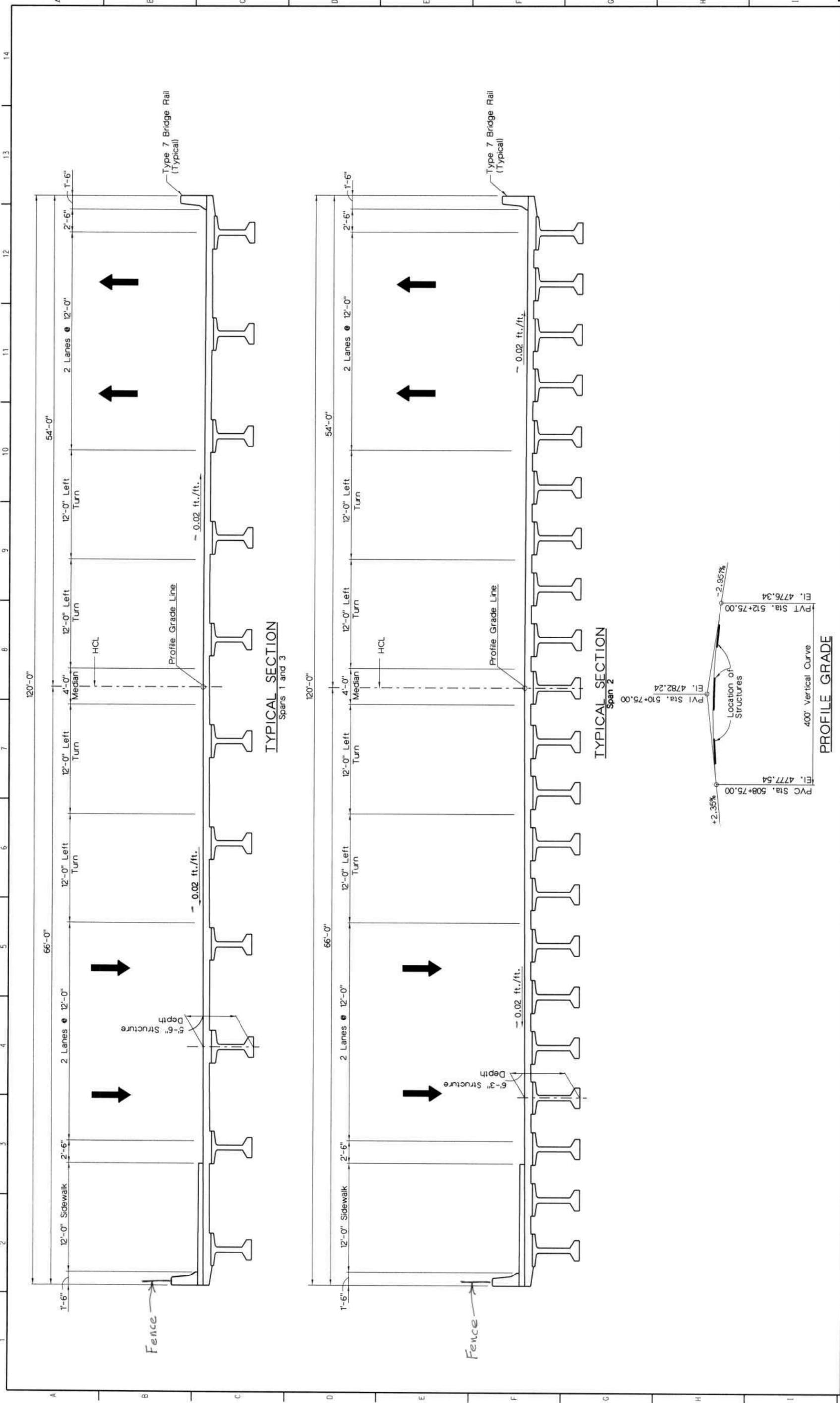
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TYPICAL SECTION

CONCEPTUAL

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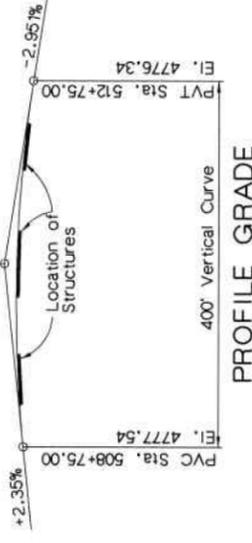
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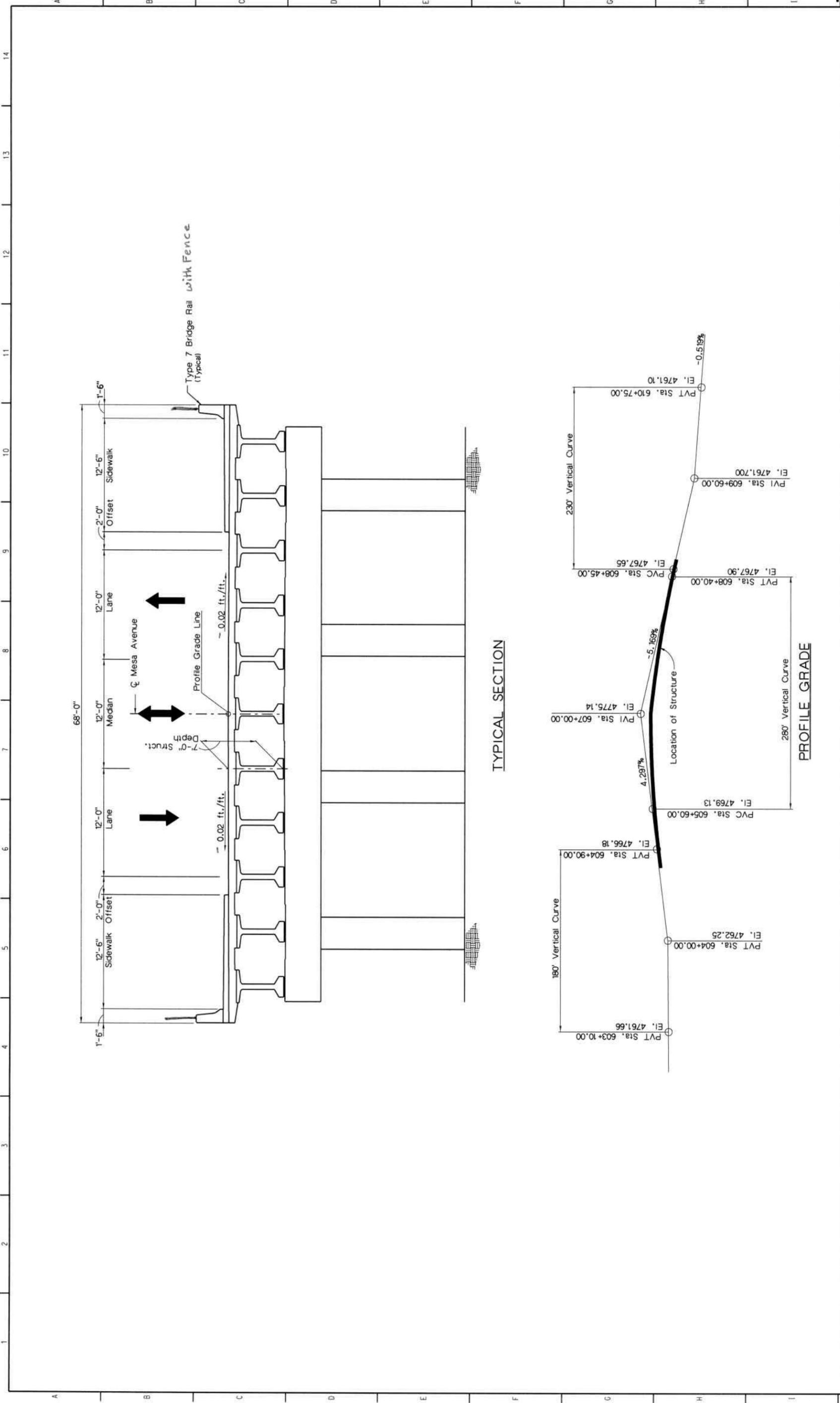
Revision Dates	
Revision	Date

(Preliminary Stage Only)

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Drawing File Name:						Designer: K. Saindon	Structure Numbers
Acad Ver.:	Scale:	Units:	English			Detailer: P. Haas	Subset Sheets:
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COLORADO DEPARTMENT OF TRANSPORTATION
REGION 2
5600 South Quebec Street
Suite 2000
Greenwood Village, Co. 80111
Phone: 303-694-2300



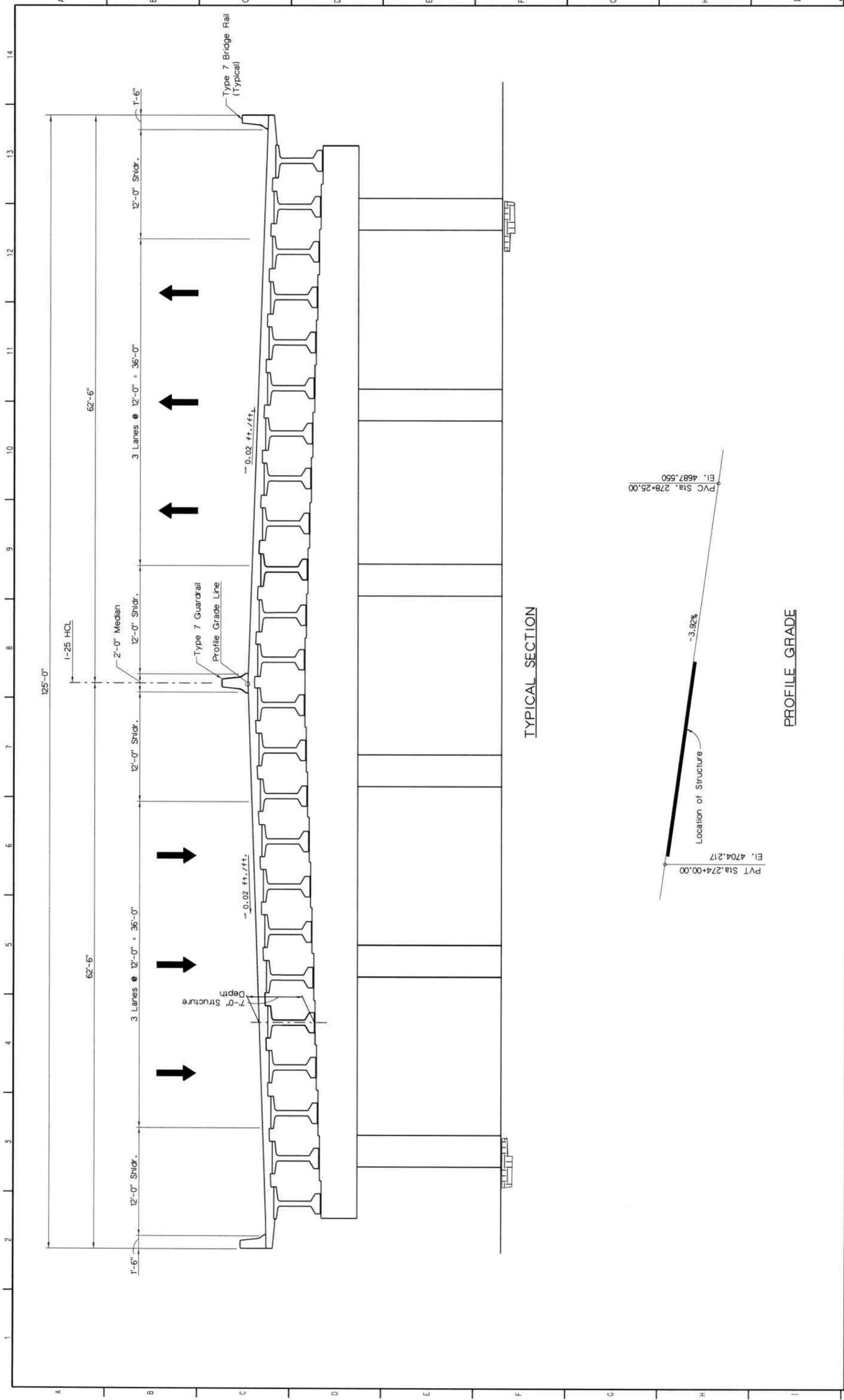


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Revision Dates	

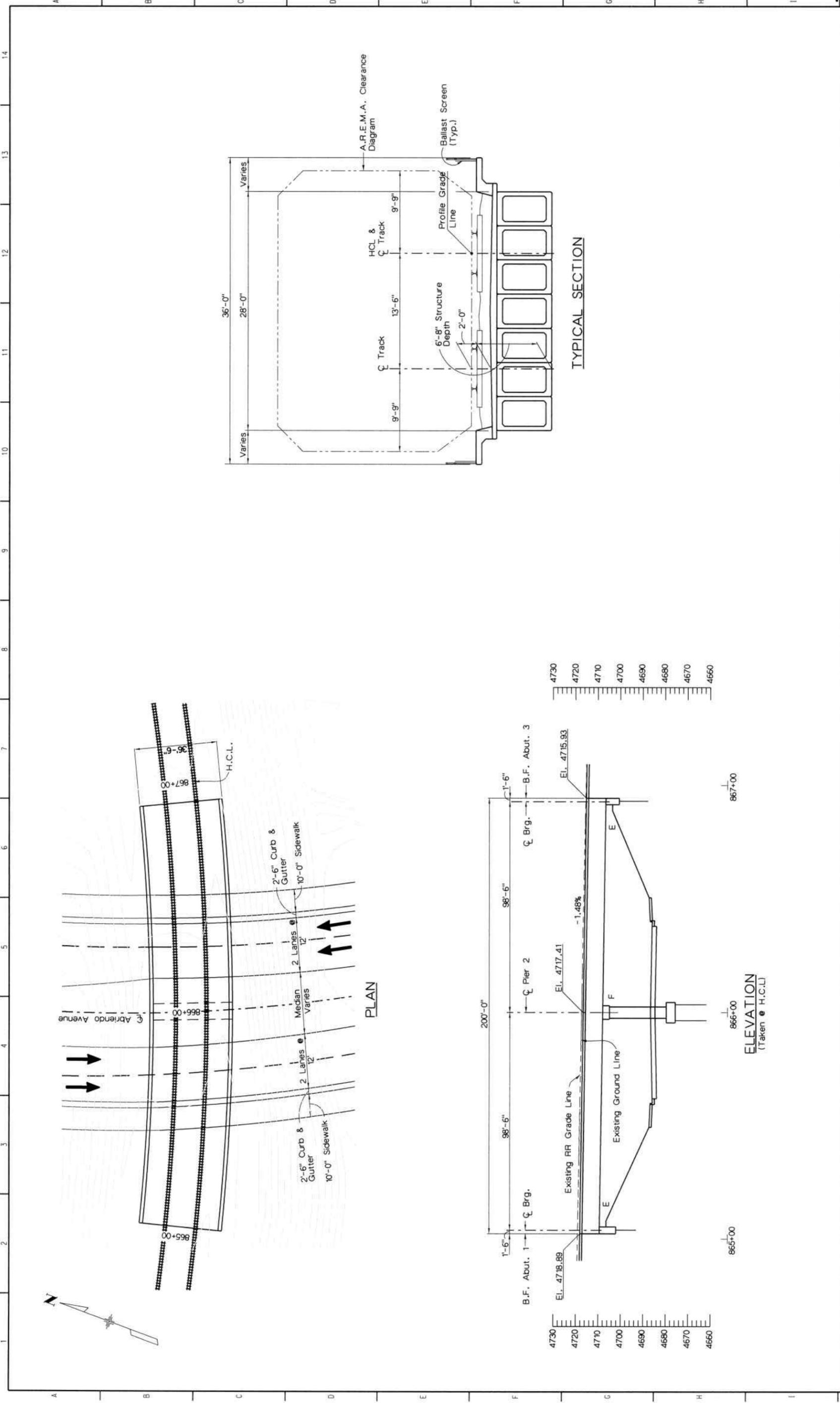
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Detailer:	P. Haas
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CONCEPTUAL



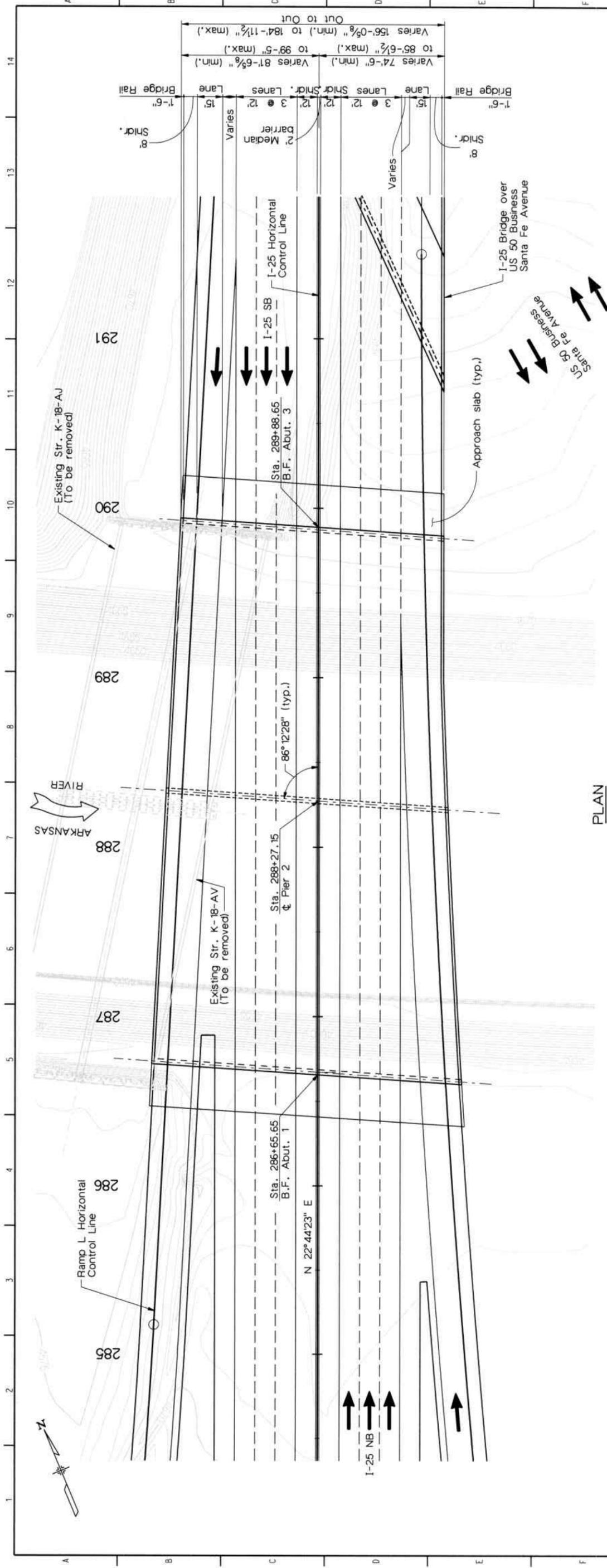
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(Preliminary Stage Only)					

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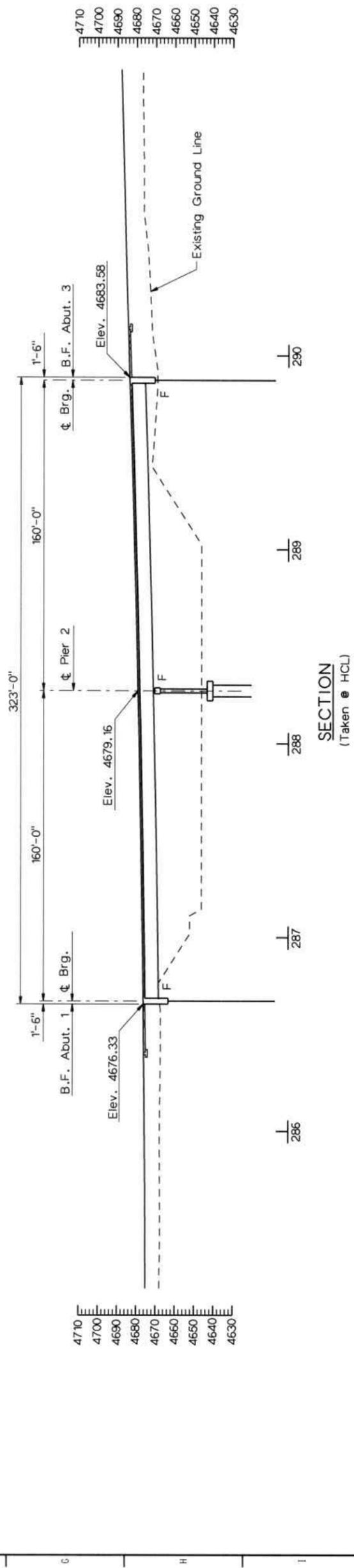
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COLORADO DEPARTMENT OF TRANSPORTATION	
REGION 2	5600 South Quebec Street
	Suite 2000
	Greenwood Village, Co. 80111
	Phone: 303-694-2300

KIRKHAM MICHAEL CONSULTING ENGINEERS	
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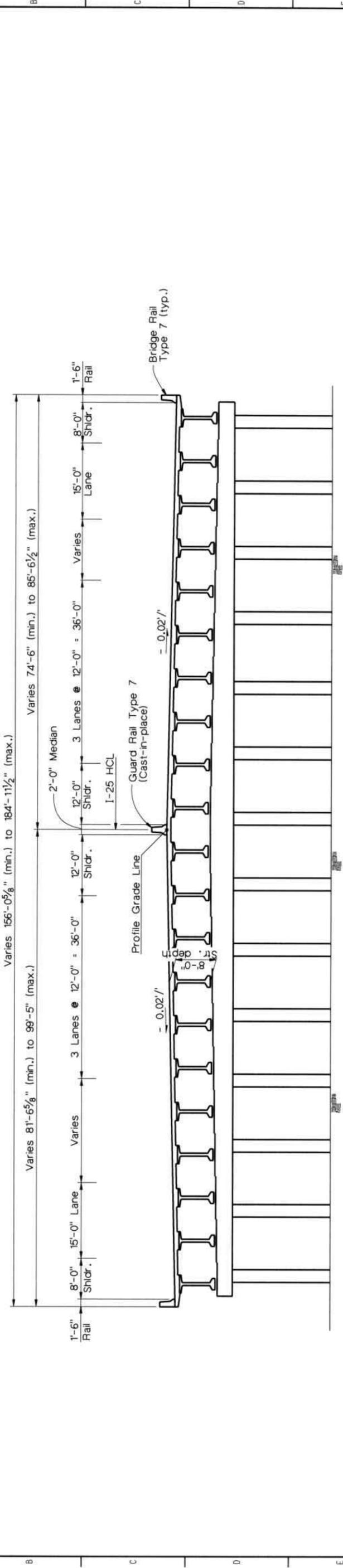
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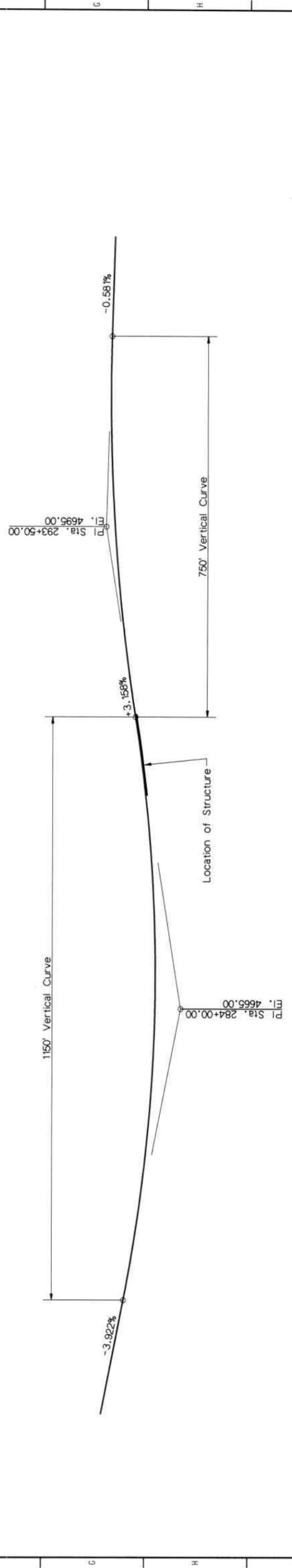
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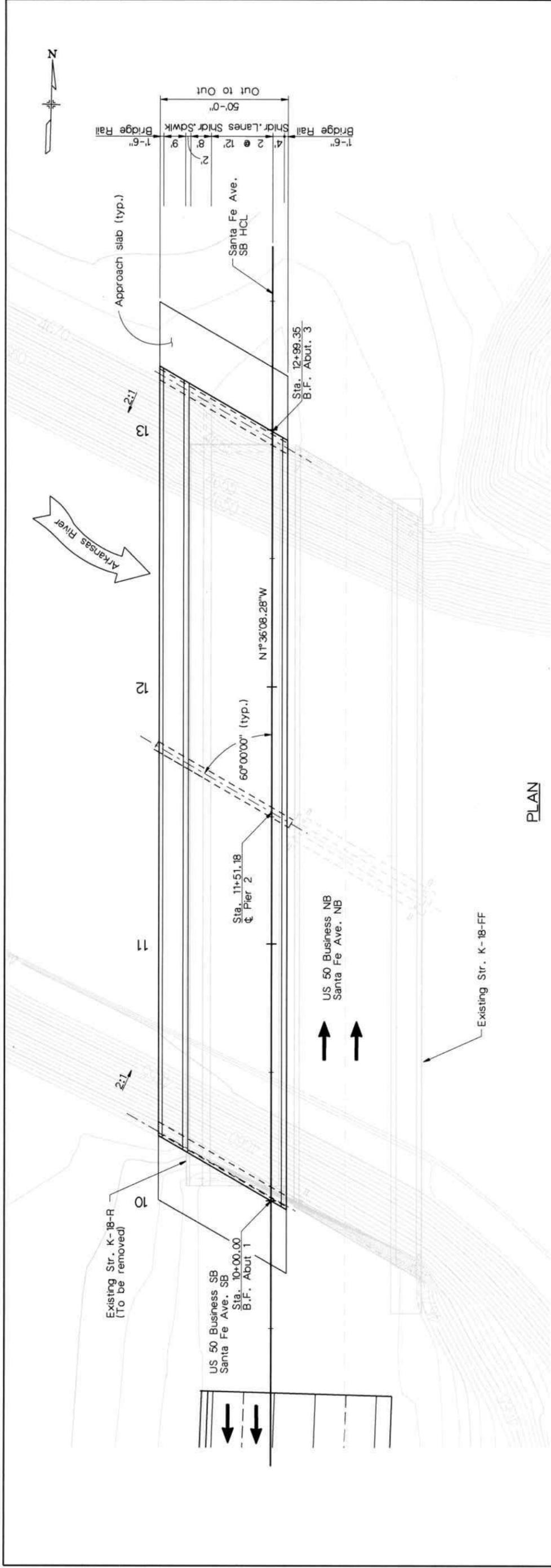


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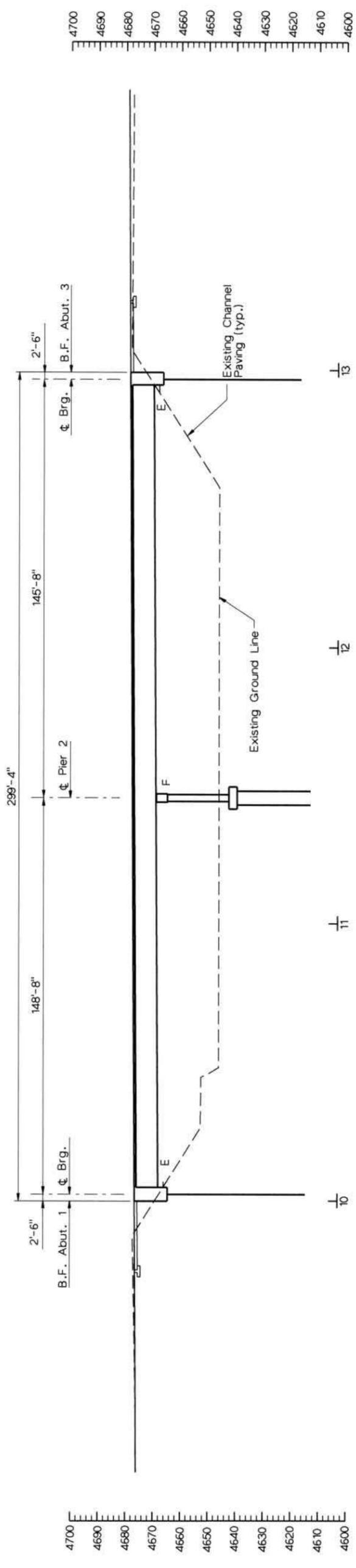


