

# Construction Drawings

## Design Engineer's Statement:

These detailed plans and specifications were prepared under my direction and supervision. Said plans and specifications have been prepared according to the criteria established by the County for detailed roadway, drainage, grading and erosion control plans and specifications, and said plans and specifications are in conformity with applicable master drainage plans and master transportation plans. Said plans and specifications meet the purposes for which the particular roadway and drainage facilities are designed and are correct to the best of my knowledge and belief. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparation of these detailed plans and specifications.



[Name, P.E. # Benjamin Kenney #48342]



1/8/2020

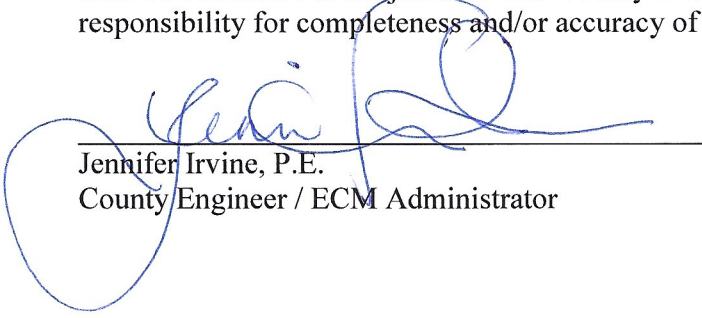
Date

## El Paso County:

Benjamin Kenney P.E.

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County plan review is provided only for general conformance with County Design Criteria. The County is not responsible for the accuracy and adequacy of the design, dimensions, and/or elevations which shall be confirmed at the job site. The County through the approval of this document assumes no responsibility for completeness and/or accuracy of this document.



Jennifer Irvine, P.E.  
County Engineer / ECM Administrator

27 APRIL 2021

Date

**GENERAL NOTES**

All construction shall be in accordance with the Colorado Department of Transportation's 2019 Standard Specifications for Road and Bridge Construction unless otherwise noted herein.

The Contractor shall be responsible for the stability of the structure during construction.

All longitudinal and transverse dimensions are measured horizontally and include no correction for grade.

Expansion Joint Material shall meet AASHTO Specification M213.

Engineer to inspect girder top flanges after deck removal to verify condition of existing steel.

Existing steel superstructure shall be cleaned and painted in accordance with Item 509 - Paint Existing Structure.

Field welding of any kind shall not be permitted on the steel girders unless specifically called for in the plans.

Grade 60 reinforcing steel is required.

All reinforcing steel shall be epoxy coated unless otherwise noted.

Permanent steel deck forms may be used at no additional cost to the project. Precast panel forms are not permitted.

The contractor is required to design and detail the overhang forming system and to show through calculations that the existing exterior girders are not overstressed. Details and calculations shall be signed and sealed by a Colorado Professional Engineer and submitted to the engineer for review.

The final finish for the surfaces of the curbs shall be Class 2. All other exposed concrete surfaces shall receive a Class 1 final finish.

An emergency deck construction joint may be located at the one quarter span point back from a pier or abutment with respect to the direction of the deck placement.

Stations, Elevations, and Dimensions contained in these plans are calculated from the "As Constructed Plans" dated November 1994. These Stations, Elevations, and Dimensions may be adjusted to meet the existing structure. The Contractor shall verify all dependent dimensions in the field before ordering or fabricating any material.

The information shown on these plans concerning the type and location of underground utilities is not guaranteed to be accurate or all inclusive. The Contractor is responsible for making their own determination as to the type and location of underground utilities as may be necessary to avoid damage thereto. The Contractor shall contact the Utility Notification Center of Colorado at 811 (1-800-922-1987) at least 3 days (2 days not including the day of notification) prior to any excavation or other earthwork.

**DESIGN DATA**

AASHTO, Eighth Edition LRFD

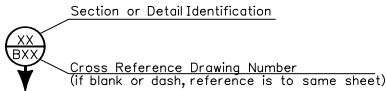
Design Method: Load and Resistance Factor Design

Live Load: HL-93 (design truck or tandem, and design lane load)

Dead Load: Assumes 37 lbs. per sq. ft. for bridge deck overlay placed at time of reconstruction. There is no provision for additional overlay. Assumes 5 lbs. per sq. ft. for permanent steel deck forms. Assumes 5 lbs. per sq. ft. for future utilities.

Reinforced Concrete: Class D Concrete: f'c = 4,500 psi  
Reinforcing Steel: fy = 60,000 psi

Structural Steel: AASHTO M-183 (ASTM A-36): fy = 36,000 psi  
AASHTO M-169 (ASTM A108): fy = 50,000 psi



**BRIDGE DESCRIPTION (EPC0091-04.37A)**

EPC0091-04.37A is a three span (35'-0", 48'-0", 35'-0") bridge; asphalt-filled corrugated metal deck on continuous rolled I beams (W27x84). It is located on Elbert Highway and crosses over Black Squirrel Creek. The existing structure is 36'-0" from inside face of rail to inside face of rail and has an out to out deck width of 36'-8" with a 20° skew. The existing rails is Type 3 connected to exterior girders. The rehabilitated structure will maintain the existing roadway width of 36'-0" and increase the out to out deck width to 39'-0". The bridge rail will be replaced with a Bridge Rail Type 10M.

**WORK DESCRIPTION (EPC0091-04.37A)**

SUMMARY: This design is specifically for the deck replacement with a composite concrete deck and the addition of a new Bridge Rail Type 10M.

WORK EXTENTS: The limits of work are only between the beginning and ending of the new concrete deck, with the exception of the transition rails. Removal and reconstruction of the approach pavement will be performed by others as required to tie into the new deck.

**WORK INCLUDES:**

- Removal of existing asphalt-filled corrugated metal deck.
- Removal of existing bridge rail and transitions.
- Modification of existing sheet pile abutment backwalls.
- Cleaning and painting of existing girders, bearing hardware, and diaphragms.
- Installation of stud shear connectors to existing girders.
- Installation of cast-in-place, reinforced concrete deck and new bridge rail.
- Installation of new transition bridge railing, tied into the existing highway guardrail.
- Installation of waterproofing membrane and asphalt wearing surface.

**INDEX OF DRAWINGS**

- B100 GENERAL INFORMATION
- B101 TYPICAL GIRDER ELEVATION
- B102 DECK REINFORCING PLAN
- B103 DECK SECTION
- B104 MISCELLANEOUS DETAILS
- B105 BRIDGE RAIL TYPE 10M (1 OF 2)
- B106 BRIDGE RAIL TYPE 10M (2 OF 2)

**ABBREVIATIONS**

- Abut. Abutment
- Bot. Bottom
- Brg. Bearing
- B.F. Back Face
- Clr. Clear
- Cont. Continuous
- Diaph. Diaphragm
- Ea. Each
- Galv. Galvanized
- Max. Maximum
- Min. Minimum
- Proj. Projection
- Reinf. Reinforcement
- Transv. Transverse
- Typ. Typical

**SUMMARY OF QUANTITIES**

Item No.	Description	Unit	Super-Structure	Abutment 1	Abutment 2	Approach Roadway	Total
202-00495	Removal of Portions of Present Structure	LS	0.8	0.1	0.1	0	1
403-34721	Hot Mix Asphalt (Grading SX) (75) (PG 58-28)	TON	80	0	0	0	80
509-00000	Structural Steel	LB	2901	0	0	0	2901
509-00001	Structural Steel (Galvanized)	LB	0	564	564	0	1128
509-90000	Paint Existing Structure(S)	LS	1	0	0	0	1
515-00120	Waterproofing (Membrane)	SY	525	0	0	0	525
601-03040	Concrete Class D (Bridge)	CY	123	0	0	0	123
602-00020	Reinforcing Steel (Epoxy Coated)	LB	66981	0	0	0	66981
606-11030	Bridge Rail Type 10M	LF	252	0	0	0	252
606-01370	Transition Type 3G	EACH	0	0	0	0	4
627-00004	Epoxy Pavement Marking	SF	162	0	0	0	162

**QUANTITY NOTES:**

1. Furnishing and installation of expansion joint material and joint filler material at each edge of deck are incidental to Item 403 - Hot Mix Asphalt.
2. Cut and fill work at the abutments shall be incidental to Item 202 - Removal of Portions of Present Structure.
3. See Special Provisions for Removal of Portions of Present Structure.
4. See Special Provisions for Item 509 - Paint Existing Structure.
5. Item 509 - Structural Steel includes Shear Stud Connectors, AASHTO M-169 (ASTM A108)
6. Item 509 - Structural Steel (Galvanized) includes Abutment Cap Angles, AASHTO M-183 (ASTM A-36).



Know what's below.  
Call before you dig.

Benjamin  
Kenney P.E.



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Date: 2020.03.03-10:54:19 -07'00'

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 CHECKED BY: BCK 1-2-21 BCK 2-28  
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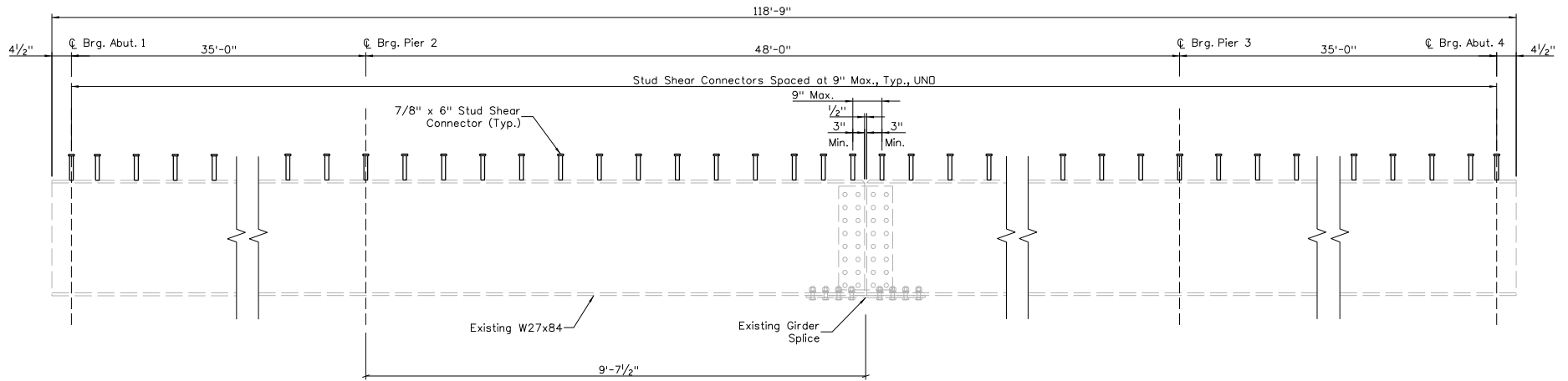
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 Phone: 303 835 1029 Ste 235 Littleton, CO 80120

Sheet Revisions		
Date:	Comments	Init.

El Paso County

3275 Akers Dr  
 Colorado Springs, CO 80922  
 Phone: 719-520-6460

As Constructed	ELBERT HIGHWAY BRIDGE OVER BLACK SQUIRREL CREEK GENERAL INFORMATION		Project No./Code
No Revisions:			1908EPCSD.00
Revised:	Designer: B. KENNEY	Structure Number: EPC0091-04.37A	BRIDGE DECK REHAB
Void:	Detailer: R. STERN	Sheet Subset: REHAB	Sheet Number 1
		Subset Sheets: B100 of 106	



**TYPICAL GIRDER ELEVATION**

**NOTES:**

- See Sheet B103 for stud shear connector transverse spacing and welding details.

INITIALS	DESIGN	DATE	DETAIL	DATE	QUANTITY	DATE
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	BSK	2-28	BSK	2-28	BSK	2-28

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Print Date: 2/28/2020	
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Sheet Revisions		
Date:	Comments	Init.

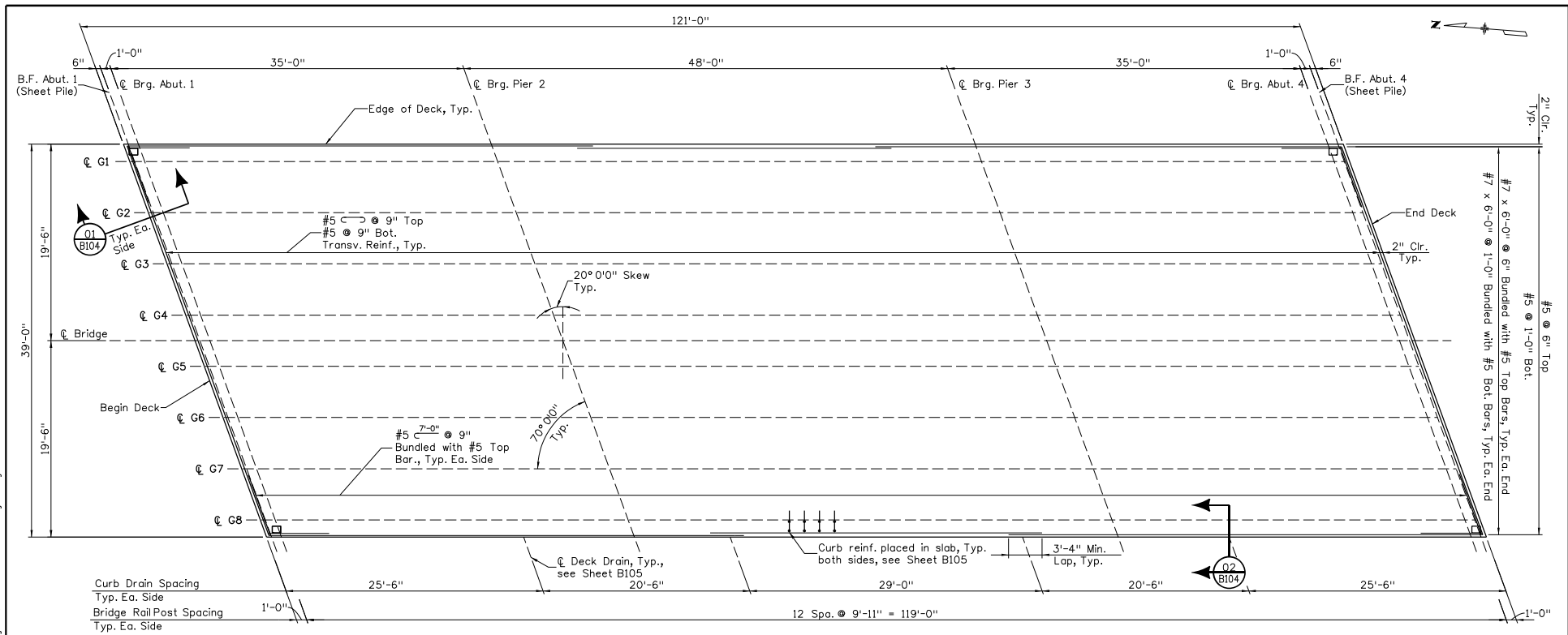
**El Paso County**

3275 Akers Dr  
 Colorado Springs, CO 80922  
 Phone: 719-520-6460

<b>As Constructed</b>
No Revisions:
Revised:
Void:

<b>ELBERT HIGHWAY BRIDGE OVER BLACK SQUIRREL CREEK TYPICAL GIRDER ELEVATION</b>		
Designer:	B. KENNEY	Structure Number
Detailer:	R. STERN	EPC0091-04.37A
Sheet Subset:	REHAB	Subset Sheets: B101 of 106

<b>Project No./Code</b>
1908EPCSD.00
BRIDGE DECK REHAB
Sheet Number 2

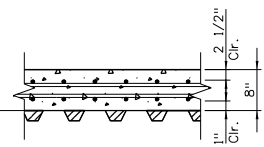


**NOTES:**

1. See Sheets B103, B104, and B105 for additional reinforcement details.
2. Transverse bars shall be placed as shown, parallel to the skew angle.
3. Stagger lap splices in adjacent bars.
4. Adjust spacing of transverse slab reinforcing in field to clear shear connectors as approved by the Engineer.
5. All work necessary to furnish and install Curb Drains shall be incidental to Item 606 - Bridge Rail Type 10M.
6. Abutment, Pier, and Girder Numbers match the Original Structure Drawings. Structure Inspection Report numbering may differ.

**DECK REINFORCING PLAN**

No concrete permitted below this line. Form flutes shall be filled with polystyrene or covered with steel sheet.



**PERMANENT STEEL DECK FORM DETAIL**



**Benjamin Kenney P.E.**

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Date: 2020.03.02 10:55:37 -07'00'

INITIALS	DESIGN	DATE	DETAIL	QUANTITY	DATE
By	CHK	2-28	RHS	2-28	2-28
Checked by	CHK	2-28	BCR	2-28	2-28

Print Date: 2/28/2020	
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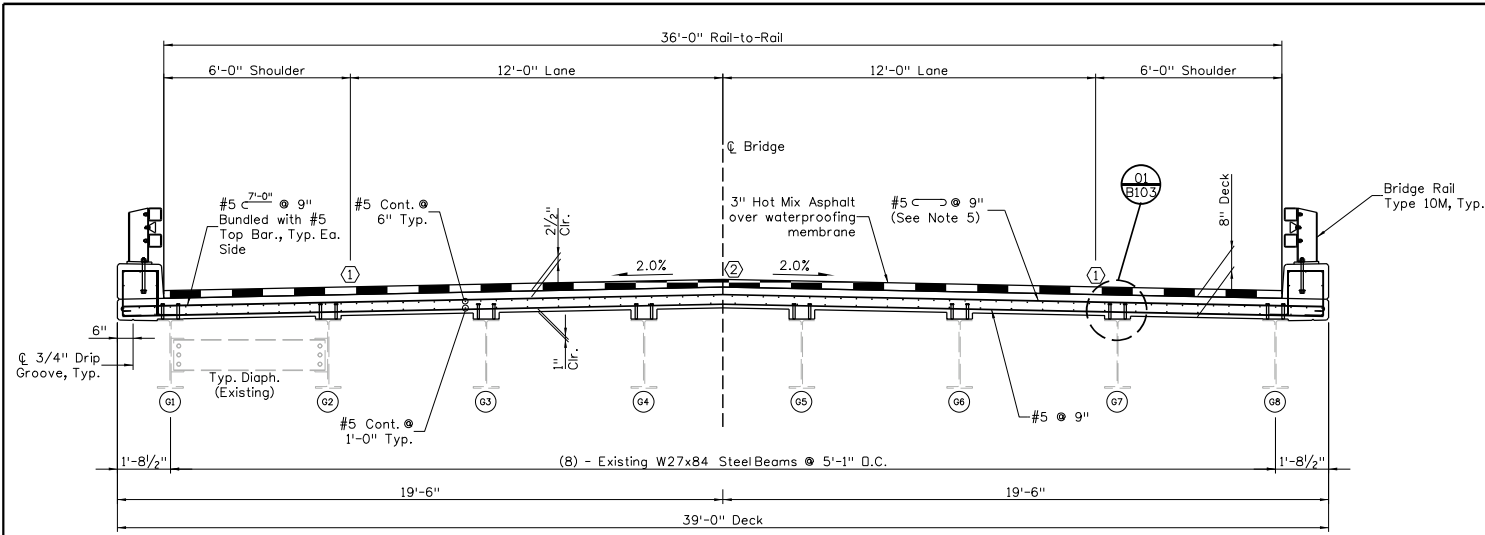
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3275 Akers Dr  
Colorado Springs, CO 80922  
Phone: 719-520-6460

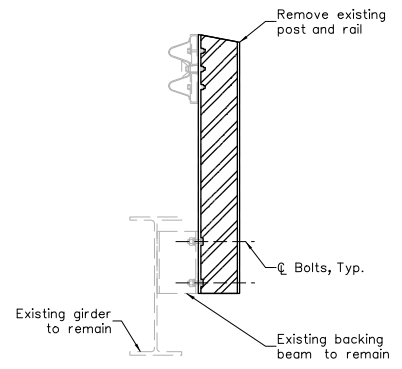
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Designer:	B. KENNEY	Structure Number
Detailer:	R. STERN	EPC0091-04.37A
Sheet Subset:	REHAB	Subset Sheets: B102 of 106

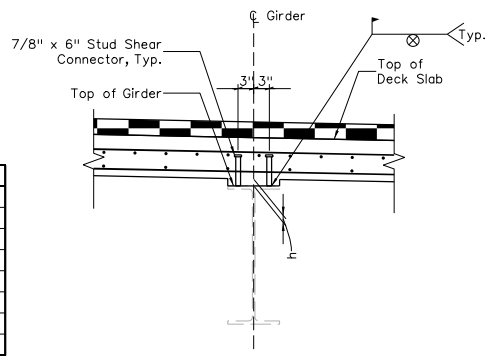
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BRIDGE DECK REHAB
Sheet Number 3



TYPICAL SECTION



REMOVAL DETAIL AT EXISTING BRIDGE RAIL POST (Deck not shown for clarity)



DETAIL 01 B103

**Haunch Dimensions**

Girder	h (in)
G1	0.125
G2	1.375
G3	2.625
G4	3.750
G5	3.750
G6	2.625
G7	1.375
G8	0.125

**NOTES:**

- See Sheet B102, B104, and B105 for additional reinforcement details.
- Deck shall be Concrete Class D (Bridge).
- Unless noted otherwise, existing bridge elements shall be retained and protected during construction. If elements to remain are damaged by the Contractor during construction, the damage shall be repaired by the Contractor at no additional cost to the County.
- Haunch thicknesses are tabulated at centerline of girders.
- A lap splice may be introduced in this bar to improve handling. Laps must be staggered and shall be a minimum of 3'-4".

