Construction Layout

9.1 Purpose

This drawing is to show a plan of the superstructure showing pertinent information necessary for construction of the structure.

9.2 Responsibility

This drawing shall be prepared and checked in the design unit. The graphic presentation of information on this drawing shall be the responsibility of the individual preparing the drawing.

9.3 Scales

Standard Architectural and Civil scales should be used that are suitable to fit the details to a standard sheet.

9.4 Combining Details

The “Construction Layout” and the “Footing and Piling Layout” may be placed on the same sheet if practical. Other details may be placed on this sheet; i.e., drain details, etc.

If the “Construction Layout” is combined with other details, it should occupy the top half of the sheet. Other configurations may be used depending on the type of structure or structures. (Left half, upper left corner, etc.)

9.5 Horizontal Control Line

The horizontal control line shall be shown and labeled consistently with the plans. For twin structures the horizontal control line shall be shown and labeled for each structure such as: “Proj. Line - Str. No. G-18-L”.

9.6 Layout Line

For structures on tangent, the layout line and the horizontal control line will coincide, and shall be labeled such as “Survey Line”, “Proj. Line”, etc.

For structures located on a curve, the layout line may be:

A) Ahead Tangent: The tangent ahead of the point of intersection (PI) of the curve.
B) Back Tangent: The tangent back of the PI of the curve.

C) A chord between two specified points.
D) A tangent to the horizontal control line at some given point (POC) on the horizontal control line.

The layout line shall be shown and labeled such as “Tangent from TS Sta. 31+48.08”, “Chord from POC Sta. 38+41.00 to PT Sta. 39+78.00”, “Tangent from POC Sta. 382+10.00”, etc.

Bearings shall be given for all layout lines, to the nearest second.

9.7 Stationing

Stationing shall be shown on the horizontal control line where it intersects with the centerline of bearing at abutments and centerline of piers. Stationing shall be given to two decimal places.

9.8 Centerlines

The following centerlines shall be shown and labeled:

A) Centerlines of bearings at abutments and piers.
B) Centerlines of piers.
C) Centerlines of all girders (shown and dimensioned to bottom of girder).
D) Centerline of roadway, median, etc., where required.
E) Centerlines of diaphragms if not shown elsewhere on the plans.

9.9 Dimensions

All dimensions shall be given in feet and inches (to the nearest 1/8 inch) except as noted.

A) The following dimensions shall be shown for all structures:
   1) End of wingwall to end of wingwall along outside of deck.
   2) End of wingwall to Centerline Abutment Bearings, Centerline Abutment Bearings to Centerline Piers, Centerline Piers to Centerline Piers, etc. along outside edge of deck.
   3) Back Face Abutments to Centerline Bearings. (Use design dimension - normal to Centerline Bearing or parallel to girder.)
   4) Centerline Pier Bearings to Centerline Piers. (Use design dimension - normal to Centerline Pier or parallel to girders.)
   5) Normal (radial) from Horizontal Control Line to Centerline Girders. (Except straight girders on curved structures - see below.)

6) Normal (radial) from Horizontal Control Line to inside of curbs, inside of curbs to outside of deck, etc.
7) Normal (radial) outside of deck to outside of deck.
8) Normal (radial) Horizontal Control Line to Profile Grade Line.
9) Location of Centerline Diaphragms (if shown).

Dimensions along edge of deck, 1) and 2) above, need not be repeated if they are the same on both sides of the structure. For girders sloped with the cross slope, a note shall be added clarifying where the locations are dimensioned, e.g. “All dimensions are horizontal. Girder Spacing Dimensions are at the bottom of girder and the extension of girder centerline.”

B) For structures on a curve with curved girders, the following dimensions shall be added to the above:
   1) Along layout line from point of tangent to centerline of abutments and piers. (Nearest hundredth of a foot) (A note similar to “538.12 ft. back on tangent from ST Sta. 1281+48.00” shall be used if the point of tangent cannot be shown on the drawing.)
   2) From layout line to Horizontal Control Line along centerline of abutment bearings and piers (nearest hundredth of a foot).
   3) From layout line to outside of deck along centerline of abutments and piers.

C) For structures on a curve with straight girders the following dimensions shall be added to (A) and (B) above:
   1) Length of chords. (if used)
   2) Location of chords if not located on Horizontal Control Line. (Nearest hundredth of a foot)
   3) Girder offsets from chords.
   4) For flared girders, dimension from horizontal control line along centerline of bearings. (Nearest hundredth of a foot)
   5) Length of girders. (CL to CL Bearings)
   6) Offsets from centerline of outside girders to outside of deck at 10th points (100 ft. spans or less) or 20th points (spans of more than 100 ft.) along girders. Offsets may be tabulated.

When girders are sloped with the cross slope which is typical for side by side boxes and tub or U girders, the assumptions on the location of the centerline becomes more critical. Additional sheets are not necessary but notes on location assumptions will be necessary. For cross slopes of 2% or less, the differences are usually within construction tolerances, but assumptions should still be listed. The location difference

between top and bottom of girder is primarily dependent on the girder height although the cross slope feeds into it as well. It is preferred to show the girder centerlines at the bottom of girder since this information can be used to determine cap and bearing elevations. With location assumption information the Contractor will be able to determine information at other locations on the girders and deck. Since bridge geometry sheets are primarily used to set haunch elevations and verify deck setting, longitudinal lines that support that effort such as web edges and panel edges may be helpful. Additional bridge geometry runs with alternate layout line locations may be necessary for these alternate locations.