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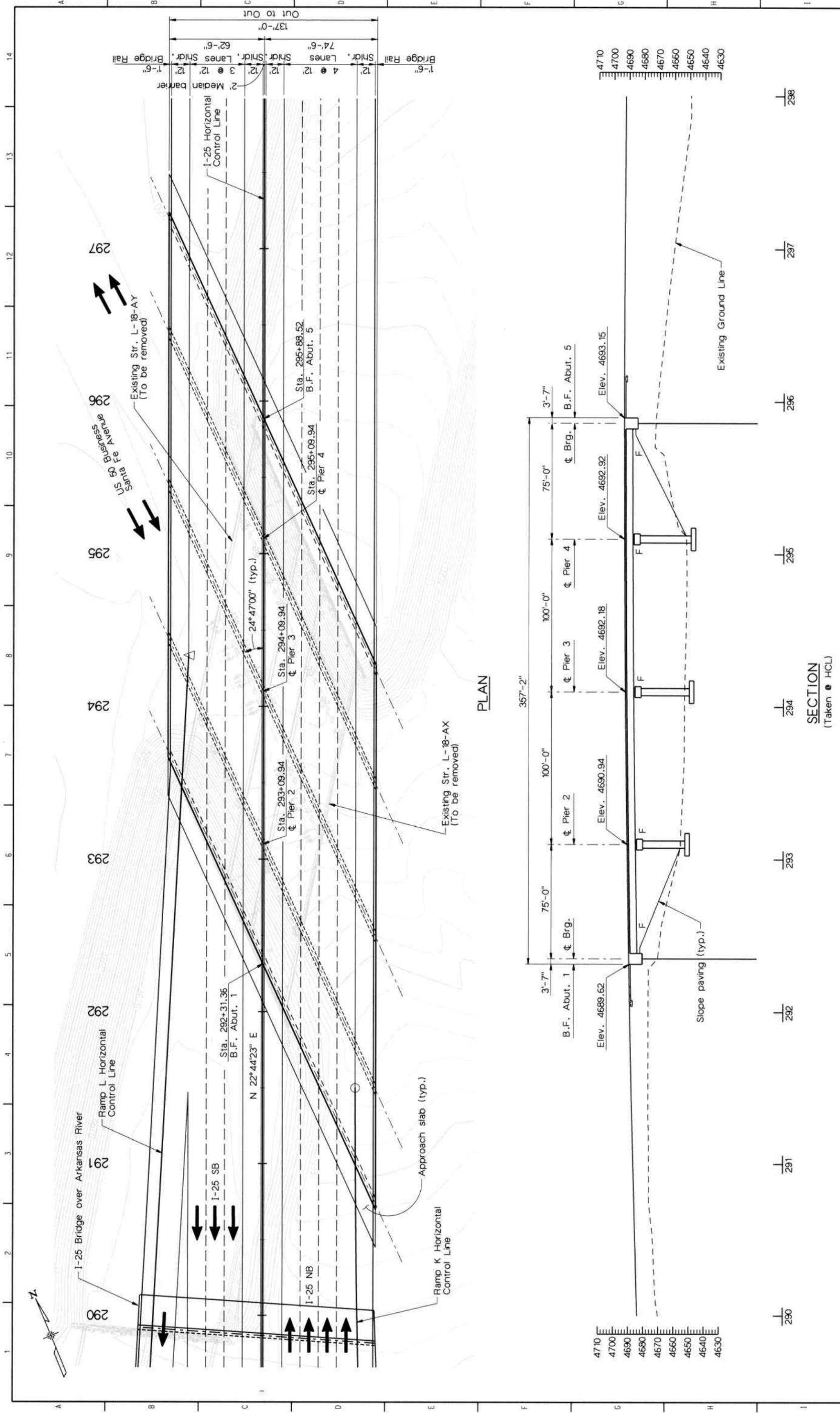
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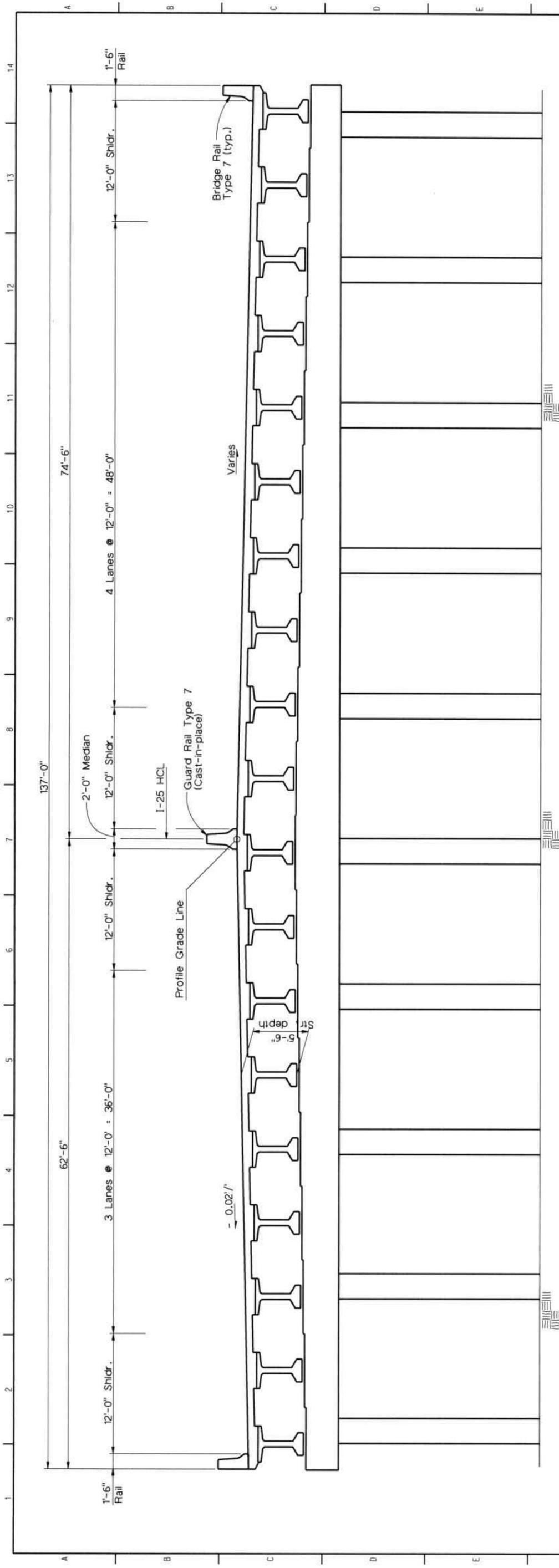


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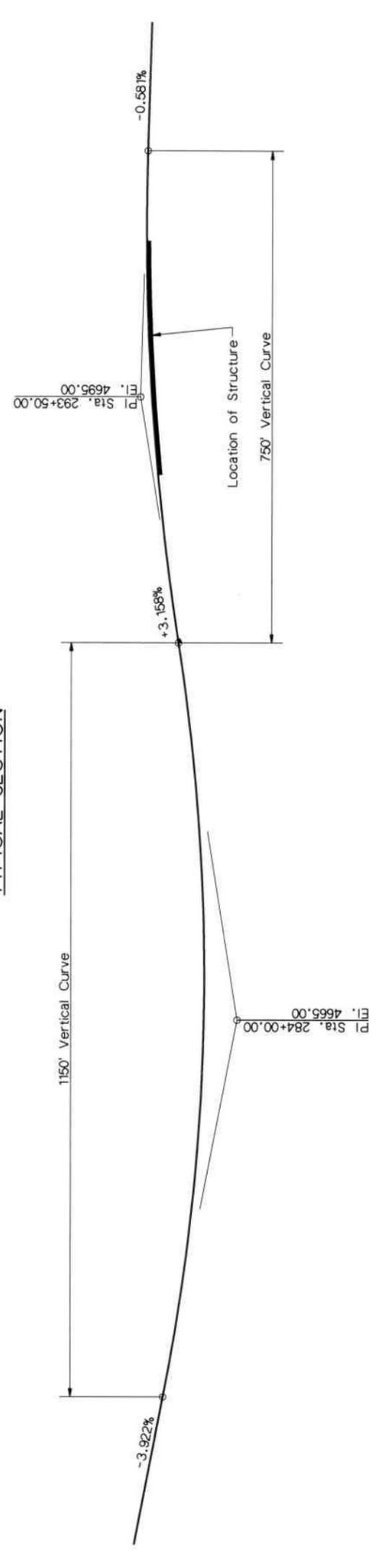
COLORADO DEPARTMENT OF TRANSPORTATION
REGION 2

The New Pueblo Freeway
EXISTING I-25 ALIGNMENT

Designer: J. Rohner
Detailer: K. Heater
Sheet Subsets: of



TYPICAL SECTION



PROFILE GRADE

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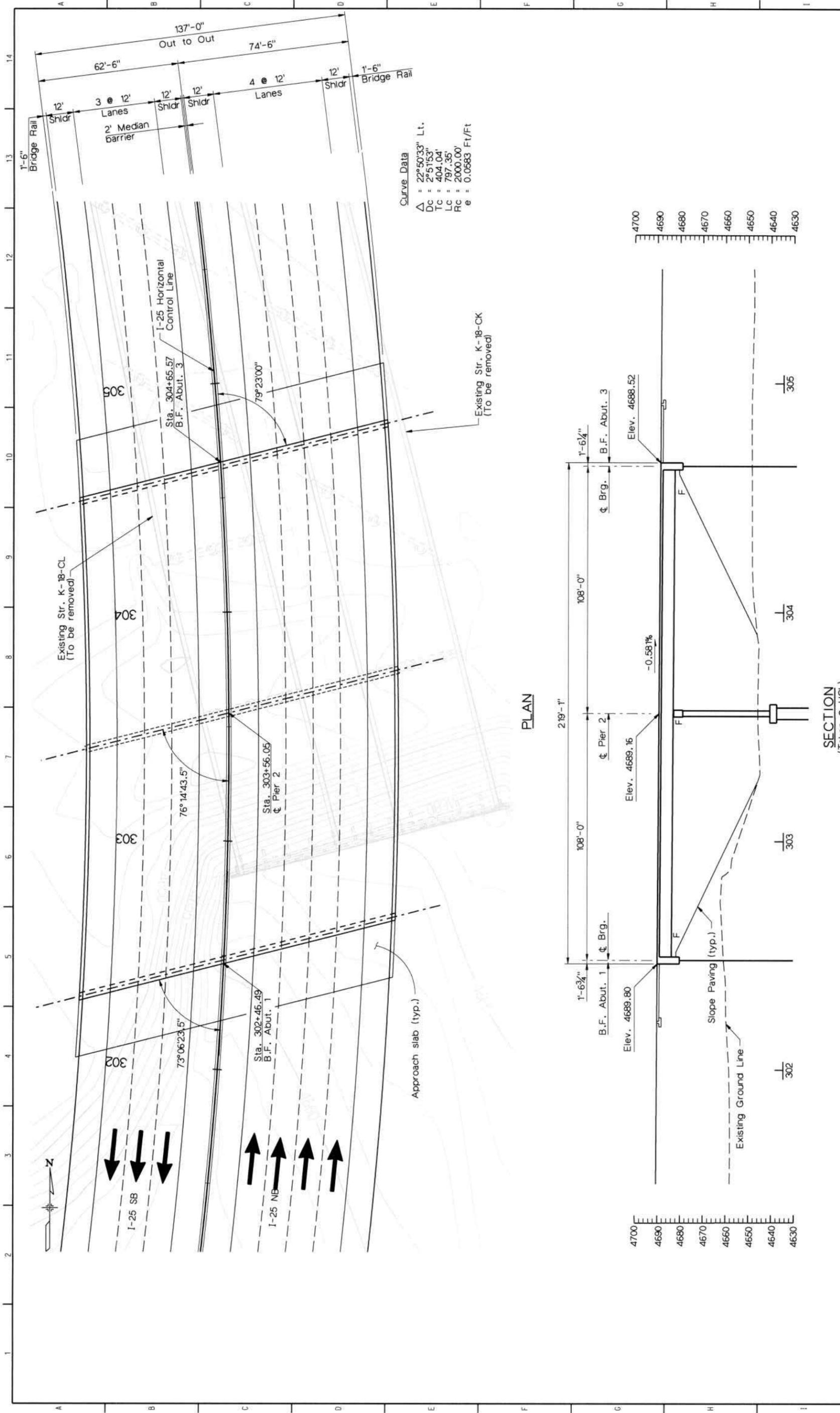
The New Pueblo Freeway

25th New Pueblo Freeway

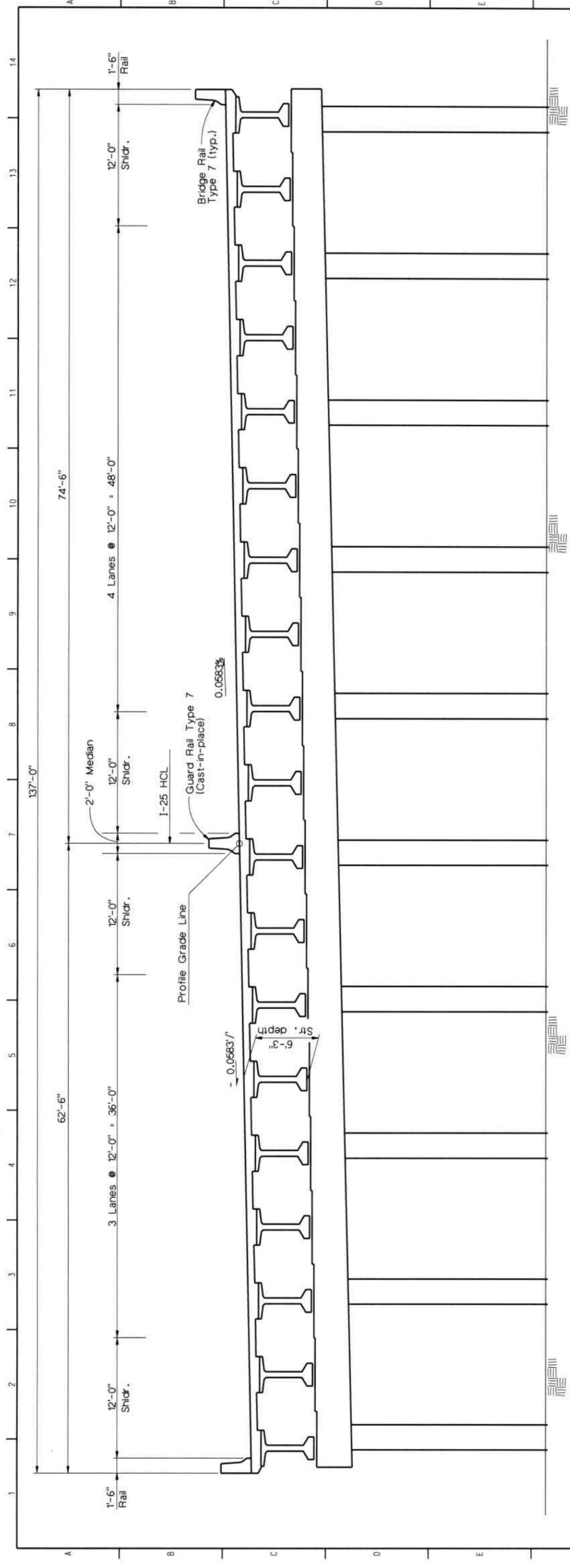
COLORADO DEPARTMENT OF TRANSPORTATION
REGION 2

Designer: J. Rohner
Detailer: K. Heater

Sheet Subsets: 12 of 14



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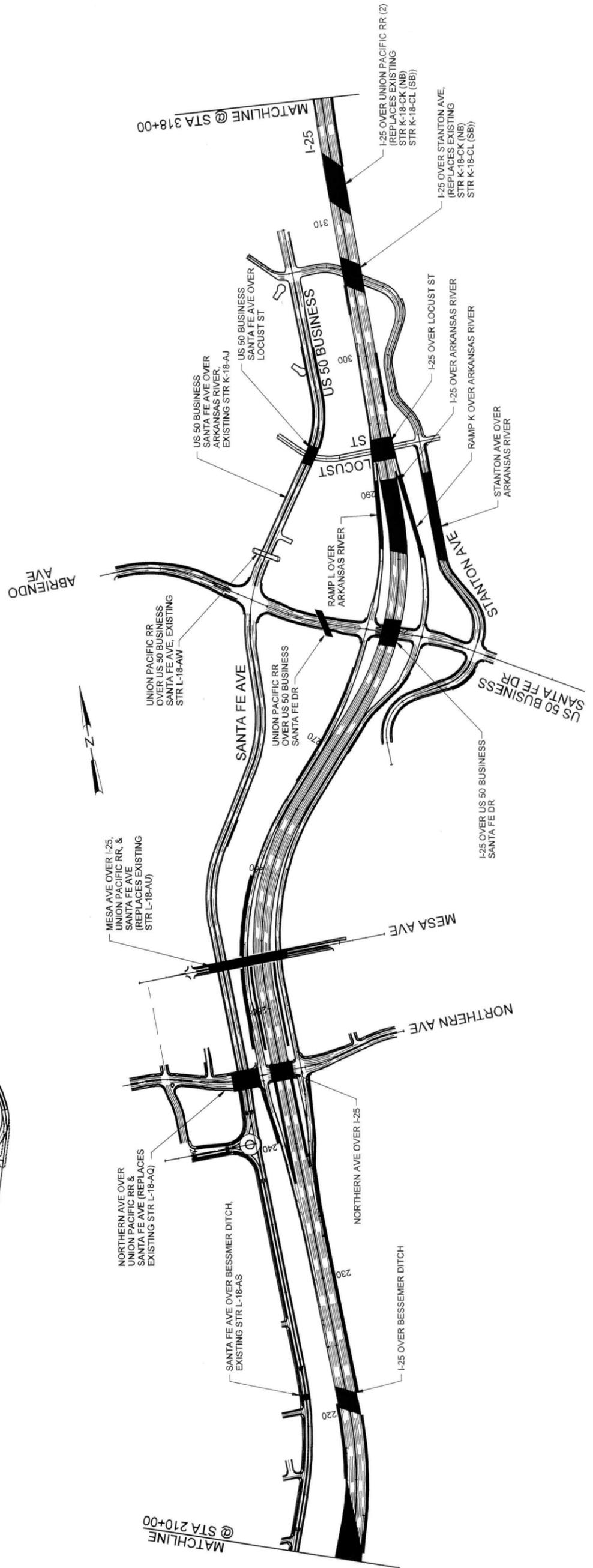
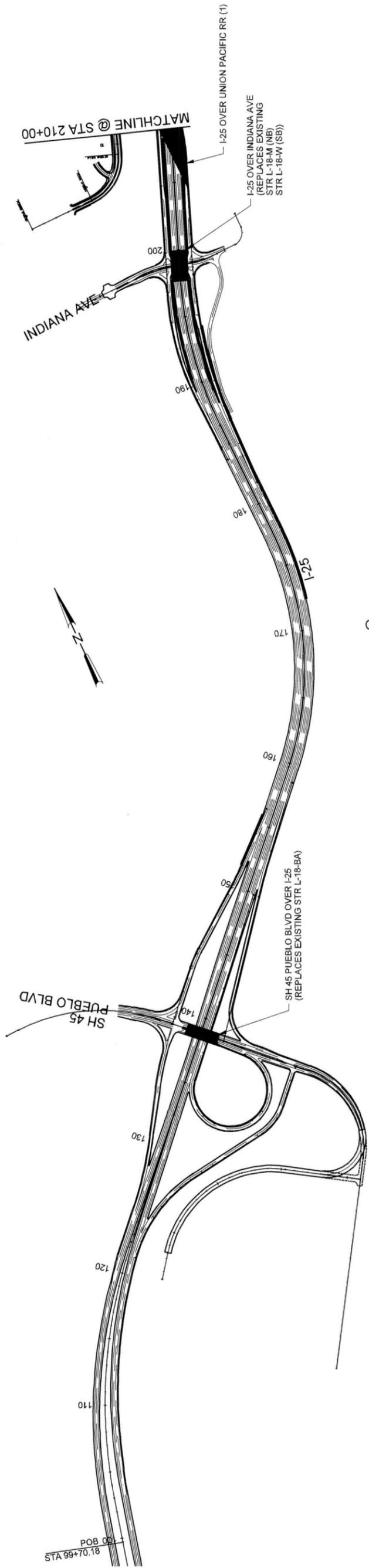


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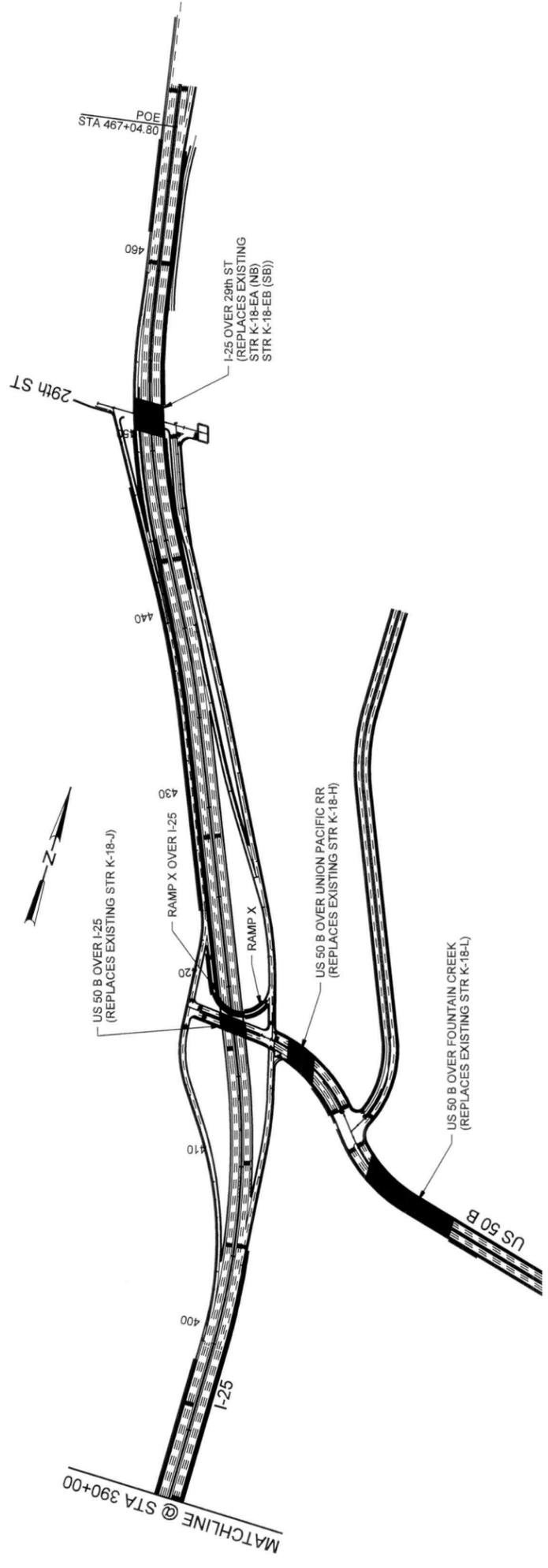
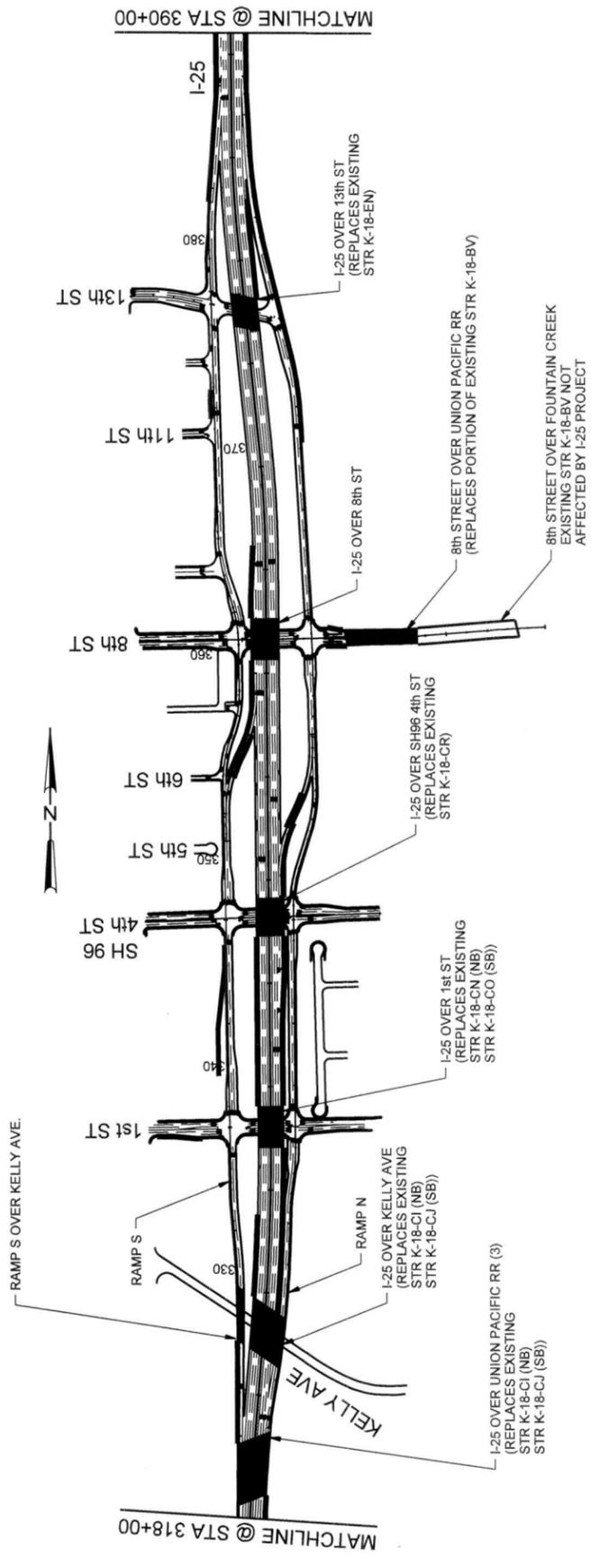
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APPENDIX C

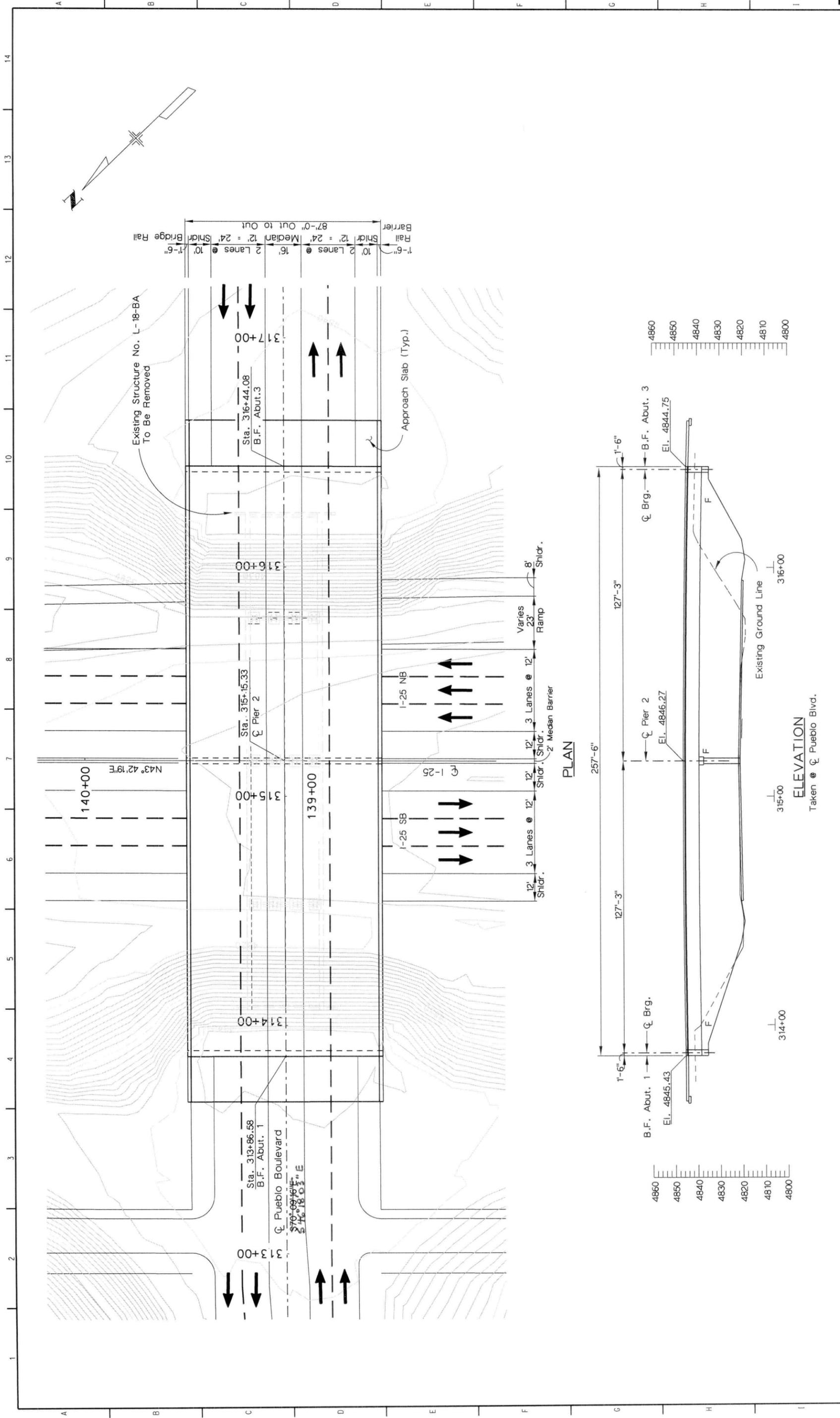
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MODIFIED I-25 ALIGNMENT ALTERNATIVE: BRIDGES



MODIFIED I-25 ALIGNMENT ALTERNATIVE: BRIDGES



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Checked by	Date	Checked by	Date	Checked by	Date	Checked by	Date

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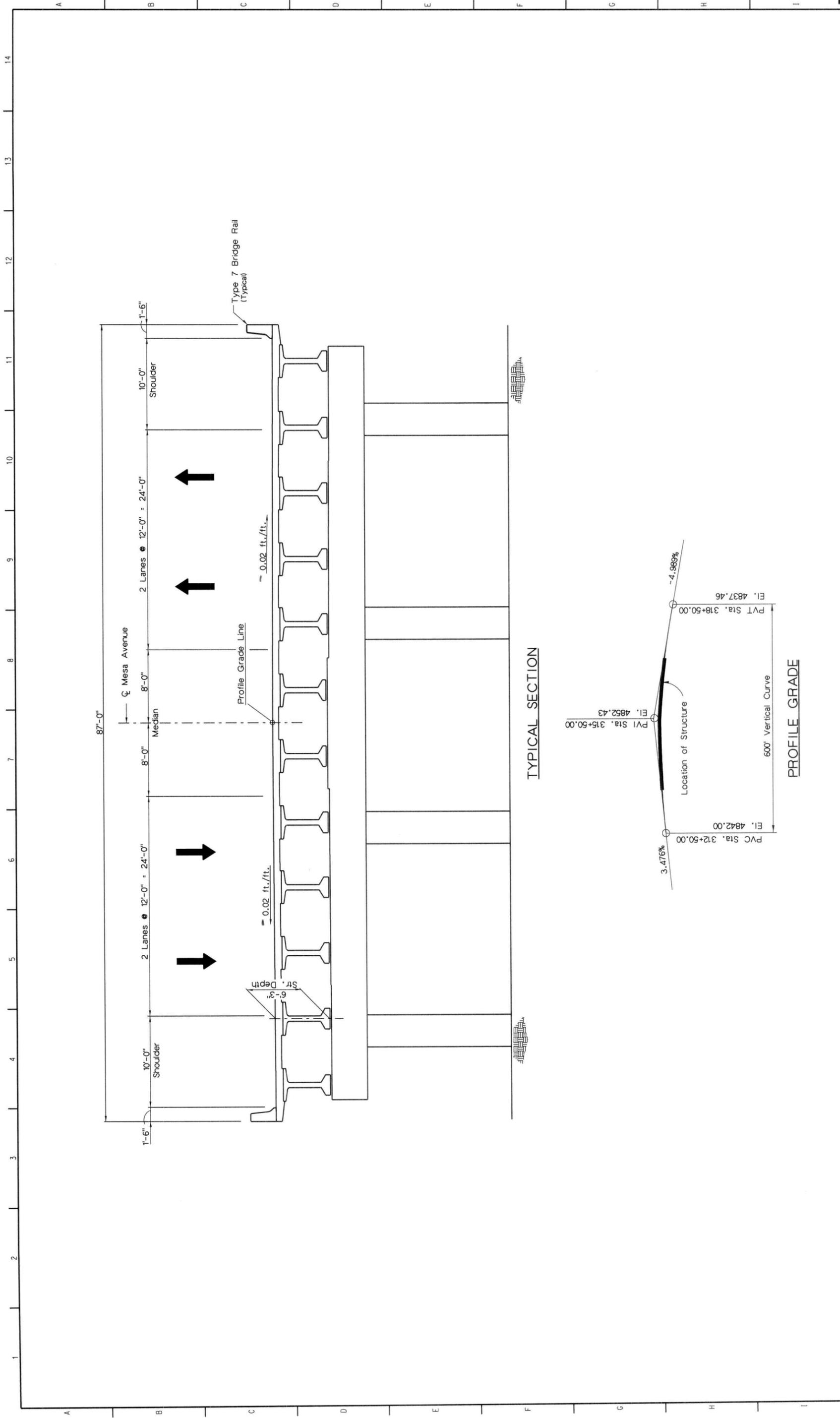
COLORADO DEPARTMENT OF TRANSPORTATION
REGION 2

KIRKHAM & MICHAEL
CONSULTING ENGINEERS

5600 South Quebec Street
Suite 2000
Greenwood Village, Co. 80111
Phone: 303-694-2300

ELEVATION
Taken @ Pueblo Blvd.