**KEY NOTES:**

- ① White-Solid 4" Stripe
- ② Double-Yellow-Solid 4" Stripe

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**e0** Engineering Operations 5575 S. Sycamore St.,  
 Phone: 303 835 1029 Ste 235 Littleton, CO 80120

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 3275 Akers Dr  
 Colorado Springs, CO 80922  
 Phone: 719-520-6460

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**ELBERT HIGHWAY BRIDGE OVER BLACK SQUIRREL CREEK DECK SECTION**  
 Designer: B. KENNEY Structure Number  
 Detailer: R. STERN  
 Sheet Subset: REHAB Subset Sheets: B103 of 106

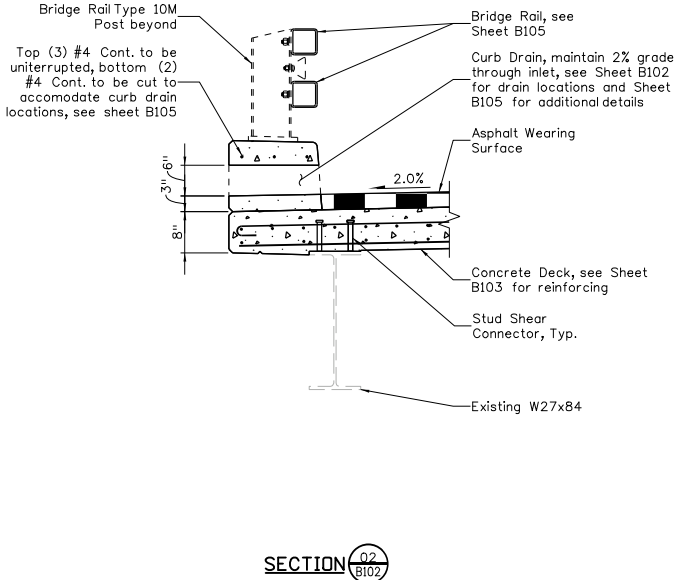
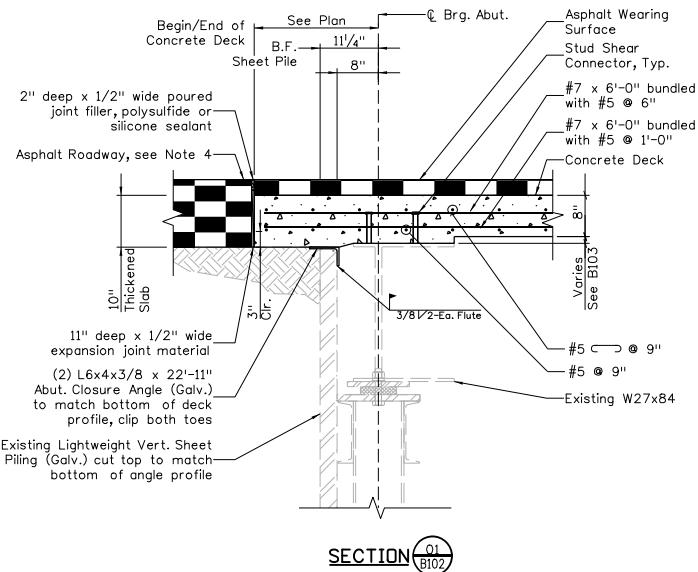
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**NOTES:**

1. See Sheets B102 and B103 for additional reinforcement information.
2. Using a thermalcutting process, the existing sheet pile abutments shall be cut within the transverse limits of the deck replacement to match the bottom of the horizontal angle leg profile.
3. Unless noted otherwise, existing bridge elements shall be retained and protected during construction. If elements to remain are damaged by the Contractor during construction, the damage shall be repaired by the Contractor at no additional cost to the County.
4. Approach roadway and asphalt transition to bridge to be regraded by others.
5. Any over excavation shall be back-filled with with Structure Backfill (Flow-Fill) or Structure Backfill (Class 1).

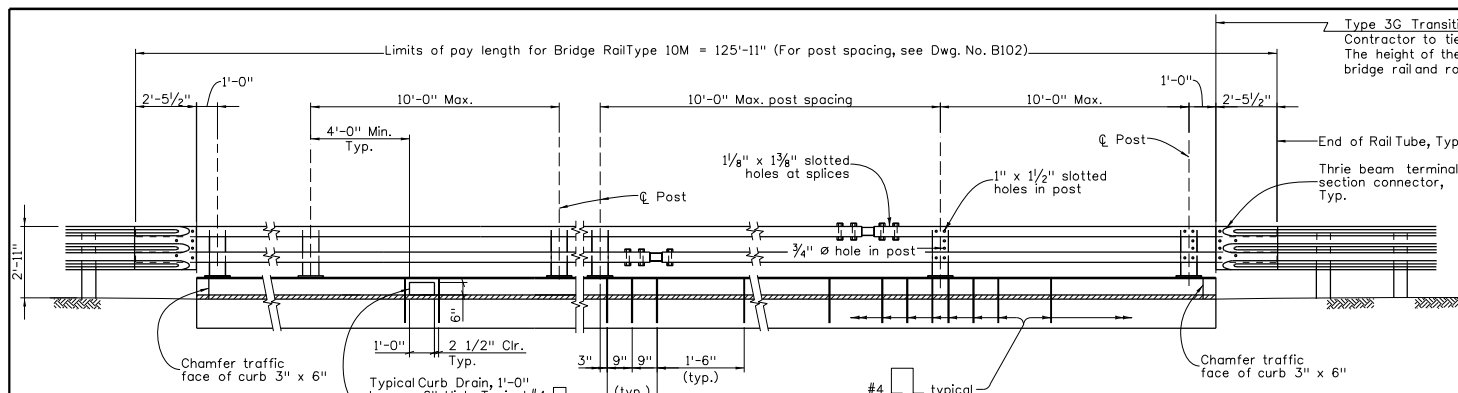


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Horiz. Scale: NTS Vert. Scale: NTS							Revised:	Designer: B. KENNEY	Structure Number	EPC0091-04.37A	
Engineering Operations 5575 S. Sycamore St., Phone: 303 835 1029 Ste 235 Littleton, CO 80120							Detailer: R. STERN	Sheet Subset: REHAB	Subset Sheets: B104 of 106	BRIDGE DECK REHAB	
											Sheet Number 5

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**RAIL PANEL AT TRANSITION SECTION**

**ELEVATION - BRIDGE RAIL**

**RAIL PANEL AT TRANSITION SECTION**

Type 3G Transition, Typ. both ends  
 Contractor to tie into existing guardrails (See M-606-1)  
 The height of the transition will vary to match bridge rail and roadway guardrail: 1" when bridge deck has a 3" overlay.

**NOTES:**  
 All tubes shall be ASTM A-500 Grade B. All posts and base plates shall be ASTM A-572 Grade 50. All other steel shall be ASTM A-36 unless otherwise noted.  
 The above material and all anchor bolts and miscellaneous bolts, nuts, and washers shall be galvanized after fabrication in accordance with Section 509. Concrete, reinforcing steel, and structural steel elements shall conform to the requirements of sections 601, 602 and 509, respectively.  
 Post anchor, encased in concrete, shall be ASTM A-36 (AASHTO M-183) steel and need not be galvanized.

The tubes shall be shop bent or fabricated to fit horizontal curve when radius is less than 1,500 feet.  
 Tubes shall be continuous over not less than two posts. No welded butt splices will be allowed in the tube sections.  
 The centerline of the tube splice shall be 1'-8" minimum and 2'-6" maximum from the centerline of the posts.  
 All bolts that have lock washers shall be tightened to snug only.  
 Posts shall be perpendicular to the longitudinal roadway grade.

One or more post spacings may be reduced (6'-8" min.) in order to maintain dimensions from the end of the rail and edge of slab.

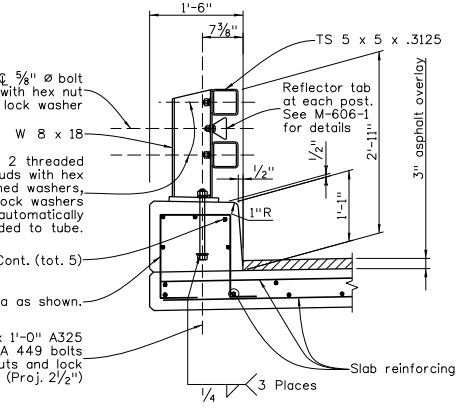
Payment will be made under item 606, Bridge Rail type 10M for all posts, post anchors, base plates, backing plates, anchor bolts, miscellaneous bolts, nuts, washers, tubes, tube expansion devices, tube splices, end plates, curb concrete (Class D), curb reinforcing steel, and reflector tabs.

Prior to fabrication of this item, three sets of working drawings which comply with the requirements of section 105, shall be submitted to the Engineer for information only.

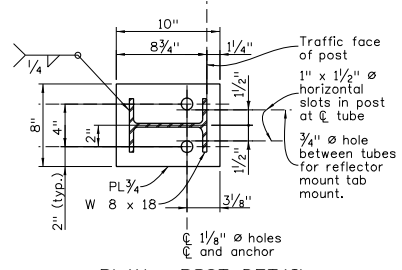
Contractor shall locate drains between transverse curb bars. Contractor shall cut longitudinal curb reinforcement to accommodate drain locations as described on Sheet B104.  
**Structural Steel:**  
 AASHTO M-183 (ASTM A-36)  $f_y = 36,000$  psi  
 AASHTO M-223 (ASTM A-572) GRADE 50  $f_y = 50,000$  psi  
 COLD FORMED ASTM A-500 GRADE B  $f_y = 46,000$  psi  
 For additional details see next rail sheet.

**INFORMATION ONLY**

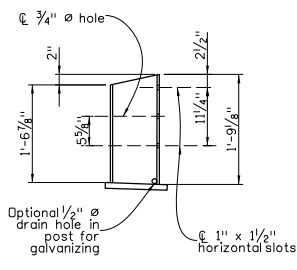
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Concrete Class D (Bridge)	CU.YD.	.06
Reinforcing Steel (Epoxy Coated)	LB.	6.6



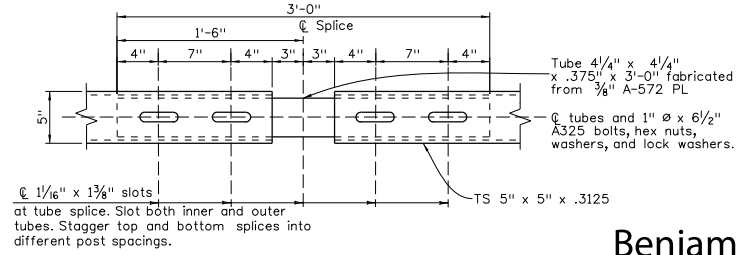
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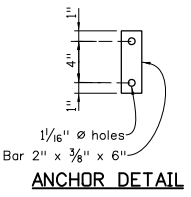
**PLAN - POST DETAIL**



**ELEVATION**



**PLAN - TUBE SPLICE**



**ANCHOR DETAIL**


**Benjamin Kenney P.E.**

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 Date: 2020.03.02 10:57:28 -07'00'



Print Date: 2/28/2020	File Name: Sheet_LB105_Type10M.dgn
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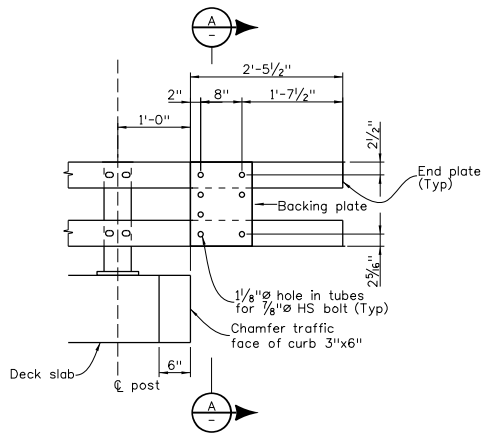
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Date:	Comments	Init.

**EI Paso County**  
  
 3275 Akers Dr  
 Colorado Springs, CO 80922  
 Phone: 719-520-6460

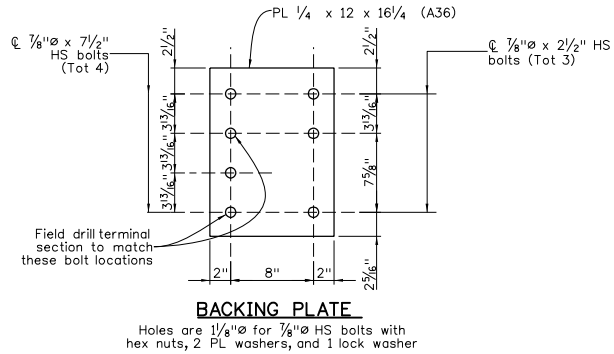
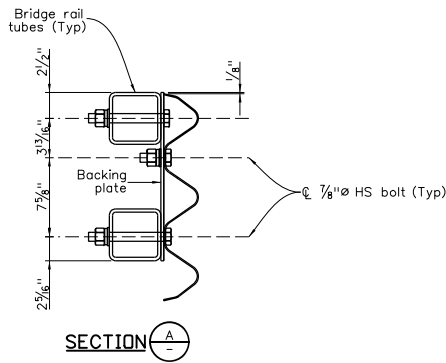
As Constructed	No Revisions:
Revised:	Void:

<b>ELBERT HIGHWAY BRIDGE OVER BLACK SQUIRREL CREEK BRIDGE RAIL TYPE 10M (1 OF 2)</b>	
Designer: B. KENNEY	Structure Number: EPC0091-04.37A
Detailer: R. STERN	Sheet Subsets: REHAB
Sheet Subset: REHAB	Subset Sheets: B105 of 106

Project No./Code	1908EPCSD.00
BRIDGE DECK REHAB	Sheet Number 6

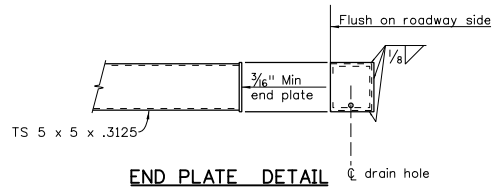


**RAIL TUBE DETAILS**  
 (Use with Bridge Rail Type 10M)  
 Thrie beam not shown.

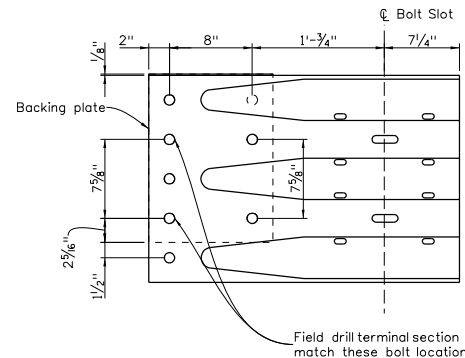


**BACKING PLATE**

Holes are 1/8" for 7/8" HS bolts with hex nuts, 2 PL washers, and 1 lock washer



**END PLATE DETAIL**



**THRIE BEAM TERMINAL SECTION (CONNECTOR) TO BACKING PLATE DETAIL**


See M standards for additional details not shown.



**Benjamin Kenney P.E.**  
 Digitally signed by Benjamin Kenney P.E.  
 Date: 2020.03.02 10:57:58 -07'00'


INITIALS	DESIGN	DATE	DETAIL	QUANTITY	DATE
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Checked By	CHK	2-28	BCR	2-28	2-28

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Print Date: 2/28/2020	
File Name: Sheet_B106_Tube_Details.dgn	
Horiz. Scale: NTS	Vert. Scale: NTS
 Engineering Operations	5575 S. Sycamore St., Phone: 303 835 1029
	Ste 235 Littleton, CO 80120

Sheet Revisions		
Date:	Comments	Init.

**El Paso County**



3275 Akers Dr  
 Colorado Springs, CO 80922  
 Phone: 719-520-6460

<b>As Constructed</b>
No Revisions:
Revised:
Void:

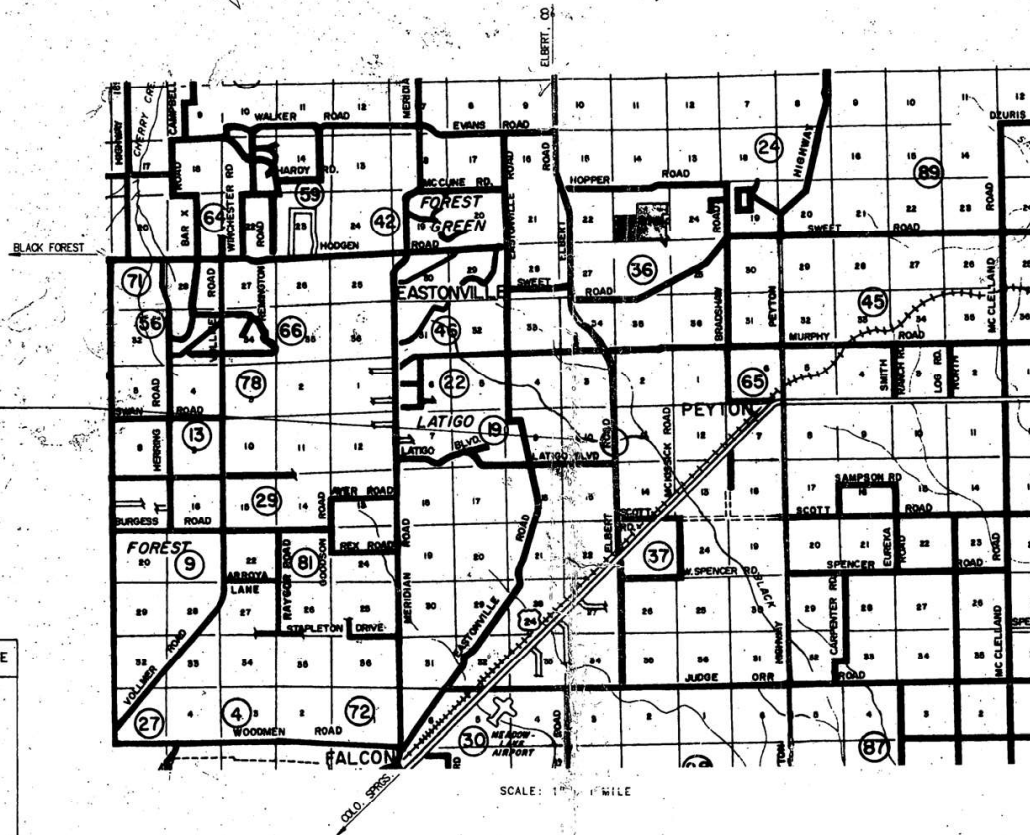
<b>ELBERT HIGHWAY BRIDGE OVER BLACK SQUIRREL CREEK BRIDGE RAIL TYPE 10M (2 OF 2)</b>		
Designer: B. KENNEY	Structure Number	EPC0091-04.37A
Detailer: R. STERN	Sheet Subset: REHAB	Subset Sheets: B106 of 106

<b>Project No./Code</b>
1908EPCSD.00
BRIDGE DECK REHAB
Sheet Number 7



ORIGINAL DRAWINGS  
FOR REFERENCE ONLY

# EL PASO COUNTY, COLORADO



PROJECT SITE

TABULATION OF LENGTHS

LOCATION	ROADWAY	STRUCTURE
STA. 2+85 BEGIN GUARD RAIL STA. 3+00.0 BEGIN PAVING ROADWAY	200.0	
STA. 5+00 STRUCTURE BRIDGE		120.00
STA. 6+20.00 END STRUCTURE ROADWAY	200.0	
STA. 6+20.0 END PAVING STA. 11+23 END GUARD RAIL		
TOTAL NET LENGTH (FT.)	400.0	120.00

DESIGN DATA

DESIGN SPEED = 40 M.P.H.  
MAXIMUM GRADE = 2.2 %  
AVERAGE DAILY TRAFFIC = 330 VEHICLES  
(1992 TRAFFIC COUNT)

## BRIDGE PROJECT NO. EPCO 0091-04.37 ELBERT HIGHWAY BRIDGE OVER BLACK SQUIRREL CREEK

EL PASO COUNTY DEPARTMENT OF TRANSPORTATION  
3170 N. CENTURY ST.  
MURRAY D. STEWART, COUNTY ENGINEER

ENGINEERING DIVISION  
3105 N. STONE AVE.  
DAVID M. WATT, PROJECT MANAGER



INDEX OF SHEETS

SHEET NO.