Figure 9.9-1 shows how with sloped girders, defining the location of where dimensions are located is critical. The centerline of girder at the bottom could be 4 ½" different from the centerline girder at top of deck. The difference between slope distances and horizontal distances can be seen as well. Figure 9.9-1 is drawn with a cross slope of 8% and 4' tall girders. Figure 9.9-2 show the same girders at 2%.

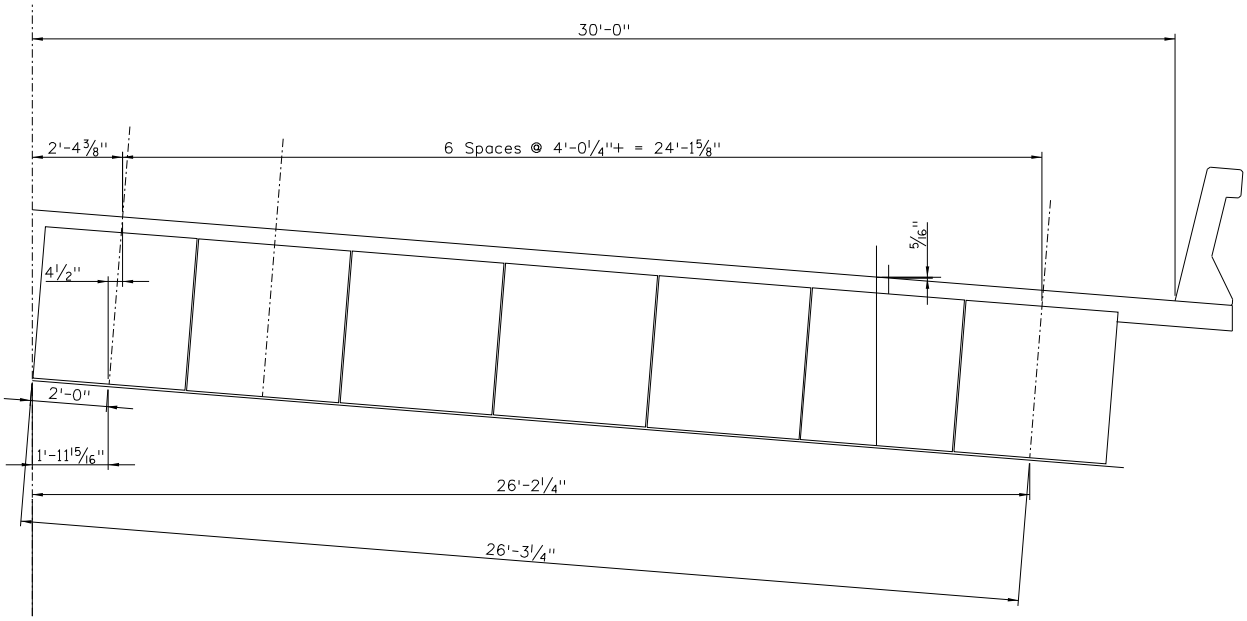


Figure 9.9-1

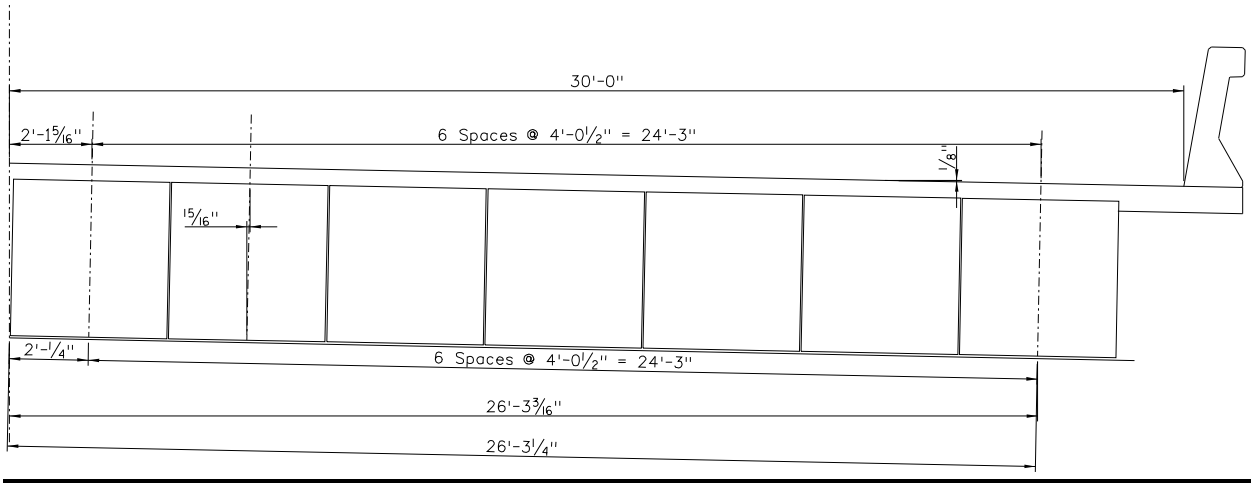


Figure 9.9-2

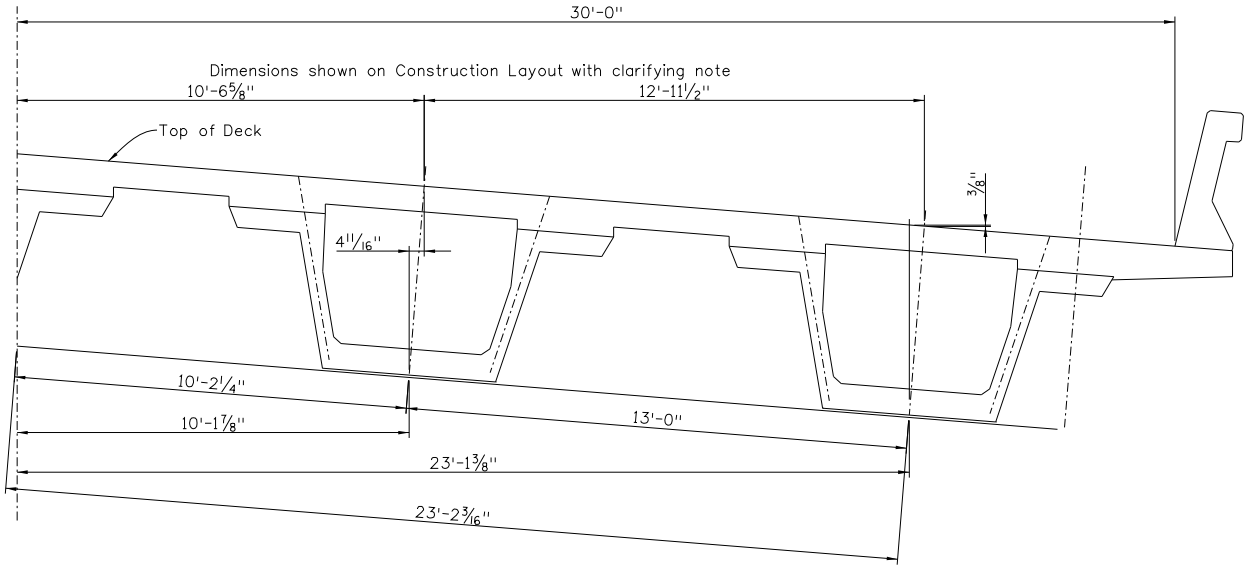


Figure 9.9-3

9.10 Angles

Angles shall be shown to the nearest second:

A) Angles between Layout Line and centerlines of abutments and piers.
B) Angles between straight girders and centerline of bearings, if girders are not parallel to the Layout Line.

9.11 BENCH MARK

Most new bridges do not have a bench mark. Older bridges may have benchmarks. If required, contact Project Manager to coordinate with Survey group.

9.12 ELECTRICAL CONDUIT & JUNCTION BOXES

Electrical conduit shall be shown on this drawing if required.

Use a minimum of 1-1/2” electrical conduit for longitudinal runs and 3/4” electrical conduit for transverse runs.

Location of junction boxes shall be shown on this drawing as required.

See CDOT Bridge Design Manual Section 2.8 for maximum length between junction boxes.

9.13 Drains

Drains shall be shown and located on this drawing as required. A detail may be required for clarity.

9.14 Check Items

The following is a summary of information to be shown on the drawing, as required. Additional information may be shown according to the individual structure.

A) Standard North Arrow
B) Label horizontal control line and give bearing, if structure is on tangent.
C) For structures on a curve, label and give the bearing of the layout line and point of tangency, or the end points for a chord.
D) Stationing
E) All centerlines
C) All necessary dimensions
D) Curb offsets
E) All required angles
F) Electrical conduits & junction boxes
G) Drains
H) Title the plan “CONSTRUCTION LAYOUT”. For plans with more than one structure, add the structure number to the title.
I) Label back face of abutments, centerline of bearings and centerline of piers.
J) Dimension widths of curbs and sidewalks
K) Project number in proper locations.

L) Typical notes
M) Complete title block
N) Spacing and location of type 10 rail posts
O) Spacing and location of fencing
P) Label girders (see section 1.13 in Chapter 1 for naming convention)
Q) Note for girder locations for girders sloped with cross slope

9.15 Title Block

This drawing is titled “CONSTRUCTION LAYOUT” and shall be so indicated in the title block.

If other details are combined on this drawing, they should be so indicated in the title. Examples: If the “Piling Layout” is placed on a drawing with the “Construction Layout”, the title of the sheet would be:

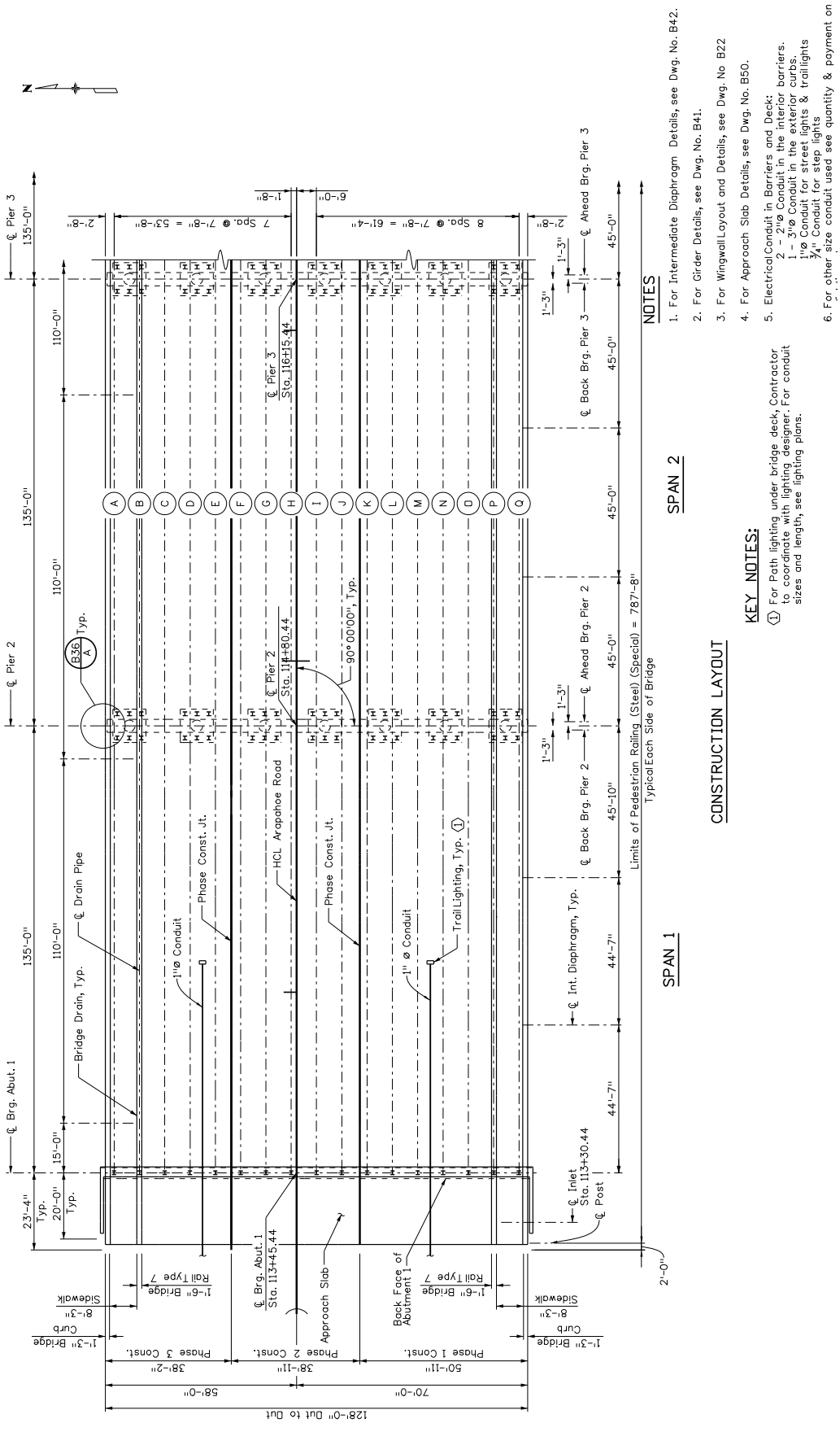
CONSTRUCTION LAYOUT

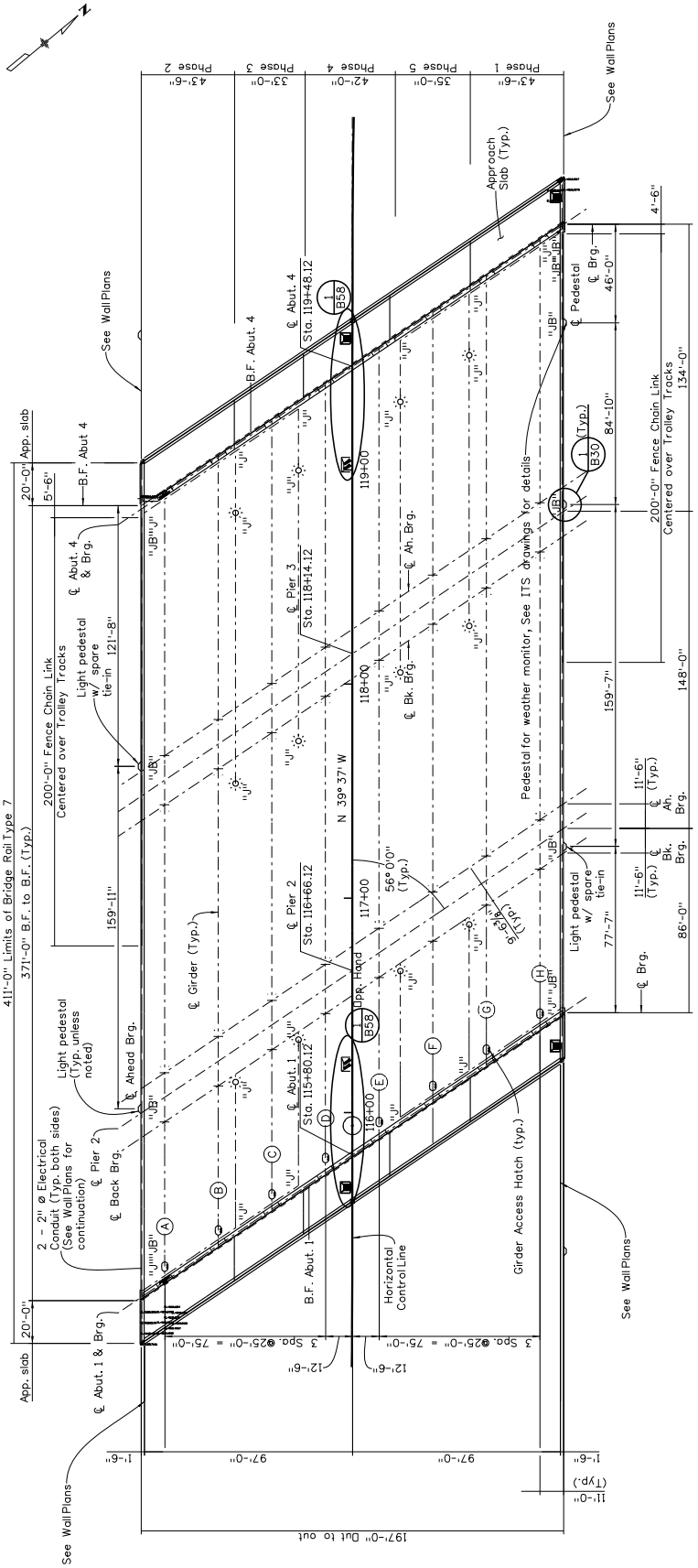
PILING LAYOUT

9.16 Typical Notes

The following notes shall appear on the drawings, as applicable:

A) Edge Offsets Note: All edge offsets are placed at 10th points (or 20th points) normal to the girder.