PLAN

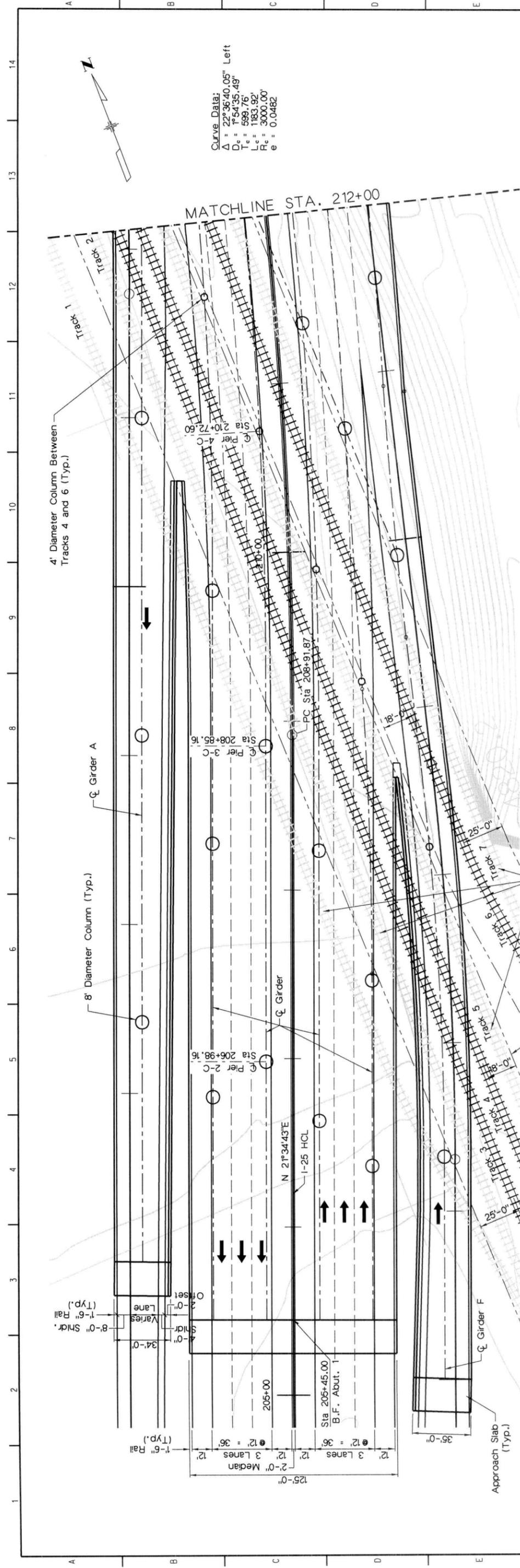


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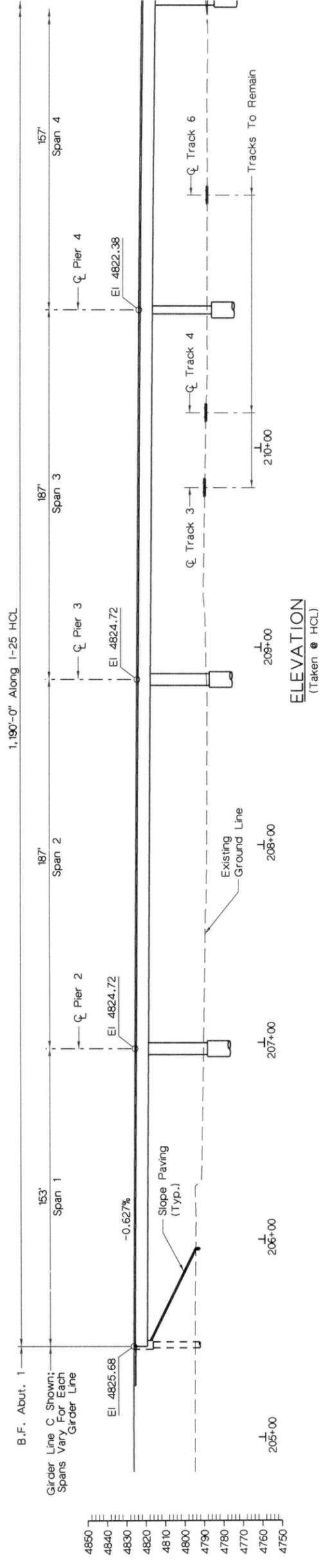
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PLAN



ELEVATION
(Taken @ HCL)

DESIGN		DETAIL		QUANTITIES	
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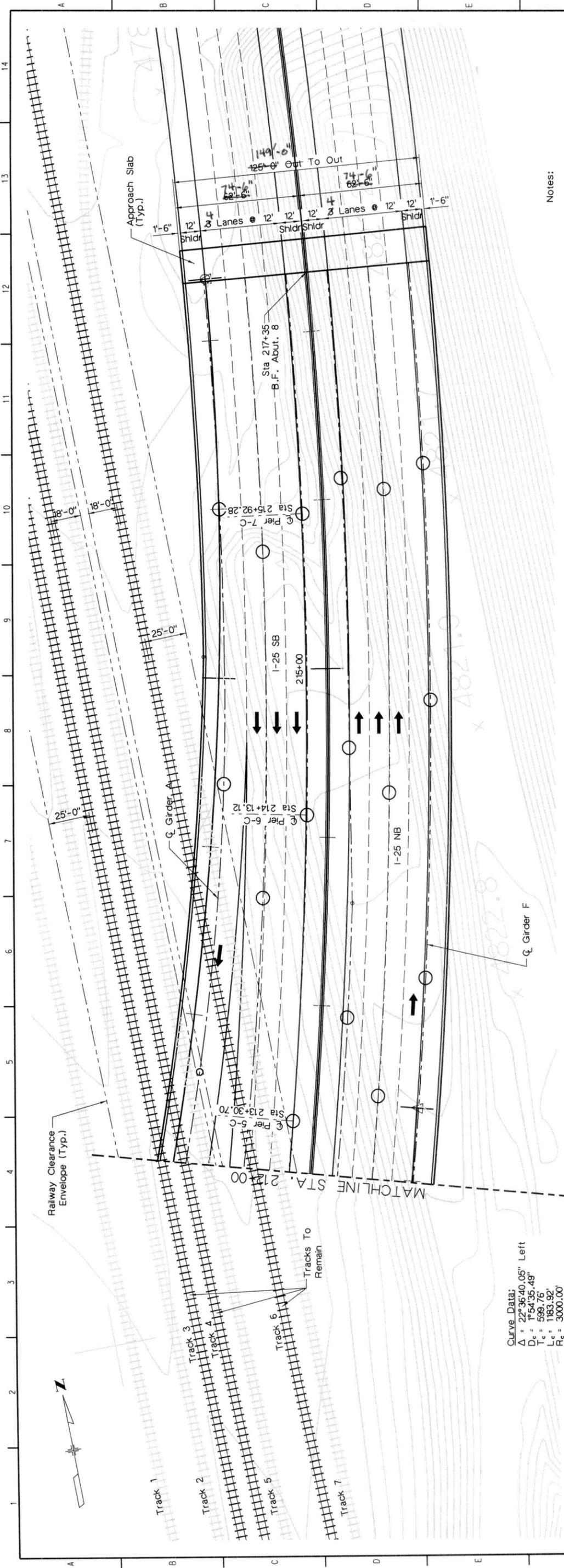
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COLORADO DEPARTMENT OF TRANSPORTATION
 REGION 2

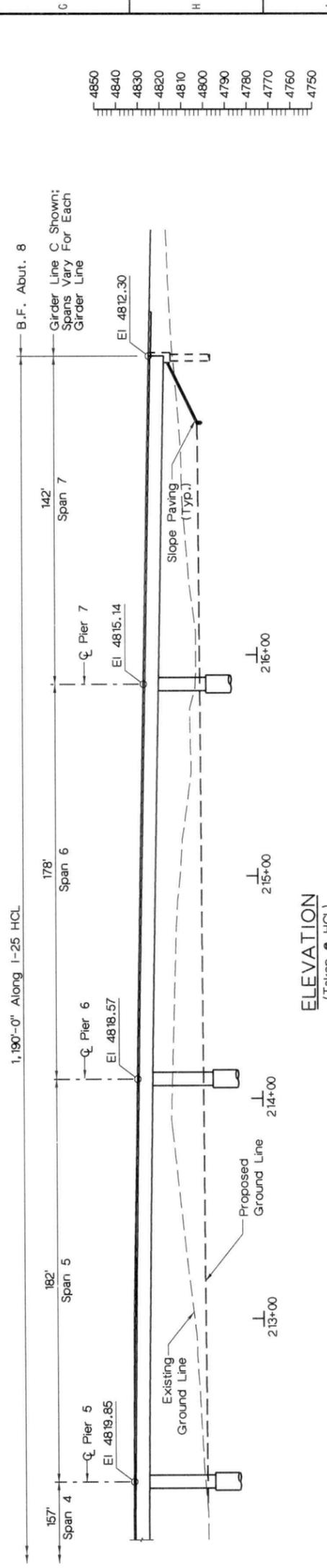
KIRKHAM & MICHAEL
 CONSULTING ENGINEERS

5600 South Quebec Street
 Suite 2000
 Greenwood Village, Co. 80111
 Phone: 303-694-2300



PLAN

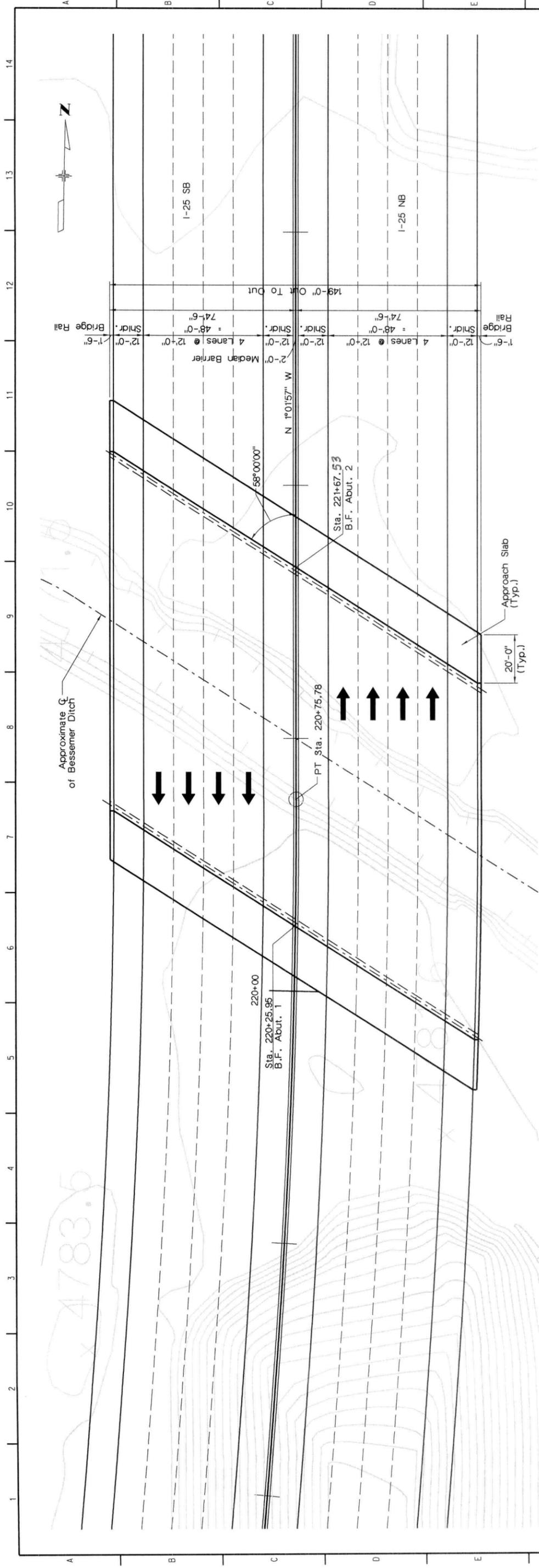
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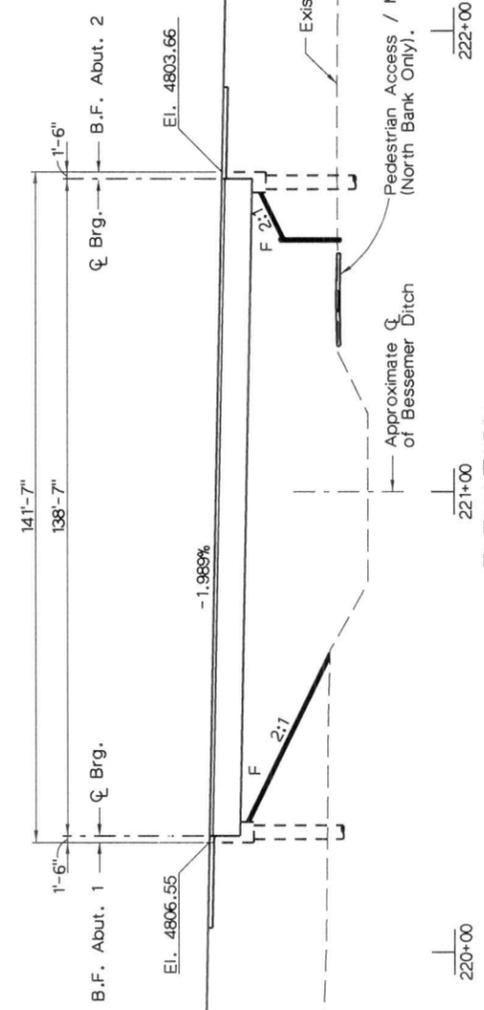
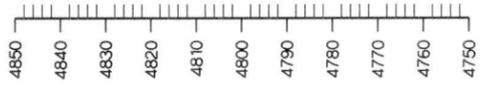
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PLAN

CURVE DATA
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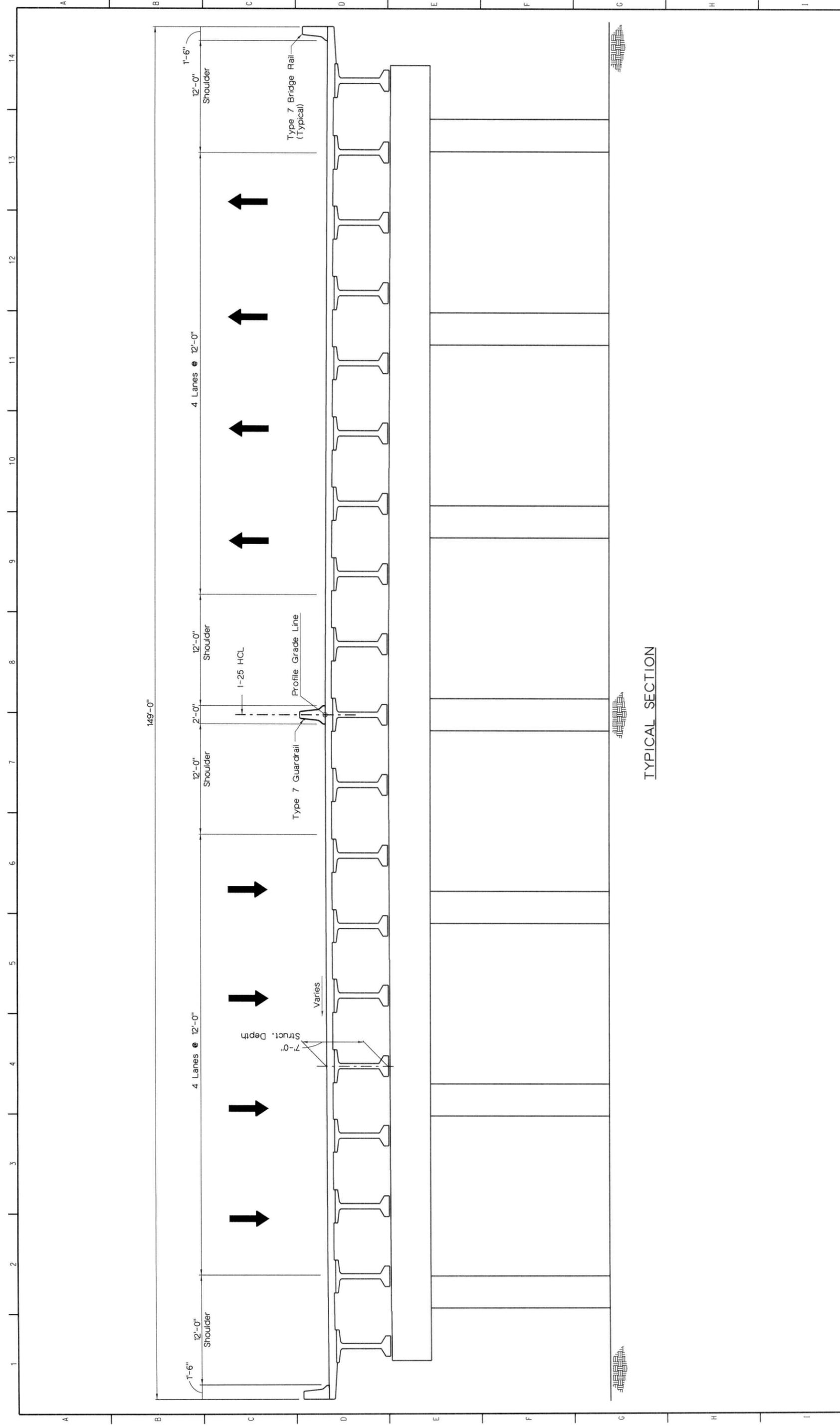


ELEVATION
 (Taken @ HCL)

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Revision	Date	Revision	Date

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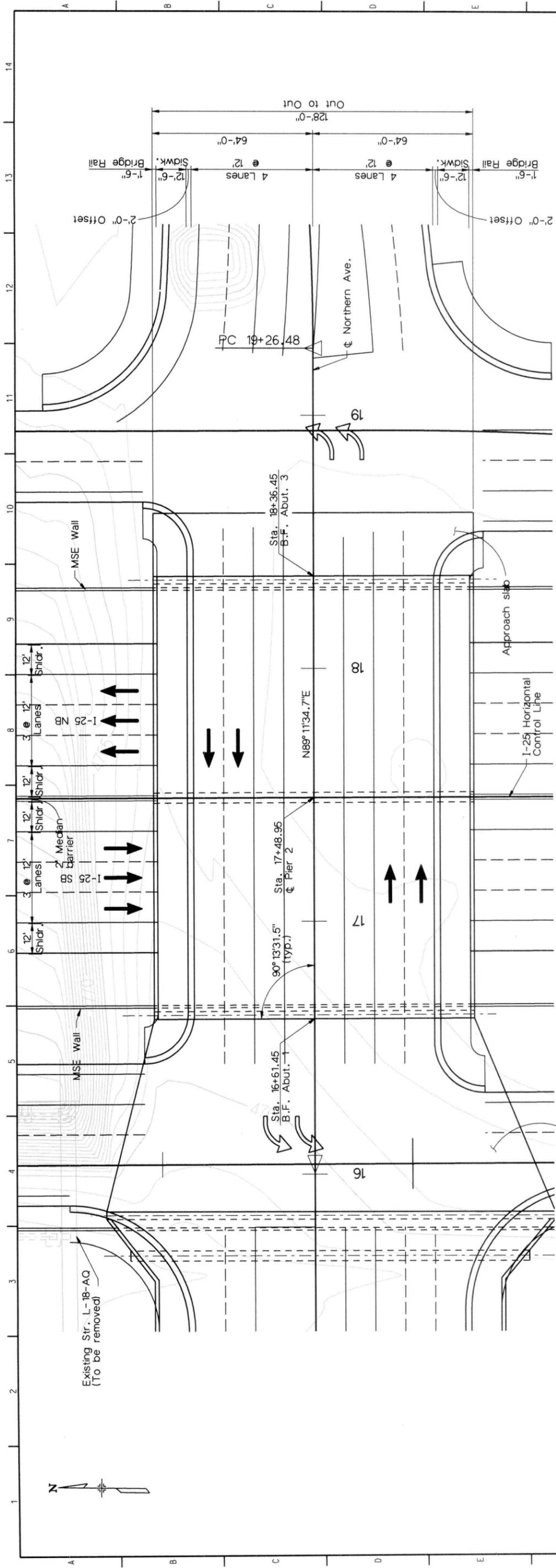


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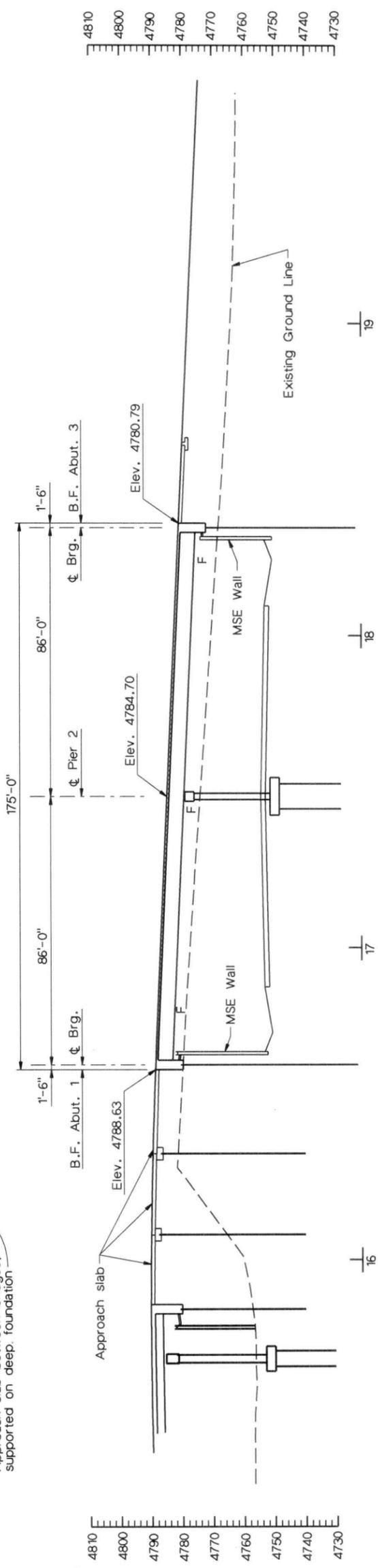
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Acad Ver.	Scale:	Units:	English		Detailer: P. Haas	Sheet Subset:	Sheet Number
						Subset Sheets:	14

COLORADO DEPARTMENT OF TRANSPORTATION
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Phone: 303-694-2300



PLAN

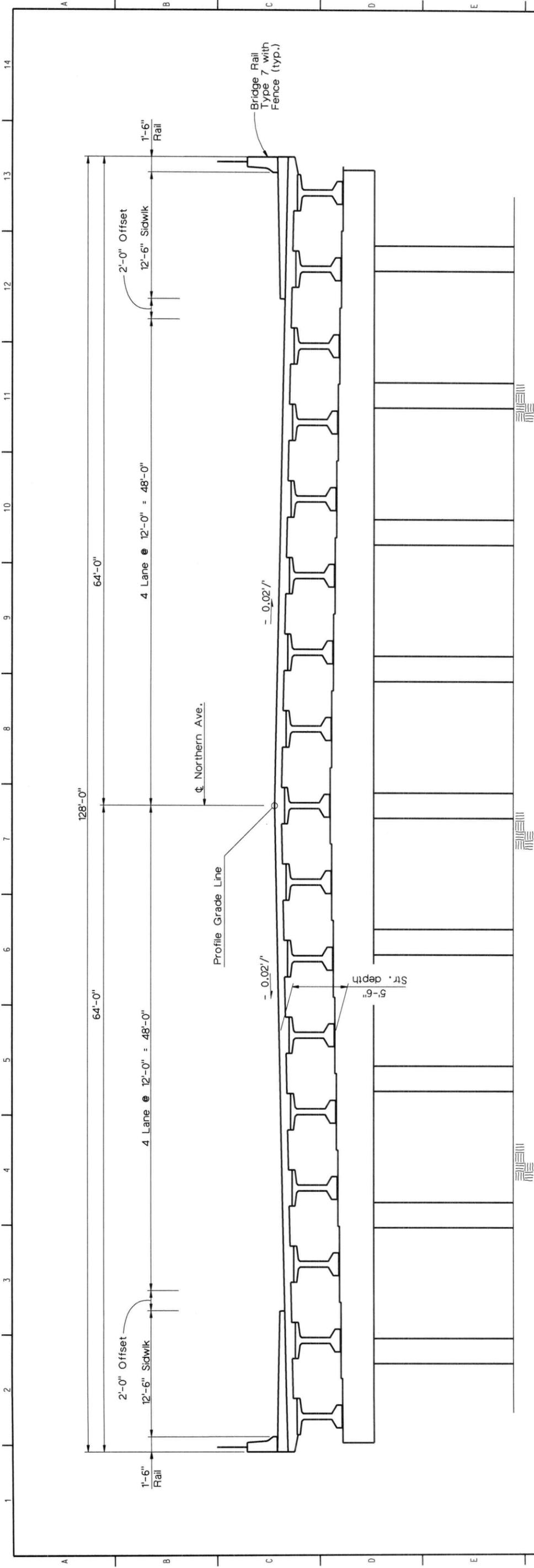
Approach slab between bridges, supported on deep foundation



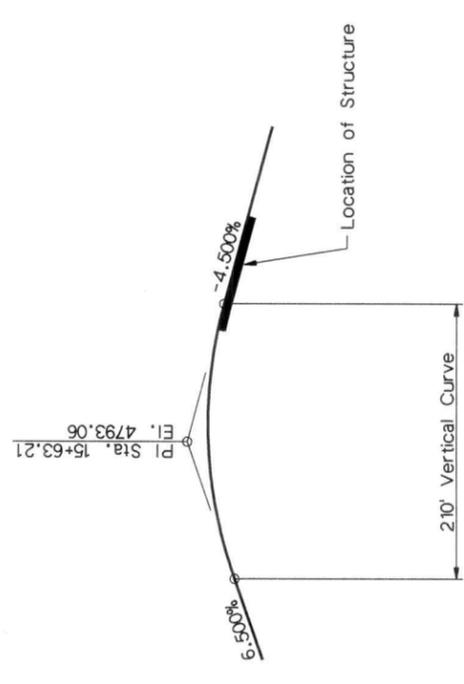
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(Taken @ Northern Ave.)

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Last Modification Date:	/ / Initials:	/	/	Revised:	/	NORTHERN AVE. OVER I-25	
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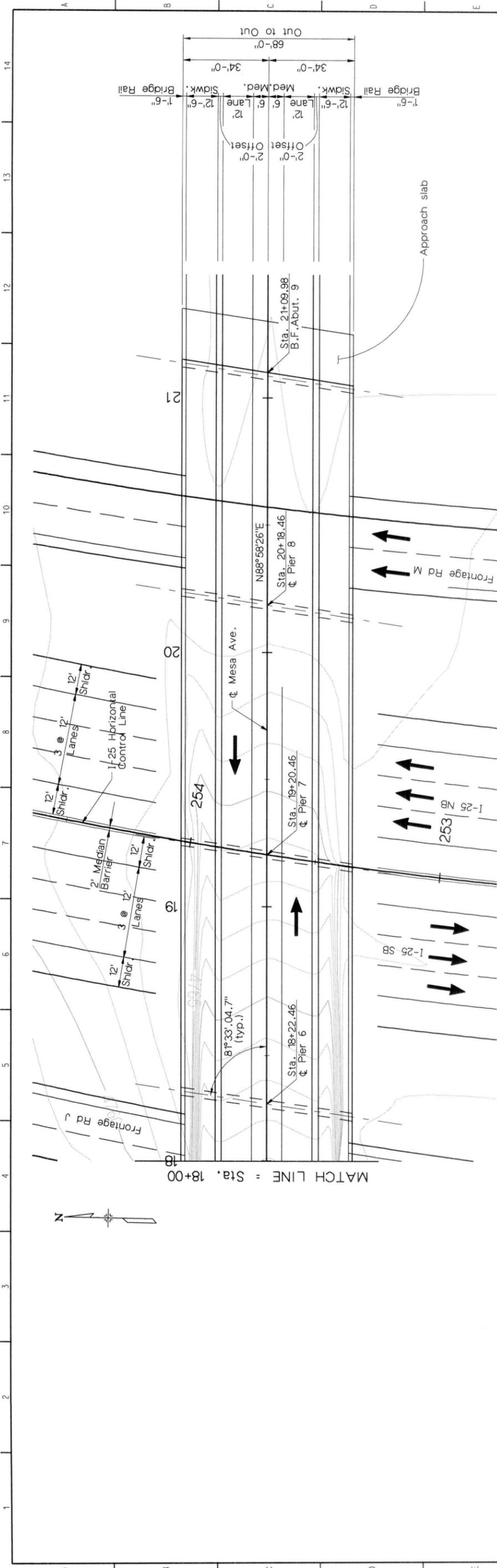
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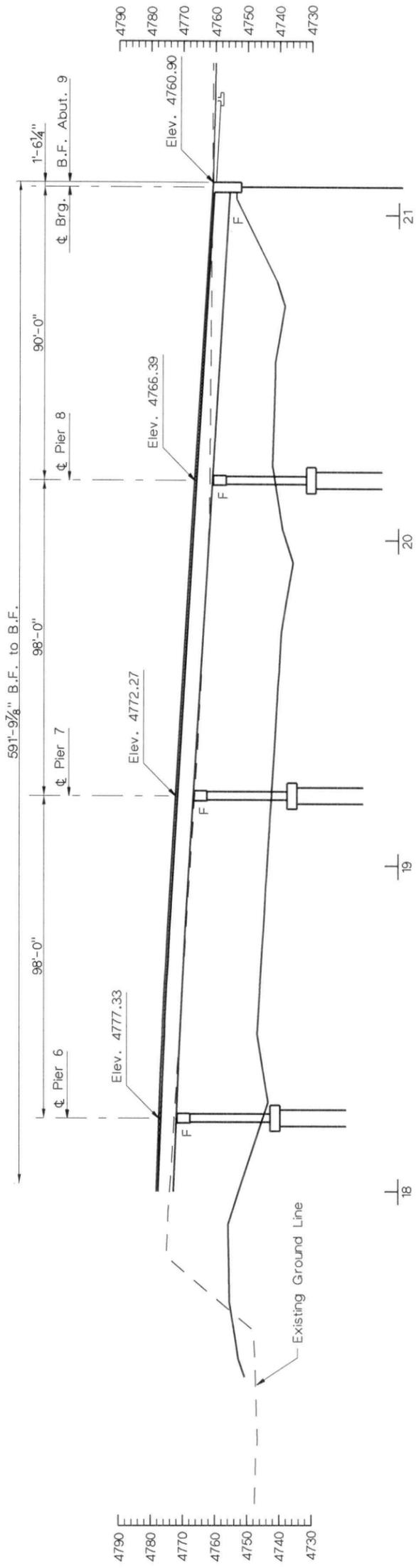
PROFILE GRADE

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Last Modification Date: /	Initials: /	/	/	Revised: /	/	NORTHERN AVE. OVER I-25	
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Project No./Code	IM-0251-156
Structure Numbers	128.31
Sheet Number	14



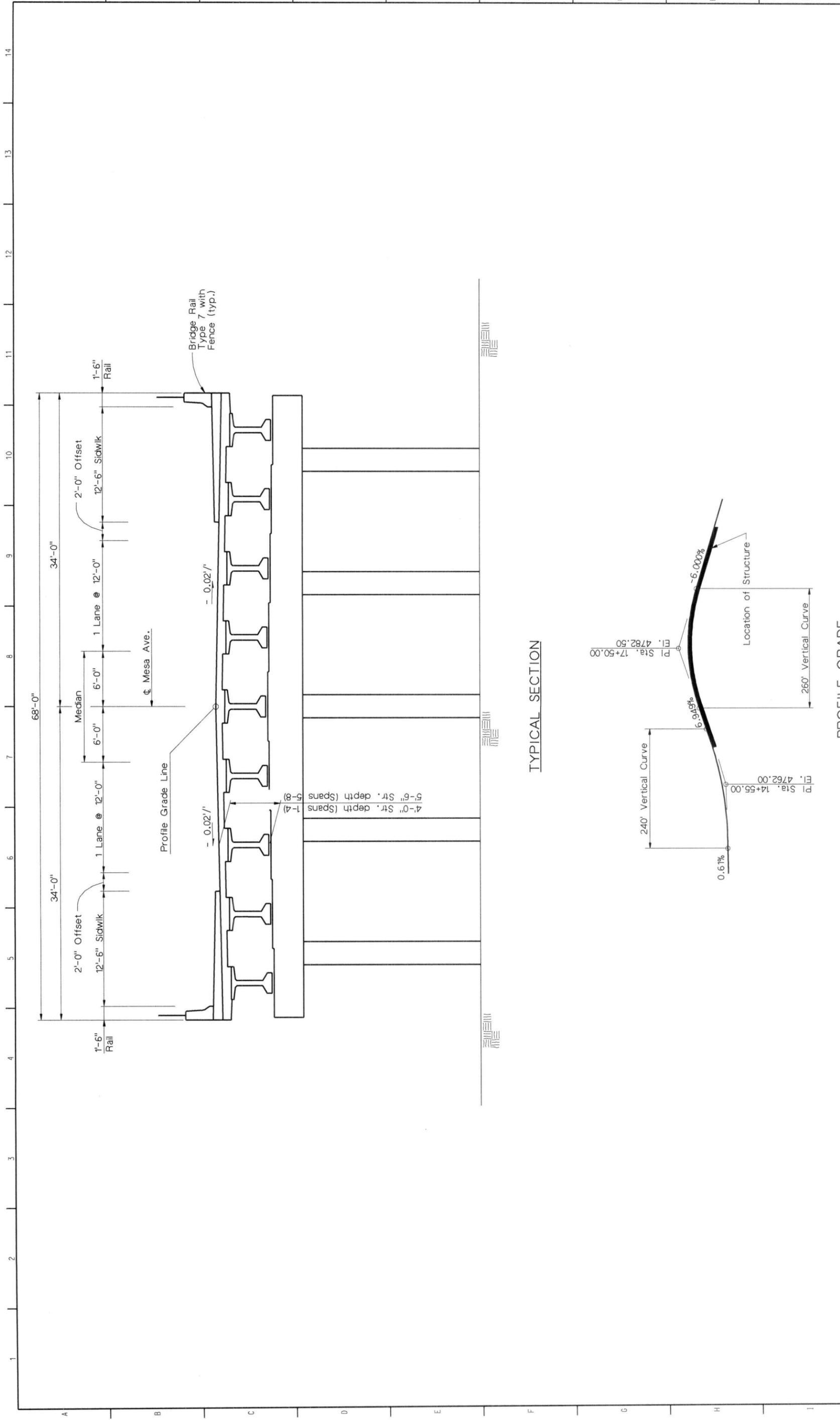
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(Taken @ & Mesa Ave.)