- 1 TITLE SHEET, TABULATION OF DESIGN DATA, VICINITY MAP
- 2 STANDARD PLAN LIST
- 3 SUMMARY OF APPROXIMATE QUANTITIES, GENERAL INFORMATION
- 4 ROADWAY TYPICAL SECTION, TABLE OF MISC. QUANTITIES
- 5 ROADWAY PLAN AND PROFILE STA. 2+75 - STA. 6+00
- 6 ROADWAY PLAN AND PROFILE STA. 6+00 - STA. 14+00
- 7 BYPASS DETOUR PLAN AND PROFILE, TRAFFIC CONTROL PLAN
- 8 GENERAL LAYOUT, RIP RAP DETAILS
- 9 ENGINEERING GEOLOGY
- 10 CONSTRUCTION AND PILING LAYOUT
- 11 ABUTMENT DETAILS
- 12 WING WALL DETAILS
- 13 PIER DETAILS
- 14 GIRDER SPLICE DETAILS
- 15 GIRDER DIAPHRAGM AND BEARING DETAILS
- 16 BRIDGE RAIL TYPE 3
- 17 ROADWAY CROSS SECTIONS STA. 2+75 - STA. 4+50
- 18 ROADWAY CROSS SECTIONS STA. 4+75 - STA. 7+00
- 19 ROADWAY CROSS SECTIONS STA. 7+50 - STA. 11+25

CONTRACTOR	_____
ENGINEER	Western States Engineering
BID DATE	_____
PROJECT STARTED	_____
PROJECT END	_____
EL PASO COUNTY APPROVED	_____

PLAN NUMBER	M STANDARD TITLE	PAGE
<input checked="" type="checkbox"/> M-100-1	STANDARD SYMBOLS	1
<input type="checkbox"/> M-107-1	TEMPORARY EROSION CONTROL	2
<input type="checkbox"/> M-203-1	APPROACH ROADS	3
<input type="checkbox"/> M-203-2	DITCH TYPES	4
<input type="checkbox"/> M-203-10	SUPERELEVATION CROWNED HIGHWAYS	5
<input type="checkbox"/> M-203-11	SUPERELEVATION DIVIDED HIGHWAYS SHOULDER PIVOT	6
<input checked="" type="checkbox"/> M-203-12	SUPERELEVATION STREETS	7
<input type="checkbox"/> M-203-13	SUPERELEVATION DIVIDED HIGHWAYS CENTER PIVOT	8
<input type="checkbox"/> M-206-1	EXCAVATION AND BACKFILL FOR STRUCTURES	(3 SHEETS) 9
<input checked="" type="checkbox"/> M-206-2	EXCAVATION AND BACKFILL FOR BRIDGES	12
<input type="checkbox"/> M-210-1	MAILBOX SUPPORTS	(2 SHEETS) 13
<input type="checkbox"/> M-214-1	PLANTING DETAILS	15
<input type="checkbox"/> M-412-1	CONCRETE PAVEMENT JOINTS	16
<input type="checkbox"/> M-412-2	CURBED CONCRETE PAVEMENT JOINTS	17
<input type="checkbox"/> M-504-1	STEEL CRIBBING	18
<input type="checkbox"/> M-506-1	GABIONS AND SLOPE MATTRESS	19
<input type="checkbox"/> M-510-1	STRUCTURAL PLATE CULVERT PIPE H-20 LOADING	20
<input type="checkbox"/> M-601-1	SINGLE CONCRETE BOX CULVERT	(2 SHEETS) 21
<input type="checkbox"/> M-601-2	DOUBLE CONCRETE BOX CULVERT	(2 SHEETS) 23
<input type="checkbox"/> M-601-3	TRIPLE CONCRETE BOX CULVERT	(2 SHEETS) 25
<input type="checkbox"/> M-601-10	HEADWALL FOR PIPE CULVERTS	27
<input type="checkbox"/> M-601-11	TYPE "S" SADDLE HEADWALL FOR PIPE CULVERTS	28
<input type="checkbox"/> M-601-12	HEADWALLS AND CULVERT OUTLET PAVING	29
<input type="checkbox"/> M-601-20	WINGWALLS FOR PIPE OR BOX CULVERTS	30
<input type="checkbox"/> M-603-1	METAL AND PLASTIC CULVERT PIPE	(2 SHEETS) 31
<input type="checkbox"/> M-603-2	REINFORCED CONCRETE PIPE	33
<input type="checkbox"/> M-603-3	PRECAST CONCRETE BOX CULVERT	34
<input type="checkbox"/> M-603-10	CONCRETE AND METAL END SECTIONS	(2 SHEETS) 35

PLAN NUMBER	M STANDARD TITLE	PAGE
<input type="checkbox"/> M-604-10	INLET, TYPE C	37
<input type="checkbox"/> M-604-11	INLET, TYPE D	38
<input type="checkbox"/> M-604-12	CURB INLET, TYPE R	(2 SHEETS) 39
<input type="checkbox"/> M-604-13	CONCRETE INLET, TYPE 13	41
<input type="checkbox"/> M-604-20	MANHOLES	(3 SHEETS) 42
<input type="checkbox"/> M-605-1	SUBSURFACE DRAINS	45
<input checked="" type="checkbox"/> M-606-1	GUARDRAIL, TYPE 3, W-BEAM	(12 SHEETS) 46
<input type="checkbox"/> M-606-12	GUARDRAIL, TYPE 4, CONCRETE BARRIER	(6 SHEETS) 58
<input checked="" type="checkbox"/> M-607-1	WIRE FENCES AND GATES	(2 SHEETS) 64
<input type="checkbox"/> M-607-2	CHAIN LINK FENCE	(3 SHEETS) 66
<input type="checkbox"/> M-607-3	BARRIER FENCE	69
<input type="checkbox"/> M-607-4	DEER FENCE AND GATE	(2 SHEETS) 70
<input type="checkbox"/> M-607-10	PICKET SNOW FENCE	72
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<input checked="" type="checkbox"/> M-609-1	CURB AND GUTTERS	74
<input type="checkbox"/> M-611-1	CATTLE GUARD	(2 SHEETS) 75
<input type="checkbox"/> M-613-1	CONVENTIONAL HIGHWAY LIGHTING	(3 SHEETS) 77
<input type="checkbox"/> M-613-2	HIGH MAST LIGHTING	(2 SHEETS) 80
<input type="checkbox"/> M-614-1	RUMBLE STRIPS	82
<input checked="" type="checkbox"/> M-615-1	EMBANKMENT PROTECTOR, TYPE 3	83
<input type="checkbox"/> M-615-2	EMBANKMENT PROTECTOR, TYPE 5	84
<input type="checkbox"/> M-616-1	INVERTED SIPHON (ALSO USE APPLICABLE M-603)	85
<input type="checkbox"/> M-620-1	FIELD LABORATORY, CLASS 1	86
<input type="checkbox"/> M-620-2	FIELD LABORATORY, CLASS 2	87
<input checked="" type="checkbox"/> M-620-11	FIELD OFFICE, CLASS 1	88
<input type="checkbox"/> M-620-12	FIELD OFFICE, CLASS 2	89
<input type="checkbox"/> M-629-1	SURVEY MONUMENTS	(2 SHEETS) 90

PLAN NUMBER	S STANDARD TITLE	PAGE
<input checked="" type="checkbox"/> S-612-1	TYPICAL DELINEATOR INSTALLATIONS	(5 SHEETS) 93
<input checked="" type="checkbox"/> S-614-1	TYPICAL GROUND SIGN PLACEMENT	98
<input type="checkbox"/> S-614-2	CLASS I GROUND SIGN INSTALLATIONS	99
<input type="checkbox"/> S-614-3	CLASS II GROUND SIGN INSTALLATIONS	100
<input type="checkbox"/> S-614-4	CLASS III SIGNS, SHEET ALUMINUM PANELS	(3 SHEETS) 101
<input type="checkbox"/> S-614-5	BREAK-AWAY SIGN SUPPORT DETAILS FOR GROUND SIGNS	(2 SHEETS) 104
<input type="checkbox"/> S-614-6	CONCRETE FOOTINGS AND SIGN ISLANDS FOR CLASS III SIGNS	(2 SHEETS) 106
<input type="checkbox"/> S-614-10	TYPICAL MARKER ASSEMBLY INSTALLATIONS	108
<input type="checkbox"/> S-614-11	MILEPOST SIGN AND INSTALLATION	109
<input type="checkbox"/> S-614-12	STRUCTURE NUMBER INSTALLATION (BRIDGE INFORMATION SHEET)	110
<input type="checkbox"/> S-614-14	FLASHING BEACON AND SIGN INSTALLATION	(2 SHEETS) 111
<input type="checkbox"/> S-614-20	TYPICAL POLE MOUNT SIGN INSTALLATION	113
<input type="checkbox"/> S-614-21	CONCRETE BARRIER SIGN POST INSTALLATIONS	114
<input type="checkbox"/> S-614-22	TYPICAL MULTI-SIGN INSTALLATIONS	115
<input type="checkbox"/> S-614-40	TYPICAL TRAFFIC SIGNAL INSTALLATION DETAILS	(3 SHEETS) 116
<input checked="" type="checkbox"/> S-627-1	TYPICAL PAVEMENT MARKINGS	(4 SHEETS) 119
<input checked="" type="checkbox"/> S-630-1	TRAFFIC CONTROLS FOR HIGHWAY CONSTRUCTION	(9 SHEETS) 123
<input checked="" type="checkbox"/> S-630-2	BARRICADES, DRUMS, CONCRETE BARRIERS (TEMP) & VERTICAL PANELS	132
<input type="checkbox"/> S-630-3	FLASHING BEACON (PORTABLE) DETAILS	133

THE STANDARD PLAN SHEETS INDICATED HEREON BY A  
MARKED BOX ARE TO BE USED TO CONSTRUCT  
THIS PROJECT

TO OBTAIN STANDARD PLANS, CONTACT:

COLORADO DEPARTMENT OF TRANSPORTATION  
MAP SALES ROOM 117  
4201 E. ARKANSAS AVE.  
DENVER, CO 80222  
(303)-757-8313  
(OR CONTACT DISTRICT INT. OFFICE IN COLORADO SPRINGS)

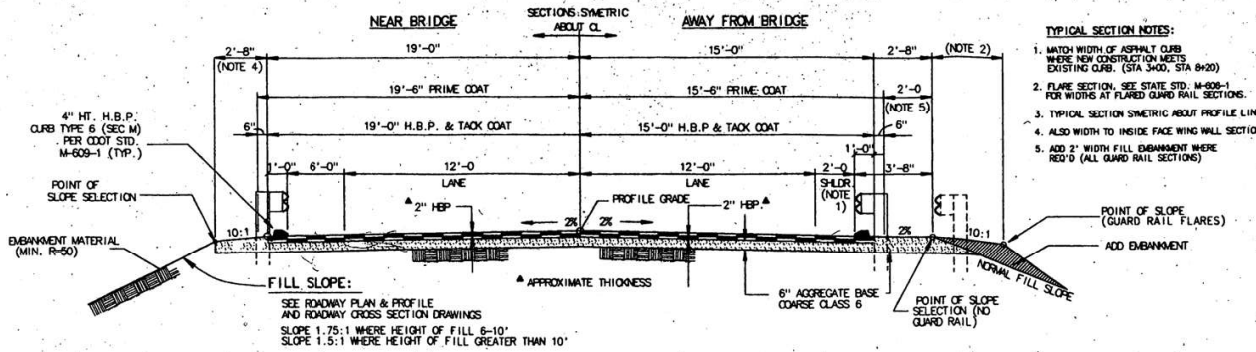
COLORADO DEPARTMENT  
OF TRANSPORTATION

## STANDARD PLANS LIST

M & S STANDARDS

NOVEMBER, 1992





- TYPICAL SECTION NOTES:**
1. MATCH WIDTH OF ASPHALT CURB WHERE NEW CONSTRUCTION MEETS EXISTING CURB. (STA 3400, STA 8420)
  2. FLARE SECTION. SEE STATE STD. M-608-1 FOR WIDTHS AT FLARED GUARD RAIL SECTIONS.
  3. TYPICAL SECTION SYMMETRIC ABOUT PROFILE LINE. AGGREGATE BASE COURSE
  4. ALSO WIDTH TO INSIDE FACE WING WALL SECTION.
  5. ADD 2" WIDTH FILL EMBANKMENT WHERE REQ'D (ALL GUARD RAIL SECTIONS)

**GENERAL NOTES**

FOR THE PRELIMINARY PLAN QUANTITIES OF BITUMINOUS MATERIALS, THE FOLLOWING RATES OF APPLICATIONS WERE USED:

PRIME COAT LIQUID DULSIFIED ASPH. 0.30 GALS PER SQ. YD.  
 TACK COAT DULSIFIED ASPH. 0.10 GALS PER SQ. YD.  
 BITUMINOUS PAVING OIL 110 LBS PER SQ. YD. HIGH  
 AGGREGATE BASE COURSE 133 LBS PER CU. FT.

RATES OF APPLICATION SHALL BE AS DETERMINED BY THE ENGINEER AT THE TIME OF APPLICATION. MATERIALS SHALL BE UNCLASSIFIED DULSIFIED ASPHALT FOR TACK COAT SHALL CONSIST OF 1 PART DULSIFIED ASPHALT AND 1 PART WATER.

THE FOLLOWING SHALL BE FURNISHED WITH EACH BITUMINOUS PAVEMENT:

1. A SKI-TYPE DEVICE AT LEAST 30 FEET IN LENGTH.
2. A SHORT SKI OR SHOE.

ANY LAYER OF BITUMINOUS PAVEMENT THAT IS TO HAVE A SUCCEEDING LAYER PLACED THEREON SHALL BE COMPLETED IN FULL WIDTH BEFORE SUCCEEDING LAYER IS PLACED.

TYPE OF COMPACTION FOR THIS PROJECT WILL BE ASHTO T-99

DEPTH OF MOISTURE-DENSITY CONTROL FOR THIS PROJECT SHALL BE AS FOLLOWS:

FULL DEPTH OF ALL EMBANKMENTS  
 BASES OF CUTS AND FILLS 0.5 FEET.

EXCAVATION REQUIRED FOR COMPACTION OF BASES OF CUTS AND FILLS WILL BE CONSIDERED AS SUBSIDIARY TO THE OPERATION AND WILL NOT BE PAID FOR SEPARATELY.

**TYPICAL SECTION**

**SUMMARY OF EARTHWORK QUANTITIES**

UNCLASSIFIED EXCAVATION (COMPLETE-IN-PLACE)	CUT (CY.)	FILL (CY.)	NET EXC. (CY.)
CL STA. 2+75 - 5+00	165	107	58
CL STA. 6+20 - 11+25	50	585	-535
CL STA. 5+00 - 5+20 (ABUT. 1 - EXCAVATE w/ BRIDGE REMOVAL)	240	0	240
CL STA. 6+08 - 6+20 (ABUT. 4 - EXCAVATE w/ BRIDGE REMOVAL)	90	0	90
CL STA. 5+20 - 6+08 (EXCAVATE IN CHANNEL TO BOTTOM EL. OF RIP RAP SECTION)	1,200	0	1,200
<b>TOTAL</b>	<b>1,745</b>	<b>692</b>	<b>1,053</b>

FOR INFORMATION ONLY		(M. GAL.)
WETTING		50
COMPACTION		(CU. YD)
EMBANKMENT (NET)		692
BASE OF CUT & FILLS		68
<b>TOTAL</b>		<b>760</b>

ROADWAY QUANTITY BALANCE		(CU. YDS)
UNCLASS. EXC.		1,745
EMBANKMENT x FACTOR 692 x 1.2		- 830
EXCESS MATERIAL (CONTRACTOR SOURCE)		915

**GUARD RAIL TYPE 3**

LOCATION (STATION)	SIDE	GUARD RAIL TYPE 3 (6'-3") (LIN. FT.)	TYPE 3E (EA.)	TYPE 3D (EA.)
2+85.5-5+10.5	RT.	225	1	
2+97.0-4+97	LT.	200		1
6+23.0-11+23	RT.	500		1
6+09.6-11+10.6	LT.	500	1	
<b>TOTALS</b>		<b>1,425</b>	<b>2</b>	<b>2</b>

**DELINEATORS (FORCE ACCOUNT-BY COUNTY)**

LOCATION (STATION)	SIDE	QUANTITY & TYPE
2+83	RT	1
2+96	LT	1
3+18	RT	1
3+34	LT	1
3+56	RT	1
3+71	LT	1
3+93	RT	1
4+08	LT	1
4+30	RT	1
4+46	LT	1
4+69	RT	1
4+92	RT	1
5+06	RT	1
6+14	LT	1
6+28	RT	1
6+52	LT	1
6+66	RT	1
7+12	LT	1
7+28	RT	1
9+12	LT	1
9+27	RT	1
10+71	LT	1
11+12	LT	1
11+27	RT	1
<b>TOTAL</b>		<b>21</b>

GUARD RAIL & END BUFFERS ARE TO BE GALVANIZED TYPE. REFLECTOR TUBES SHALL BE MOUNTED ON ALL GUARD RAIL TYPE 3 AND BRIDGE RAIL TYPE 3 AT ALTERNATE POSTS ON A MAX SPACING OF 12'-0". EXCEPT FOR THE END 7 POSTS FOR ANCHORAGE TYPE 3E. SEE STATE STD M-608-1, SH. 2 & 3 FOR DETAILS.

**FENCING**

LOCATION (STATION)	SIDE	REMOVAL OF FENCE (LIN. FT.)	FENCE BARBED WIRE w/METAL PST (LIN. FT.)	FENCE (TEMPORARY)
2+40 - 8+25	RT.	535	535	575
<b>TOTALS</b>		<b>535</b>	<b>535</b>	<b>575</b>

IT IS ESTIMATED 2 END POSTS & 2 CORNER AND LINE BRACE POSTS WILL BE REQ'D.

**CONSTRUCTION TRAFFIC CONTROL DEVICES**

SIGN CODE	LEGEND	SIZE	A	B
36W20-1	ROAD/CONSTRUCTION/1500 FT.	36X36	2	
36W20-2	DETOUR/AHEAD	36x36	2	
R2-1(15)	SPEED LIMIT/15	48x30		2
24W1-4(L)	CURVE ARROW	36x36	1	
24W1-4(R)	CURVE ARROW	36x36	1	
R11-2	ROAD/CLOSED	48x30		8
48M-10(L)	DETOUR ARROW	48x18	2	
48M-10(R)	DETOUR ARROW	48x18	2	
G20-12	END/CONSTRUCTION	60x24		2
<b>TOTALS</b>			<b>10</b>	<b>12</b>

OTHER DEVICES		QUANTITY
BARRICADE (3M-4)(12')(TEMP)		8
DRUM CHANNELIZING DEVICE (w/ FLASH LIGHT)		12
CONCRETE BARRIER (TEMPORARY)		100 LIN. FT.

