15.2.1 PURPOSE

These drawings are to graphically present all pertinent information necessary for the construction of miscellaneous structures as well as depict constructability and ROW issues. Miscellaneous structures are structures within CDOT ROW that cover multiple definitions as defined in the Bridge Design Manual. Examples include culverts, pedestrian/bike structures, non-standard overhead signs, overhead pipes, overhead cables, railroad bridges, private drive structures, overhead conveyor belts, and overhead snow sheds.

15.2.2 RESPONSIBILITY

The graphical presentation of information on these drawings shall be the responsibility of the individual preparing the drawings in addition to the designer. Close cooperation with Roadway design group is essential for proper layout. Layout lines should be provided by the Roadway Design unit and checked by the Bridge Design Unit. Structure design using standard worksheets should be provided by the Bridge Design Unit and checked by the Roadway Design Unit.

15.2.3 SCALES

Standard Architectural and Civil scales shall be used that are suitable to make the details legible on a standard sheet.

15.2.4 ORIENTATION OF DETAILS

The PLAN of the structure shall be placed, if possible, at the upper left of the drawing.

The ELEVATION of the structure shall be projected below the PLAN when possible. When possible, the END ELEVATION and/or Sections shall be placed to the right of the PLAN and ELEVATION. If space is limited, the sections or secondary views may be shown on another sheet. Generally, sections should be taken from the PLAN and ELEVATION rather than from secondary views or other sections.

15.2.5 CONTROL

The horizontal control line for the structure shall be identified as well as the profile grade line.

15.2.6 DIMENSIONS

A sufficient number of dimensions shall be shown on the details to provide adequate information necessary in the checking of the plans and the construction and/or design of the structure. Quantities should be able to be verified based on plan dimensions.

15.2.7 ANGLES

The following angles shall be shown in the PLAN view of the structure when applicable:

A) Bent angle

15.2.8 WORKSHEETS

The use of the Bridge Worksheets is encouraged, but the designer shall verify the dimensions and applicability of the worksheet for the required application.

15.2.9 CHECK ITEMS FOR ALL STRUCTURE TYPES

Listed below is a summary of items that shall be checked and appear on the drawings for all structure types as applicable. See specific structure types in sections 15.2.10 through 15.2.13 for additional information as required. Structure drawings should show sufficient information in order to check any shop or working drawing information provided by the Contractor. Additional information shall be shown as required for the project as well as for the individual structure type.

CHECK ITEMS

A) Identify Horizontal Control Line. Station and offset information from Roadway horizontal control line is acceptable for structure control. If structure control line is based on roadway information, roadway information shall be provided in the structure plans as a reference, e.g. bearings, horizontal curve date, etc.
B) Identify vertical control information. If vertical control information is based on roadway information, roadway information shall be provided in the structure plans as a reference, e.g. vertical PIs, grades, etc.
C) Provide structure number.
D) Identify concrete coating (color) limits and/or rustications.
E) Identify limits of concrete sealer and/or waterproofing membrane.
F) Delineate approximate construction or excavation limits for structure type shown in plan view.
G) Show weephole/drainhole locations in elevation views.
H) Show surface drainage plan.
I) Locate interferences or special details such as light supports.
J) Depict and show interferences for structure in elevation views such as drains, abutments.
K) Provide isometric views for difficult intersections such as at abutments or angle points.
L) Show all known utilities and utility crossings.
M) Show utility details of conduits entering/exiting structures.
N) Show locations of changes in typical section.
O) Show proposed grade as applicable
P) Show existing grade.
Q) If structure is not associated with a bridge plan set, the name and direction of the nearest town shall be provided at the beginning and end of the structure.
R) Show finished contour lines when they are available.
S) Show standard North Arrow.
T) Show nearby structures, such as pipes, overhead signs, bridges, etc. that affect the design or construction.
U) Show type of slope protection as applicable.
V) Show direction and rate of fill or cut slopes. Show approximate location of toe and top of slopes.
W) Show existing structures (dashed), label with structure number, and note if the existing structure is to be removed.
X) Title the General Layout plan view “PLAN”.

Y) Provide matchlines for structures which extend to multiple sheets. Matchlines should be placed to avoid critical section changes or alignment changes in the structure.
Z) Show ROW limits if available and dimensions to railroad as needed.
AA) Verify accuracy of dimensions and elevations in accordance with Section 1.6 of this manual.
BB) Show allowable long-term settlement.
CC) Provide design information and constraints, e.g. Ground Water levels, allowable bearing capacity, allowable differential settlement, fill material properties

15.2.10 CULVERT EXAMPLES & CHECK ITEMS

Listed below is a summary of items that shall be checked and appear on the drawing, when applicable. Additional information may appear as necessary to fully depict required work. The structure examples shown here are a guide only, each structure shall be evaluated for applicability of examples and worksheets on a case by case basis. The items to be shown in the drawings for CBCs are similar to the items identified in Chapter No 6, sections 6.5 through 6.7. If standard box culverts are used on the project and there are no deviations from the M-Standard plans, then the M-Standard sheets may be used and additional details may not be required.