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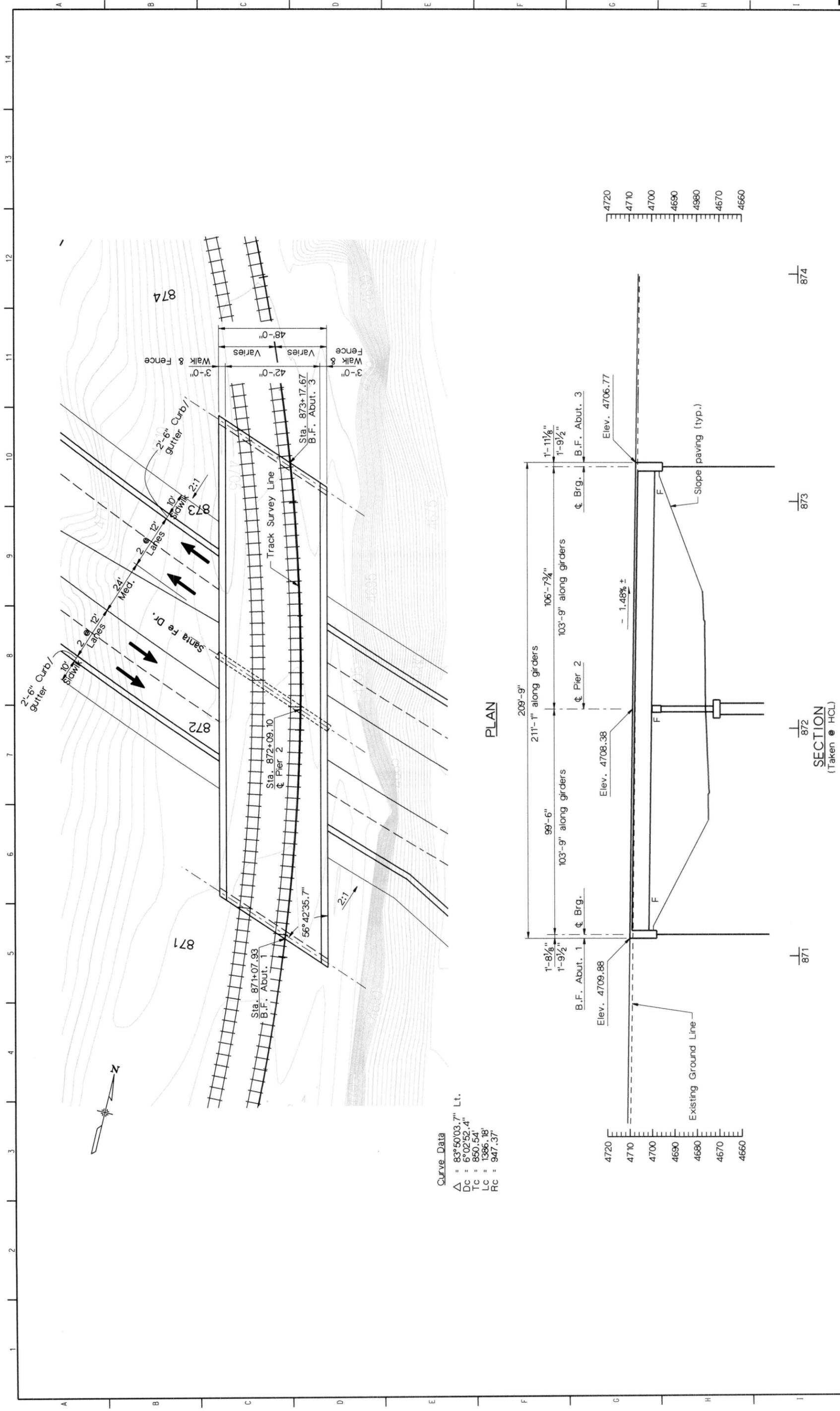


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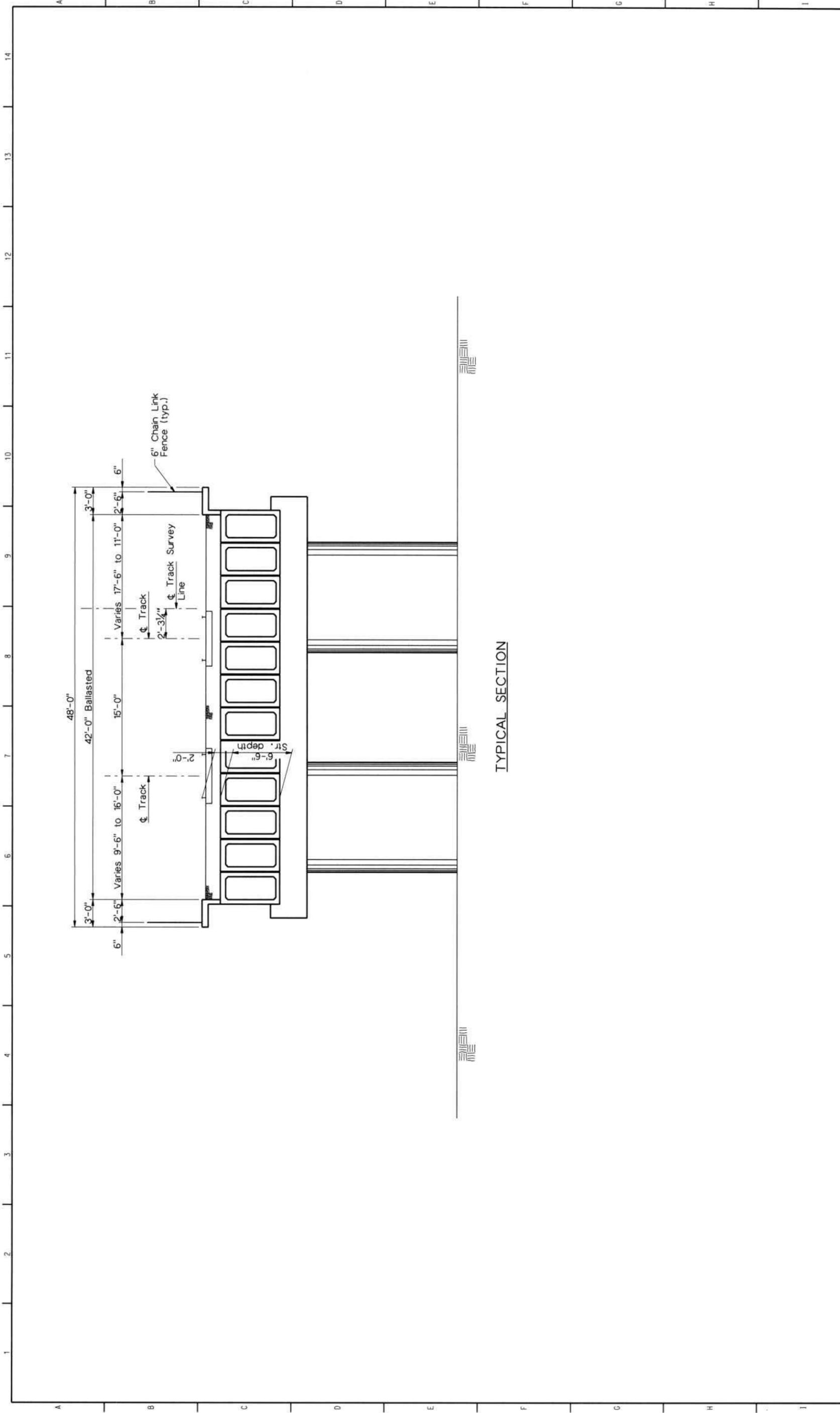
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the New Pueblo Freeway
 COLORADO DEPARTMENT OF TRANSPORTATION
 REGION 2

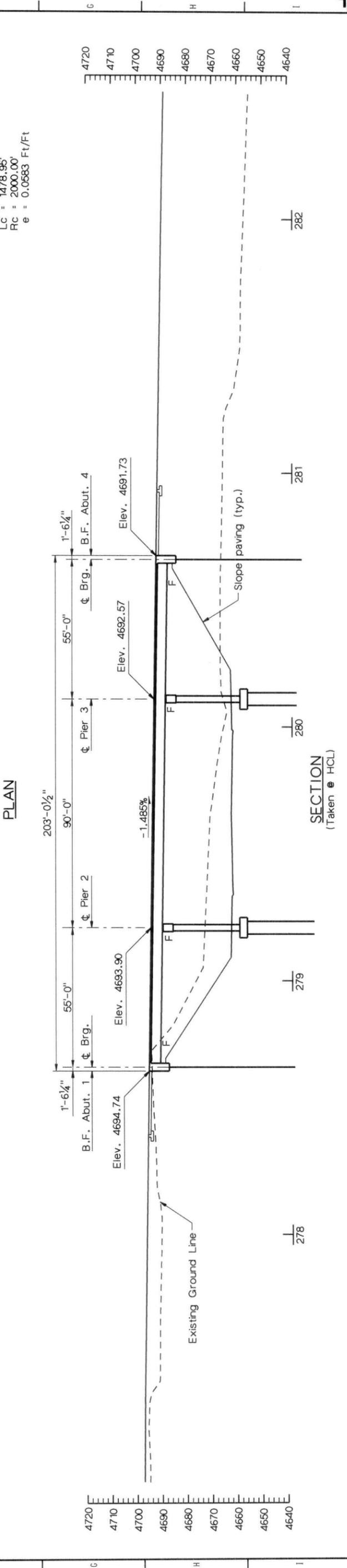


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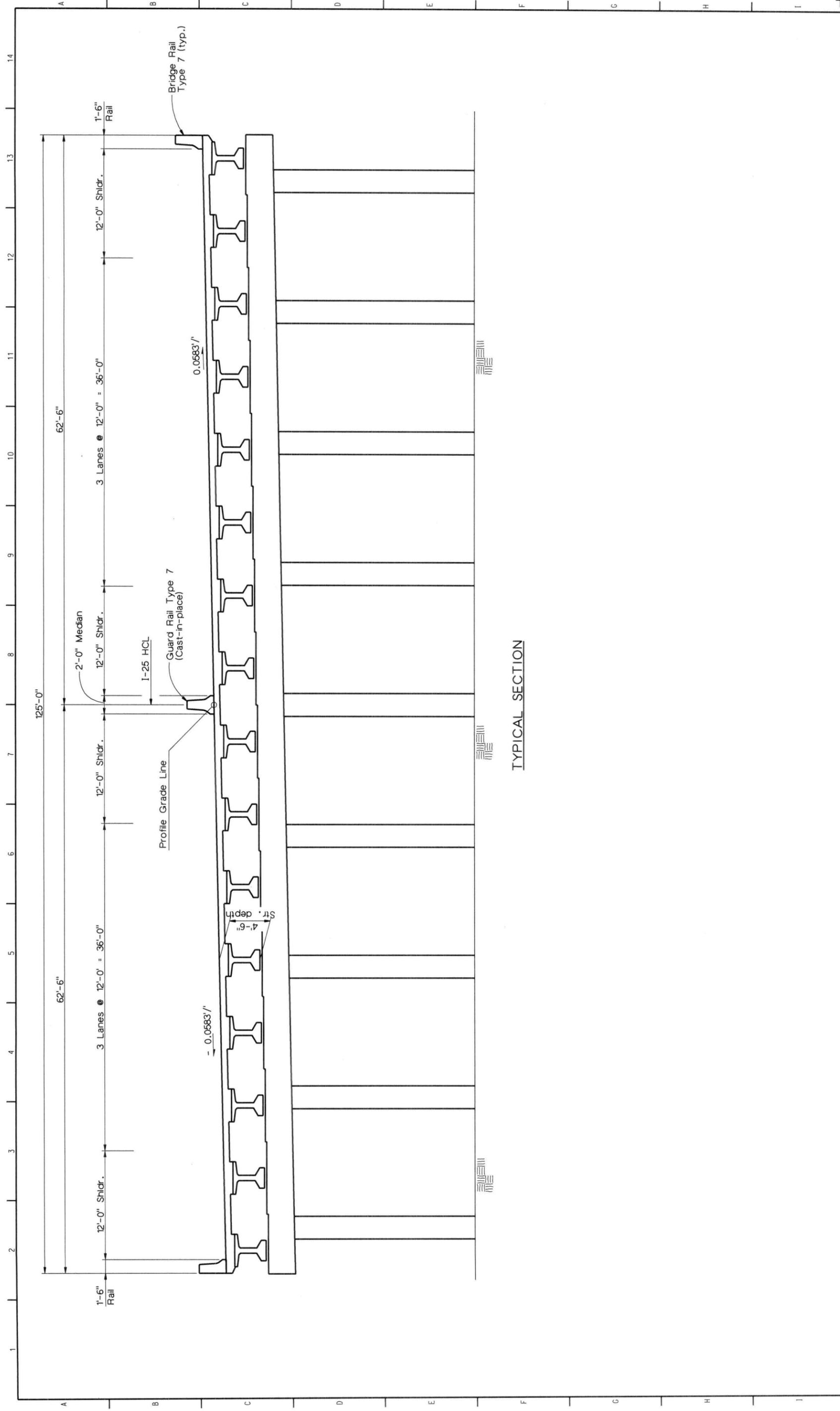


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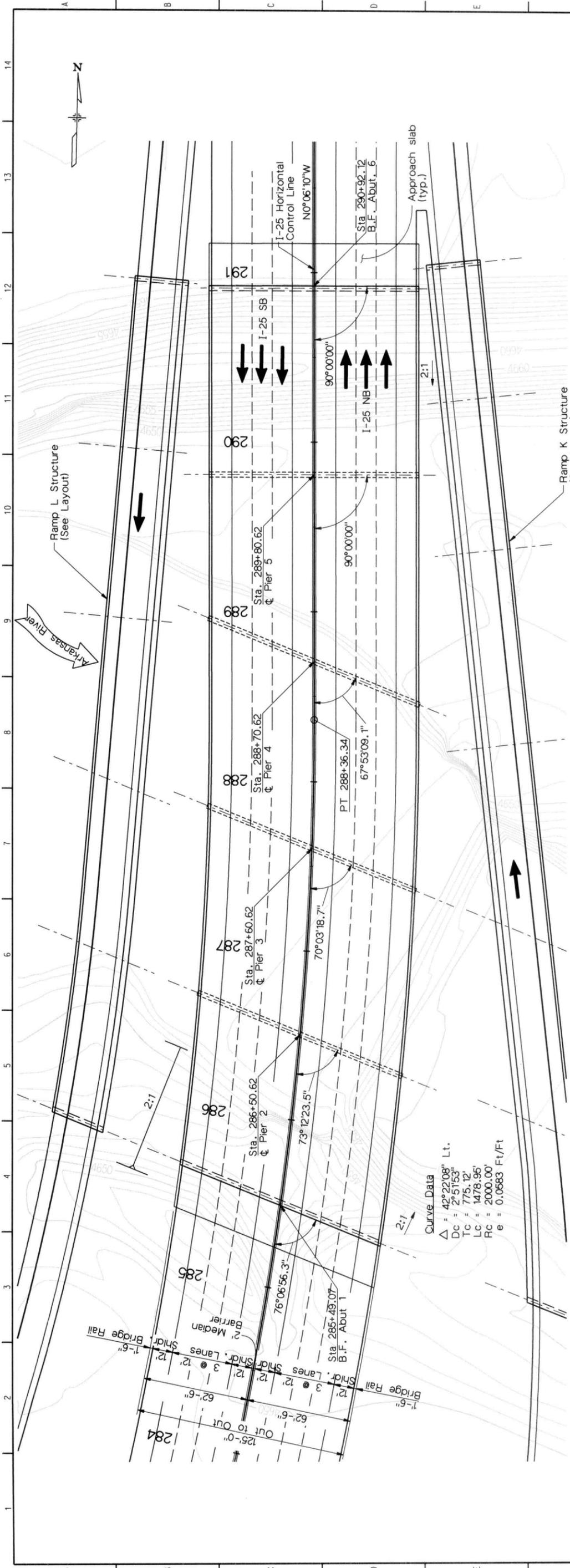
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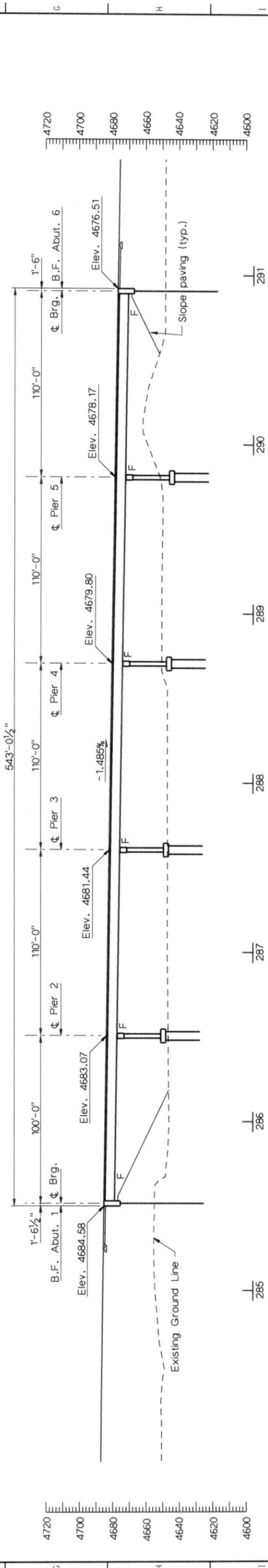
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Computer File Information		Index of Revisions		Basic Engineering		Project No./Code	
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Last Modification Date:	/ /	Initials:		Revised:	/ /	I-25 OVER SANTA FE DR.	
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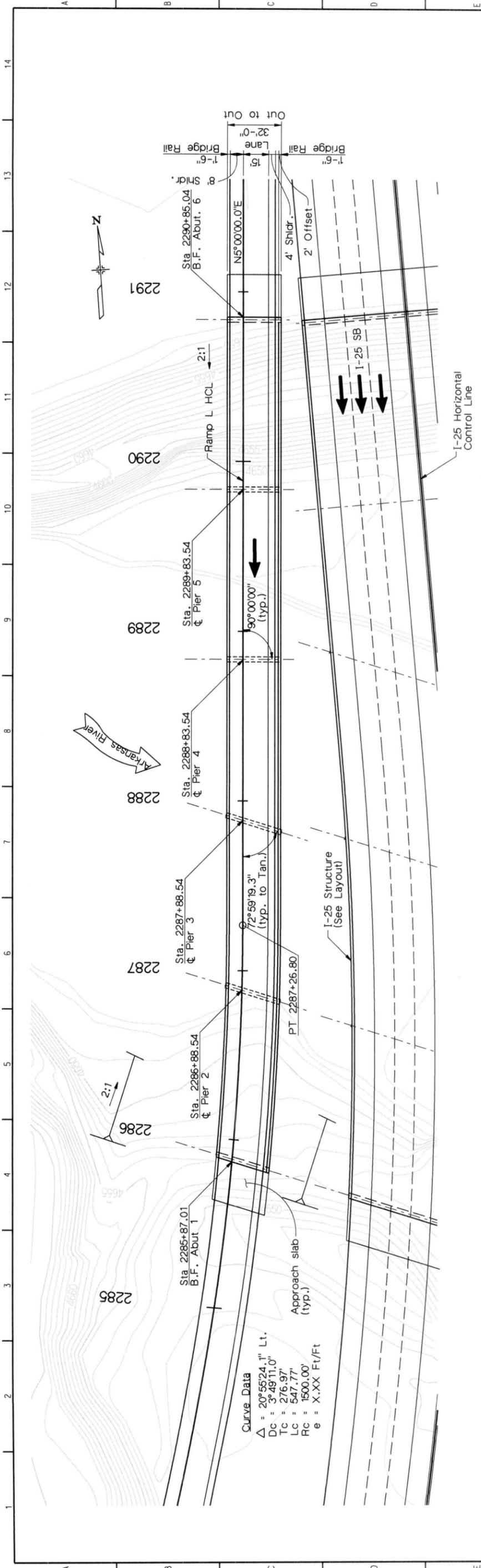


PLAN

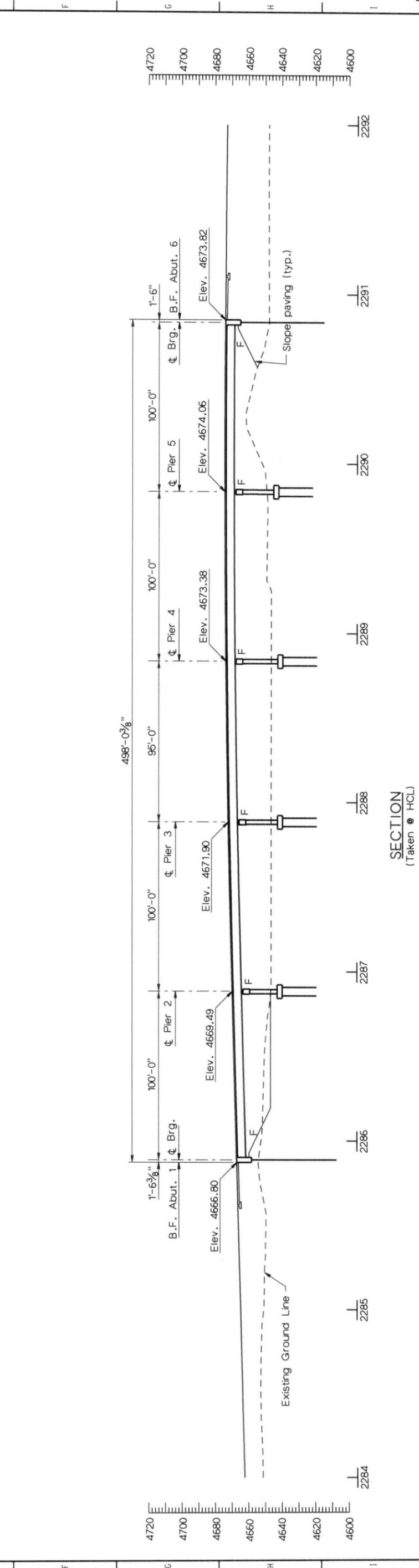


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(Taken @ HCL)

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Last Modification Date:	/ /	Initials:	/ /	Revised:	/ /	I-25 OVER ARKANSAS RIVER	
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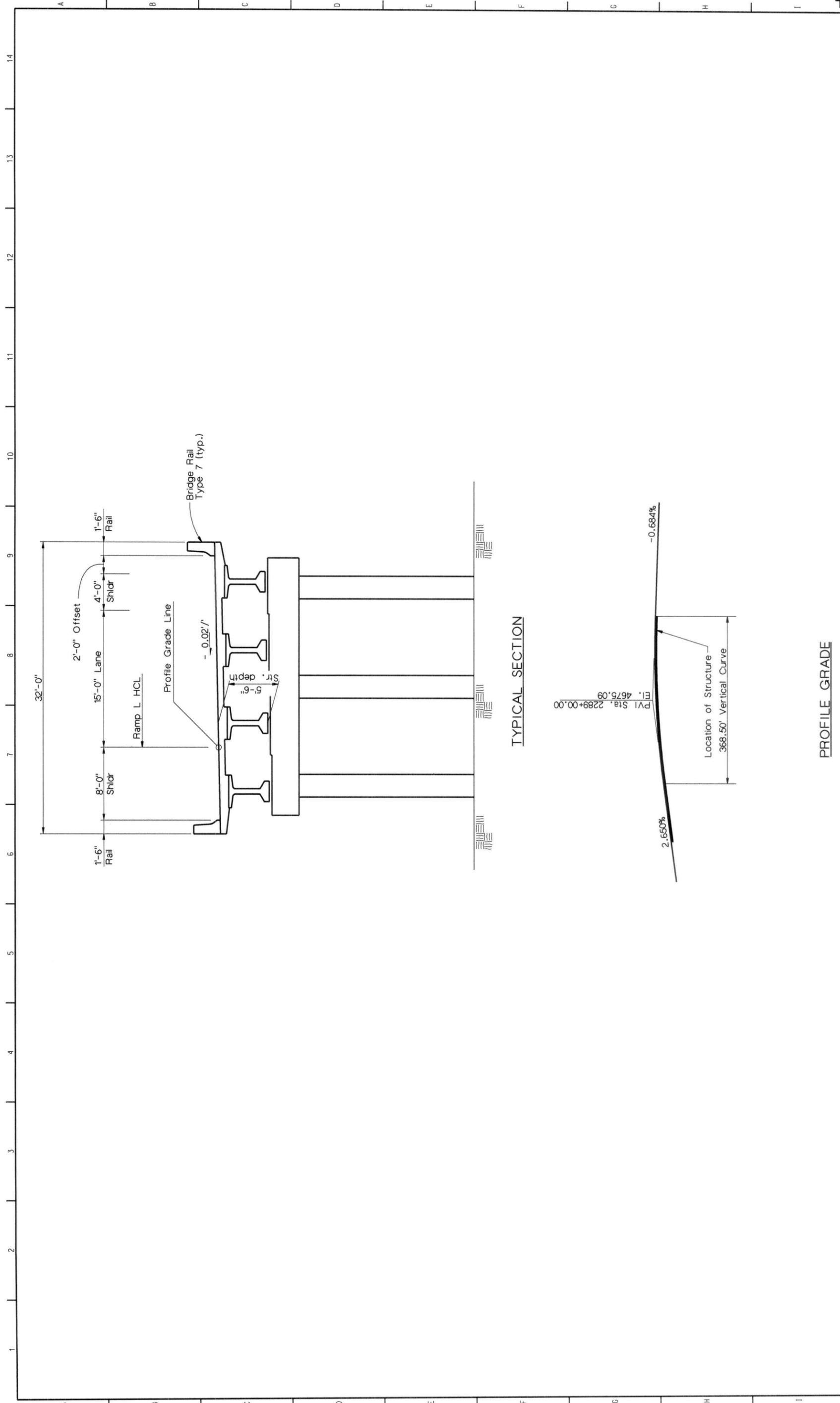


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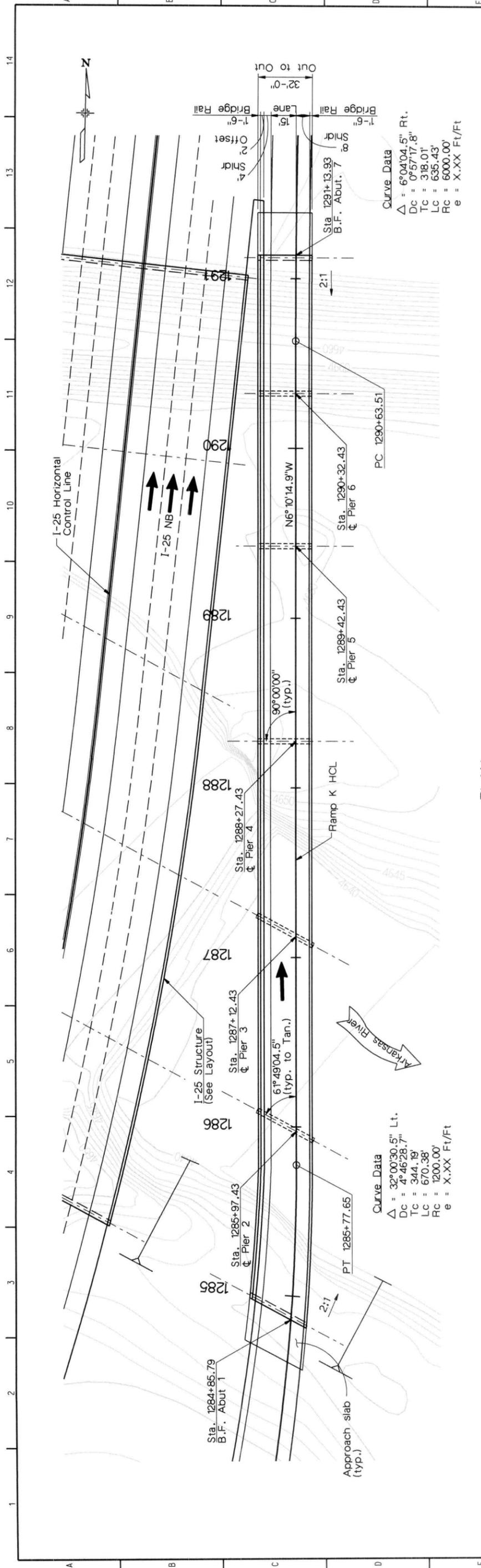
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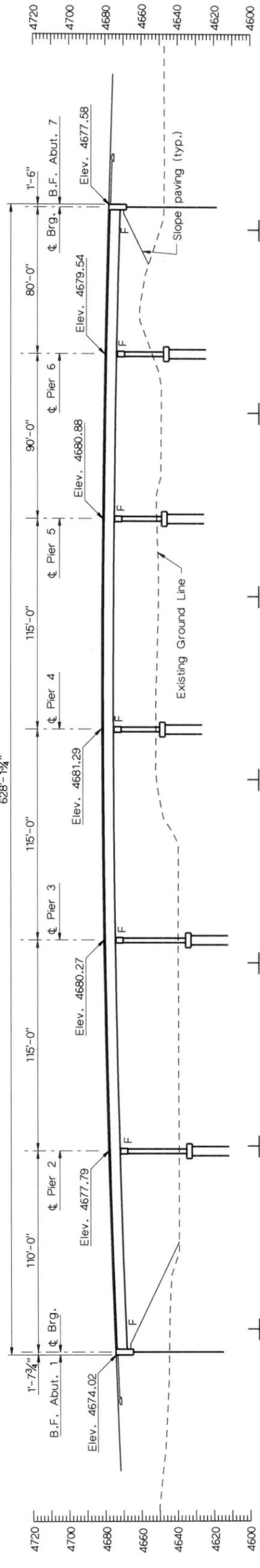
TYPICAL SECTION