SEE STATE STD. S-430-2 FOR BARRICADE DETAILS. BID ITEM BARRICADE TYPE (3M-4) INCLUDES FLASHING WARNING LIGHTS.  
 SEE STATE STD. S-430-2 FOR DETAILS OF CONSTRUCTION TRAFFIC CONTROL DEVICES.

TYPE 1 DELINEATORS SHALL BE CRYSTAL PER STD. S-612-1  
 DELINEATORS TYPE 111 SHALL BE VERTICAL PANELS CONFORMING TO STD. S-612-1, SIGN TYPE CM-3 PANEL.

**SUBBASE & SURFACING COURSES**

STATION	*AGGREGATE BASE (CLASS 6) (TONS)	*HOT BITUMINOUS PAVEMENT (GRADE 0) (TONS)	BOTTOM LAYER	TOP LAYER
2+75 - 5+00	240	85	85	
6+20-11+25	330	85	85	
3+00 - 5+00				
6+20 - 8+20				
<b>TOTALS</b>	<b>570</b>	<b>170</b>	<b>170</b>	

\* CONTRACTOR SOURCE

**REMOVAL OF ASPHALT**

STATION	SIDE	ASPHALT CURB (TYPE 6 - SECTION M) (LIN. FT.)	ASPHALT MAT (SQ. YD.)
2+46-5+18	RT	275	775
2+55-5+18	LT	265	795
6+10-8+20	LT	210	510
6+10-8+20	RT	210	
3+00 - 5+19			675
6+08.5-8+20			675
<b>TOTALS</b>		<b>960</b>	<b>1,350</b>

**ASPHALT CURB TYPE 6**

LOCATION (STATION)	SIDE	QUANTITY (LIN FT.)
2+96 - 4+35	LT.	139
4+35 - 4+65	LT	35
4+66 - 4+93	LT.	27.5
6+13 - 6+41	LT.	27.5
6+41 - 6+72	LT.	35
6+72 - 8+20	LT.	400
3+23 - 4+48	RT.	125
4+48 - 4+79	RT.	35
4+79 - 5+06	RT.	27.5
6+27 - 6+54	RT.	27.5
6+54 - 6+85	RT	35
6+85 - 8+20	RT.	135
<b>TOTAL</b>		<b>1,050 *</b>

\* IT IS ESTIMATED 15 TONS OF H.B.P. IS REQUIRED FOR 1,050 LIN. FT. CURB TYPE 6. 140 L.F. OF CURB TYPE 6 IS INCLUDED IN ABOVE 1,050 L.F. TOTAL IS FOR EMBANK. PROTECTION.

**EMBANKMENT PROTECTOR**

STATION	SIDE	REMOVE EXIST. (EACH)	NEW (TYPE 3) (EACH)
5+09	LT	1	
4+35-4+65	LT		1
4+48-4+79	RT		1
6+10	RT	1	
6+54-6+85	RT		1
6+41-6+72	LT		1
6+74	LT	1	
<b>TOTALS</b>		<b>3</b>	<b>4</b>

ITEM 615 - EMBANKMENT PROTECTOR TYPE 3 ALSO REQUIRES THE FOLLOWING ADDITIONAL WORK ITEM TOTAL APPROX. QUANTITIES:

ITEM 608 - RIPRAP = 4 CU. YD.  
 ITEM 609 - CURB TYPE 6 (SEC. M) = 140 LIN. FT.  
 ITEM 617 - 12" CULVERT PIPE (FLEXIBLE TYPE) = 150 LIN. FT.  
 (SEE STATE STD. M-818-1)

ROADWAY TYPICAL SECTION  
 TABLE OF MISC. QUANTITIES  
 over Black Squirrel Creek  
 Elbert Highway



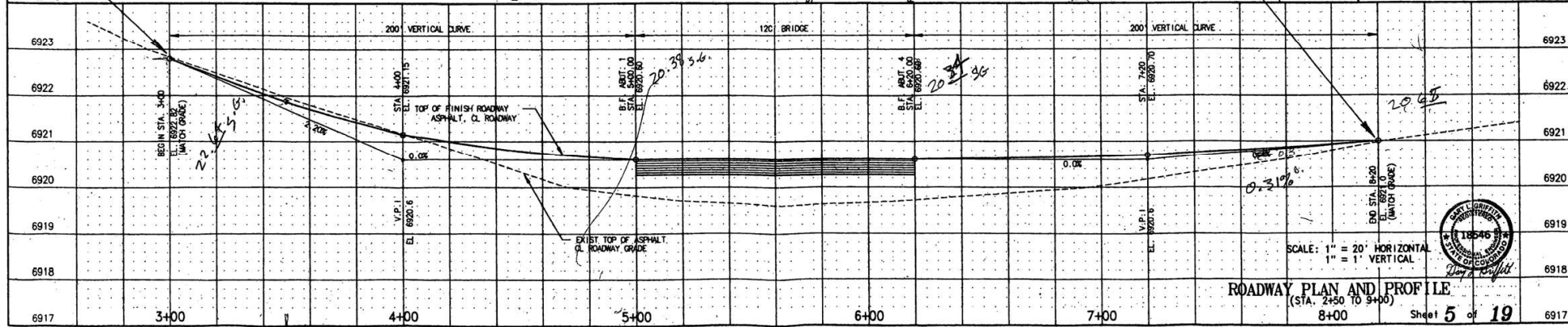
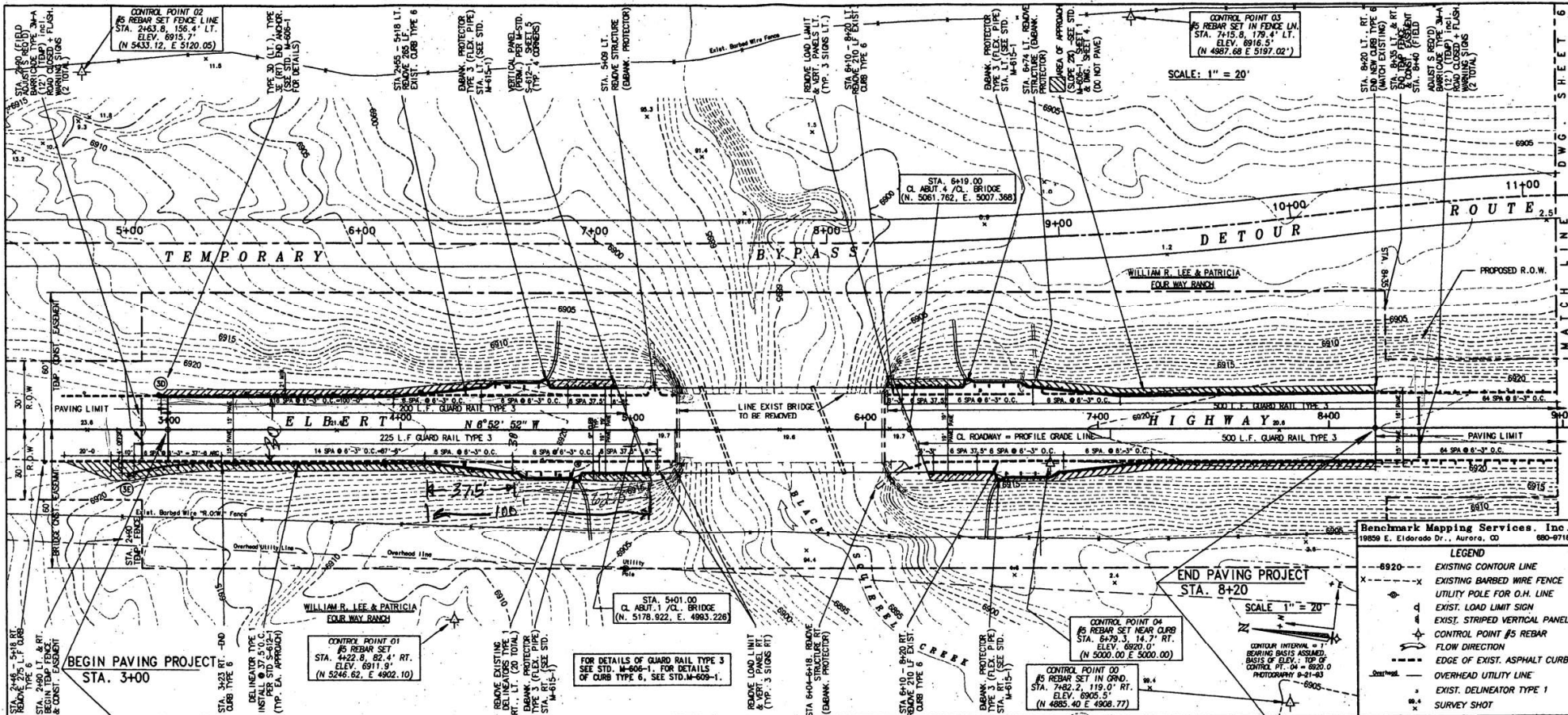
WESTERN STATES ENGINEERING AND INSPECTION SERVICE INC.  
 Structures - Foundations - Bridges  
 Gary L. Griffith, P.E. President  
 600 S. Riverside Ct., Englewood, CO 80111  
 303.771-6878



Drawn by	Checked by	Date	Scale
G. Griffith			

No.	Date	Description



Benchmark Mapping Services, Inc.  
19859 E. Eldorado Dr., Aurora, CO 800-9718

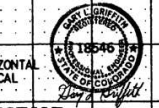
- LEGEND**
- - - 6920 - - - EXISTING CONTOUR LINE
  - x - - - x EXISTING BARBED WIRE FENCE
  - o EXIST. UTILITY POLE FOR O.H. LINE
  - ▲ EXIST. LOAD LIMIT SIGN
  - ▬ EXIST. STRIPED VERTICAL PANEL
  - CONTROL POINT #5 REBAR
  - FLOW DIRECTION
  - - - EDGE OF EXIST. ASPHALT CURB
  - OVERHEAD UTILITY LINE
  - ▲ EXIST. DELINEATOR TYPE 1
  - SURVEY SHOT

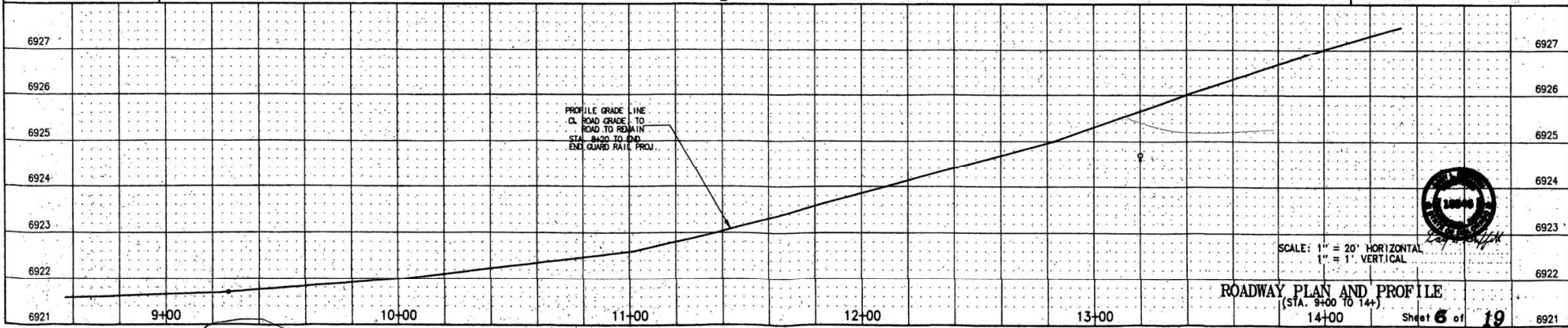
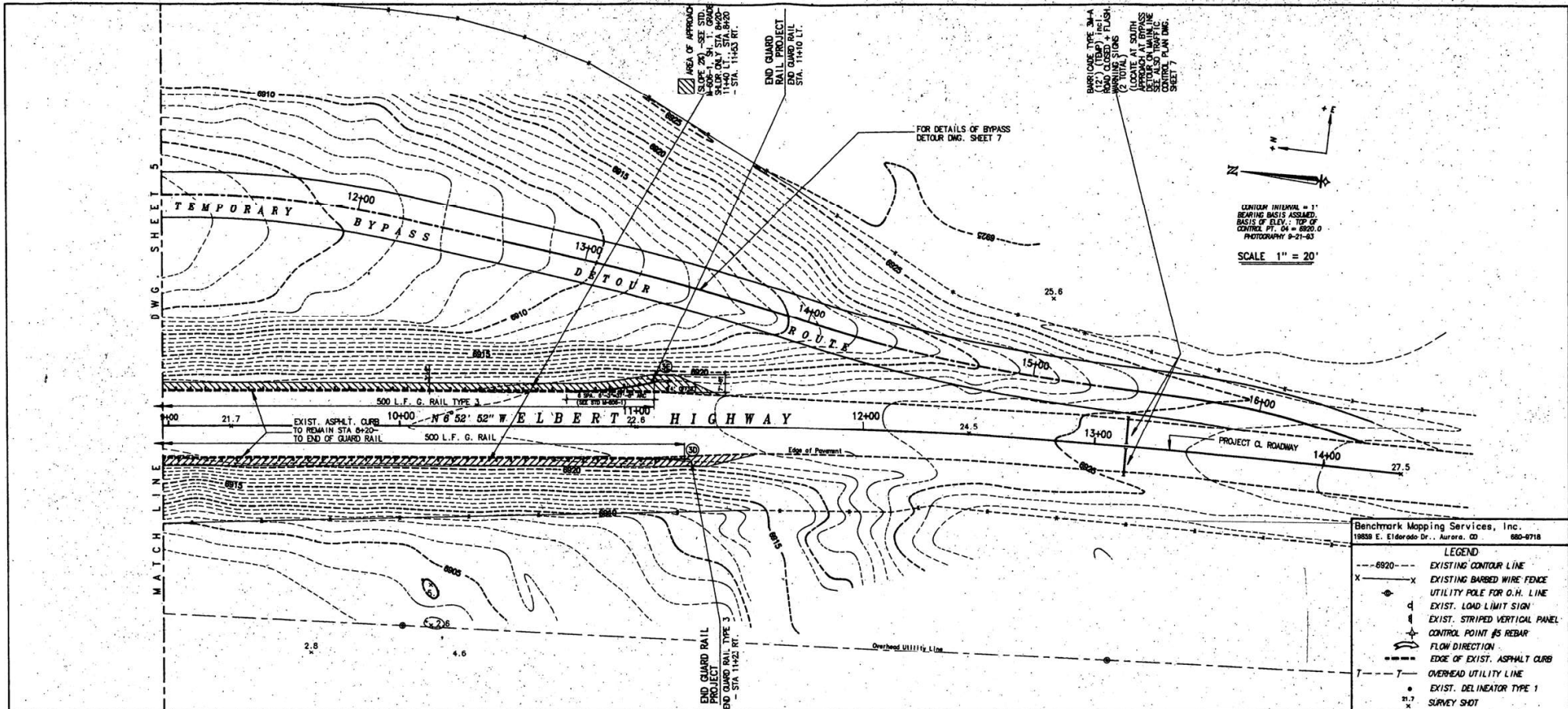
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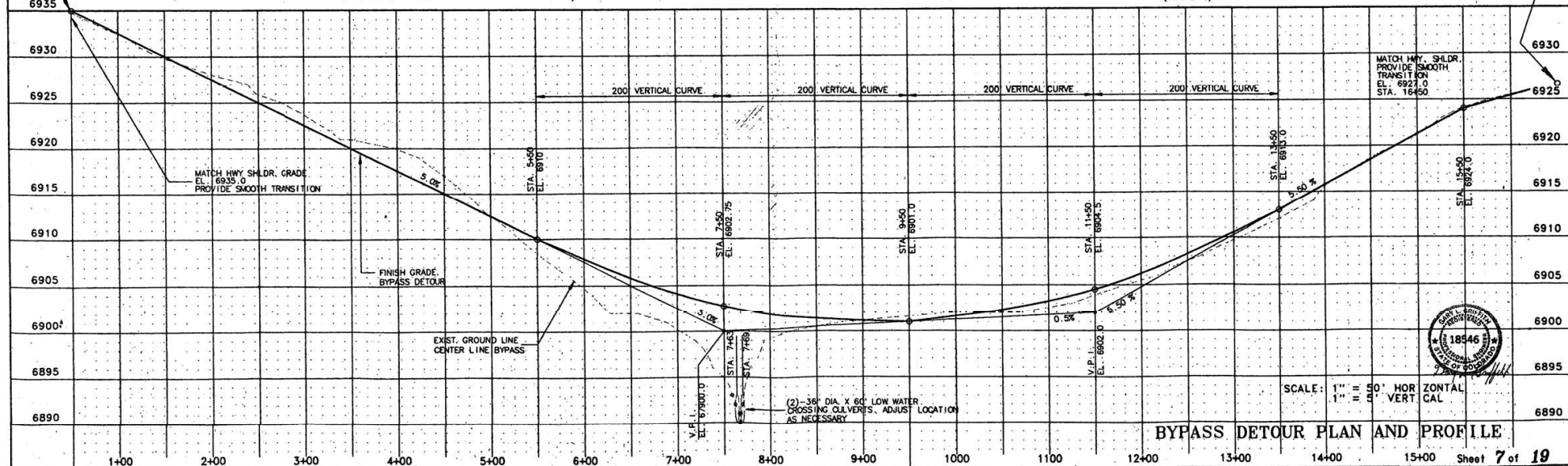
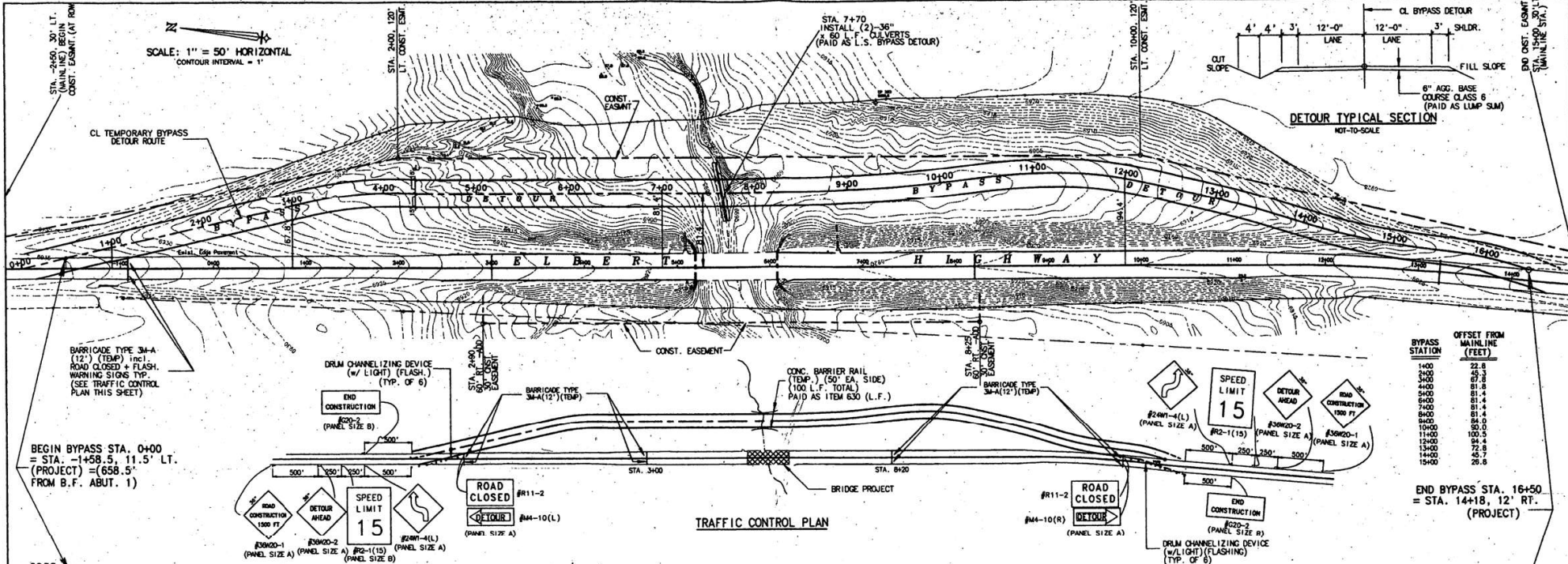
SCALE: 1" = 20'