CONSTRUCTION LAYOUT
SPAN 1
SPAN 2
KEY NOTES:
1 For Path lighting under bridge deck, Contractor to coordinate with lighting designer. For conduit sizes and length, see lighting plans.
NOTES
1. For Intermediate Diaphragm Details, see Dwg. No. B42.
2. For Girder Details, see Dwg. No. B41.
3. For WingwallLayout and Details, see Dwg. No B22
4. For Approach Slab Details, see Dwg. No. B50.
5. ElectricalConduit in Barriers and Deck:
2 - 2"ø Conduit in the interior barriers.
1 - 3"ø Conduit in the exterior curbs.
1"ø Conduit for street lights & trailights
¾" Conduit for step lights
6. For other size conduit used see quantity & payment on
℄ Brg. Abut. 1
℄ Pier 2
℄ Pier 3
℄ Ahead Brg. Pier 3
℄ Back Brg. Pier 3
℄ Ahead Brg. Pier 2
℄ Back Brg. Pier 2
℄ Int. Diaphragm, Typ.
℄ Inlet
Sta. 113+30.44
℄ Post
℄ Brg. Abut. 1
Sta. 113+45.44
℄ Pier 2
Sta. 114+80.44
℄ Pier 3
Sta. 116+15.44
B36
A
Typ.
90° 00'00", Typ.
Bridge Drain, Typ.
℄ Drain Pipe
1"ø Conduit
Phase Const. Jt.
HCL Arapahoe Road
Phase Const. Jt.
1" ø Conduit
Trail Lighting, Typ. 1
Limits of Pedestrian Railing (Steel) (Special) = 787'-8"
Typical Each Side of Bridge
Approach Slab
Back Face of Abutment 1
Rail Type 7 Bridge
Rail Type 7 Bridge
Sidewalk
Sidewalk
1'-3" Bridge Curb
1'-3" Bridge Curb
Phase 3 Const.
Phase 2 Const.
Phase 1 Const.
38'-2"
38'-11"
50'-11"
58'-0"
70'-0"
128'-0" Out to Out
23'-4" Typ.
20'-0" Typ.
15'-0"
110'-0"
135'-0"
44'-7"
45'-10"
45'-0"
1'-3"
2'-8"
7 Spa. @ 7'-8" = 53'-8"
8 Spa. @ 7'-8" = 61'-4"
6'-0"
1'-8"
A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q



CONSTRUCTION LAYOUT

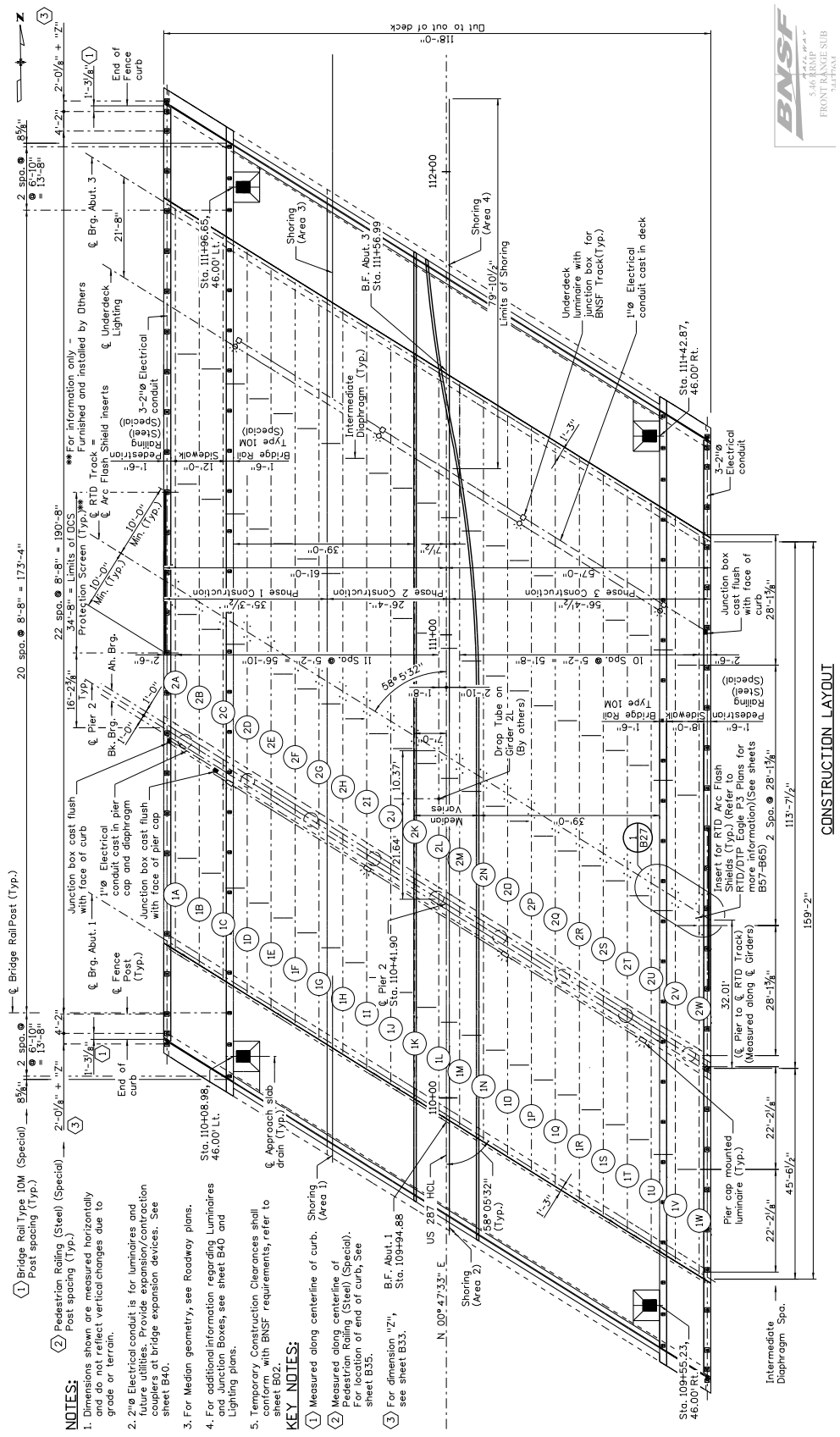
Notes:

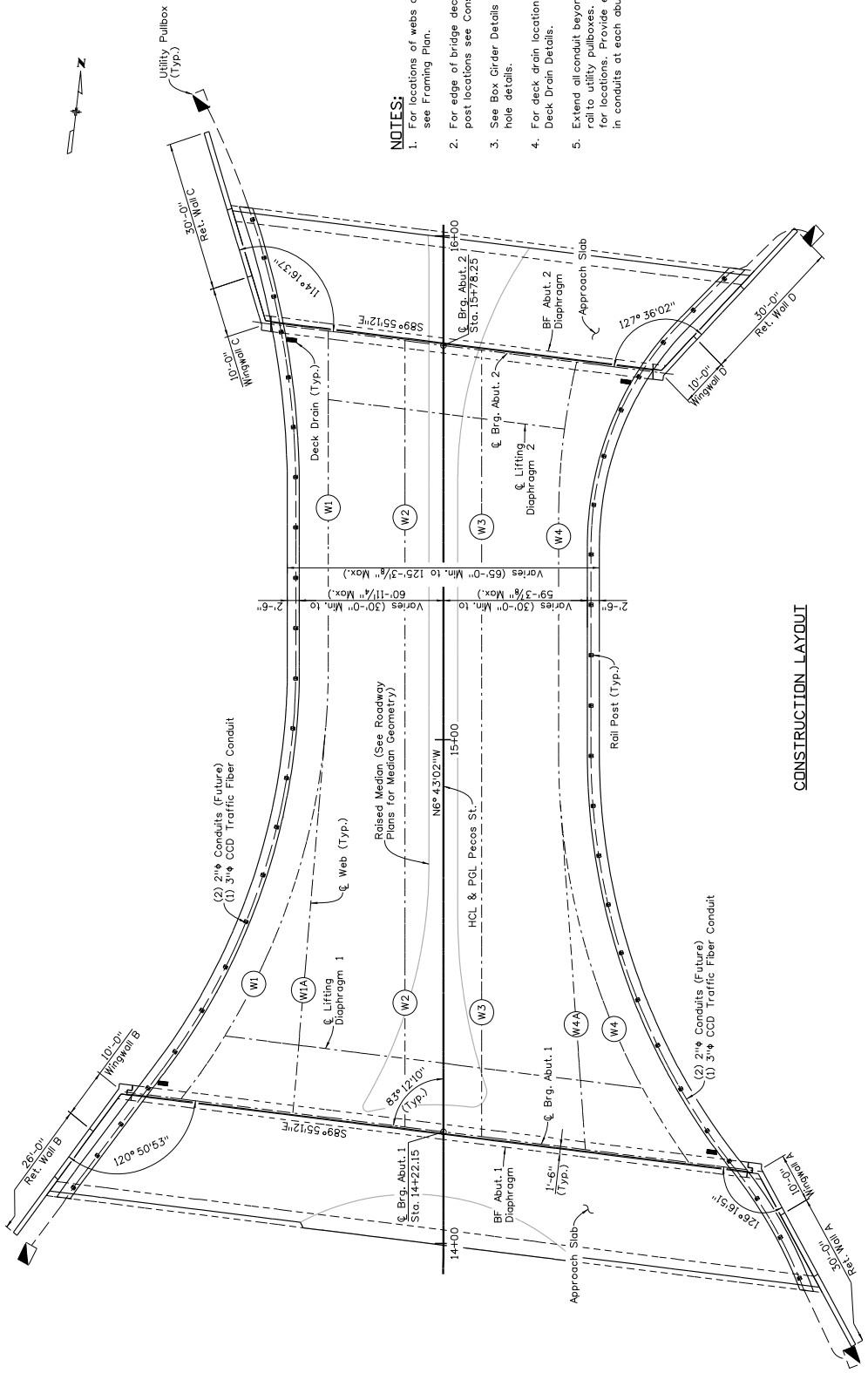
1. All exposed Electric Conduit shall be Galvanized rigid metal.
2. Junction box shall be flush to front face of Bridge Rail and provided with a water tight cover. Drain for interior condensation.
3. For pull box information, see light pedestal drawings No. B30 & B31.