PROFILE GRADE

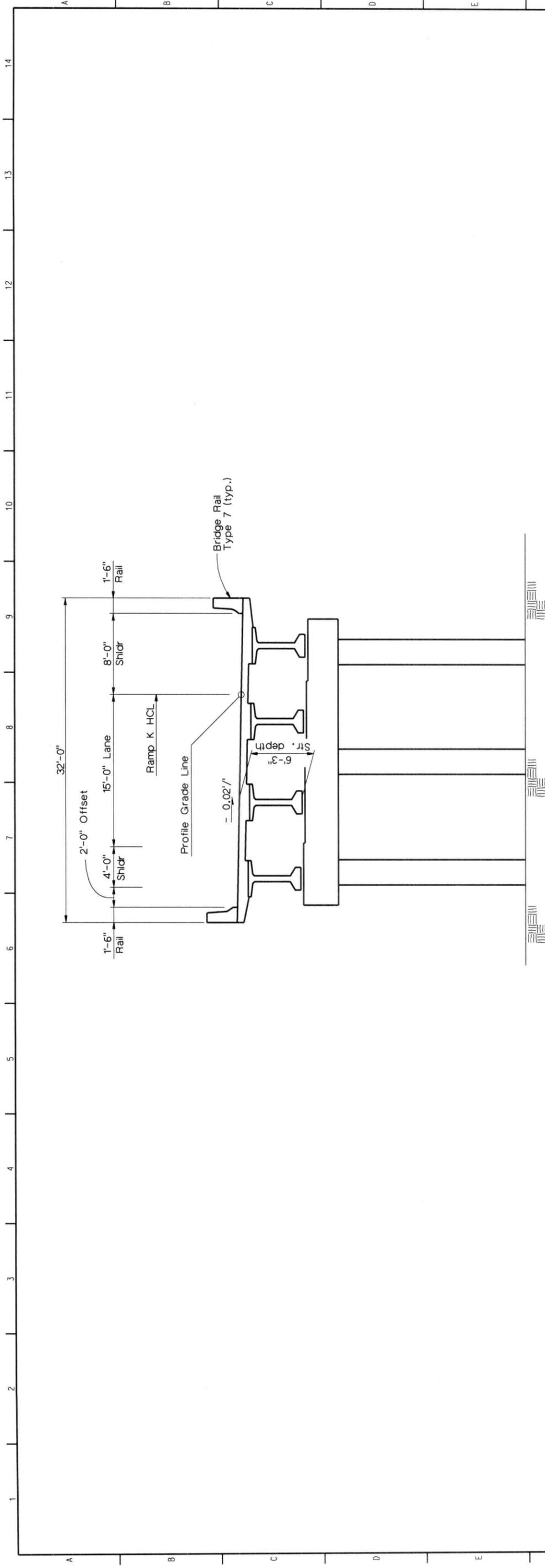
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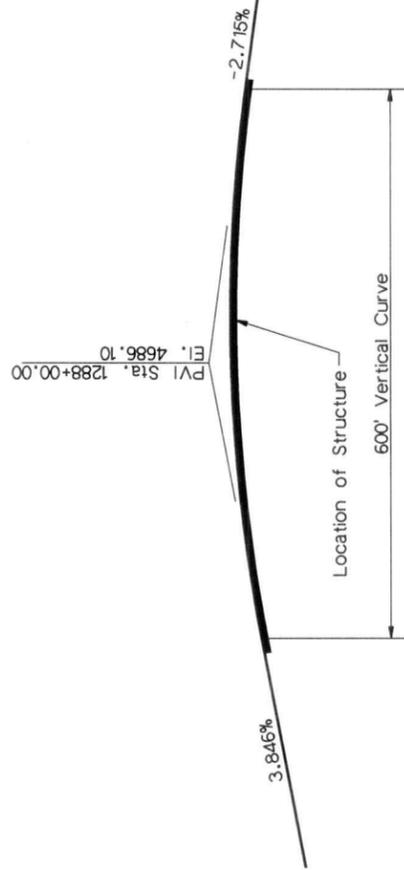
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Computer File Information		Index of Revisions		Basic Engineering		RAMP K OVER ARKANSAS RIVER		Project No./Code	
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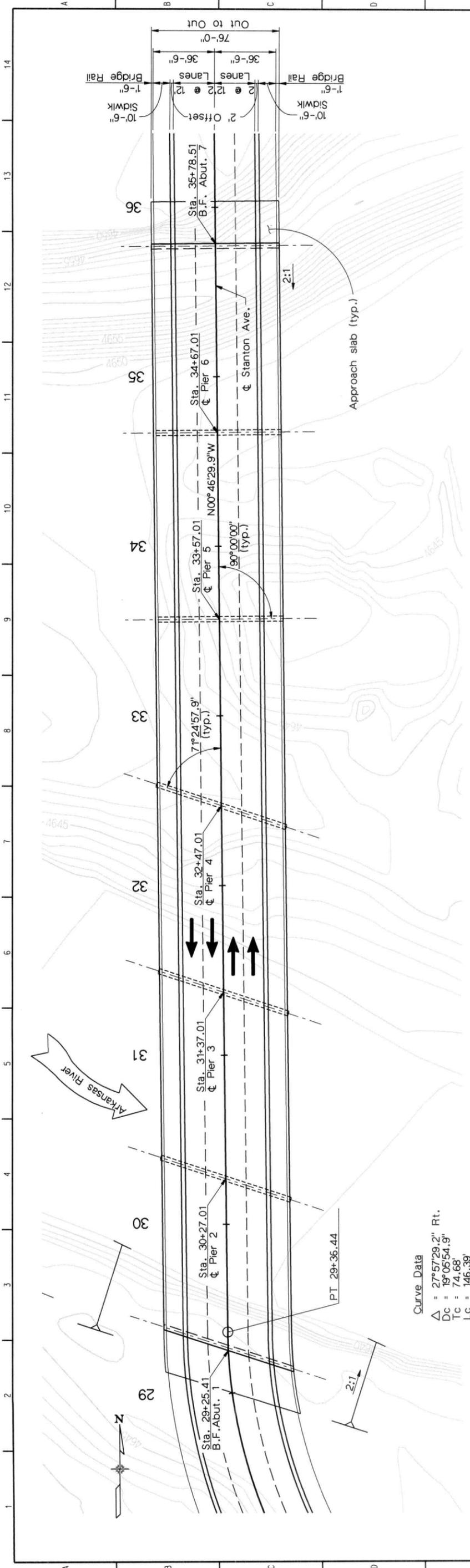


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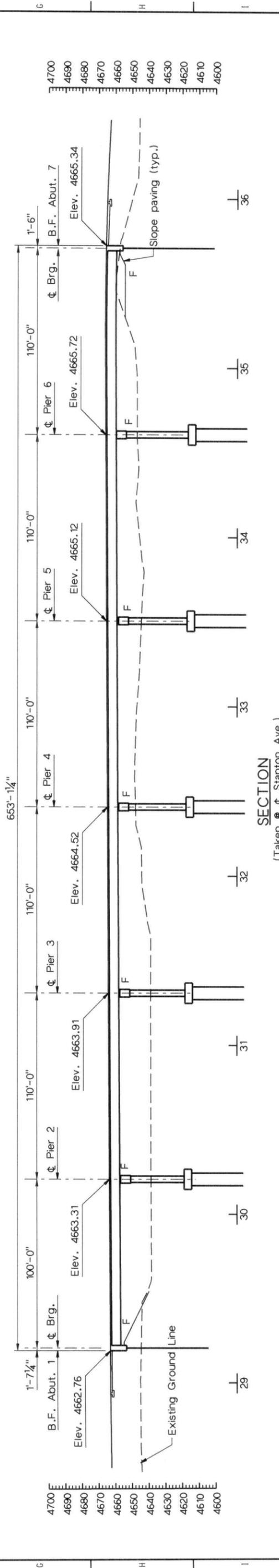


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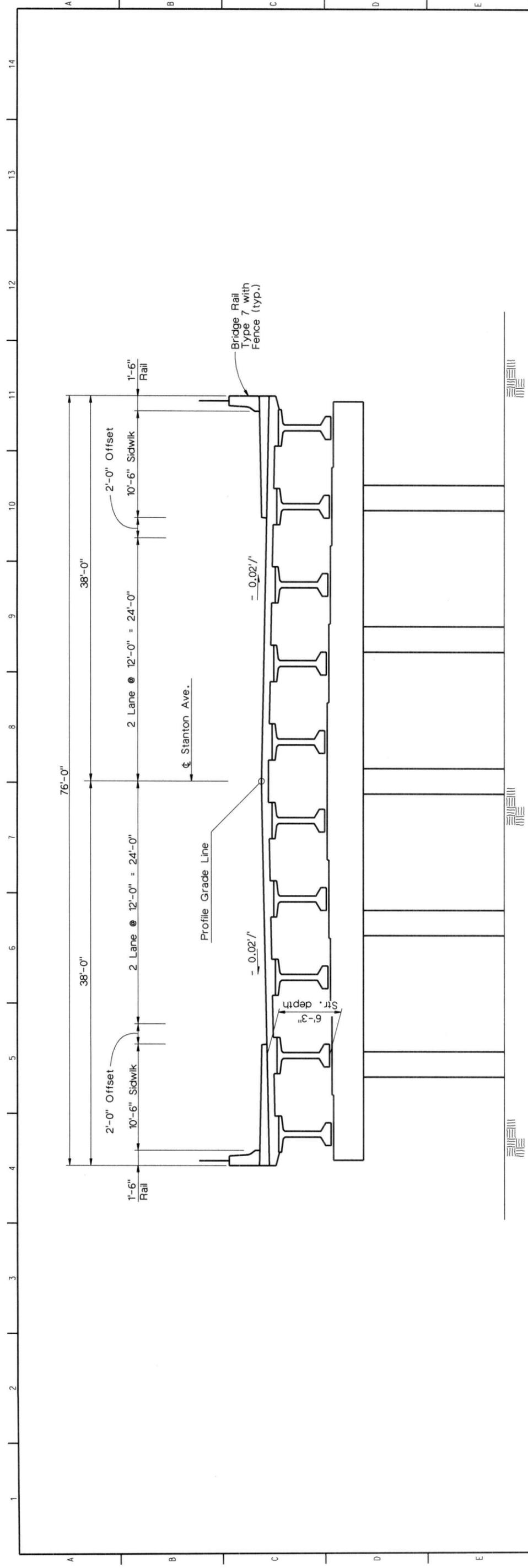
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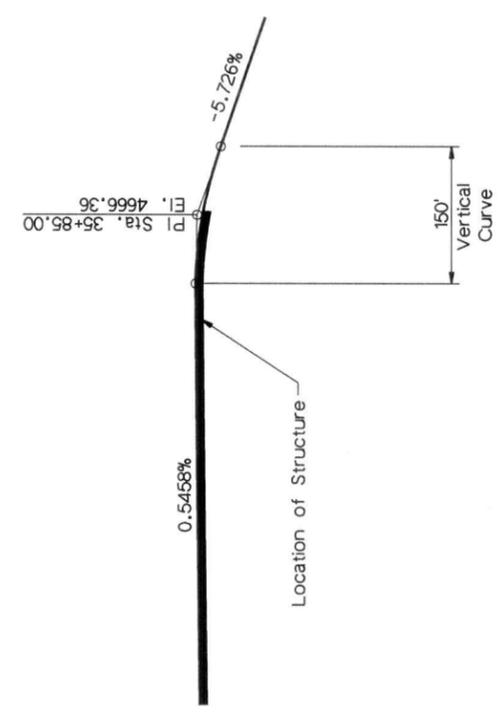
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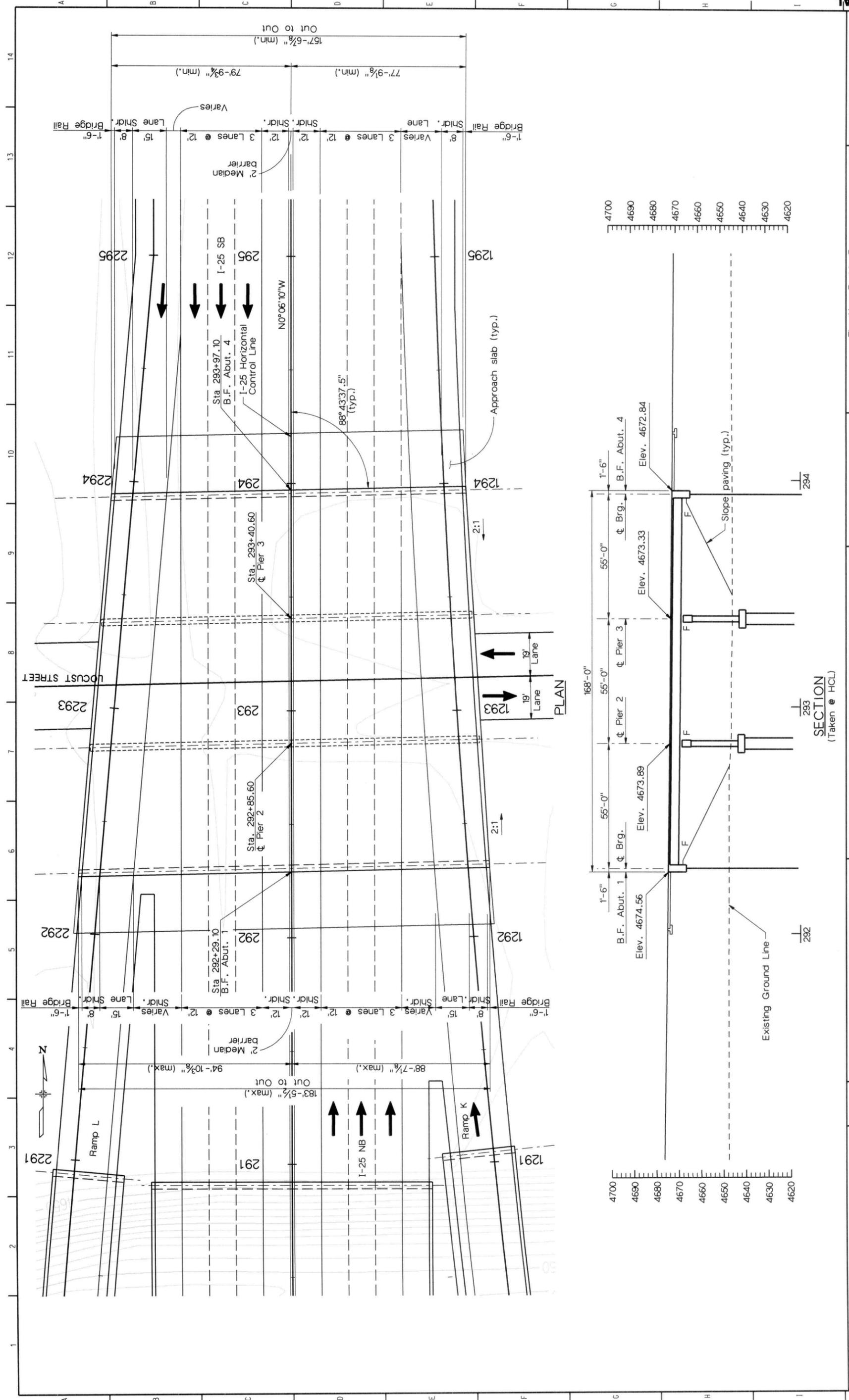


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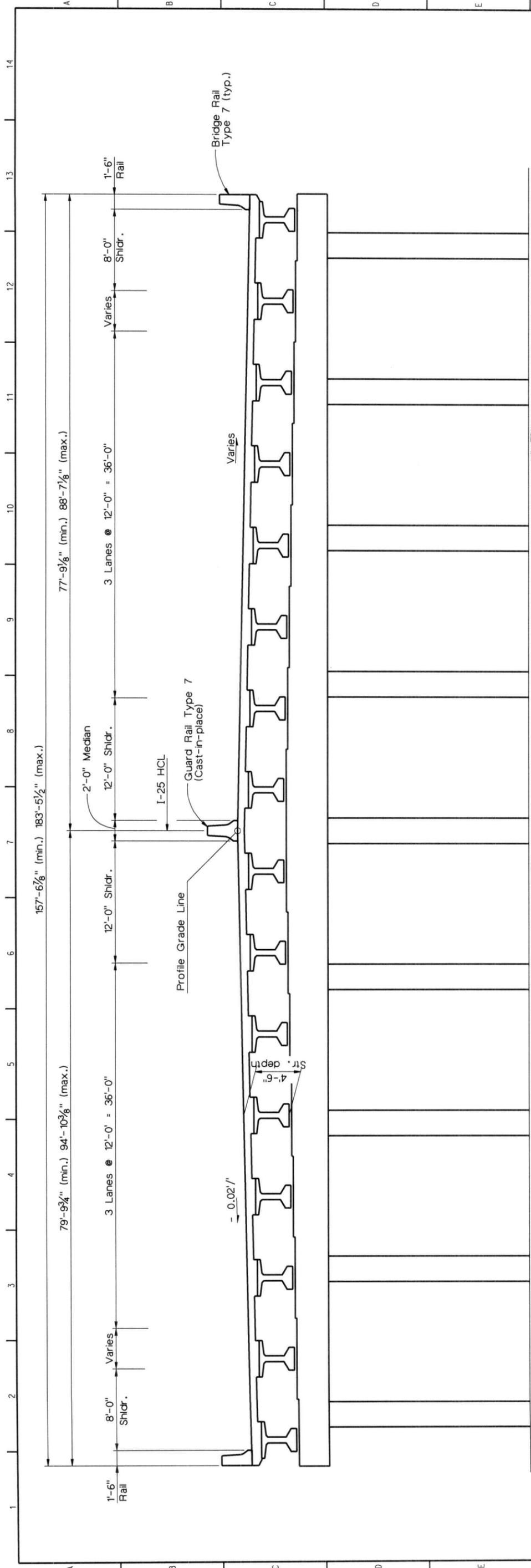


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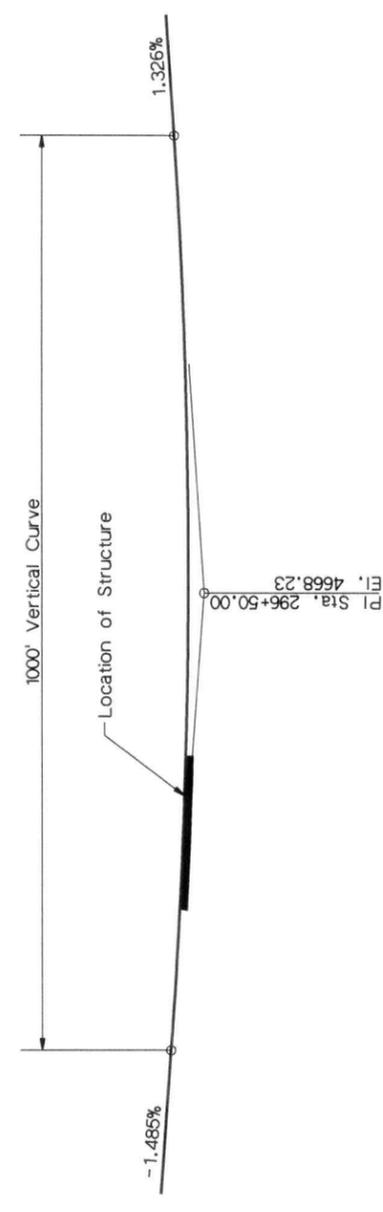
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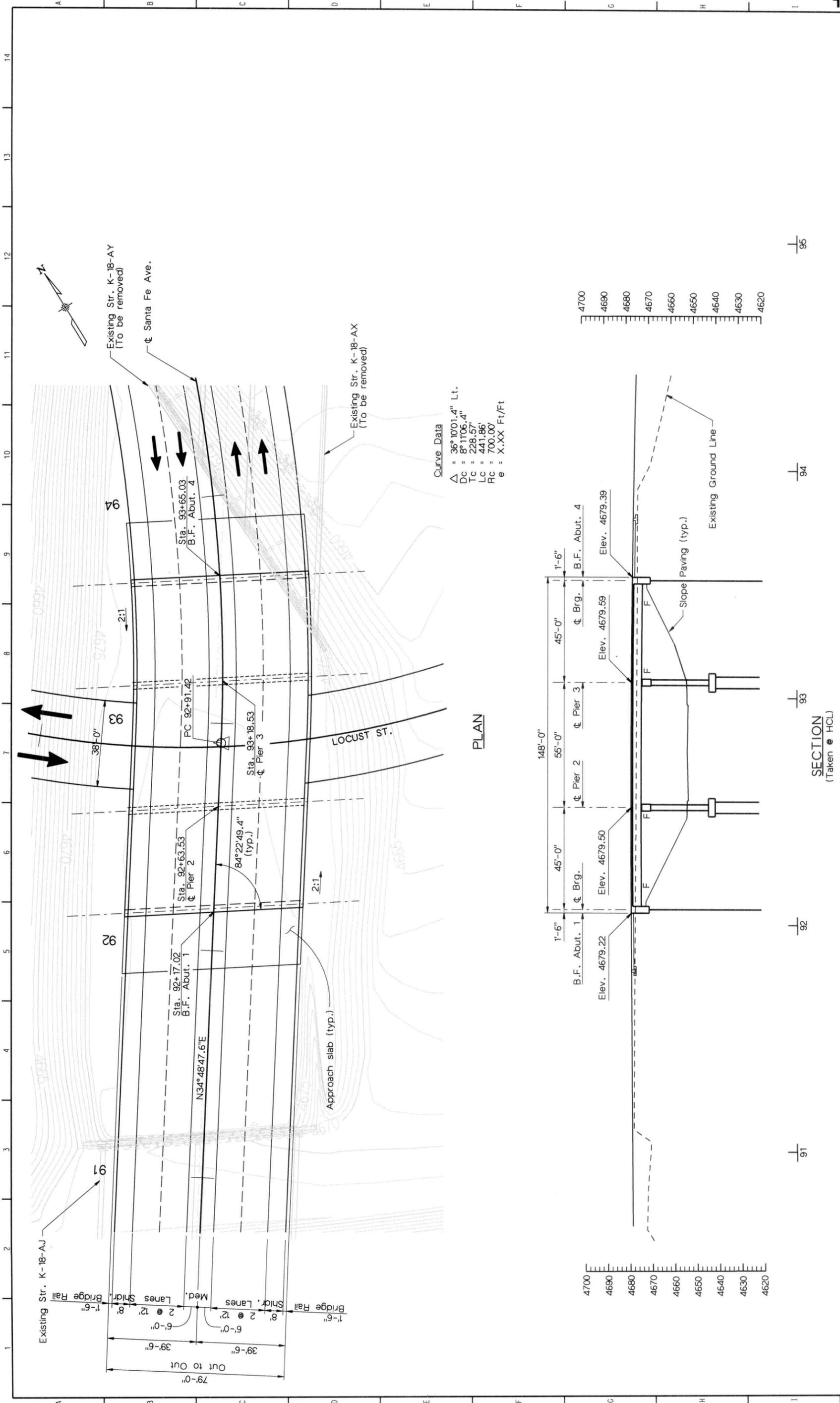


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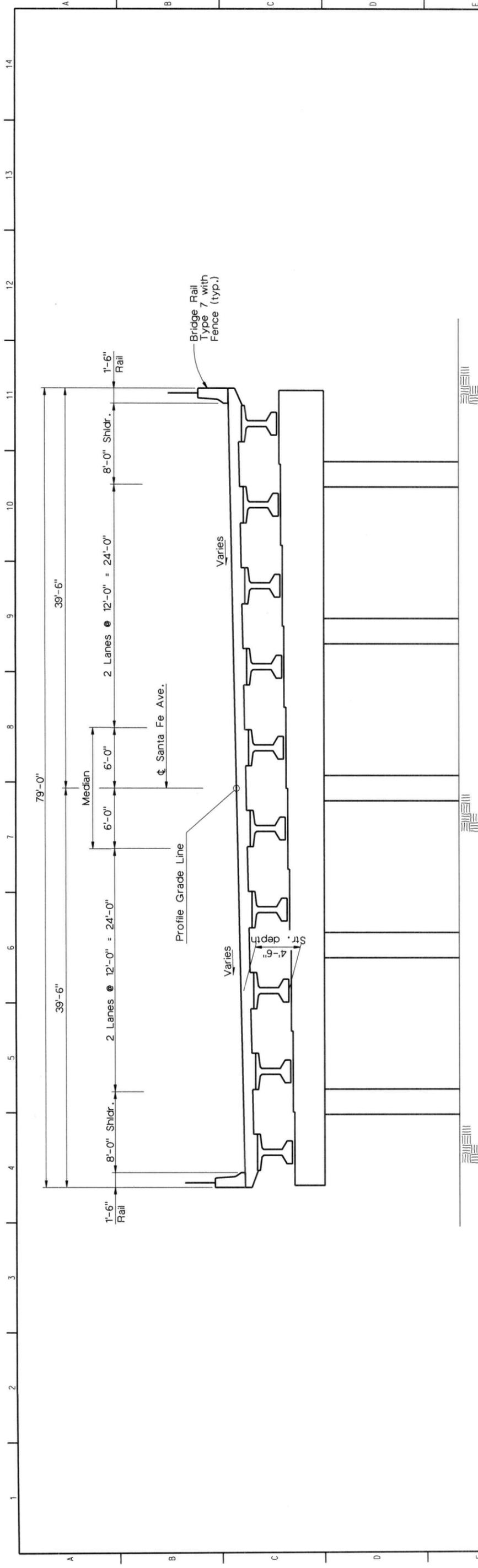


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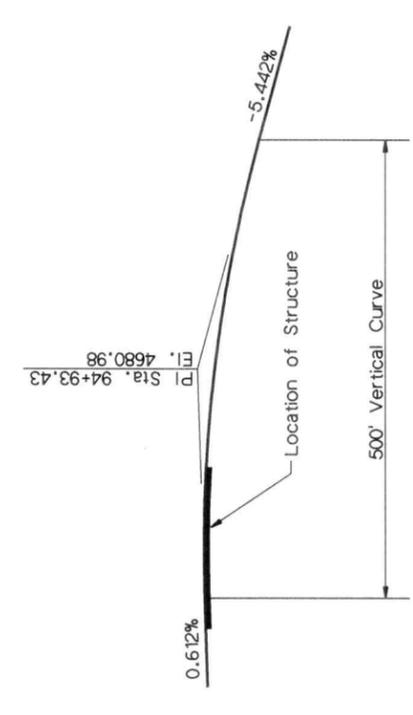
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25th New Pueblo Freeway COLORADO DEPARTMENT OF TRANSPORTATION REGION 2		Subsets: of 12 29-JAN-2007		13		14																		



Computer File Information		Index of Revisions		Basic Engineering		Project No./Code	
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TYPICAL SECTION



PROFILE GRADE

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Last Modification Date:	/ / Initials:
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25th New Pueblo Freeway