SCALE: 1" = 20' HORIZONTAL  
1" = 1' VERTICAL

ROADWAY PLAN AND PROFILE  
(STA. 2+50 TO 9+00)







$$\begin{array}{r} 250 \\ 47 \\ \hline 1750 \\ 1000 \\ \hline 1750 \end{array}$$

$$\begin{array}{r} 434 \\ 27 \overline{) 11750} \\ \underline{198} \\ 95 \\ \underline{81} \\ 140 \end{array}$$

$$(1250)(47)(2)$$

$$\left[ \frac{348}{460} + \frac{828}{184} \right] \left[ \frac{47}{84.64} \right] (2) = \text{AButs } 434$$

$$\frac{2.5}{176}$$

$$\frac{2(9.2)(22)}{27} + 4(22)$$

$$\frac{2(2)(2)(22)}{27} = \frac{176}{27} = 767 \text{ WIND OUTSLOPS}$$

$$\begin{array}{r} 84.6 \\ 26 \\ \hline 3384 \\ 1692 \\ \hline 2030.4 \end{array}$$

$$\frac{06.5}{27} \frac{176}{140}$$

$$\triangle 9.2 @ 12' \text{ LONG + 6 WINDS}$$

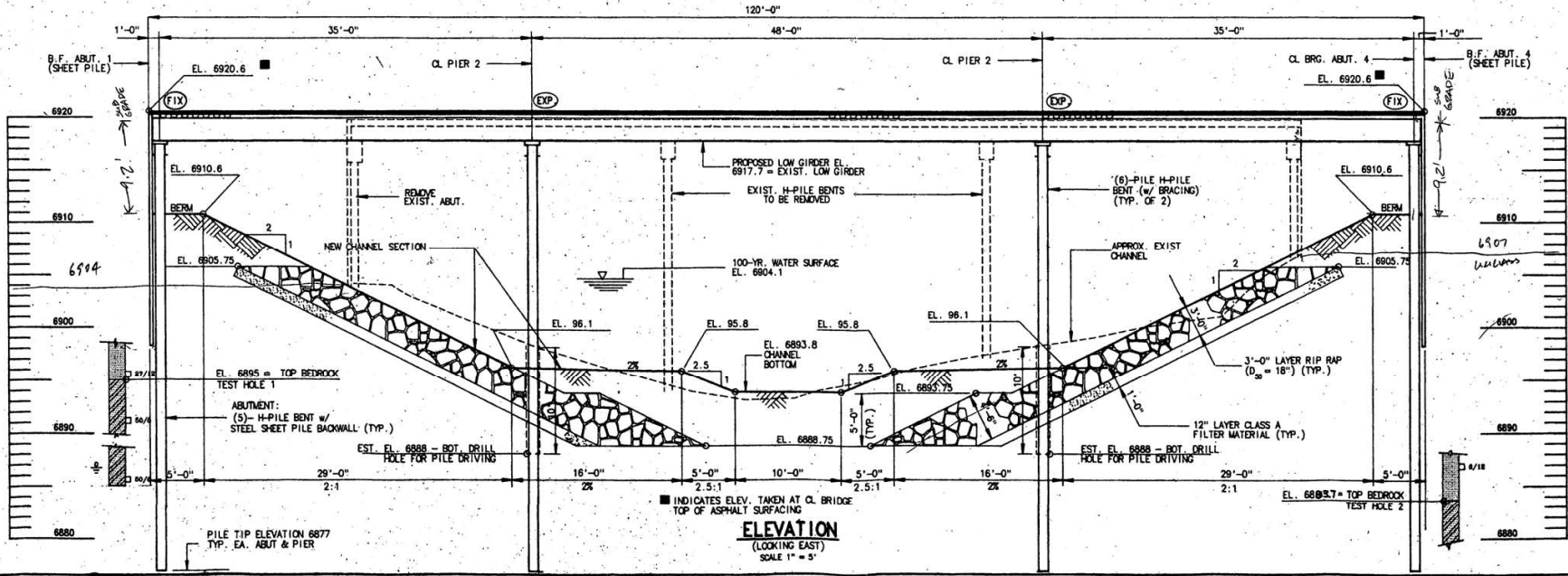
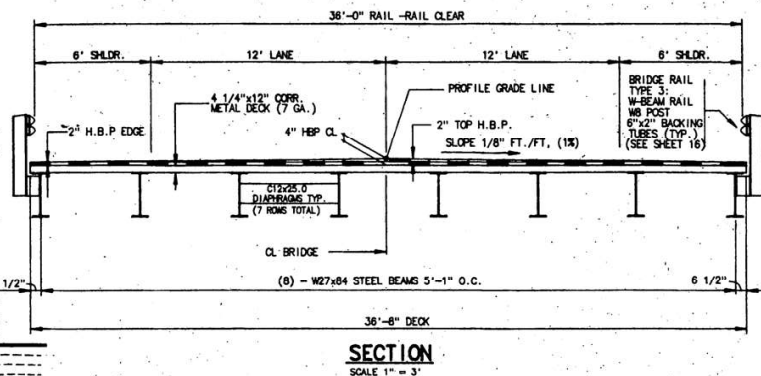
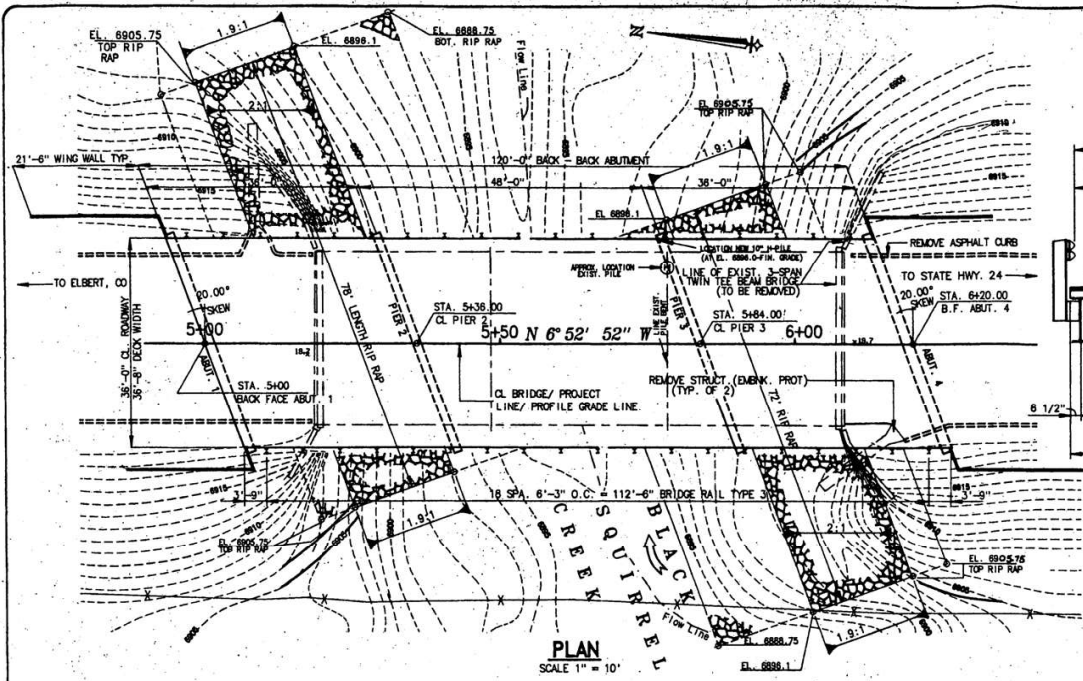
$$= \frac{2(9.2^2)(12)}{27} = \frac{(2)(84.6)(12)}{27} = \frac{2030}{27} = 7524$$

$$+ 7$$

$$\frac{43017}{522}$$

$$\begin{array}{r} 75 \\ 27 \overline{) 2030} \\ \underline{189} \\ 140 \end{array}$$





over Black Squirrel Creek

**GENERAL LAYOUT  
RIP RAP DETAILS**

Elbert Highway

WESTERN STATES ENGINEERING  
INSPECTION SERVICE INC.  
Structures • Foundations • Bridges  
Gary L. Griffin, P.E. President  
687 S. Niagra Ct., Englewood, CO 80111  
303.771-6675

Designed by: G. GULLINO	Date: 10-24
Drawn by: REV IS IDMS	
Checked by:	
No.:	Description
Date:	

Sheet No. **8** of **19**

Plan No. **GENERAL LAYOUT**

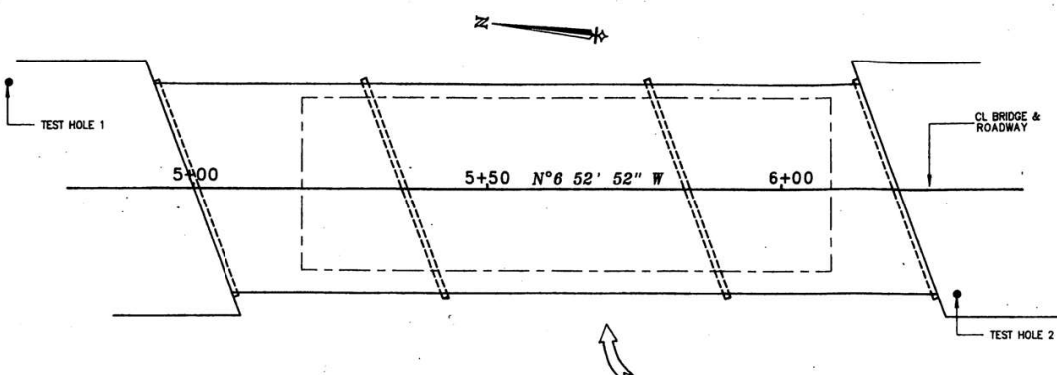


WESTERN STATES ENGINEERING  
INSPECTION SERVICE INC.  
Structures • Foundations • Drifts  
Gary L. Griffin, P.E. President  
6067 S. Wagon Ct., Englewood, CO 80111  
303/771-8875



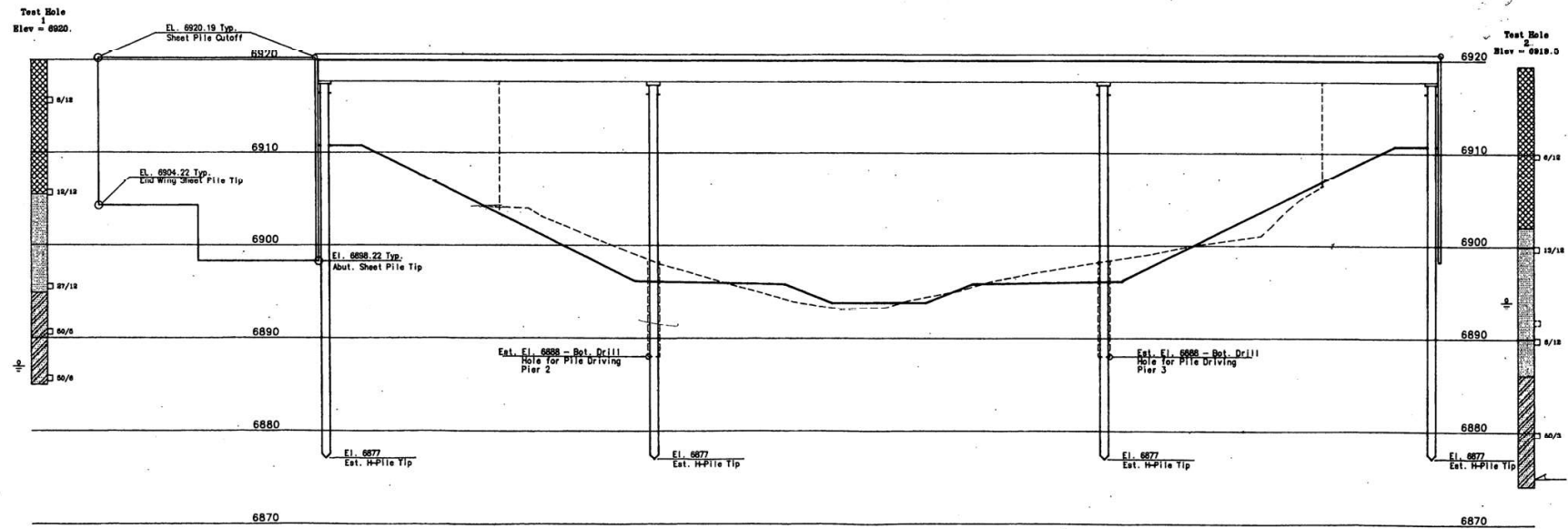
Designed by:	G. Griffin
Drawn by:	...
Checked by:	...
REV ISONS	...
No.:	...
By:	...
Date:	...
Description:	...

Sheet No. **9** of **19**  
Plan No. ENGIN. GEOLOGY



NOTES:

1. Test holes were drilled on September 28, 1993 with a 4-inch diameter continuous flight power auger.
2. Locations of the test holes were measured approximately by pacing from reference to the existing bridge.
3. Elevations of test holes were measured by instrument level and were referenced to topographic features shown on the site plan.
4. Lines between materials shown on the test hole logs represent approximate boundaries between material types and transitions may be gradual.
5. Water level readings shown on the logs are for the date of drilling. Fluctuations in the water level may occur with time.

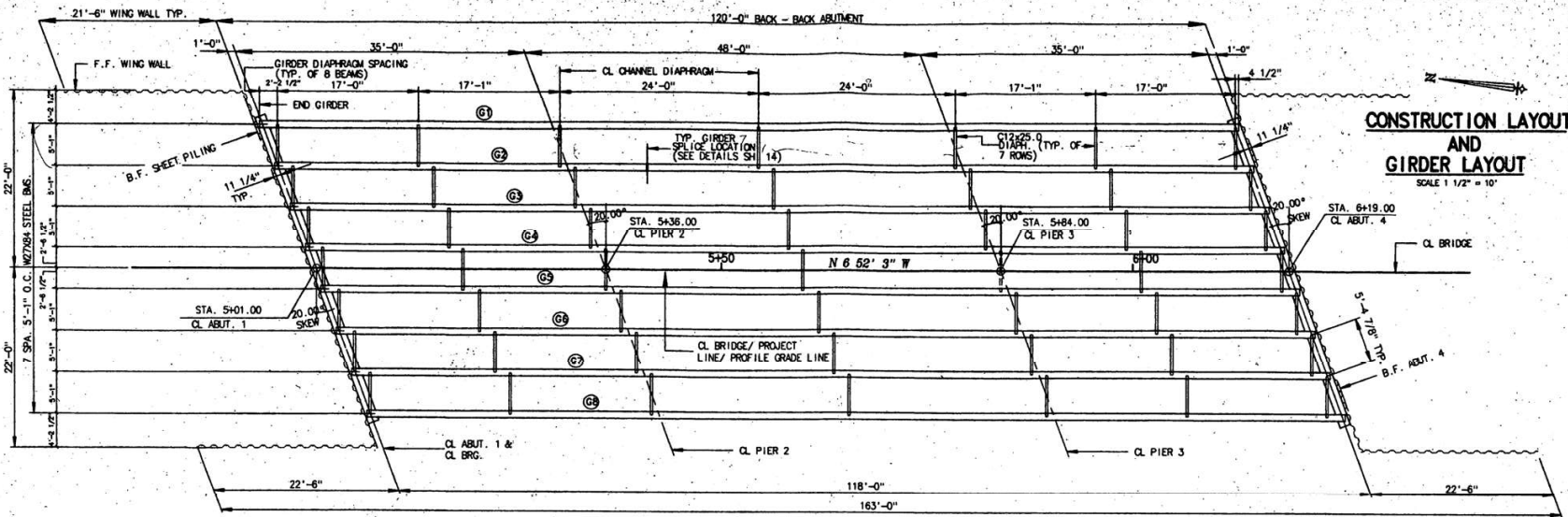


SUMMARY OF LABORATORY TEST RESULTS

Sample Location	Natural Moisture Content (%)	Natural Dry Density (pcf)	Gravel (%)	Sand (%)	Percent Passing No. 200 Sieve	Atterberg Limits Liquid Limit (%)	Plasticity Index (%)	Unconfined Compressive Strength (pcf)	Water Soluble Sulfates (%)	Soil or Bedrock Type
1	4	103	2	69	29	28	14			Fill, Clayey Sand
1	29	81	4	80	16		NP			Sandstone
2	9	100	8	65	27	31	14			Fill, Clayey Sand
2	19	42	10	82	8		NP			Slightly Silty Sandstone
2	39	123	120.4		58	42				Sandstone
Channel Rim - Water Side			9	86	3		NP			Sl. Silty Sand w/Gravel
Channel Rim - Emb. Side			10	84	6		NP			Sl. Silty Sand w/Gravel

LEGEND

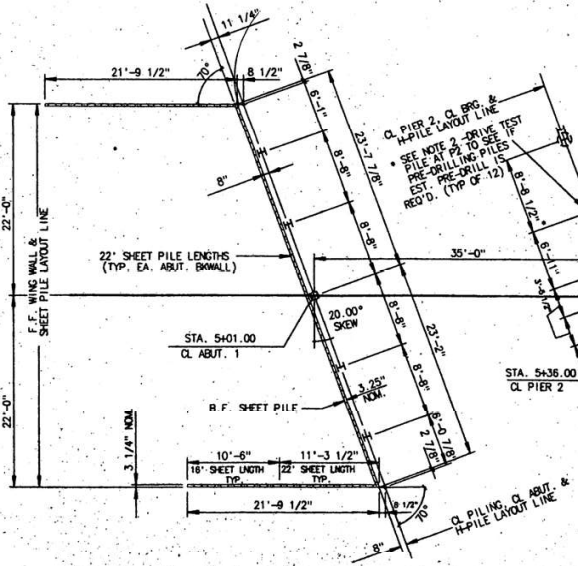
- Fill: Sand; clayey, fine to coarse grained with occasional gravels, non to medium plastic, moist and brown in color.
- Sand: Slightly silty to clayey, fine to coarse grained with occasional gravels, non to low plastic; medium dense, moist to wet and brown in color.
- Sandstone: Silty to clayey, fine to coarse grained with occasional gravels, non to medium plastic, very hard, moist and gray to green.
- Drive sample, 2-inch I.D. California liner sample
- Small disturbed sample
- 27/18 Drive sample blow count. Indicates 23 blows of a 140-pound hammer falling 30 inches were required to drive the sampler 12 inches.
- Depth to water level and number of days after drilling that measurement was taken.
- Cored Hole



**CONSTRUCTION LAYOUT AND GIRDER LAYOUT**  
SCALE 1/2" = 10'

**NOTES:**

1. ALL H-PILES SHALL BE CONSIDERED END BEARING TYPE WITH APPROVED REINFORCING TIPS.
2. H-PILE LAYOUT DIMENSIONS GIVEN ARE HOR. PROJECTION AND TAKEN AT ELEVATION 6886.0 FOR PIER 2 AND PIER 3 (BATTERED PILES) (SEE ALSO DNG. SH. 13, ELEV. VIEW).
3. PILES SHOWN THIS WAY ARE BATTERED 1:12 IN THE DIRECTION SHOWN. SEE DNG. SHEET 13 FOR DETAILS.
4. ALL H-PILING SHOULD PENETRATE AT LEAST 3 FEET INTO BEDROCK AND AT LEAST 10 FEET INTO NATURAL GROUND.
5. H-PILES SHALL BE DRIVEN TO VIRTUAL REFUSAL. VIRTUAL REFUSAL SHALL BE DEFINED AS A PENETRATION OF 1 INCH OR LESS PER THE FINAL 10 BLOWS OF THE HAMMER. IF VIRTUAL REFUSAL IS REACHED PRIOR TO THE ESTIMATED TIP ELEVATION SPECIFIED, THE ENGINEER SHALL ASSESS PILE DRIVING RECORDS AND DETERMINE LOAD BEARING OF DRIVEN PILES BY MEANS OF PILE HAMMER LOAD BEARING CURVES. SEE NOTE 11 - PIER.
6. PILE DRIVING HAMMER SHALL HAVE A MINIMUM RATED ENERGY OUTPUT OF NO LESS THAN 28,000 FT.-LBS. CONTRACTOR SHALL SUBMIT PILE HAMMER SPECIFICATIONS TO ENGINEER FOR APPROVAL.
7. REFER ALSO ENGINEERING GEOLOGY DNG. SHEET 9 FOR LOG OF TEST BORINGS.
8. SHEET PILING SHALL BE DRIVEN WITH VIBRATORY EQUIPMENT. DESIGN OF ABUT. SHEET PILE LENGTHS BASED ON PENETRATION INTO NATURAL GROUND WHERE EXCAVATION OCCURS PRIOR TO DRIVING. CONTRACTOR SHALL EXCAVATE TO EL. 6910.0 PRIOR TO DRIVING ABUTMENT SHEET PILING.
9. WING SHEET PILING DESIGN LENGTH BASED ON PENETRATION BELOW NATURAL EXISTING GROUND LINE. CONTRACTOR SHOULD NOT EXCAVATE BELOW EL. 6916 BEFORE DRIVING WING WALL SHEET PILING.
10. SEE DNG. SHEET 11 FOR SHEET PILE MATERIAL SPECS.
11. H-PILES SHOWN THIS WAY INDICATE DRILLING HOLES TO FACILITATE PILE DRIVING WILL BE REQUIRED (TO EST. EL. 6908 AT PIER 2 AND PIER 3). A TEST PILE AT PIER 2 SHALL BE DRIVEN TO DETERMINE AND VERIFY THE ESTIMATED DEPTH OF HOLE REQUIRED. SEE ALSO DNG. SHEET ELEVATION AND ING. SHEET 9 ENG. GEOLOGY. BACKFILL PREPILL HOLE AFTER DRIVING WITH PEA GRAVEL CONCRETE. COST OF TEST PILE SHALL BE INCLUDED IN BID ITEM 502.