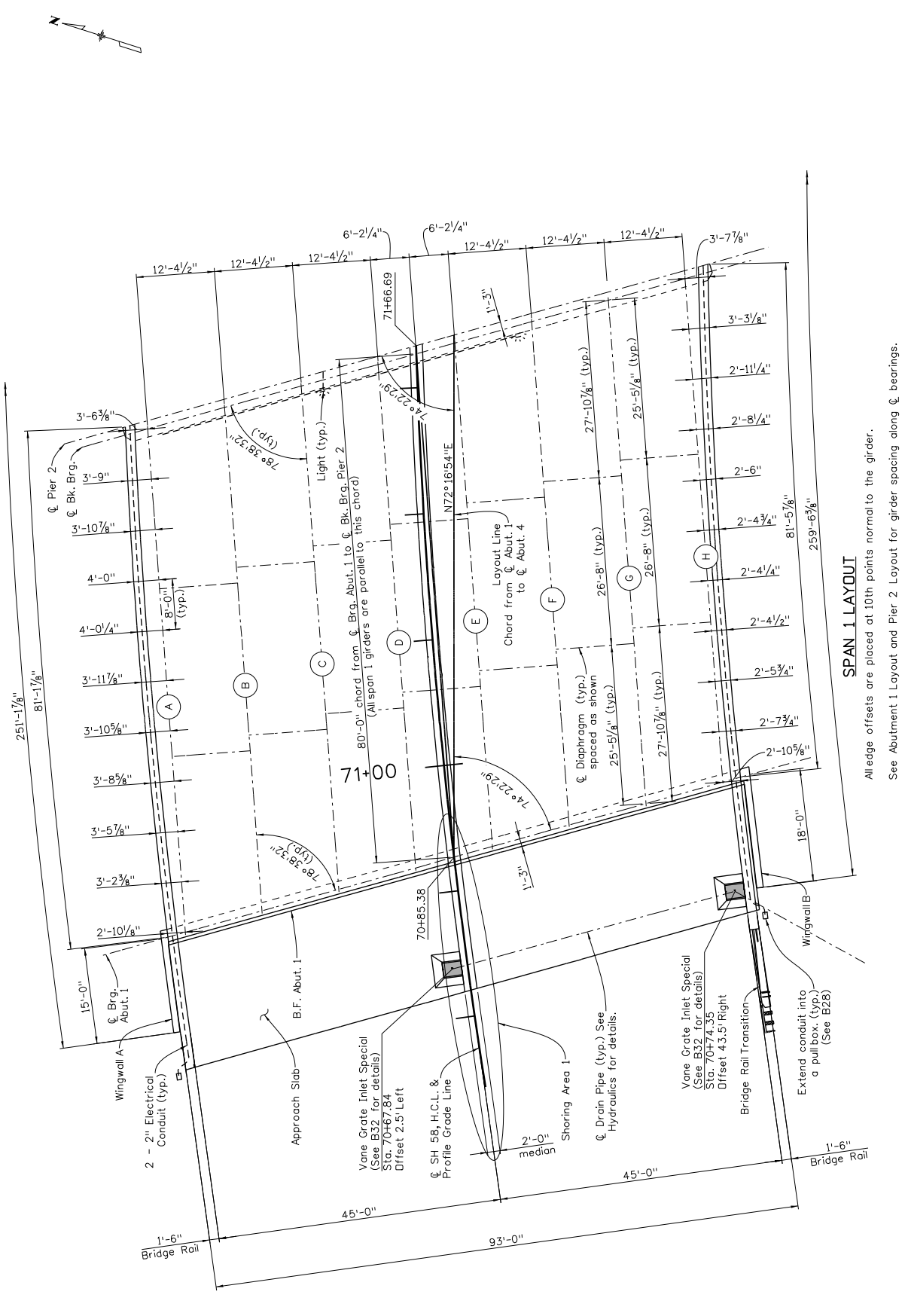
☼ Hidden Luminaire Location. See Lighting Plans for Details

"U" = 6"x6"x4" Junction Box flush with bottom of slab. Drain for interior condensation.

"UB" = 8"x18"x8½" Barrier Junction Box


CONSTRUCTION LAYOUT
NOTES:
1. Dimensions shown are measured horizontally and do not reflect vertical changes due to grade or terrain.
2. 2"ø Electrical conduit is for luminaires and future utilities. Provide expansion/contraction couplers at bridge expansion devices. See sheet B40.
3. For Median geometry, see Roadway plans.
4. For additional information regarding Luminaires and Junction Boxes, see sheet B40 and Lighting plans.
5. Temporary Construction Clearances shall conform with BNSF requirements, refer to sheet B02.
KEY NOTES:
(1) Measured along centerline of curb.
(2) Measured along centerline of Pedestrian Railing (Steel) (Special). For location of end of curb, See sheet B35.
(3) For dimension "Z", see sheet B33.
(1) Bridge Rail Type 10M (Special) Post spacing (Typ.)
(2) Pedestrian Railing (Steel) (Special) Post spacing (Typ.)
℄ Bridge Rail Post (Typ.)
20 spa. @ 8'-8" = 173'-4"
22 spa. @ 8'-8" = 190'-8"
118'-0" Out to out of deck
** For information only - Furnished and installed by Others
℄ Brg. Abut. 1
℄ Brg. Abut. 3
℄ Pier 2
℄ Fence Post (Typ.)
End of curb
End of Fence curb
Junction box cast flush with face of curb
1"ø Electrical conduit cast in pier cap and diaphragm
Junction box cast flush with face of pier cap
Bk. Brg.
Ah. Brg.
Bridge Rail Type 10M (Special)
Sidewalk
Pedestrian Railing (Steel) (Special)
3-2"ø Electrical conduit
℄ RTD
℄ Arc Flash Shield inserts
℄ Underdeck Lighting
Track = Protection Screen (Typ.)**
Intermediate Diaphragm (Typ.)
Drop Tube on Girder 2L (By others)
Median
Varies
Phase 1 Construction
Phase 2 Construction
Phase 3 Construction
Shoring (Area 1)
Shoring (Area 2)
Shoring (Area 3)
Shoring (Area 4)
Limits of Shoring
Sta. 111+96.65, 46.00' Lt.
B.F. Abut. 3 Sta. 111+56.99
Sta. 111+42.87, 46.00' Rt.
Underdeck luminaire with junction box for BNSF Track (Typ.)
1"ø Electrical conduit cast in deck
Insert for RTD Arc Flash Shields (Typ.) (Refer to RTD/DTP Eagle P3 Plans for more information) See sheets B57-B65.
℄ Pier to ℄ RTD Track) (Measured along ℄ Girders)
Pier cap mounted luminaire (Typ.)
Approach slab drain (Typ.)
Sta. 110+08.98, 46.00' Lt.
Sta. 109+55.23, 46.00' Rt.
B.F. Abut. 1 Sta. 109+94.88
℄ Pier 2 Sta. 110+41.90
110+00
111+00
112+00
US 287
HCL
N 00° 47' 33" E
58° 05' 32" (Typ.)
58° 5' 32"
2 spa. @ 6'-10" = 13'-8"
2'-0"/8" + "Z"
1'-3"/8"
4'-2"
8½"
16'-2⅜" Typ.
34'-8" = Limits of OCS
35'-3½"
26'-4"
56'-10"
61'-0"
59'-0"
57'-0"
56'-4½"
51'-2" = 9'-6" @ 5 Spa.
39'-0"
10.37'
21.64'
32.01'
28'-1⅜"
2 Spa. @ 28'-1⅜"
113'-7½"
159'-2"
45'-6½"
22'-2⅛"
79'-10½"
Junction box cast flush with face of curb
Intermediate Diaphragm Spa.