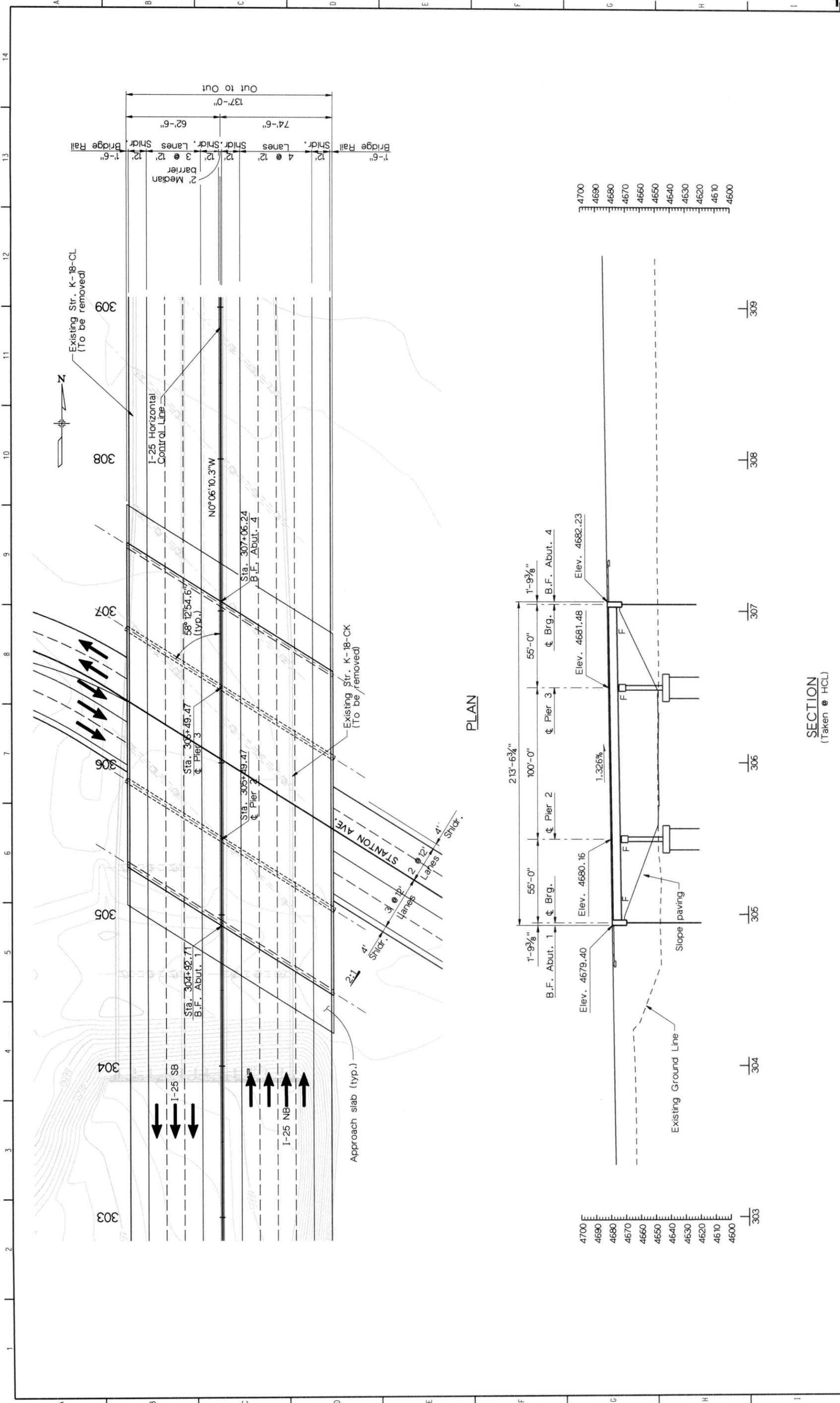
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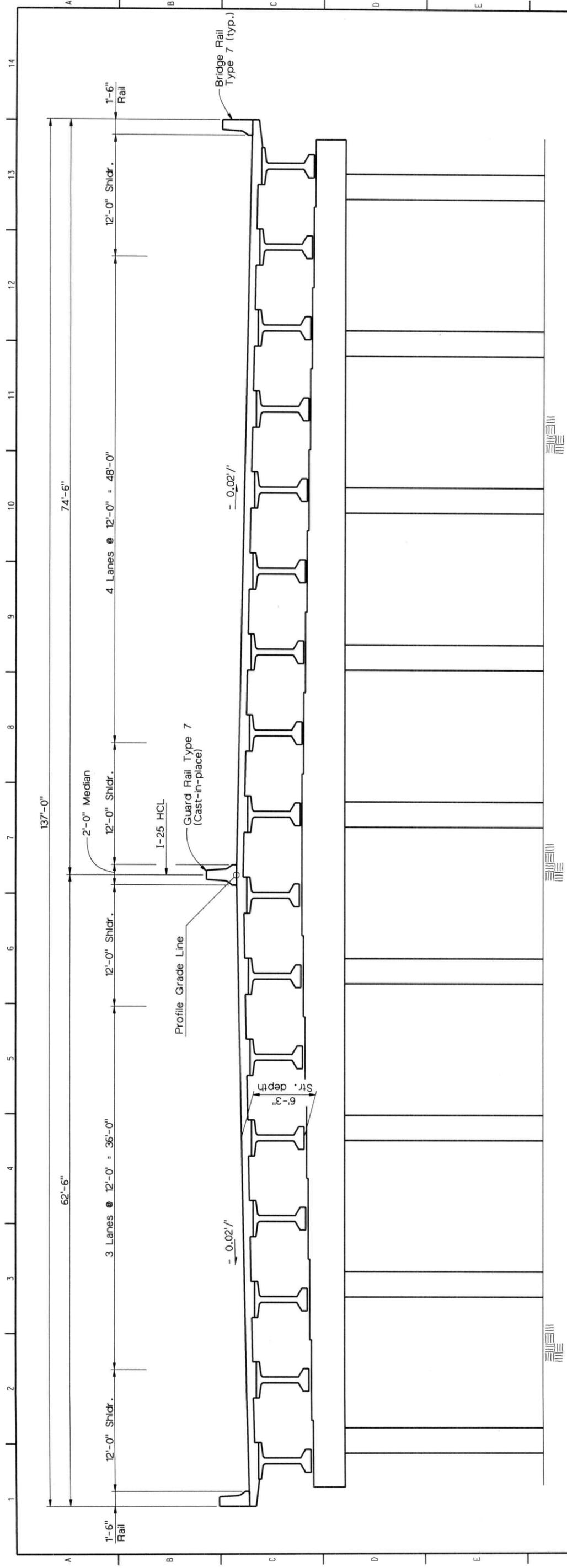
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Detailer:	K. Heater
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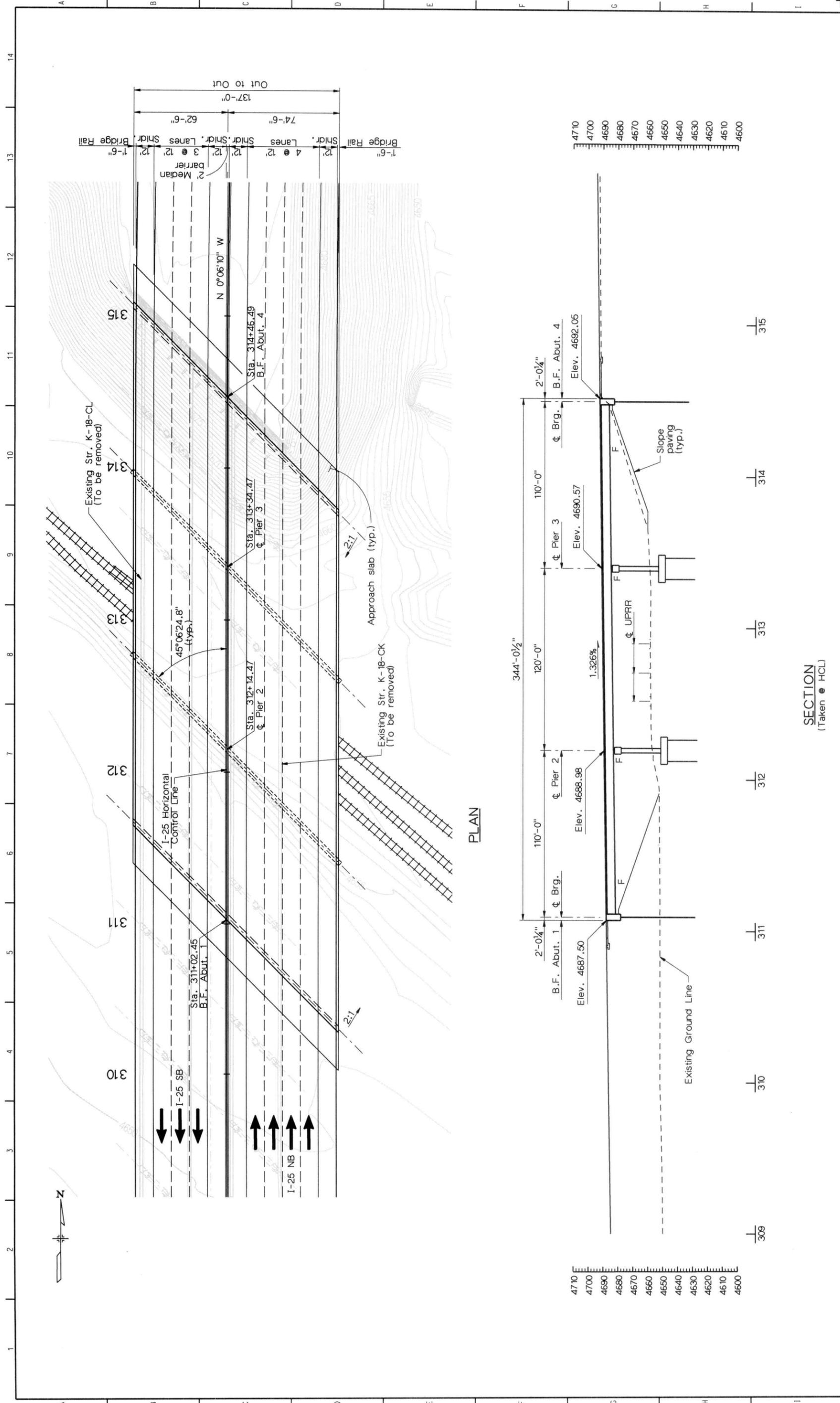
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Structure Numbers	128.31
Sheet Number	14



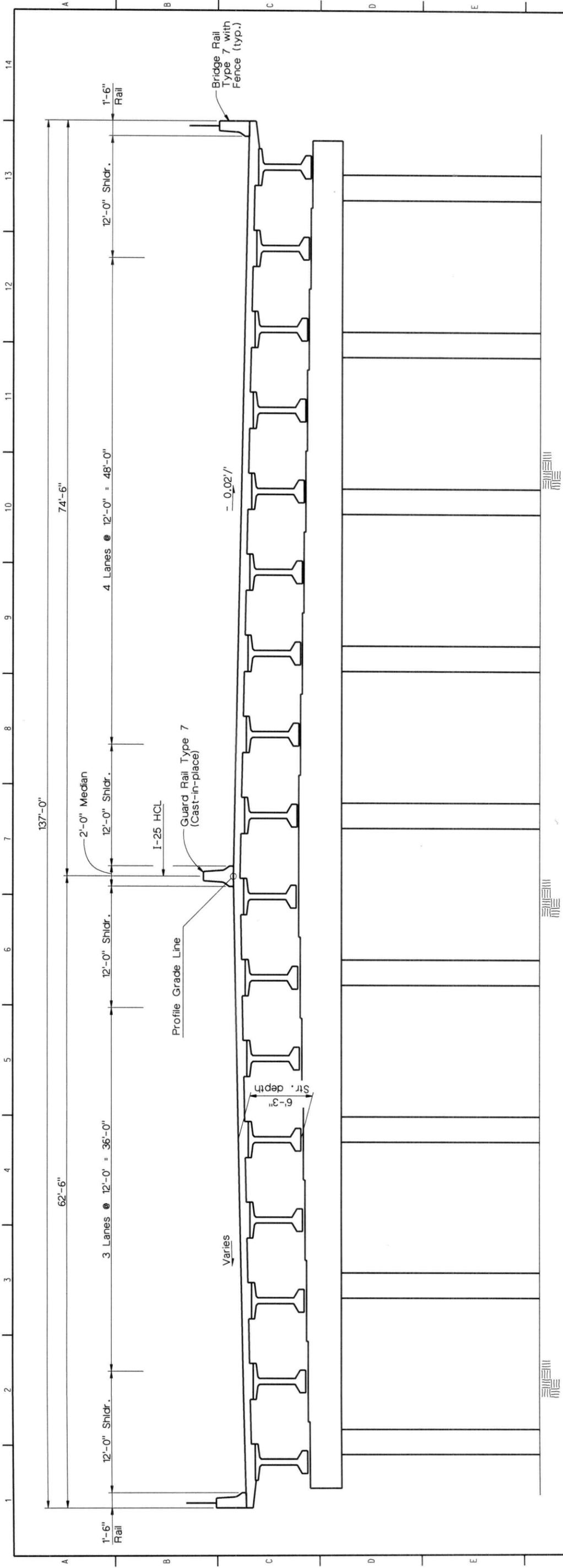


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Designer: J. Rohner Detailer: K. Heater Sheet Subset: / / of		No Revisions: / / Revised: / / Void: / /		Subsets: / / of		12 29-JAN-2007 13		14 14:35:40 14	

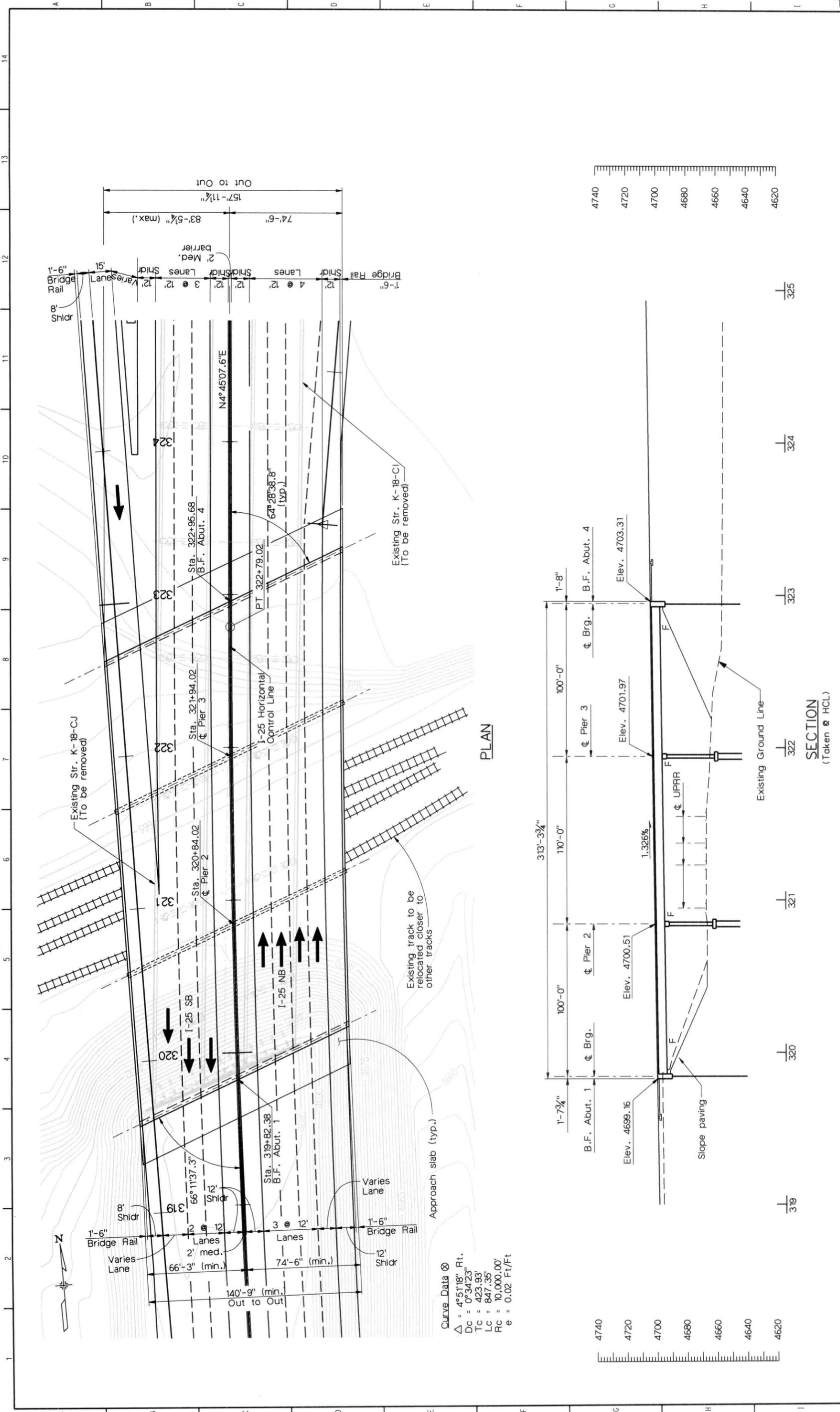


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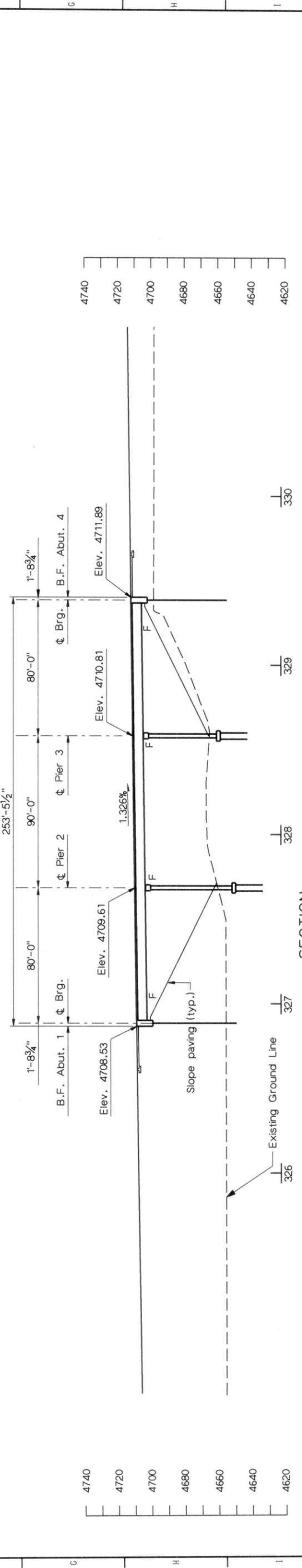
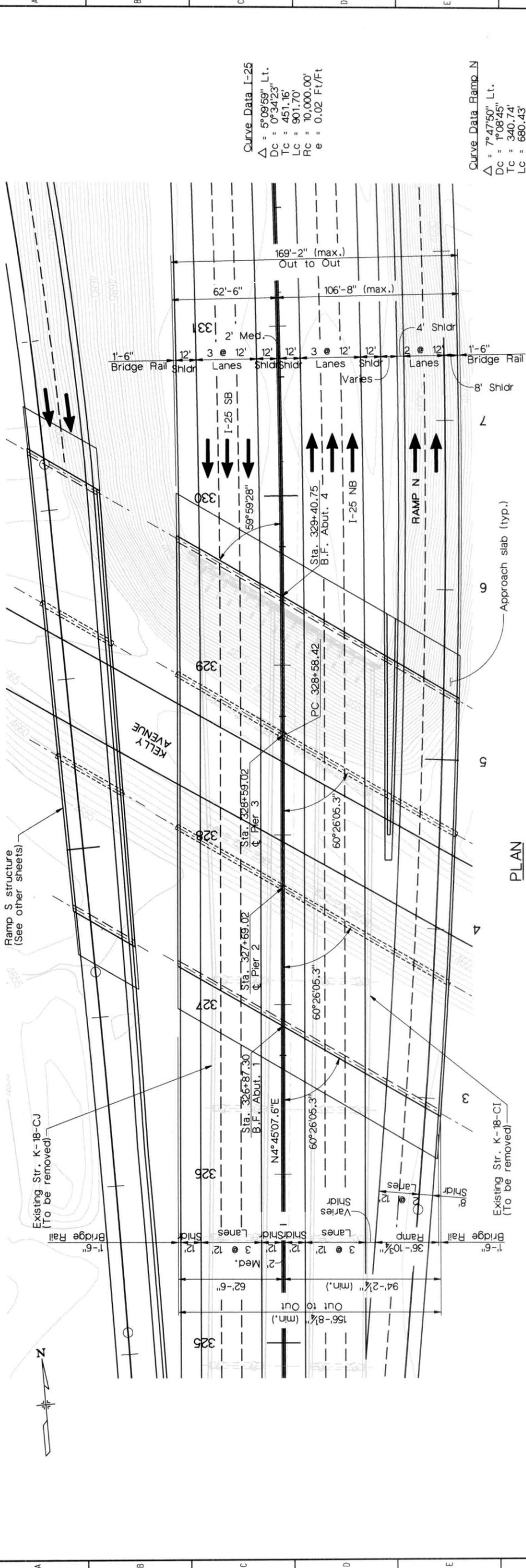
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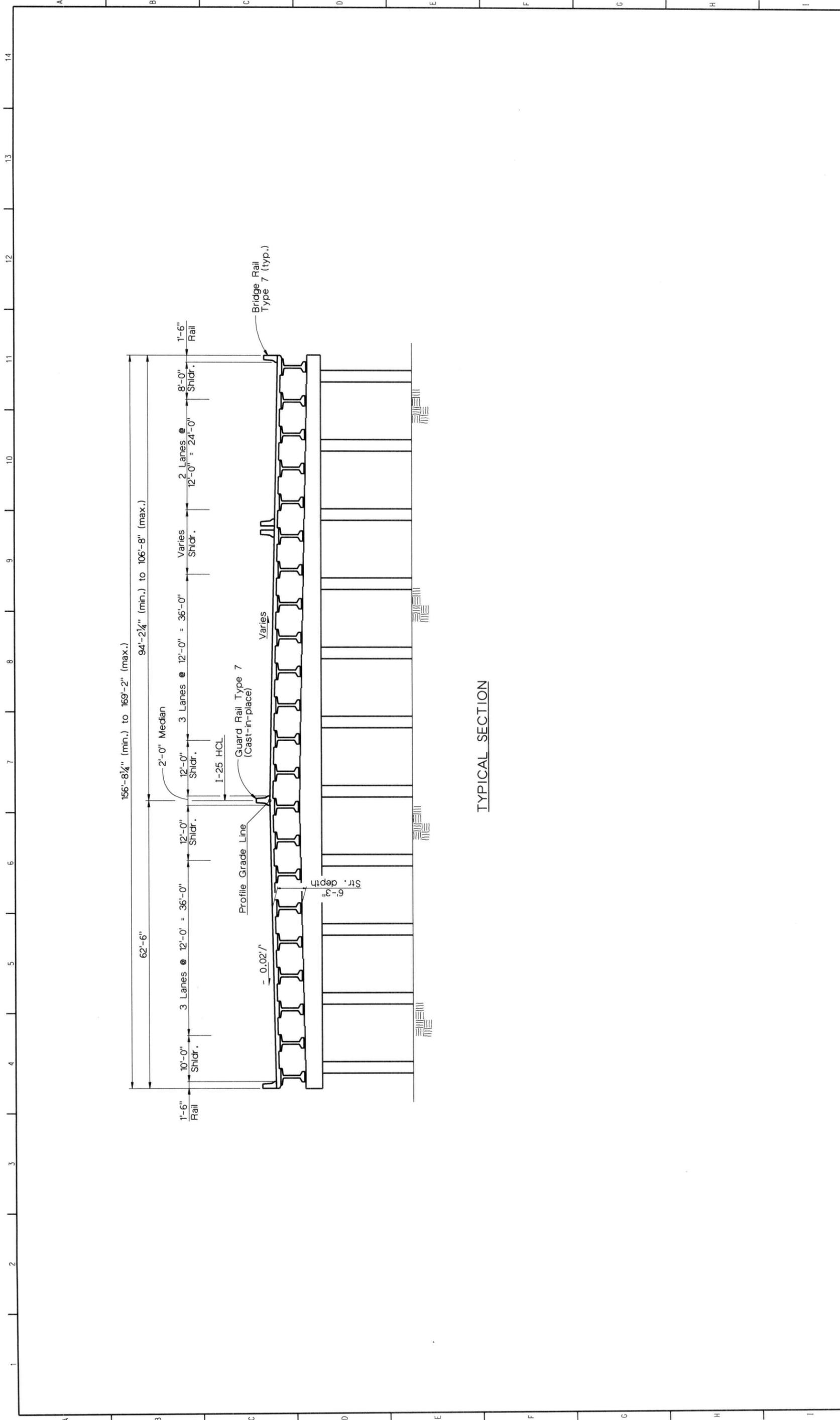


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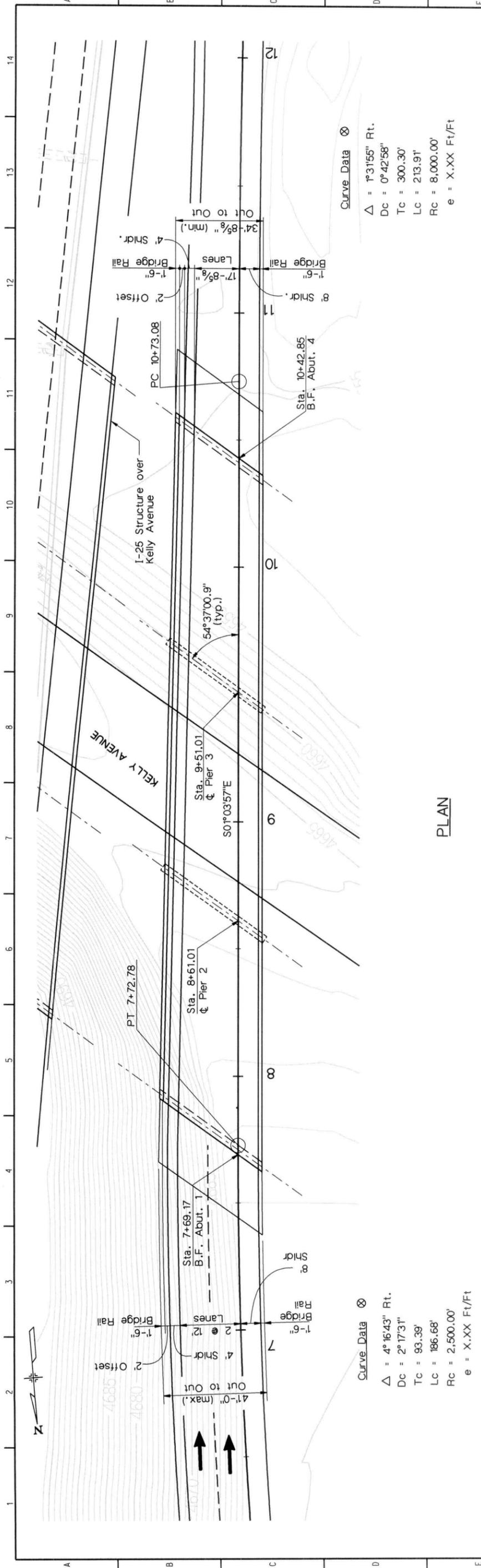


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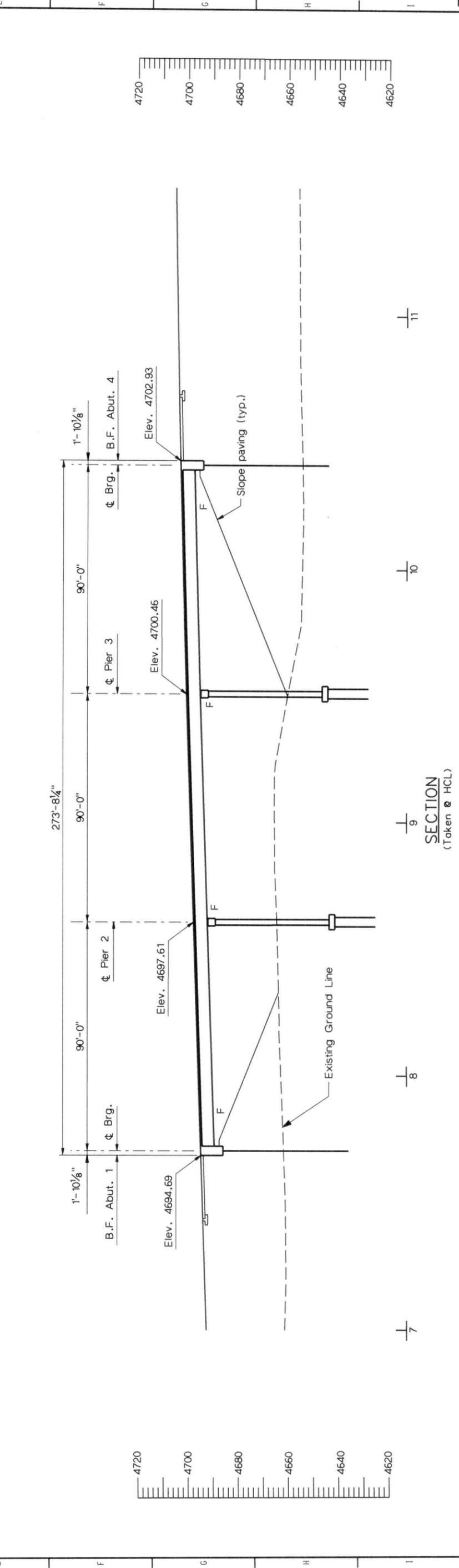


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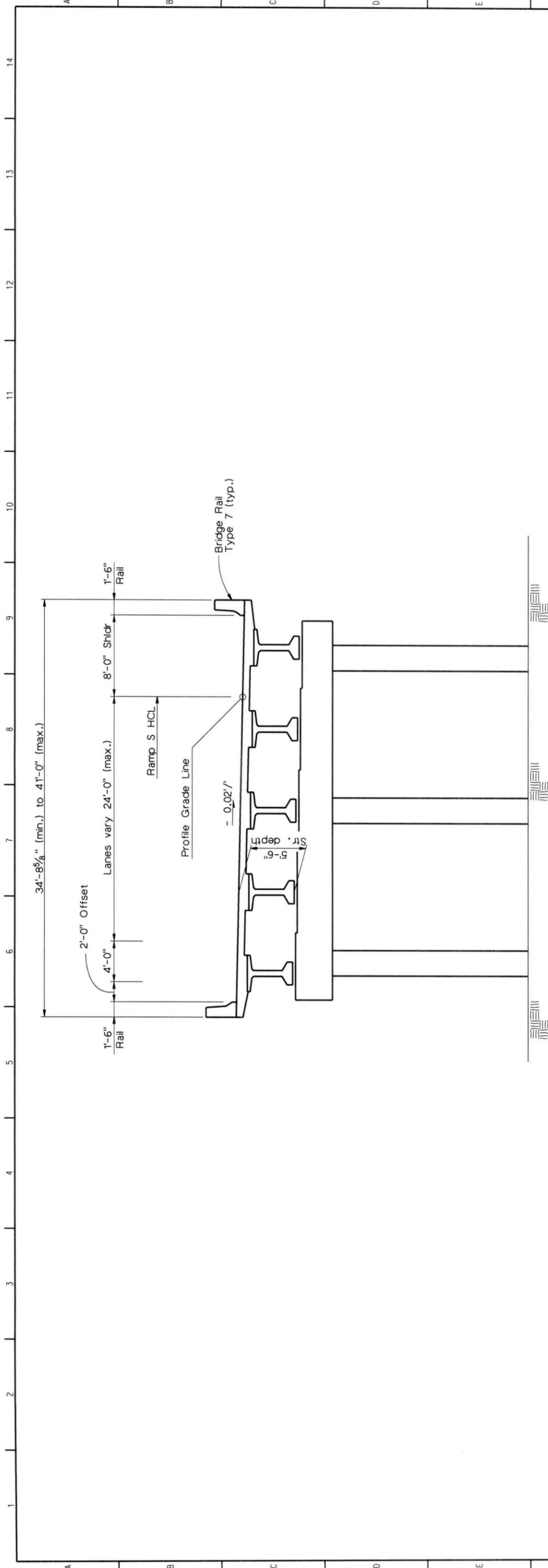
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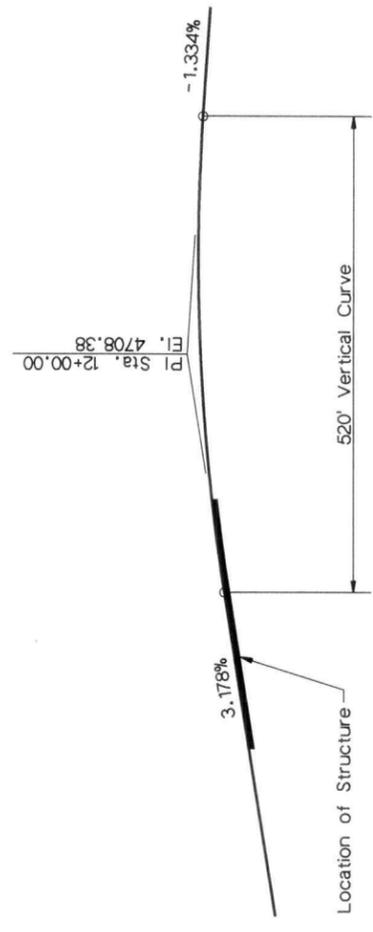
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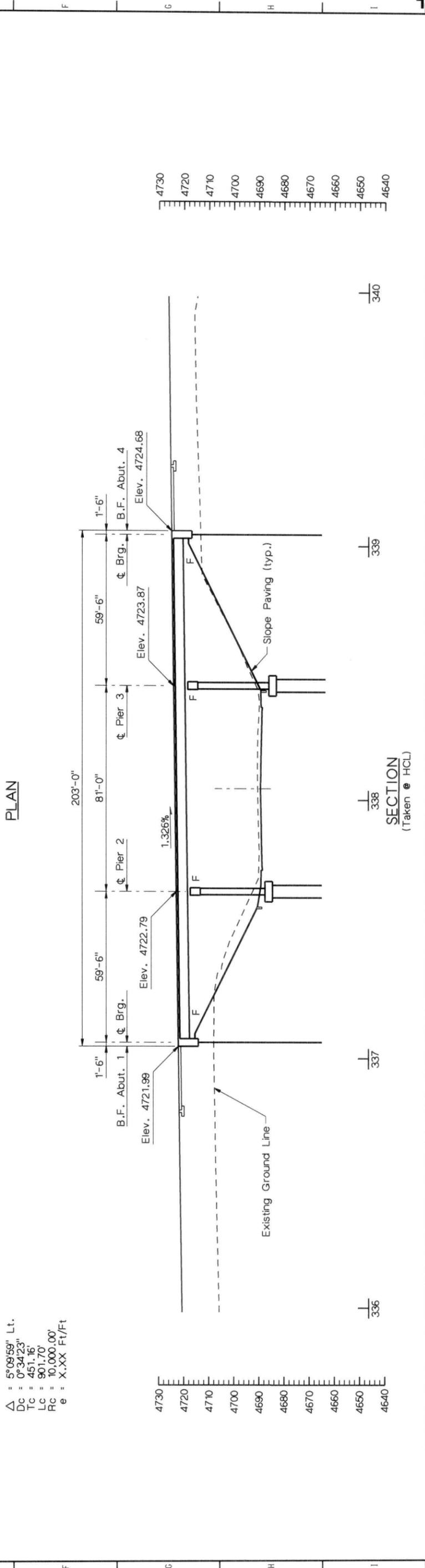
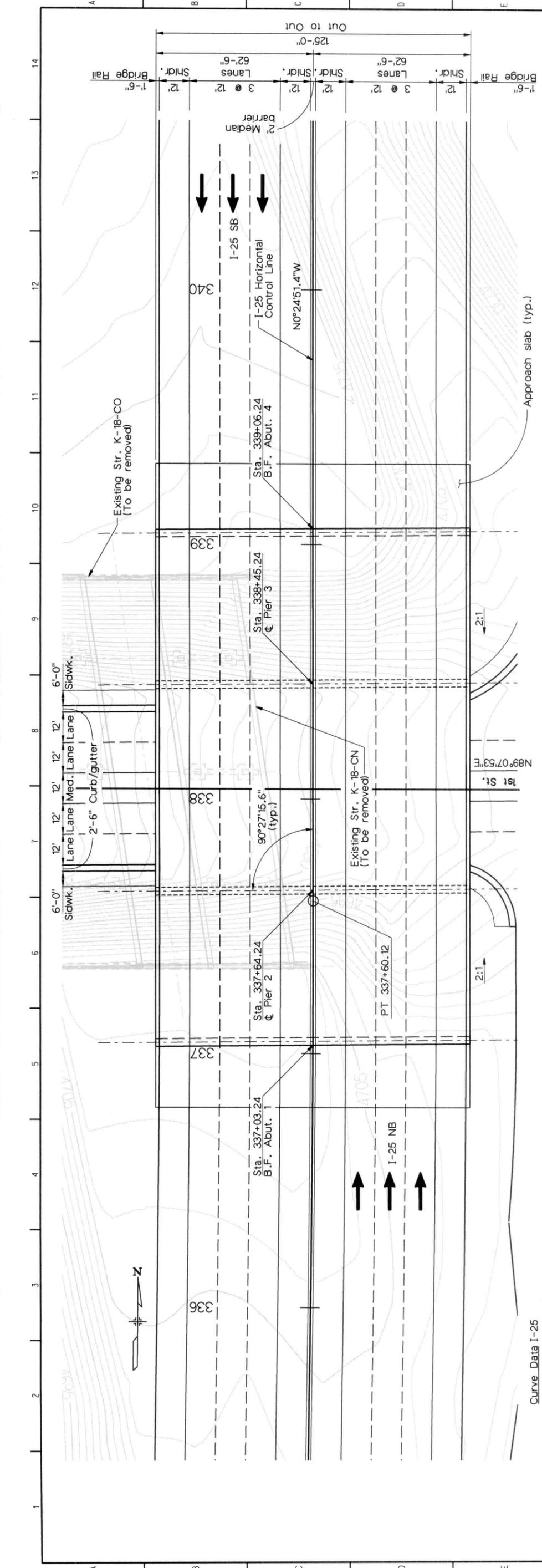