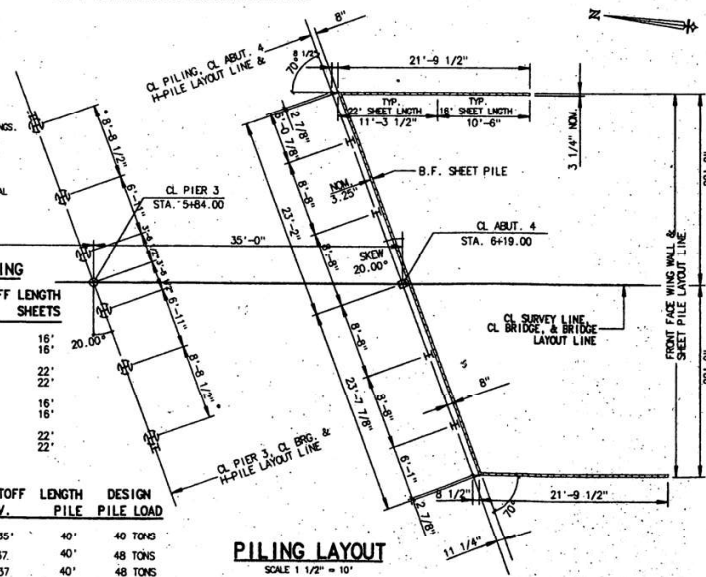


**WING WALL SHEET PILING**

LOCATION	TIP ELEV. (STATION)	PILE CUTOFF ELEV.	LENGTH	SHEETS
ABUT. 1: 4+86.5-4+97 RT.	6904.22	6920.19	16'	18
4+70.5-4+81 LT.	6904.22	6920.19	16'	18
4+97.0-5+08 RT.	6898.22	6920.19	22'	22
4+81.0-4+92 LT.	6898.22	6920.19	16'	18
ABUT. 4: 6+39-6+49.5 RT.	6904.22	6920.19	16'	18
6+23-6+33.5 LT.	6904.22	6920.19	16'	18
6+27.7-6+39 RT.	6898.22	6920.19	22'	22
6+11.7-6+23 LT.	6898.22	6920.19	22'	22

**H-PILES**

LOCATION	NO. PILES & SIZE	PILING TIP ELEV.	PILE CUTOFF ELEV.	LENGTH PILE	DESIGN PILE LOAD
ABUT. 1	(5)-HP10x42	6877'	6917.35'	40'	40 TONS
PIER 2	(6)-HP10x42	6877'	6917.37'	40'	48 TONS
PIER 3	(6)-HP10x42	6877'	6917.37'	40'	48 TONS
ABUT. 4	(5)-HP10x42	6877'	6917.35'	40'	40 TONS

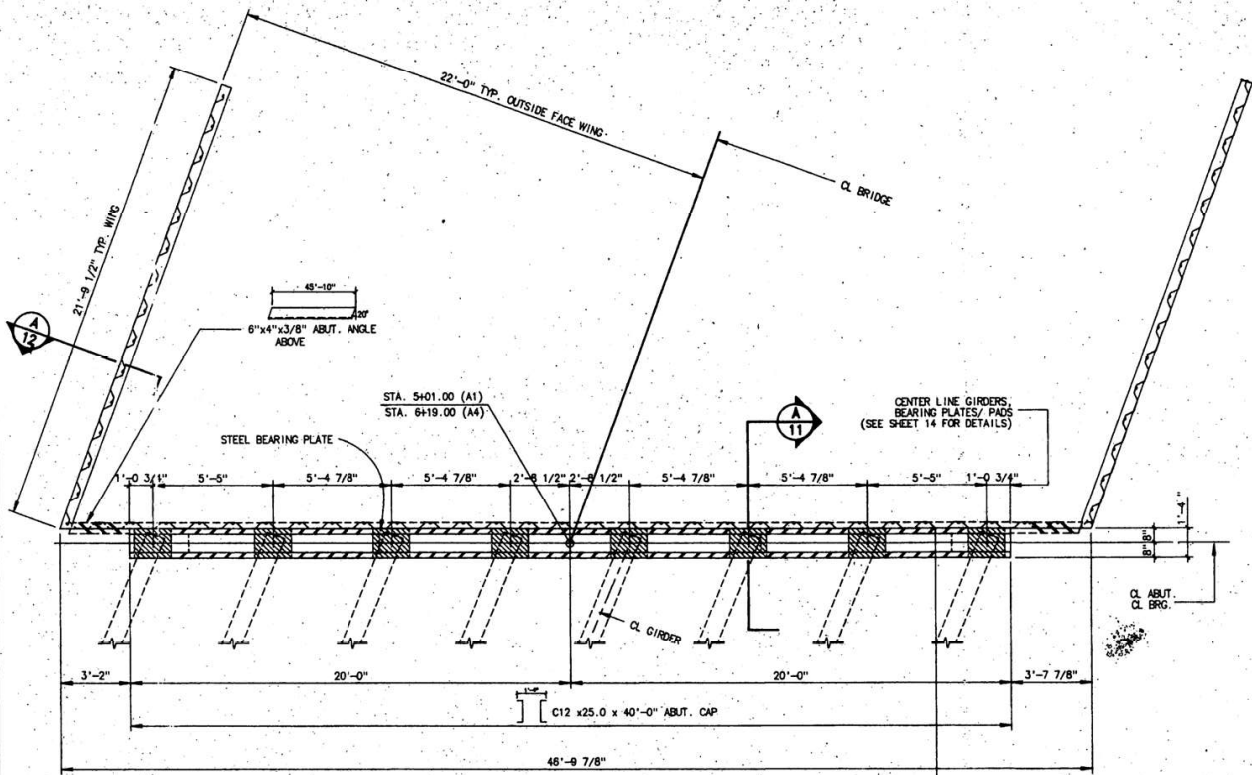


**PILING LAYOUT**  
SCALE 1/2" = 10'

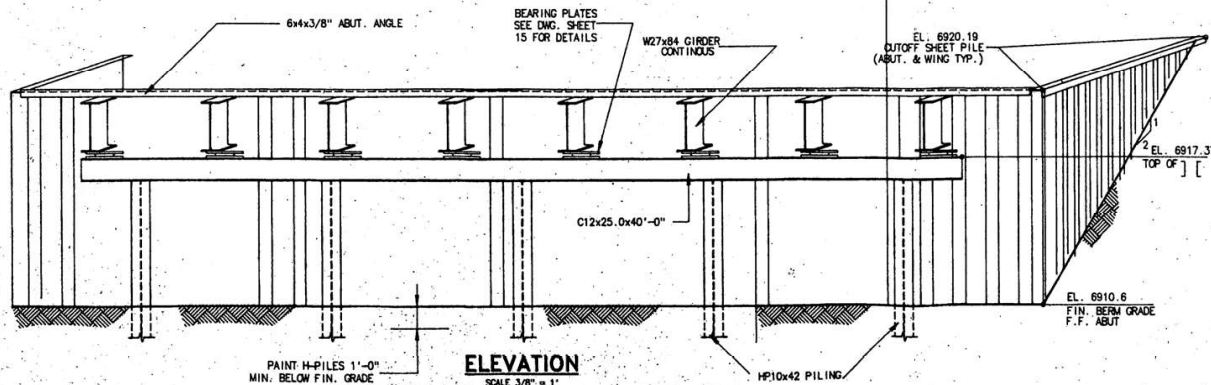


WESTERN STATES ENGINEERING AND INSPECTION SERVICE INC.  
Structures - Foundations - Bridges  
Gary L. Griffith, P.E., President  
6047 S. Nilgore Ct., Englewood, CO 80111  
303/771-6875

Designed by: G. SELLIER  
Drawn by: [ ]  
Checked by: [ ]  
Date: 10-24  
REV IS (ONS)  
Description  
No. By Date Description  
1-10-95 BY DWG



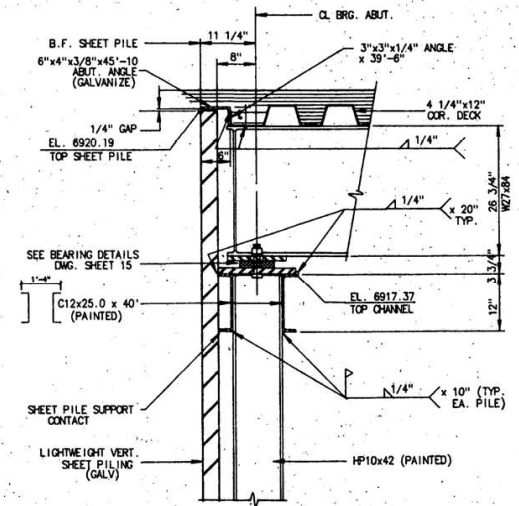
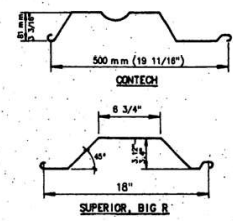
**PLAN**  
SCALE 3/8" = 1'



**ELEVATION**  
SCALE 3/8" = 1'

**SHEET PILING NOTES:**

1. SHEET PILING SHALL BE LIGHT WEIGHT GAUGE WITH INTERLOCK TABS CONTINUOUS FOR LENGTH OF PILE. CORNER FITTINGS AND ELBOWS SHALL BE FABRICATED BY THE SUPPLIER.
2. SHEETS MAY BE MADE FROM BLACK STEEL CONFORMING TO ASTM A572 (GR. 50). THE SHEETS SHALL BE HOT-DIPPED GALVANIZED AFTER FABRICATION ACCORDING TO ASTM A123 AT THE RATE OF 2 OUNCES PER SQUARE FOOT TOTAL FOR EACH SIDE. SHEETS MAY ALSO BE MADE OF FIRE-GALVANIZED STEEL CONFORMING TO ASTM A 446 GR. A MIN. COATING ASTM ASSQ OF 2 OUNCES PER SQUARE FOOT TOTAL EACH SIDE.
3. SEE CONSTRUCTION LAYOUT DWG. SHEET 10 FOR SHEET LENGTHS AT ABUTMENTS AND WING WALLS AND SHEET PILE DRIVING NOTES.
4. GAUGE = 7 GA. SECTION MODULUS  $S_x = 2.8 \text{ in.}^3$  MIN. per ft. of wall. MOMENT OF INERTIA  $I_x = 4.4 \text{ in.}^4$  MIN. per ft. of wall
5. SUPPLIERS:
  - Superior Piling, Inc. 1-800-544-1198
  - Bridgeway, IL
  - Shoreline Steel Supply 1 600 682 0660
  - New Haven, MI
  - ConTech Construction Products, Inc. 303-431-8999
  - Wheatridge, CO
  - Big R Manufacturing & Distributing 303-358-6800
  - Grealey, CO



**SECTION A-11**  
SCALE 1" = 1'

**ABUTMENT DETAILS**

over Black Squirrel Creek

Elbert Highway

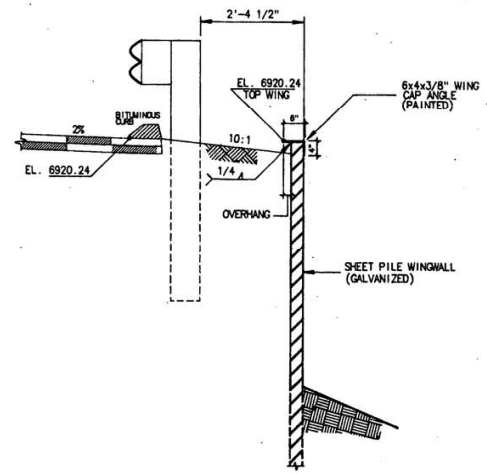
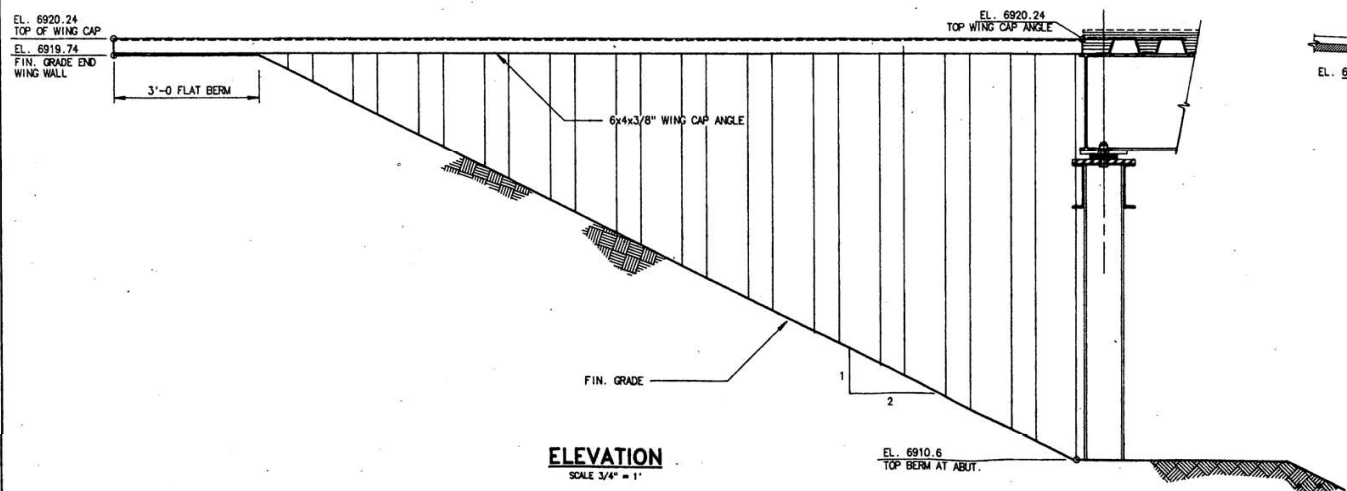
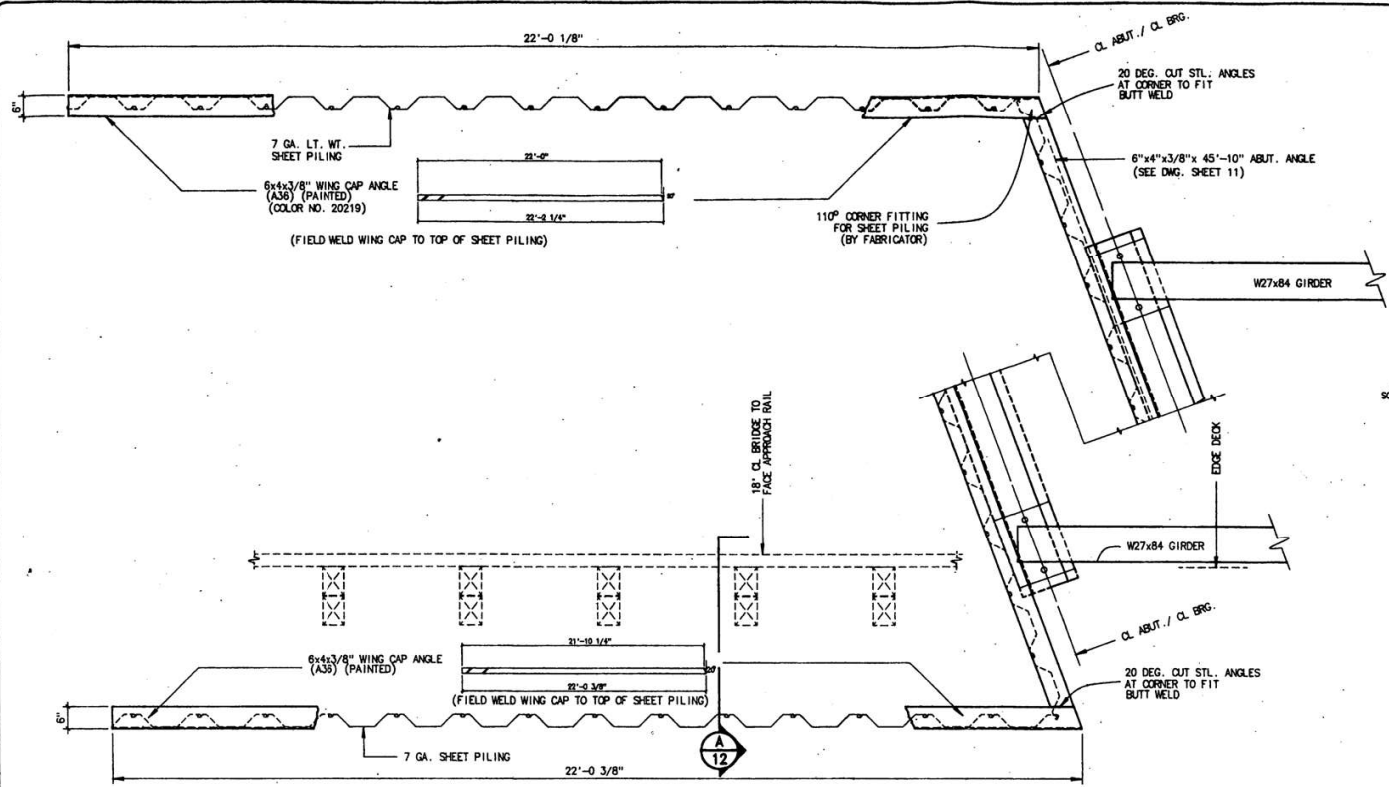


**WESTERN STATES ENGINEERING AND INSPECTION SERVICE INC.**  
Structures - Foundations - Bridges  
Gary L. Grifflin, P.E. President  
6807 S. Wadsworth Ct., Englewood, CO 80111  
303.777-6873



Designed by:	G. Grifflin
Checked by:	J. Ch...
Date:	REV 15 1008
By:	Date
Description	