NOTES:
1. For locations of webs and access openings see Framing Plan.
2. For edge of bridge deck geometry and rail post locations see Construction Layout (2 of 2).
3. See Box Girder Details for ventilation and drain hole details.
4. For deck drain locations and details see Deck Drain Details.
5. Extend all conduit beyond end of bridge rail to utility pullboxes. See Utility Plans for locations. Provide expansion sleeve in conduits at each abutment.
CONSTRUCTION LAYOUT
Utility Pullbox (Typ.)
30'-0" Ret. Wall C
10'-0" Wingwall C
114° 16'37"
S89° 55'12"E
℄ Brg. Abut. 2 Sta. 15+78.25
BF Abut. 2 Diaphragm
Approach Slab
127° 36'02"
30'-0" Ret. Wall D
10'-0" Wingwall D
16+00
Deck Drain (Typ.)
℄ Brg. Abut. 2
℄ Lifting Diaphragm 2
W1
W2
W3
W4
Varies (65'-0" Min. to 125'-3⅛" Max.)
Varies (30'-0" Min. to 60'-11¼" Max.)
Varies (30'-0" Min. to 59'-3⅞" Max.)
2'-6"
2'-6"
Rail Post (Typ.)
(2) 2"Φ Conduits (Future)
(1) 3"Φ CCD Traffic Fiber Conduit
Raised Median (See Roadway Plans for Median Geometry)
N6° 43'02"W
15+00
HCL & PGL Pecos St.
℄ Web (Typ.)
W1A
℄ Lifting Diaphragm 1
W4A
(2) 2"Φ Conduits (Future)
(1) 3"Φ CCD Traffic Fiber Conduit
10'-0" Wingwall B
26'-0" Ret. Wall B
120° 50'53"
83° 12'10" (Typ.)
S89° 55'12"E
℄ Brg. Abut. 1
℄ Brg. Abut. 1 Sta. 14+22.15
BF Abut. 1 Diaphragm
1'-6" (Typ.)
126° 16'51"
10'-0" Wingwall A
30'-0" Ret. Wall A
14+00
Approach Slab


SPAN 1 LAYOUT
All edge offsets are placed at 10th points normal to the girder.
See Abutment 1 Layout and Pier 2 Layout for girder spacing along ℄ bearings.
℄ Pier 2
℄ Bk. Brg.
℄ Brg. Abut. 1
℄ Brg. Pier 2
℄ Bk. Brg. Abut. 1 to ℄ Brg. Pier 2
(All span 1 girders are parallel to this chord)
80'-0" chord from
Light (typ.)
Layout Line
Chord from ℄ Abut. 1
to ℄ Abut. 4
N72°16'54"E
71+66.69
71+00
70+85.38
74°22'29"
78°38'32" (typ.)
℄ Diaphragm (typ.)
spaced as shown
B.F. Abut. 1
Approach Slab
Wingwall A
Wingwall B
2 - 2" Electrical
Conduit (typ.)
Vane Grate Inlet Special
(See B32 for details)
Sta. 70+67.84
Offset 2.5' Left
℄ SH 58, H.C.L. &
Profile Grade Line
Shoring Area 1
℄ Drain Pipe (typ.) See
Hydraulics for details.
Vane Grate Inlet Special
(See B32 for details)
Sta. 70+74.35
Offset 43.5' Right
Bridge Rail Transition
Extend conduit into
a pull box. (typ.)
(See B28)
2'-0" median
45'-0"
45'-0"
93'-0"
1'-6" Bridge Rail
1'-6" Bridge Rail
251'-1⅞"
81'-1⅞"
259'-6¾"
81'-5⅞"
18'-0"
15'-0"
8'-0" (typ.)
1'-3"
1'-3"
12'-4½" (typ.)
6'-2¼"
6'-2¼"
3'-7⅞"
3'-6⅜"
3'-9"
3'-10⅞"
4'-0"
4'-0¼"
3'-11⅞"
3'-10⅝"
3'-8⅝"
3'-5⅞"
3'-2⅜"
2'-10⅛"
3'-3⅛"
2'-11¼"
2'-8¼"
2'-6"
2'-4¾"
2'-4¼"
2'-4½"
2'-5¾"
2'-7¾"
2'-10⅝"
27'-10⅞" (typ.)
25'-5⅛" (typ.)
26'-8" (typ.)
A
B
C
D
E
F
G
H