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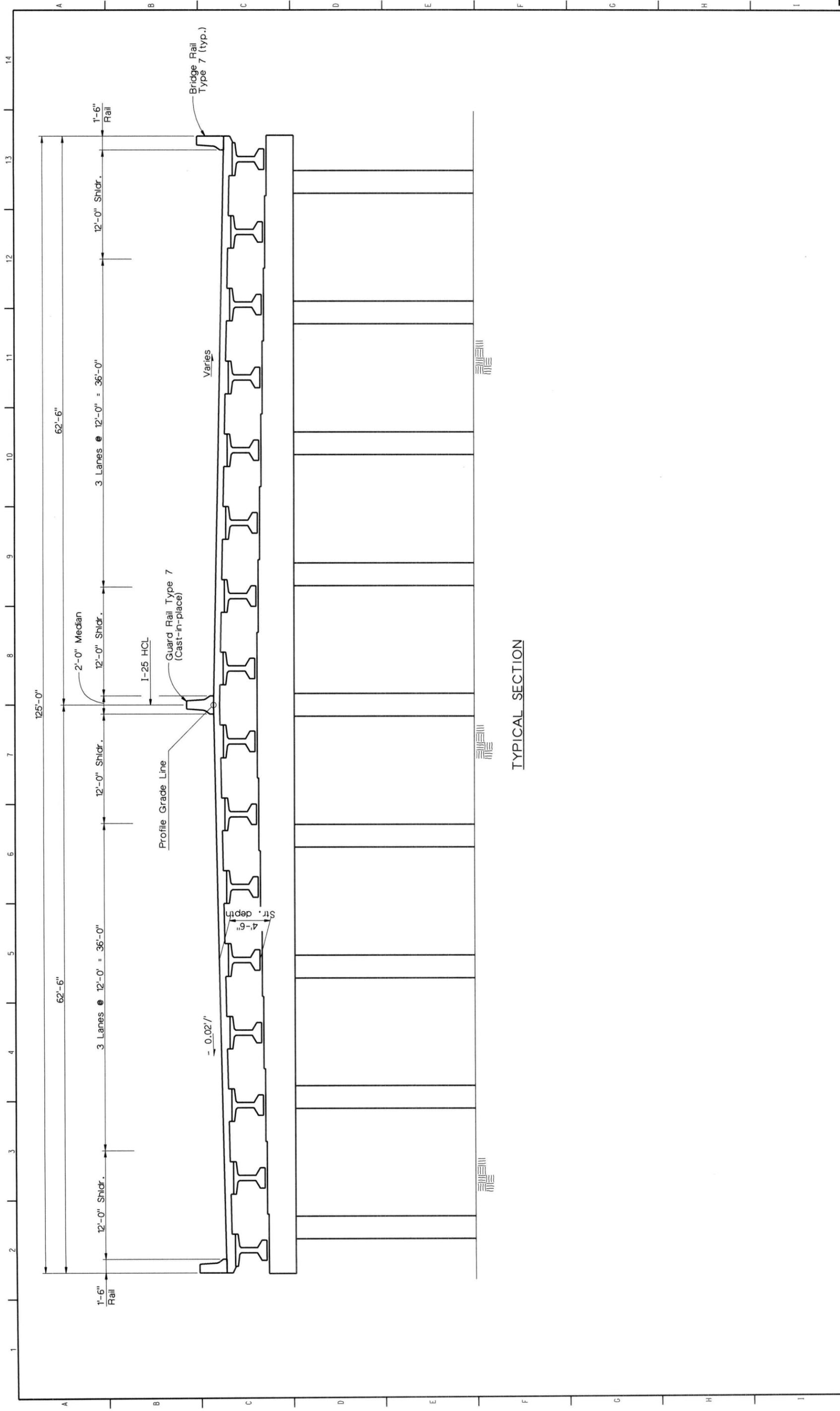


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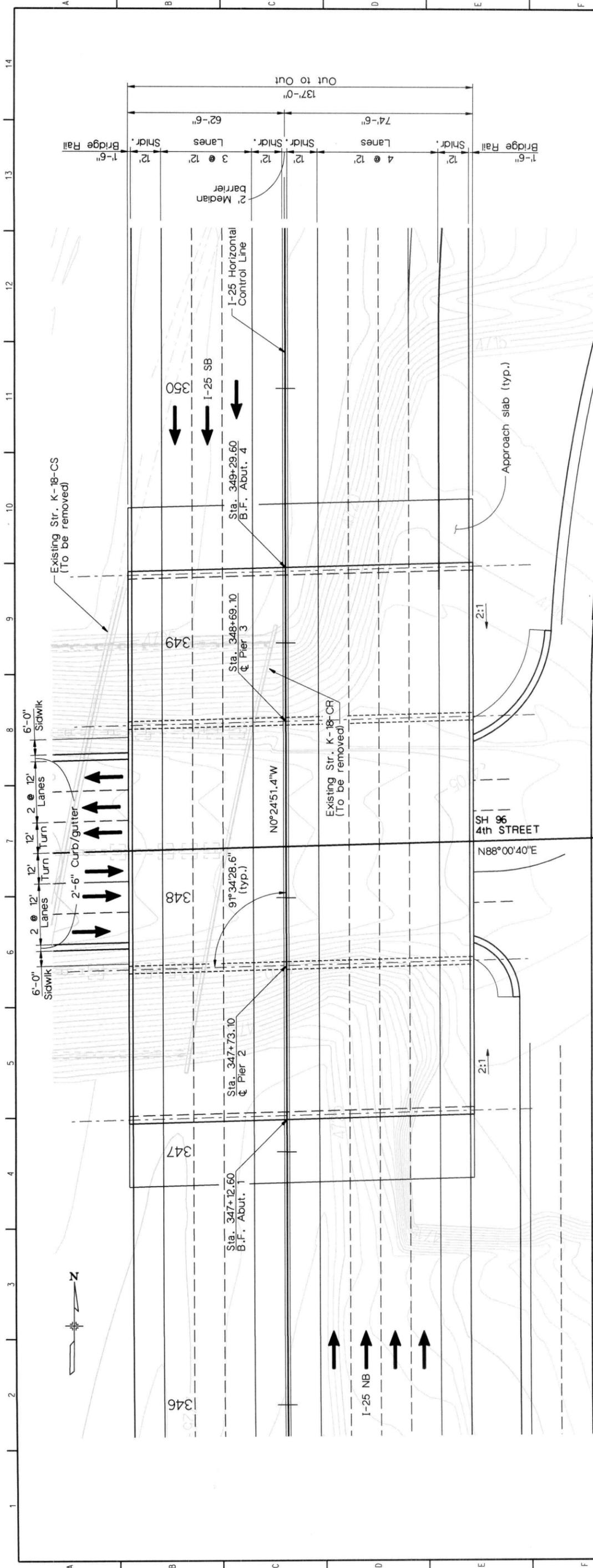


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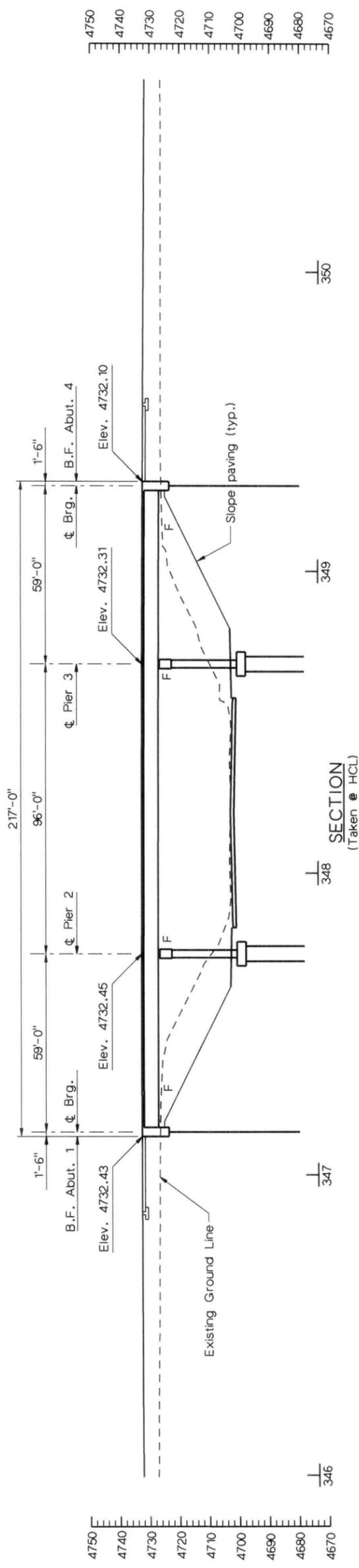


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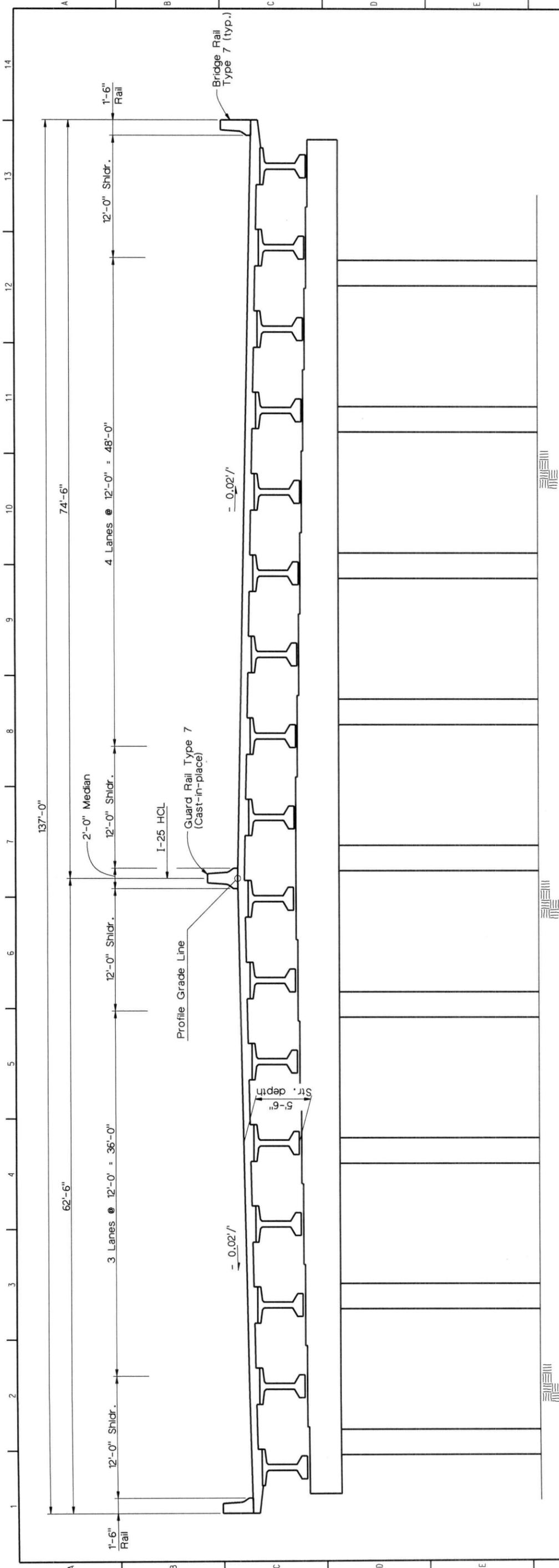


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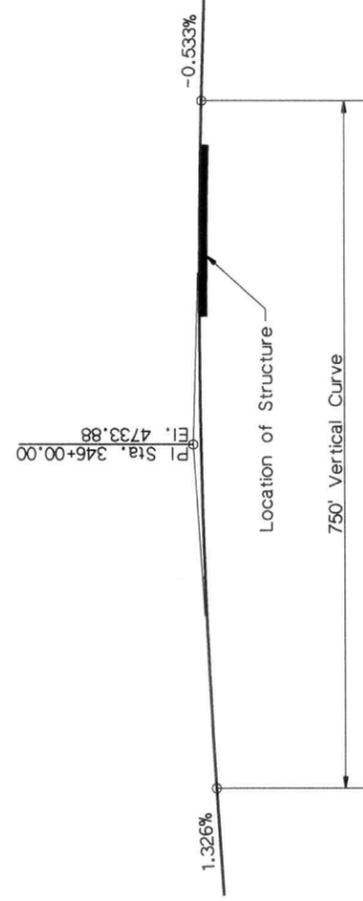


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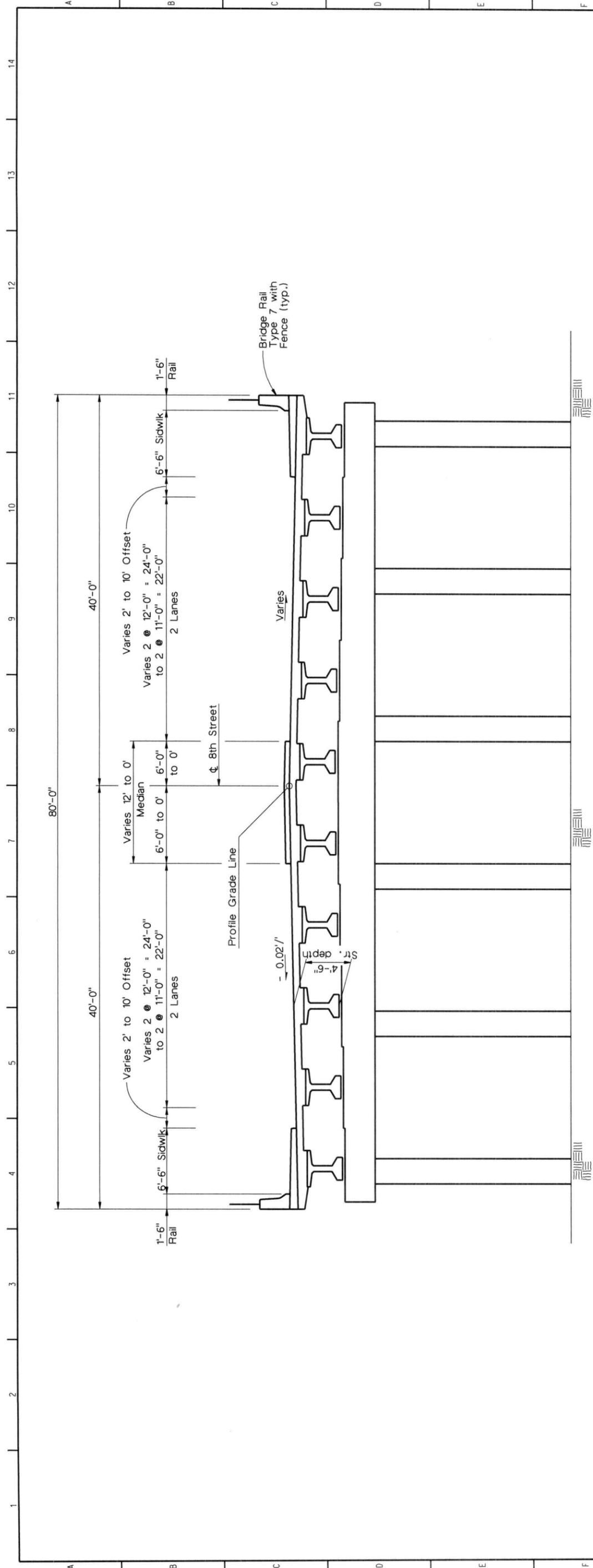


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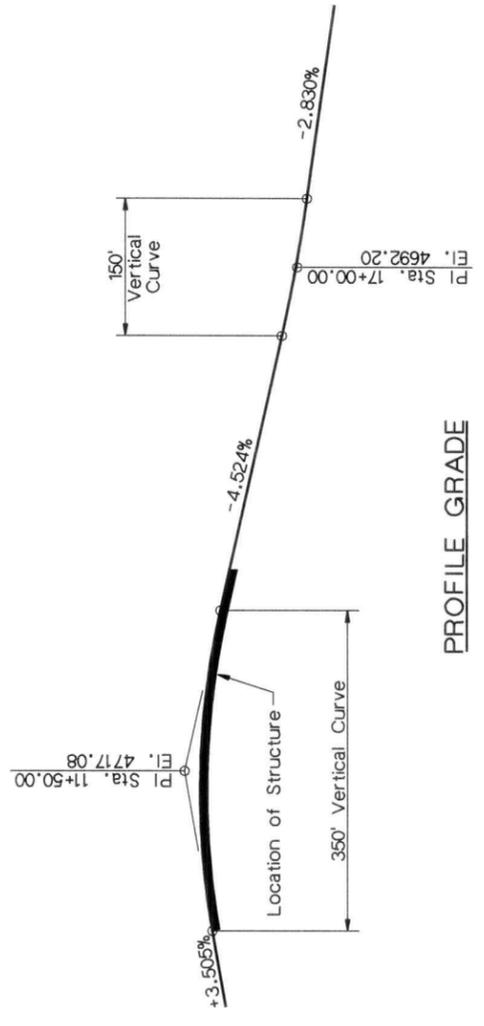


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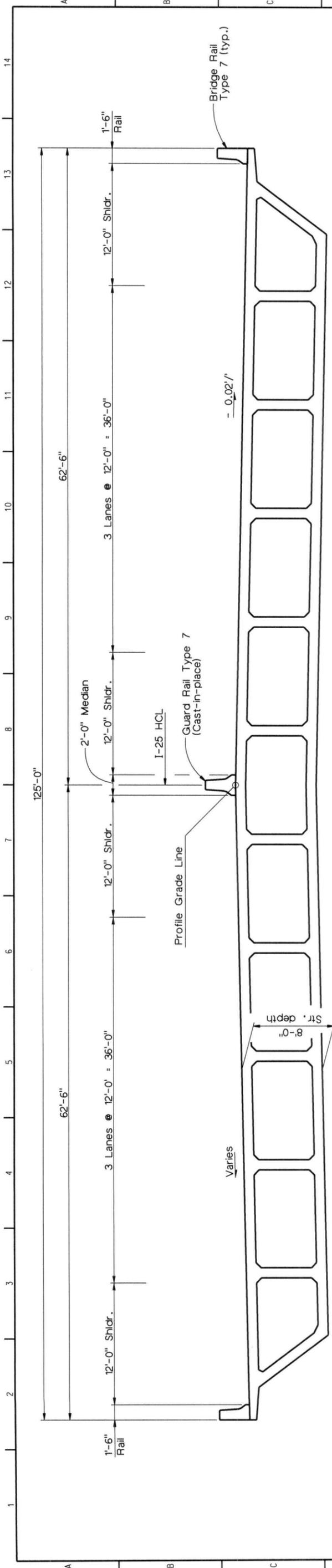
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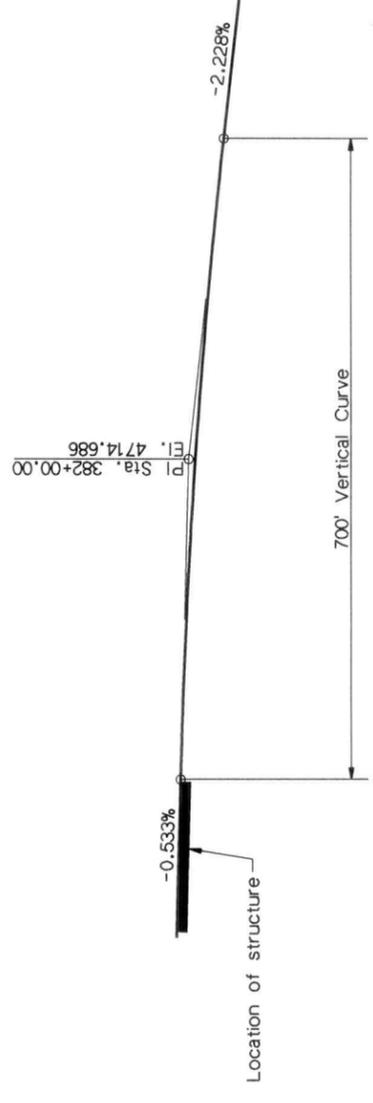
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TYPICAL SECTION



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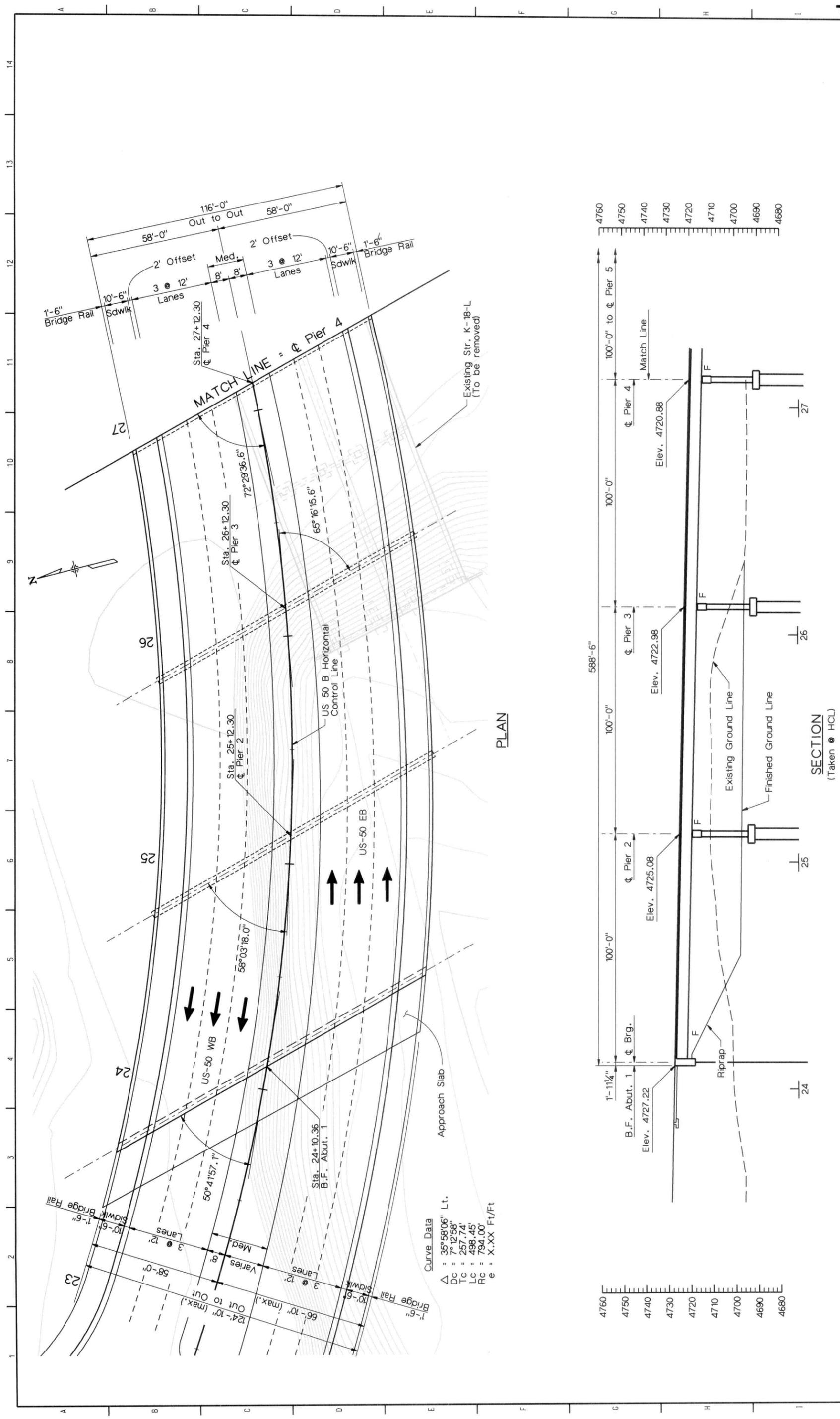
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25 the New Pueblo Freeway
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 REGION 2

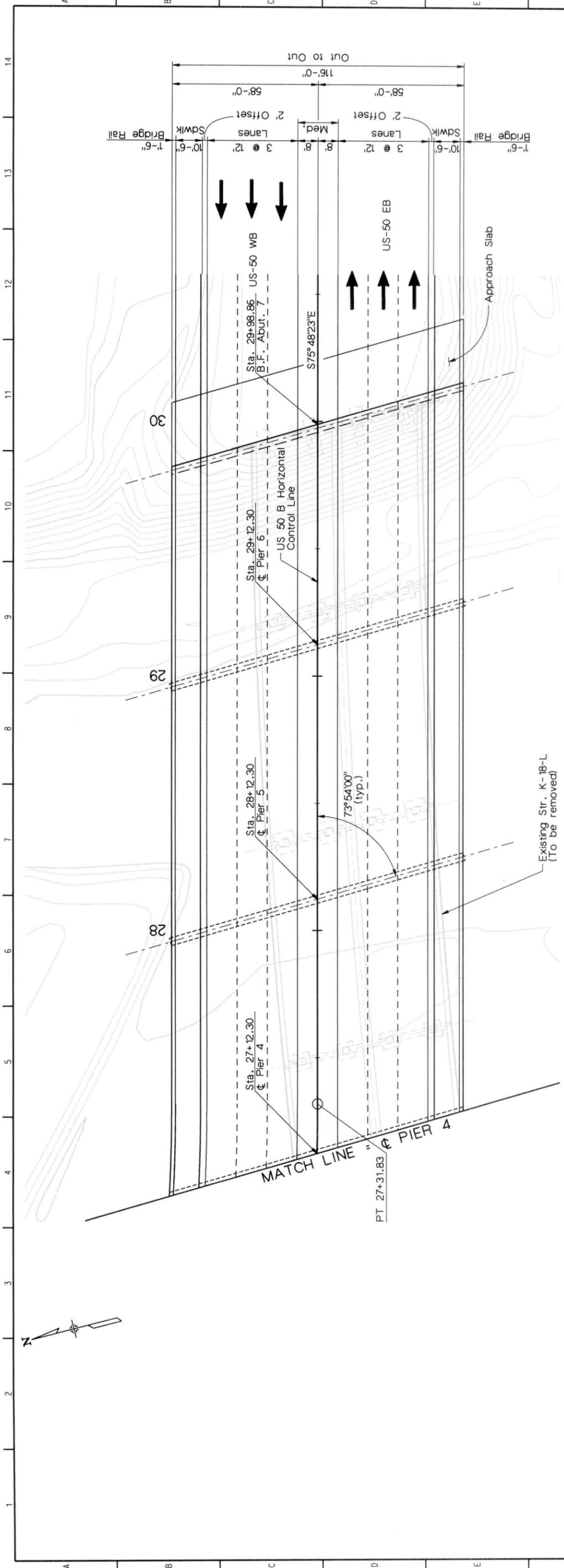
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Detailer:	K. Heater
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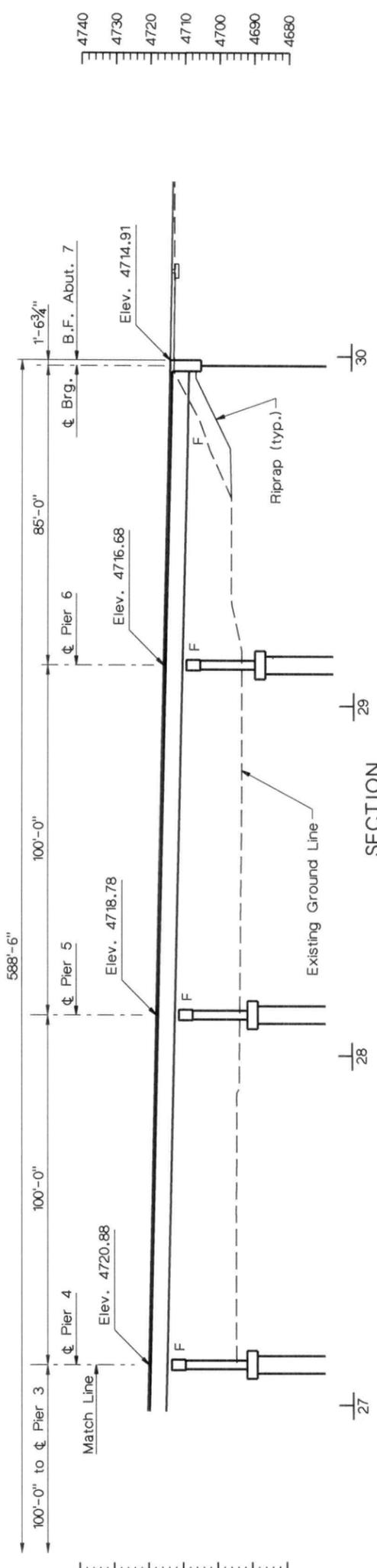
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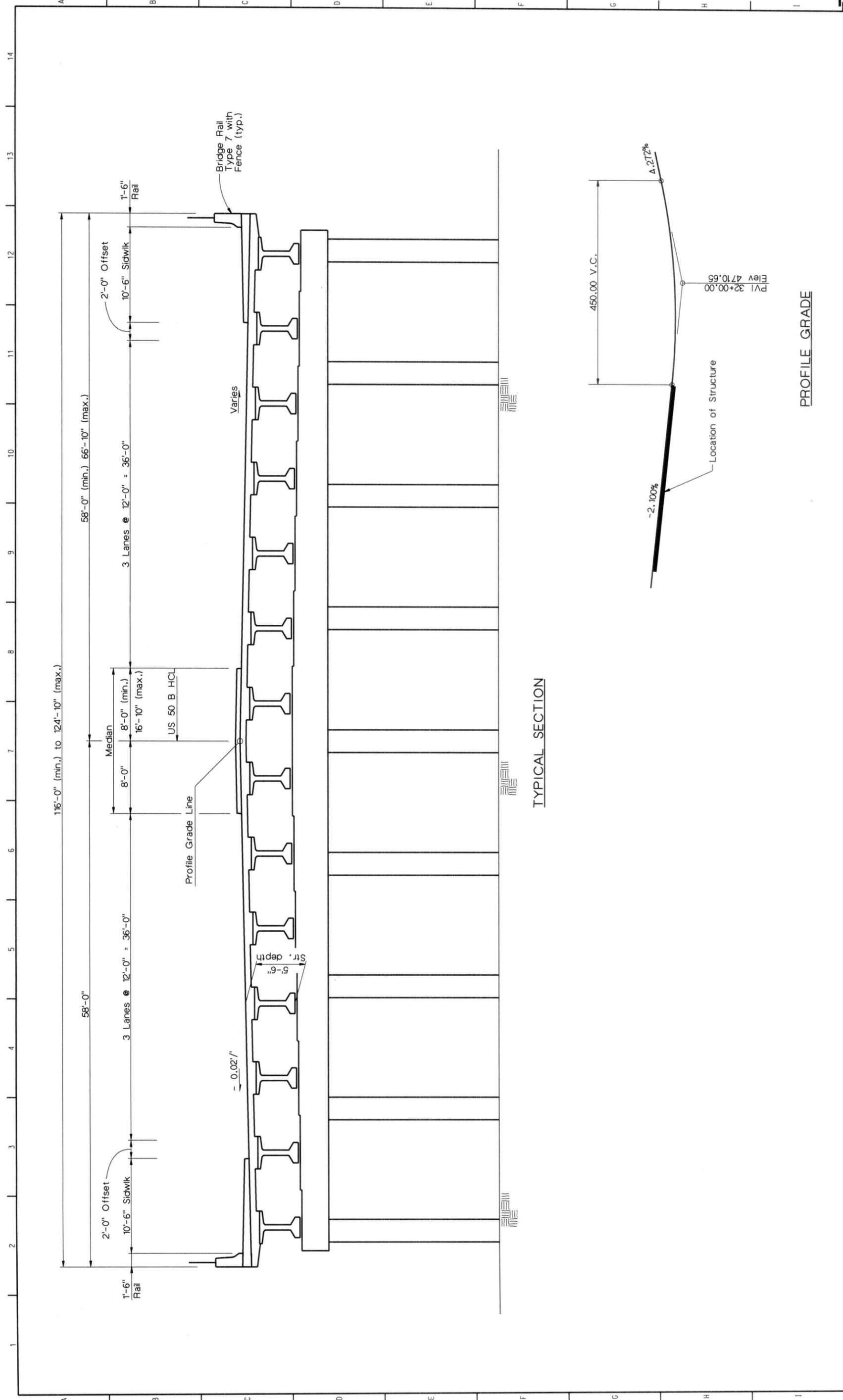
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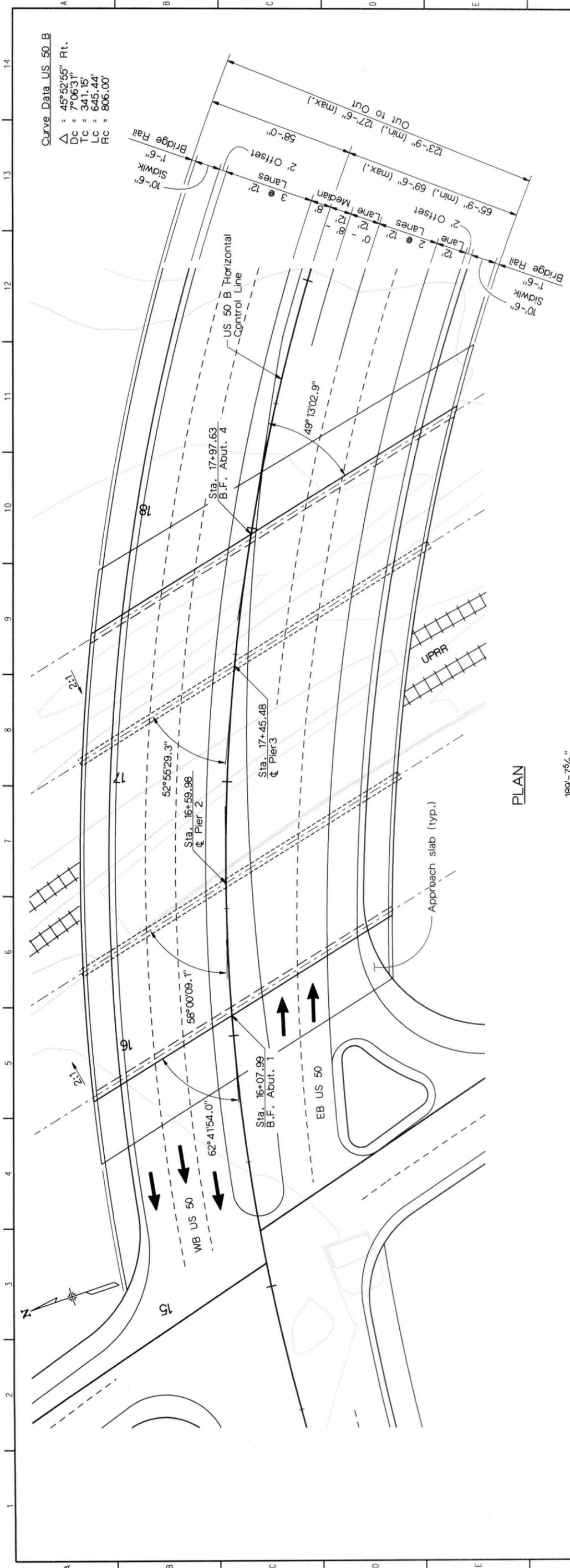