Sheet No. **11** of **19**  
Plan No. **ABUTMENT DETAILS**



WING WALL DETAILS

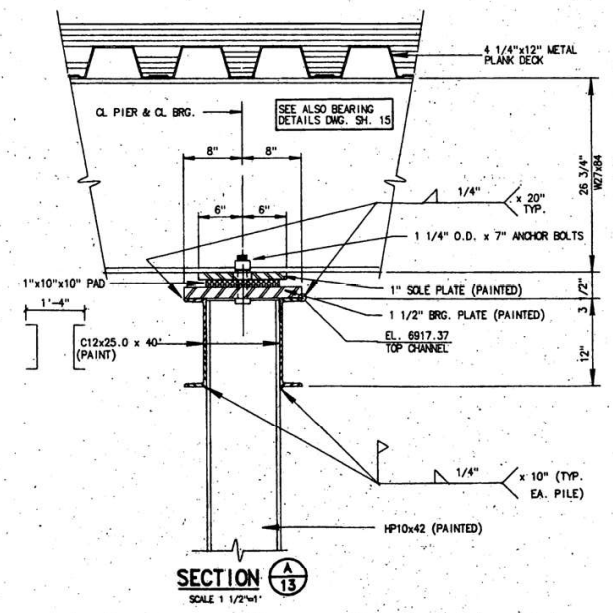
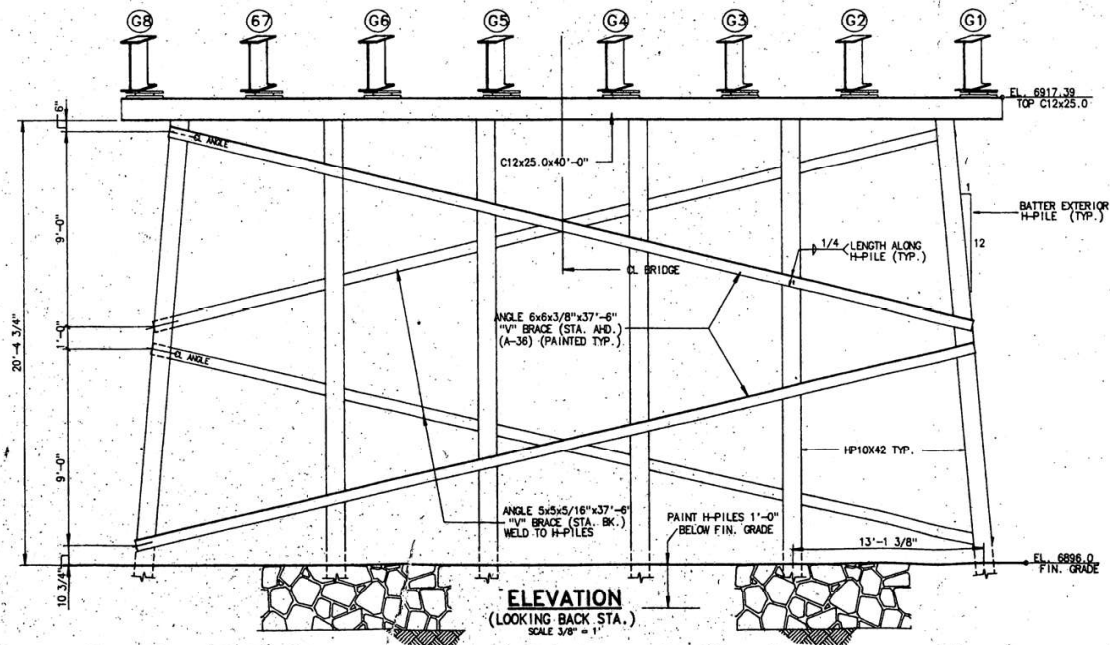
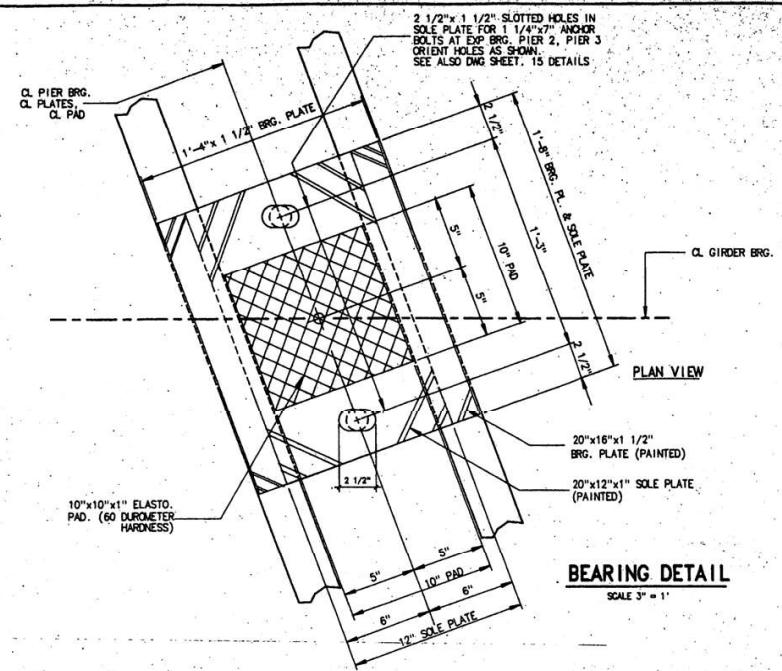
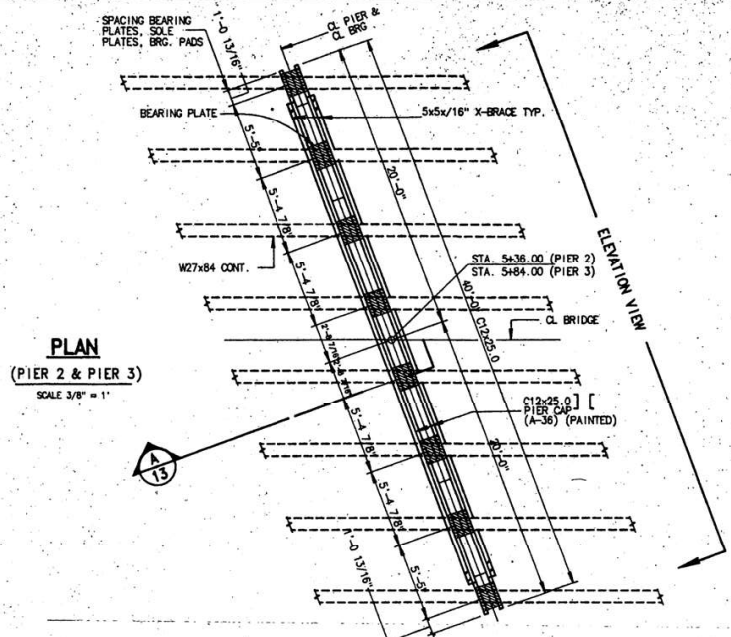
over Black Squirrel Creek  
Elbert Highway



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AND  
INSPECTION SERVICE INC.  
Structures • Foundations • Bridges  
Gary L. Griffin, P.E., President  
6047 S. Niagara Ct., Englewood, CO 80111  
303/771-4675

Designed by: G. GRILLIN	Date: 10-28
Drawn by: REV ISONS	Description
No. By	Date

Sheet No. 12 of 19  
Plan No. WING WALL DETAILS



over Black Squirrel Creek

**PIER DETAILS**

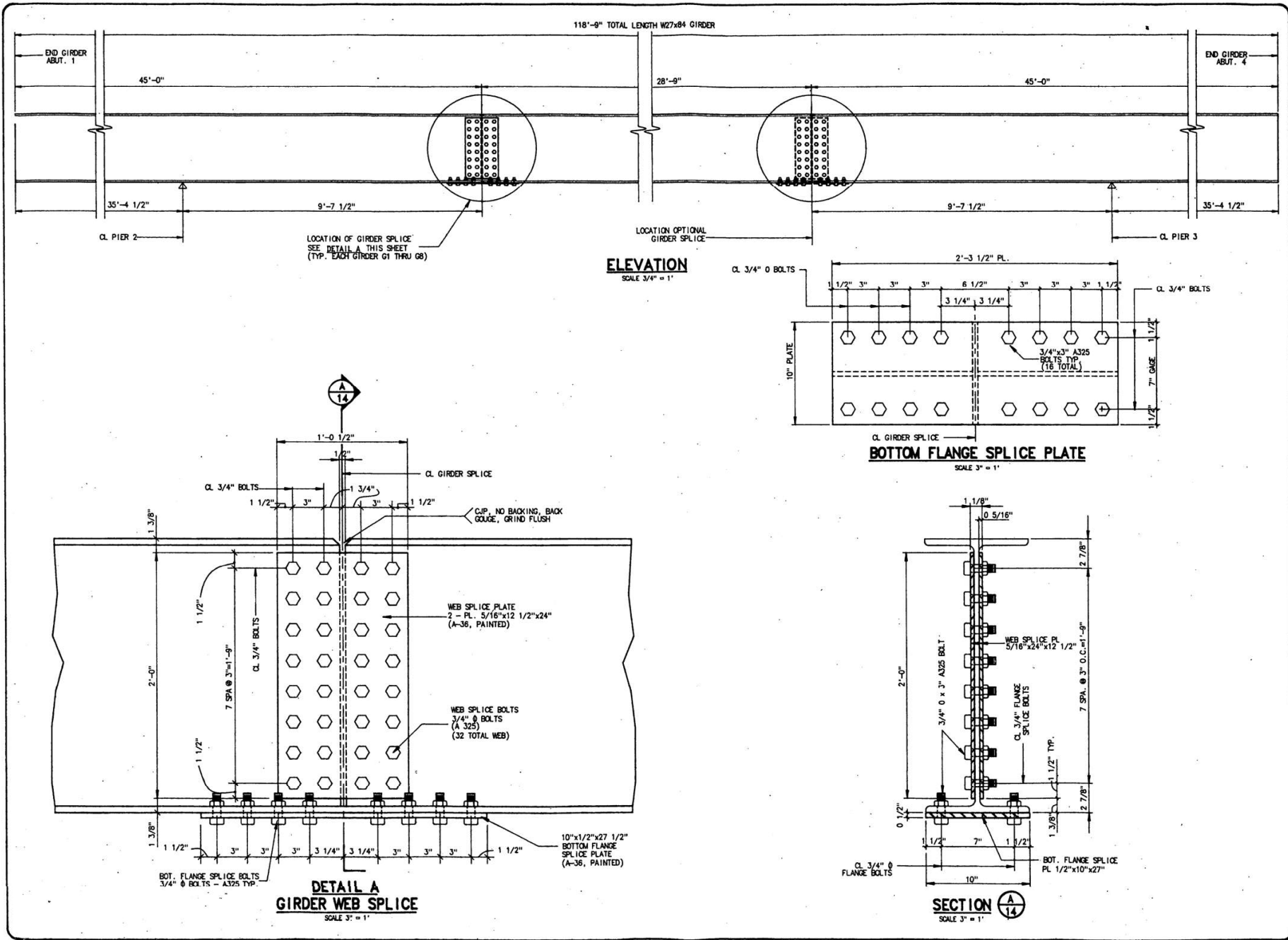
Ribert Highway

WESTERN STATES ENGINEERING AND INSPECTION SERVICE, INC.  
Structures - Foundations - Bridges  
Gary L. Griffith, P.E., President  
687 S. Wigawa Ct., Englewood, CO 80111  
303/771-6875

Designed By: S. GILLIN	Drawn By: REY JS DMS	Check By: REY JS DMS	Date: 10-24
No.:	By:	Date:	Description:

Sheet No. **13** of **19**

Plan No. **PIER DETAILS**



**GIRDER SPLICE DETAILS**

over Black Squirrel Creek

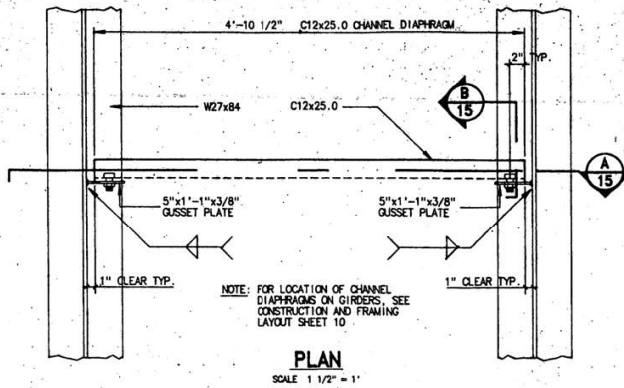
Elbert Highway



**WESTERN STATES ENGINEERING AND INSPECTION SERVICE INC.**  
Structures • Foundations • Bridges  
Gary L. Criffin, P.E. President  
6807 S. Newport Cl. Englewood, CO 80111  
303/771-6873

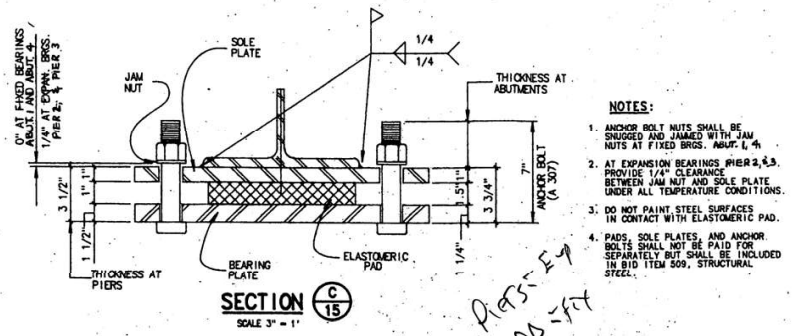
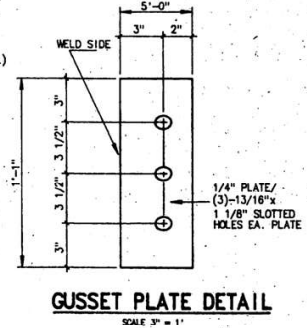
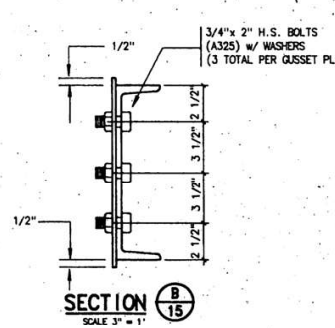
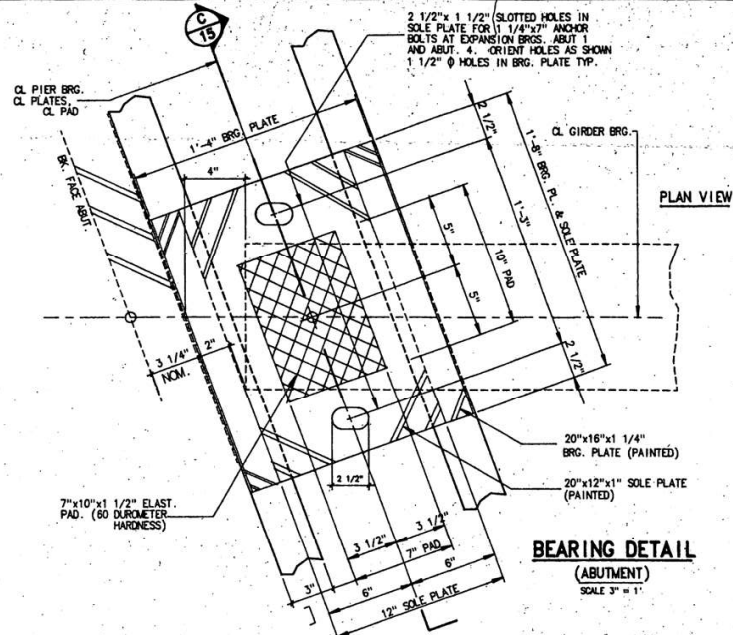
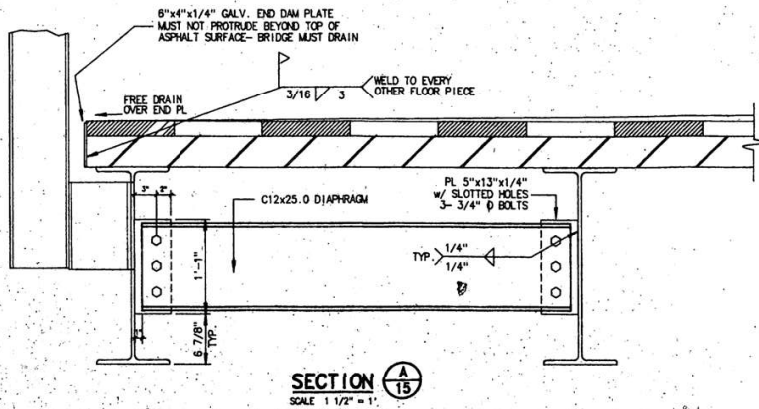
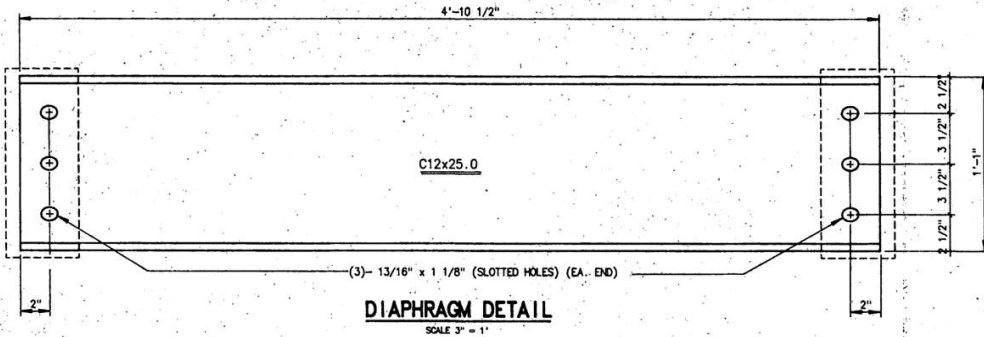
Designed by: G. Criffin	Check by: J. J. J.
Drawn by: REVISED	DATE
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No. 7	
No. 8	
No. 9	
No. 10	

Sheet No. **14** of **19**  
Plan No. **SPLICE DETAILS**



**NOTES:**

1. ALL STRUCTURAL STEEL BID ITEM 509, INCLUDING GIRDERS, CHANNEL DIAPHRAGMS, GUSSET PLATES, CHANNEL ABUTMENT AND PIER CAPS, BRG. PLATES, SOLE PLATES, AND PIER X-BRACING, EXCEPT BOLTS, SHALL BE FABRICATED FROM AISHO M 270 GR. 36 STEEL.
2. ALL ABOVE STEEL SHALL BE SHOP CLEANED AND PAINTED ACCORDING TO SEC. 509.24. GIRDERS TO BE BLAST CLEANED PER SSPG-SP 8. ALL STRUCTURAL STEEL, SHOP WELDS, TO BE PRIMED AND PAINTED PER SEC. 509 AND 708 OF THE SPECIFICATIONS. (USE OF 2 ALTERNATE PAINT SYSTEMS ALLOWED: (1) 3-COAT ALKYO SYSTEM, OR POLYURETHANE SYSTEM)
3. FABRICATOR SHALL NOT MASK GUSSET PLATE BOLT BEARING SURFACES DURING PAINTING.
4. TOP FINISH COAT OF ALL STRUCTURAL STEEL, BID ITEM 509, SHALL BE FEDERAL COLOR NO. 20219 (PINE BARK). FABRICATOR TO SUPPLY TOUCH-UP PAINT.
5. ALL BOLTS TO BE HIGH-STRENGTH ASTM A325 GALVANIZED UNLESS OTHERWISE NOTED.
6. SUBMIT SHOP DRAWINGS FOR ENGINEER APPROVAL.



**NOTES:**

1. ANCHOR BOLT NUTS SHALL BE SNUGGED AND JAMMED WITH JAM NUTS AT FIXED BRGS. ABUT. 1, 4.
2. AT EXPANSION BEARINGS PIER 2, 3, PROVIDE 1/4" CLEARANCE BETWEEN JAM NUT AND SOLE PLATE UNDER ALL TEMPERATURE CONDITIONS.
3. DO NOT PAINT STEEL SURFACES IN CONTACT WITH ELASTOMERIC PAD.
4. PADS, SOLE PLATES, AND ANCHOR BOLTS SHALL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN BID ITEM 509, STRUCTURAL STEEL.

**GIRDER DIAPHRAGM AND BEARING DETAILS**

over Black Squirrel Creek

Elbert Highway



WESTERN STATES ENGINEERING AND INSPECTION SERVICE INC.  
Structures • Foundations • Bridges

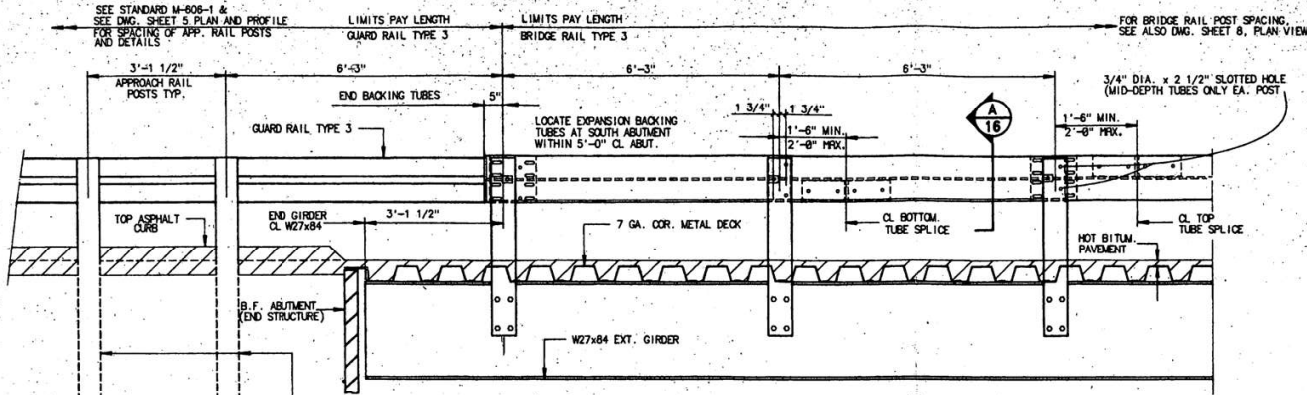
Gary L. Grifflin, P.E. President  
687 S. Inverness Ct. Englewood, CO 80111  
303.771-6876



Designed by: <i>G. Grifflin</i>	Date: <i>JCB</i>
Checked by: <i>JCB</i>	Date: <i>JCB</i>
Reviewed by: <i>JCB</i>	Date: <i>JCB</i>
Drawn by: <i>JCB</i>	Date: <i>JCB</i>
Insp. by: <i>JCB</i>	Date: <i>JCB</i>
Scale: <i>JCB</i>	Date: <i>JCB</i>
Sheet No. <b>15</b> of <b>19</b>	

Plan No. **DIAPHRAGM BEARING DETAILS**





NOTE: POST BEYOND THE END OF STRUCTURE SHALL BE INCLUDED IN THE PRICE OF GUARD RAIL TYPE 3.

6"x8" TREATED TIMBER POST TYP. (OR STEEL POST ALT. PER STATE STD.)

**ELEVATION**  
SCALE 3/4" = 1"

**NOTES:**

ALL TUBES SHALL BE FABRICATED FROM ASTM A-500 GRADE B. ALL SPLICES FOR TUBES SHALL BE FABRICATED FROM ASTM A-372 GRADE 50. THIS MATERIAL SHALL BE PRIMED AND PAINTED FINAL FINISH COAT FEDERAL COLOR NO. 20219 (SATIN). PAINTING SHALL BE DONE ACCORDING TO SPECIFICATION SECTION 509 AND 708 OF THE STANDARD SPECIFICATIONS AS STATED IN THE CONTRACT SPECIFICATIONS.

SHOP DRAWINGS FOR BRIDGE RAIL TYPE 3 FOR ENGINEER'S APPROVAL SHALL BE PROVIDED AT LEAST 1 GALLON FIELD TOUCH UP PAINT COLOR NO. 20219 TO BE SUPPLIED.

ALL W8x28 POSTS, W8x28 BACKING BEAM POST ATTACHMENT MATERIAL SHALL BE FABRICATED FROM A-36 STEEL AND FINISH PAINTED FEDERAL COLOR NO. 20219 (PINE BARK).

ALL W-BEAM MATERIAL AND MISCELLANEOUS BOLTS, NUTS, AND WASHERS SHALL BE GALVANIZED.

W8x28 POSTS, W-BEAM, MISCELLANEOUS BOLTS, NUTS, WASHER, TUBES, TUBE SPLICES, AND REFLECTOR TABS, SHALL BE INCLUDED IN THE BID PRICE FOR ITEM 608 BRIDGE RAIL TYPE 3. W8x28 POST ATTACHMENT (BACKING BM.) IS NOT INCLUDED IN ITEM 608, BUT TO BE SUPPLIED WITH STRUCTURAL STEEL ITEM 509.

REFLECTOR TABS SHALL BE INSTALLED AT 12'-6" INTERVALS FOR BRIDGE RAIL TYPE 3 AND REFLECTOR TABS WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE COST OF BRIDGE RAIL TYPE 3.

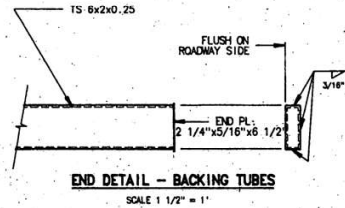
TUBES SHALL BE CONTINUOUS OVER NOT LESS THAN TWO POSTS.

POSTS SHALL BE INSTALLED PLUMB.

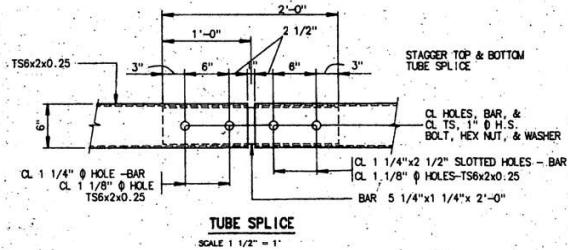
FOR DETAILS OF GUARD RAIL TYPE 3 AND TERMINAL SECTIONS SEE STATE STANDARD M-608-1.

STRUCTURAL STEEL:

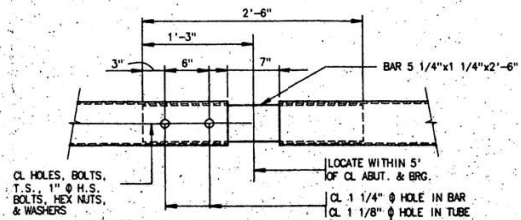
COLD FORMED ASTM A-500	fa = 27,600 psi Grade B
AASHTO M-222 (ASTM A-588)	fa = 37,500 psi
AASHTO M-183 (ASTM A-36)	fa = 20,000 psi
AASHTO M-223 (ASTM A-372)	fa = 37,500 psi Grade B



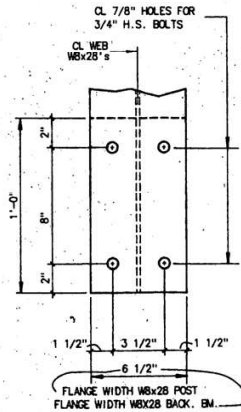
**END DETAIL - BACKING TUBES**  
SCALE 1 1/2" = 1"



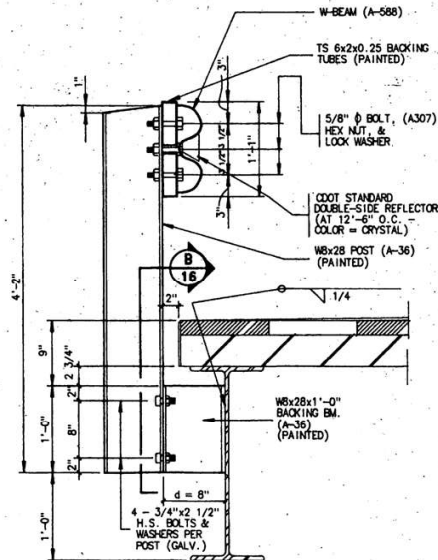
**TUBE SPLICE**  
SCALE 1 1/2" = 1"



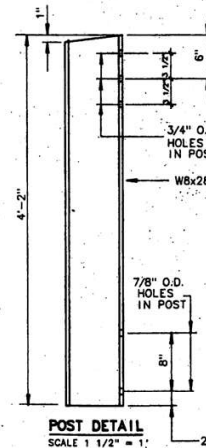
**BACKING TUBE FOR EXPANSION**  
(REQ'D AT SOUTH ABUT.)  
SCALE 1 1/2" = 1"



**SECTION B**  
SCALE 3" = 1"



**SECTION A**  
SCALE 1 1/2" = 1"



**POST DETAIL**  
SCALE 1 1/2" = 1"

**BRIDGE RAIL TYPE 3**

over Black Squirrel Creek

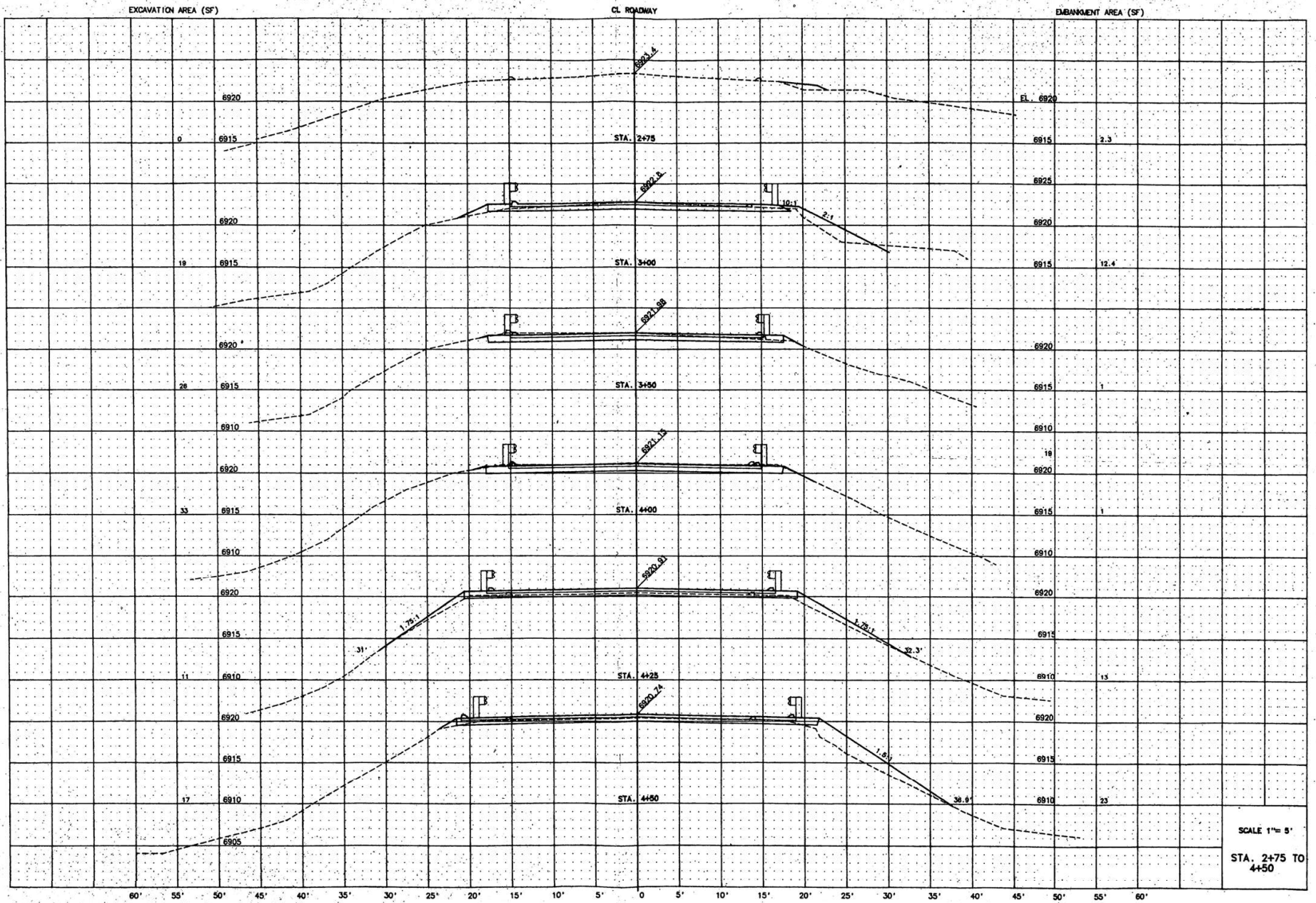
Elbert Highway



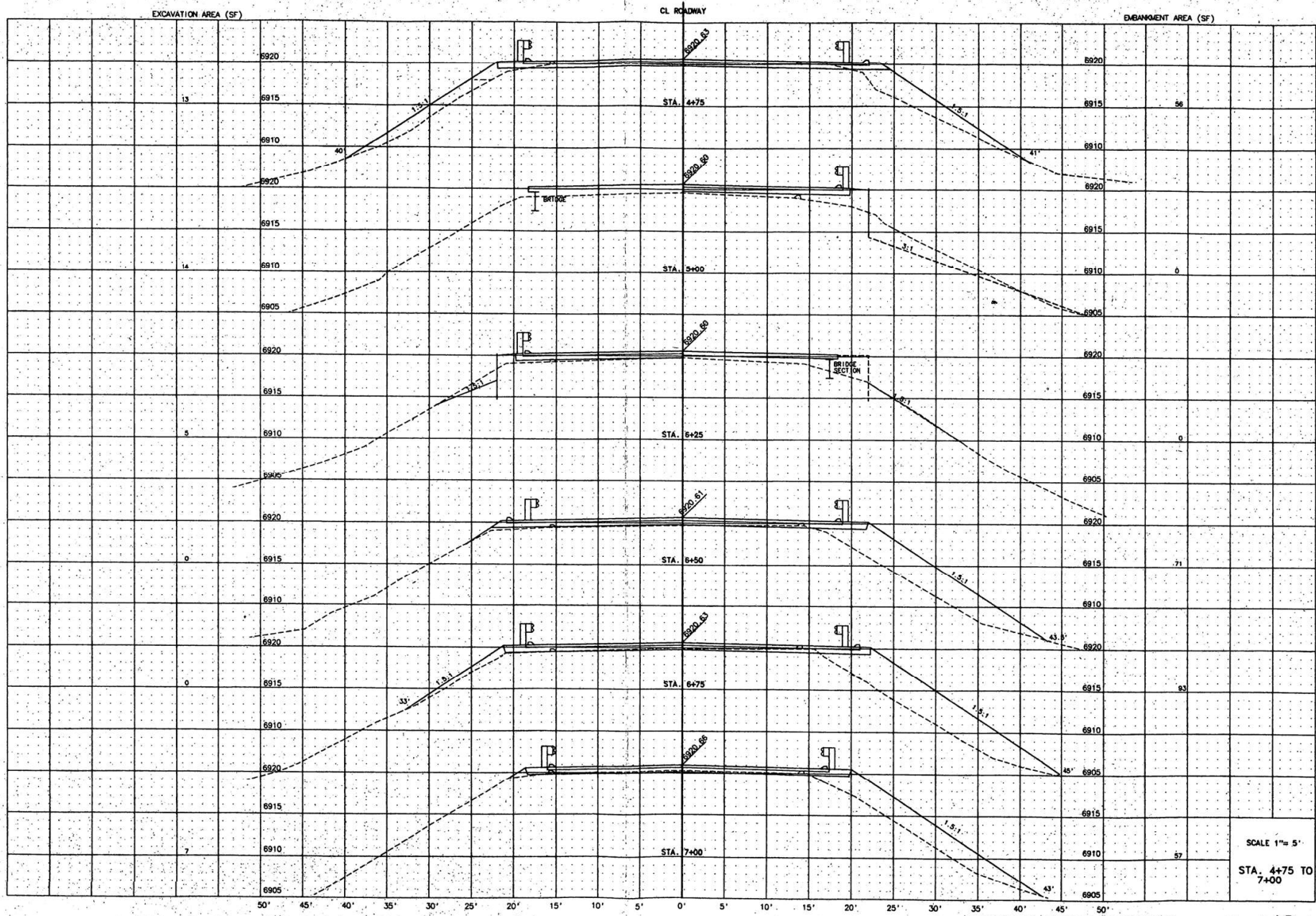
WESTERN STATES ENGINEERING AND INSPECTION SERVICE INC.  
Structures - Foundations - Bridges  
Gary L. Griffith, P.E. President  
620 S. Milwaukee, Englewood, CO 80111  
303.771-4676

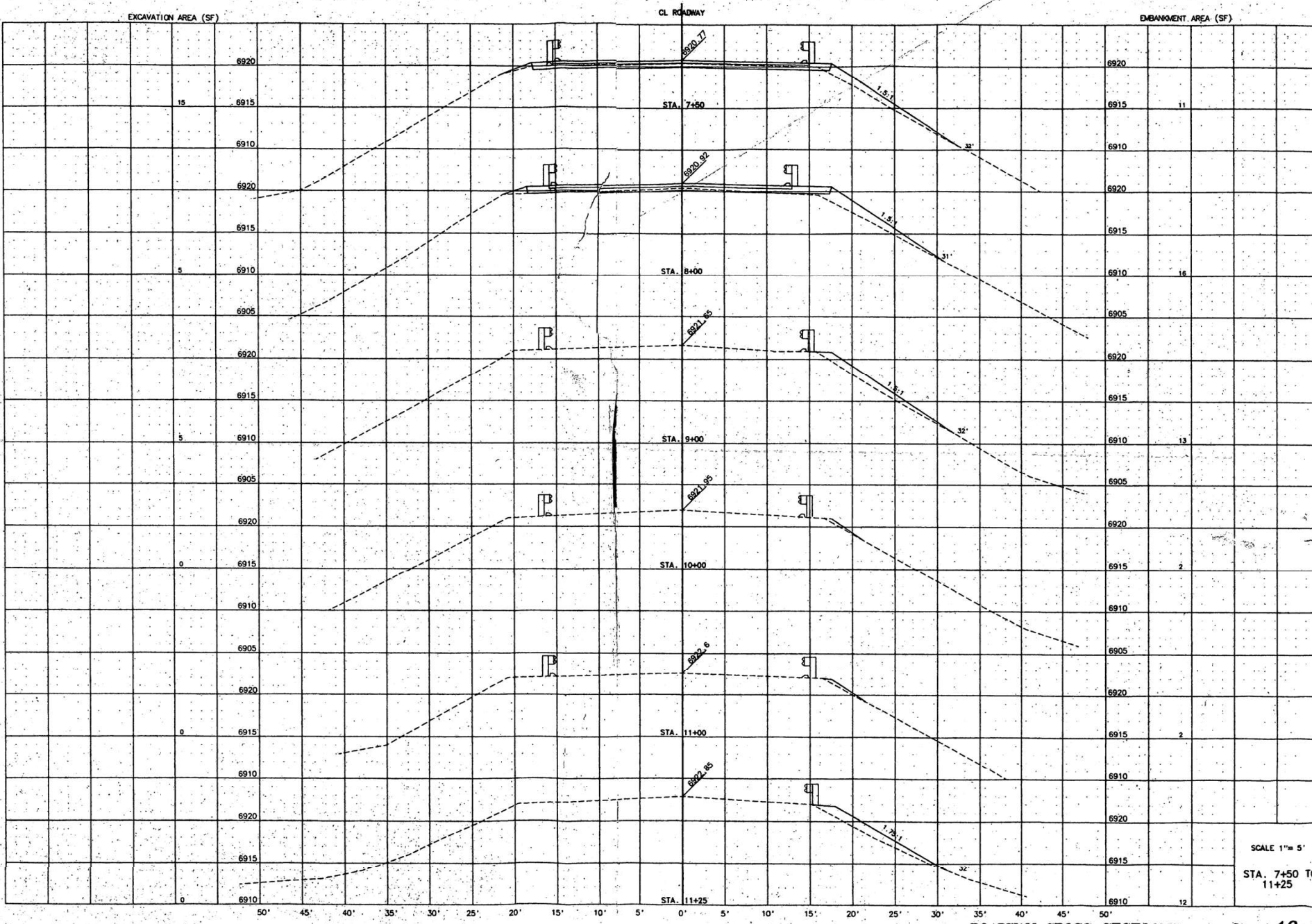
Designed by:	G. Griffith
Checked by:	J.C.B.
Drawn by:	REV/SLD/MS
Date:	
Scale:	
Description:	

Sheet No. **16 of 19**  
Plan No. **BRIDGE RAIL TYPE 3**



SCALE 1" = 5'  
 STA. 2+75 TO 4+50





SCALE 1" = 5'

STA. 7+50 TO 11+25