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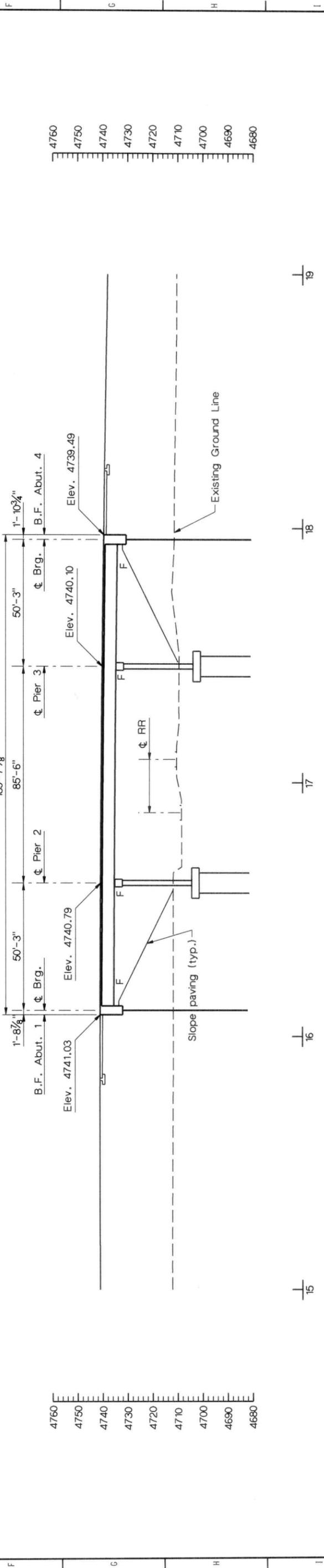


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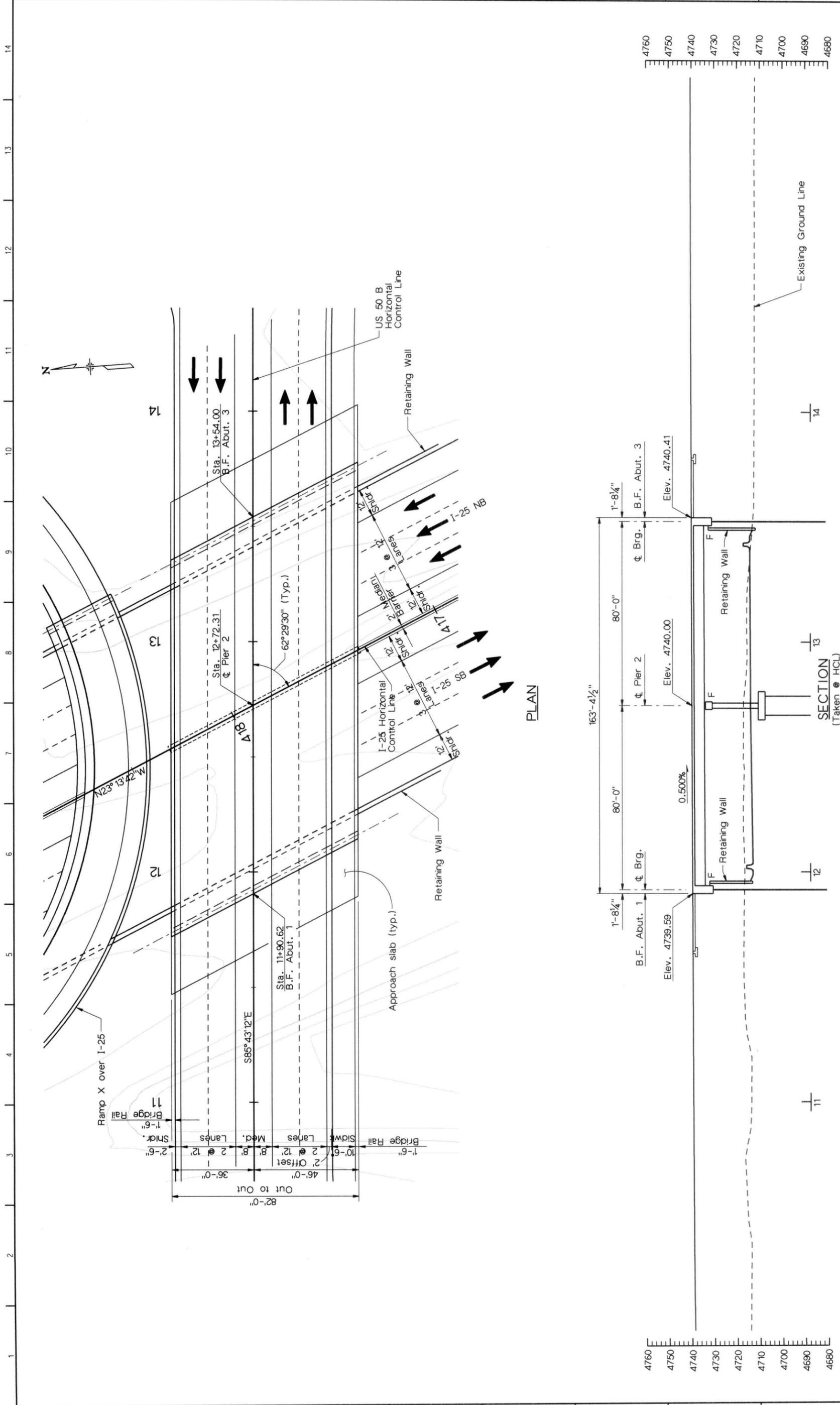
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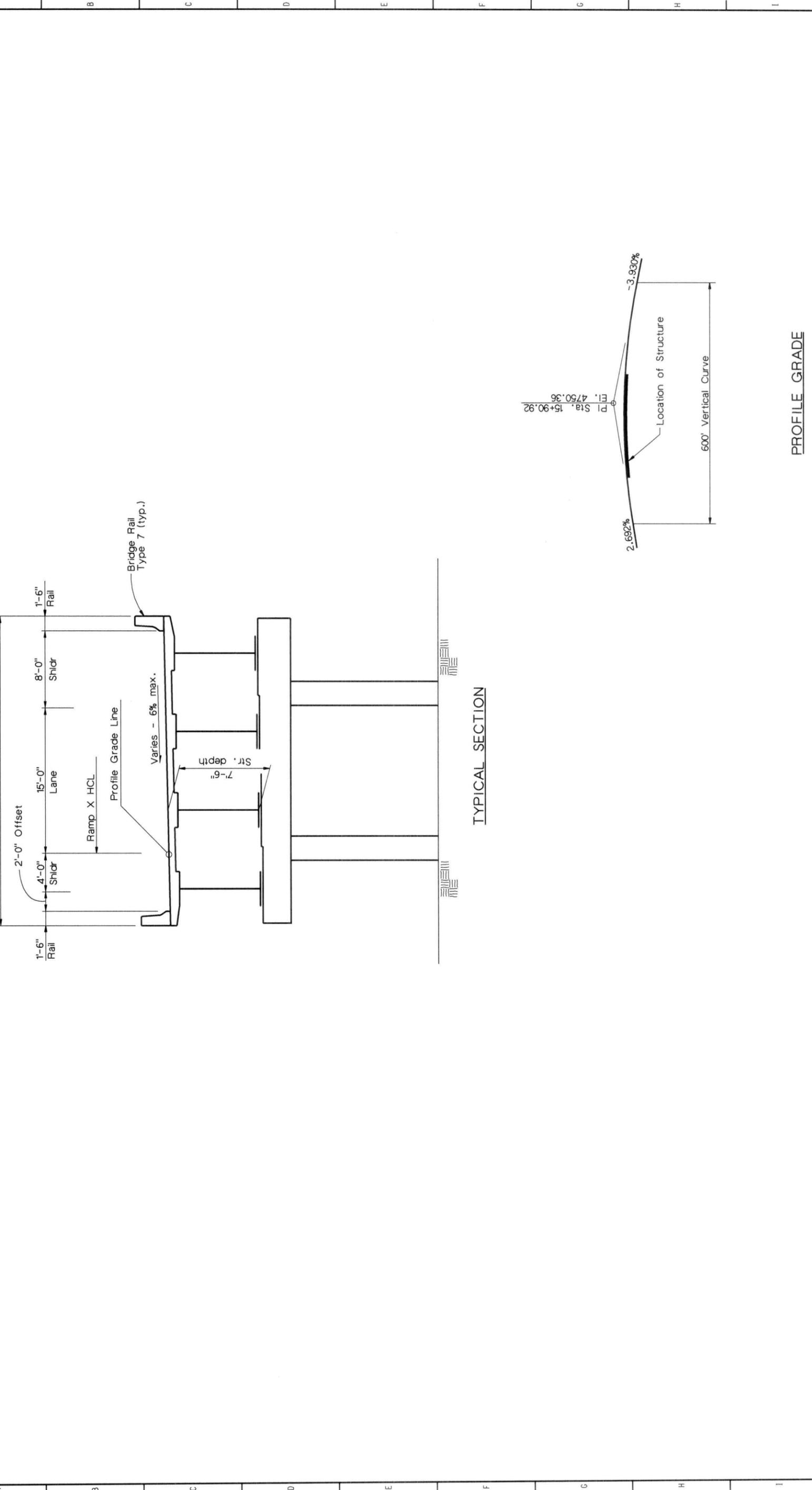


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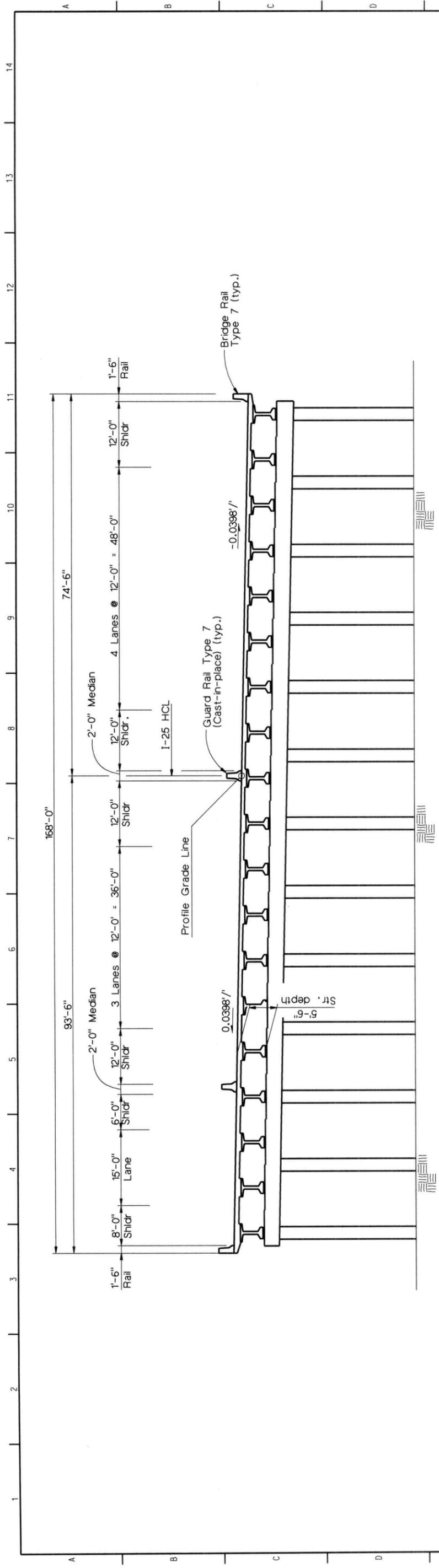
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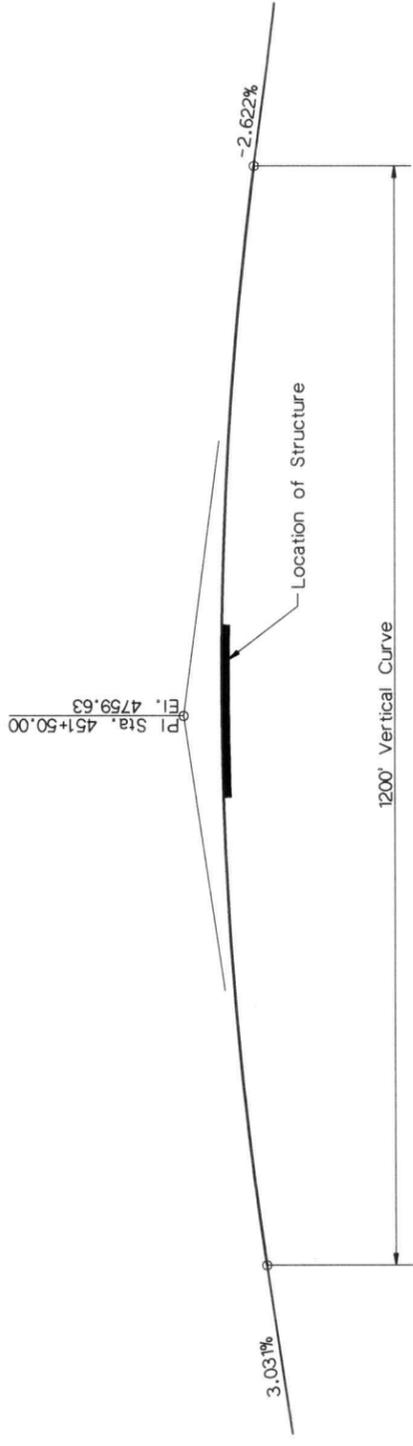
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PROFILE GRADE

TYPICAL SECTION



TYPICAL SECTION

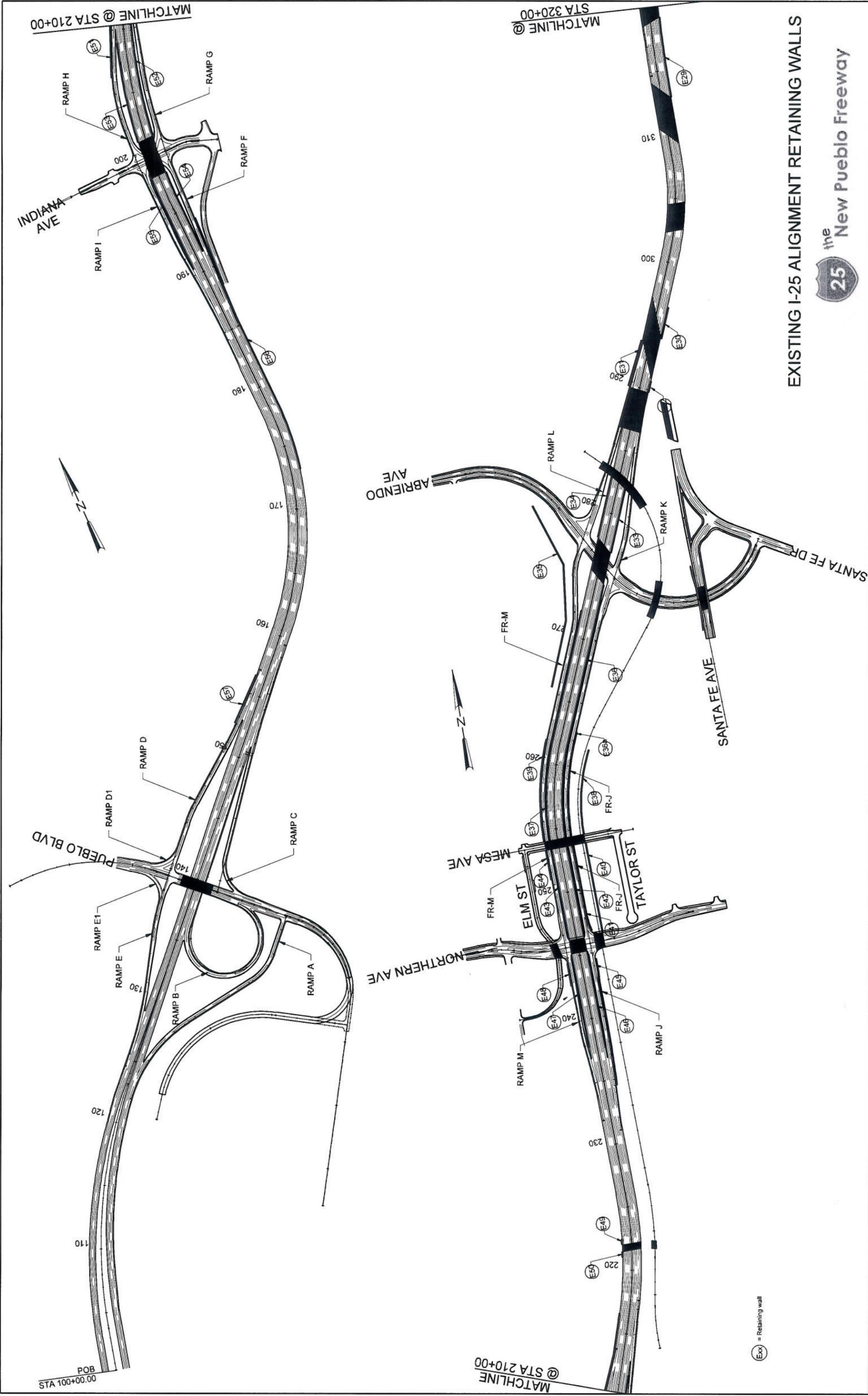


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APPENDIX D

RETAINING WALL CONCEPTUAL LAYOUT DRAWINGS



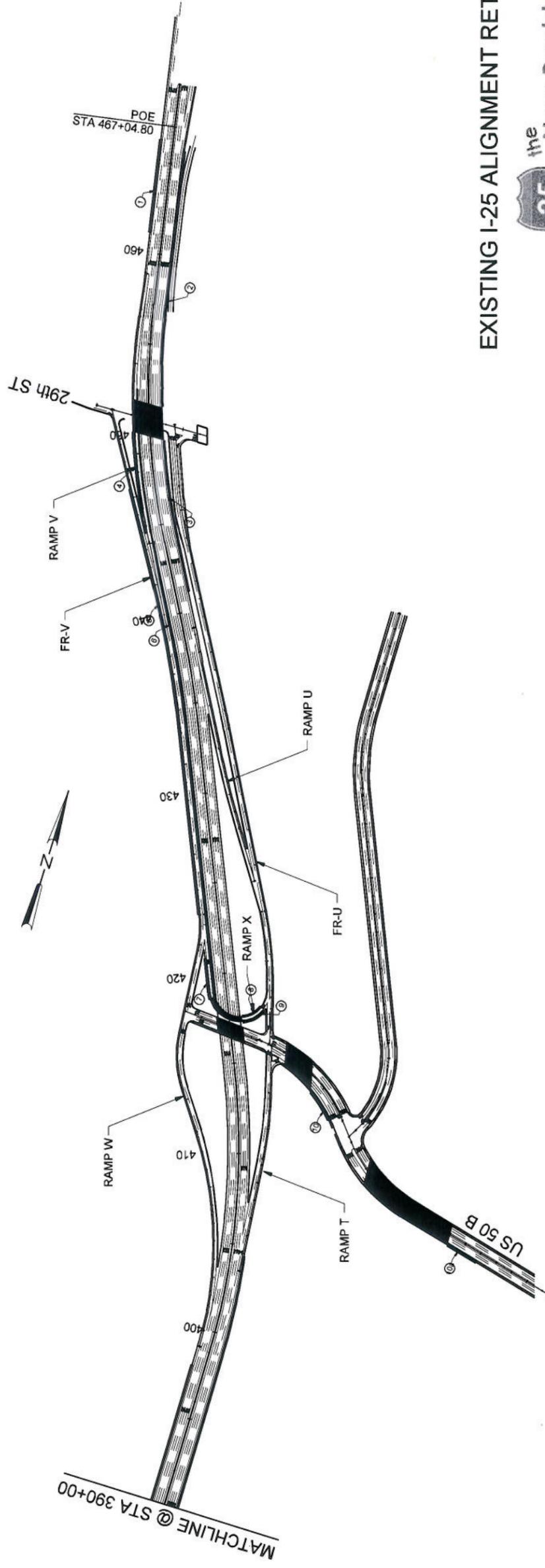
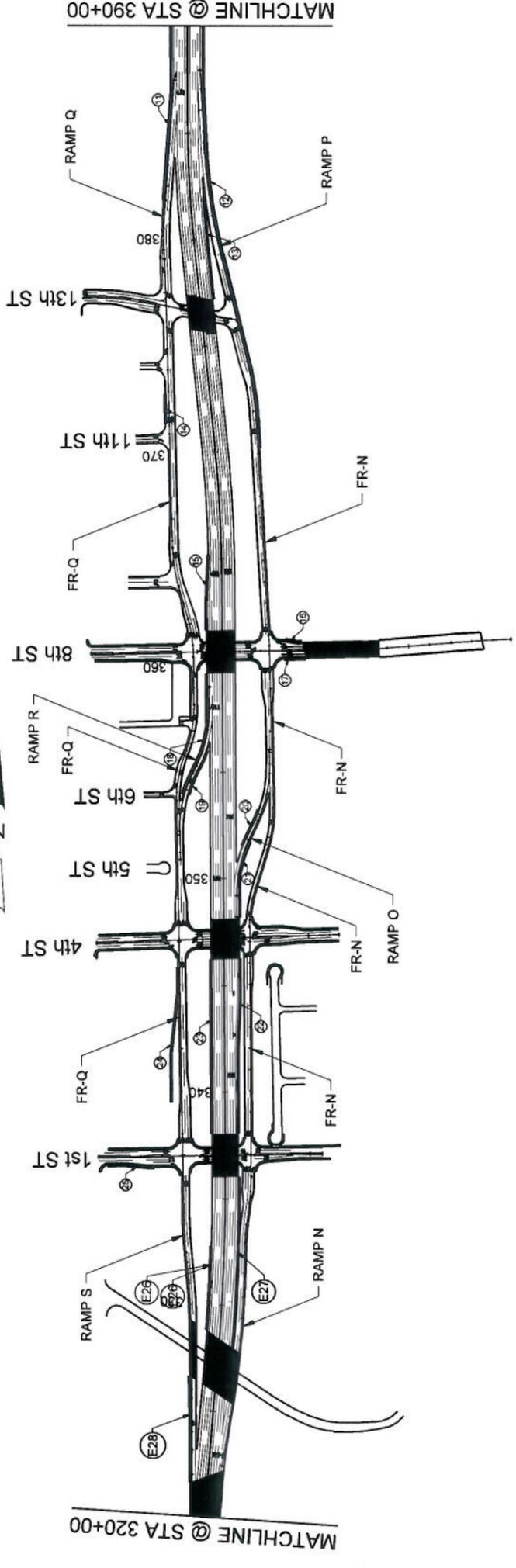
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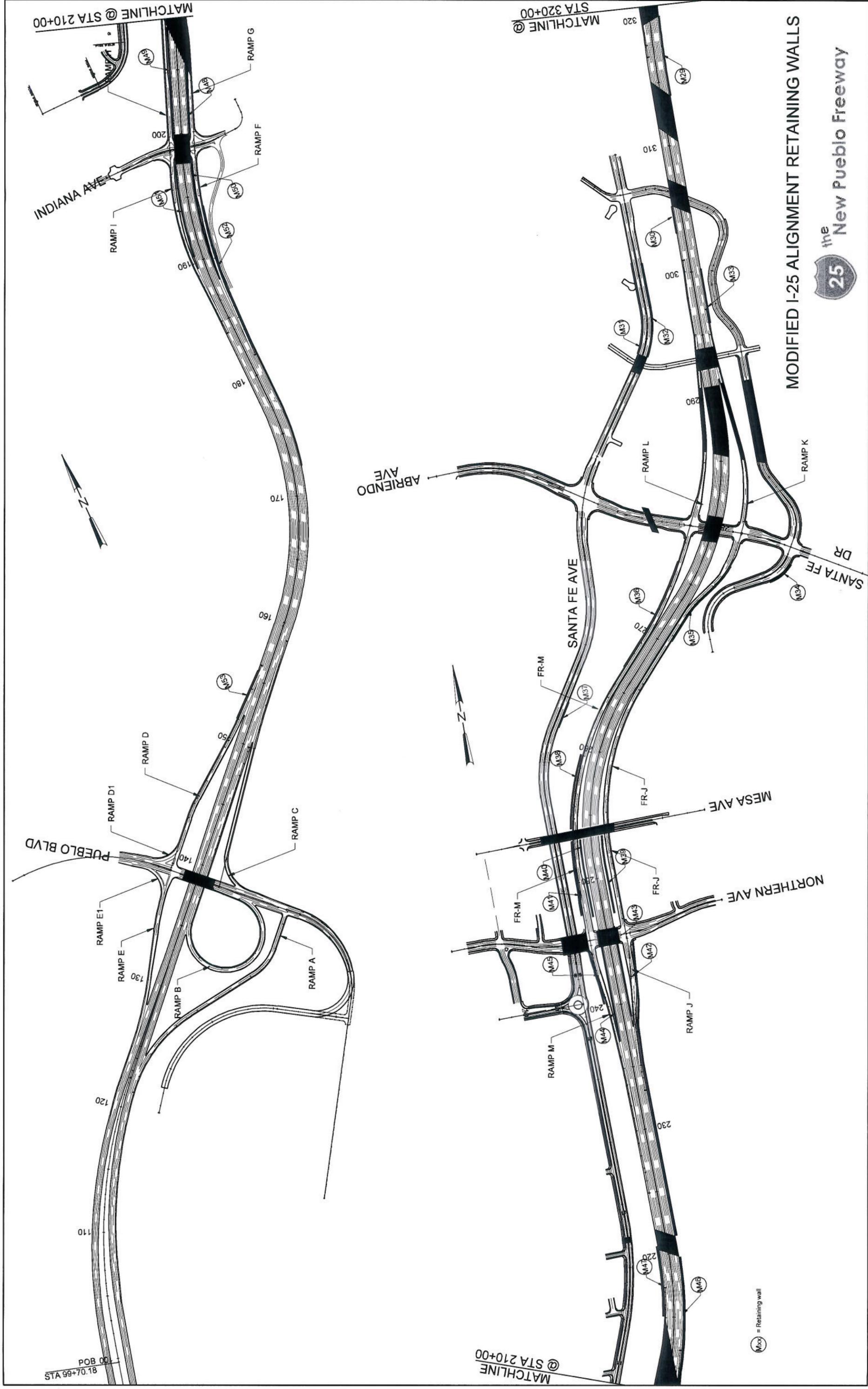
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25th the New Pueblo Freeway

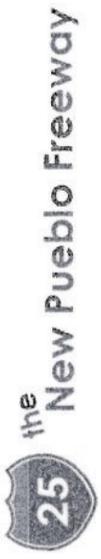
Ex = Retaining wall

EXISTING I-25 ALIGNMENT RETAINING WALLS





MODIFIED I-25 ALIGNMENT RETAINING WALLS



(Mxx) = Retaining wall

MODIFIED I-25 ALIGNMENT RETAINING WALLS

25th the New Pueblo Freeway

Moxy = Retaining wall