CHECK ITEMS

A) Identify bent angle of the structure.
B) Identify length.
C) Show wingwall information, e.g. skews, lengths, heights, etc. Tabular information is acceptable.
D) Show material type (concrete, metal, precast, CIP, etc).
E) Delineate construction or excavation limits. (Applicable only if M standards are not used) Note: the pay limits for CBCs are typically 1’-6” from the edge of the CBC but reasonable cut limits should be shown as approximate or conceptual for constructability purposes.
F) Identify clearance envelope if required, e.g. wildlife crossings, bike/pedestrian paths, etc.
G) Include note that height and width vary based on manufacturer (for steel arch structures).
H) Show phasing details.
I) Show shoring locations if required.
J) Show precast/CIP connections.
K) Show lighting details.
L) Identify invert elevations.
M) Show minimum fill height used for design.
N) Show path or channel widths.
O) Provide foundation information (for arch structures, 3 sided box culvert, etc).

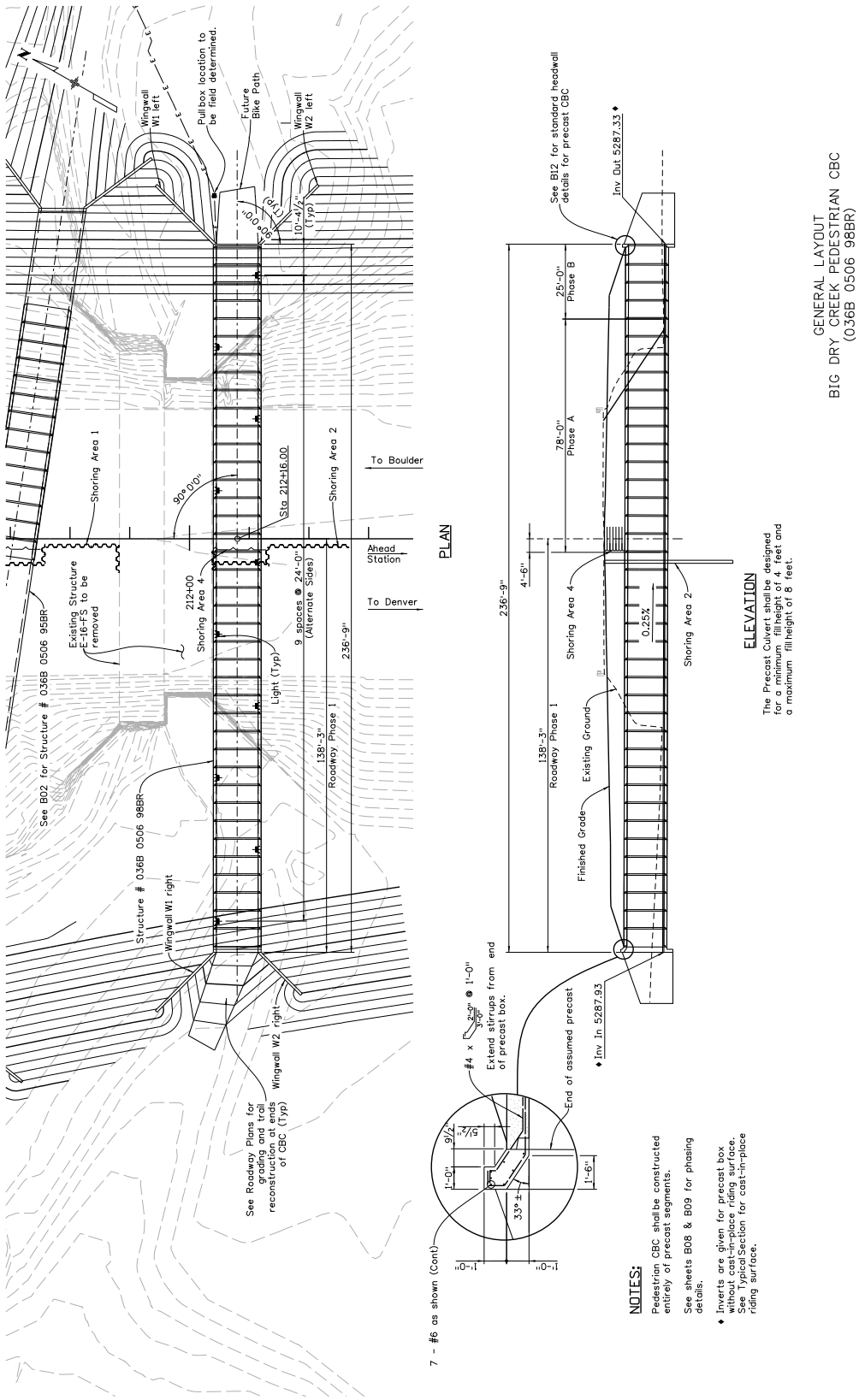
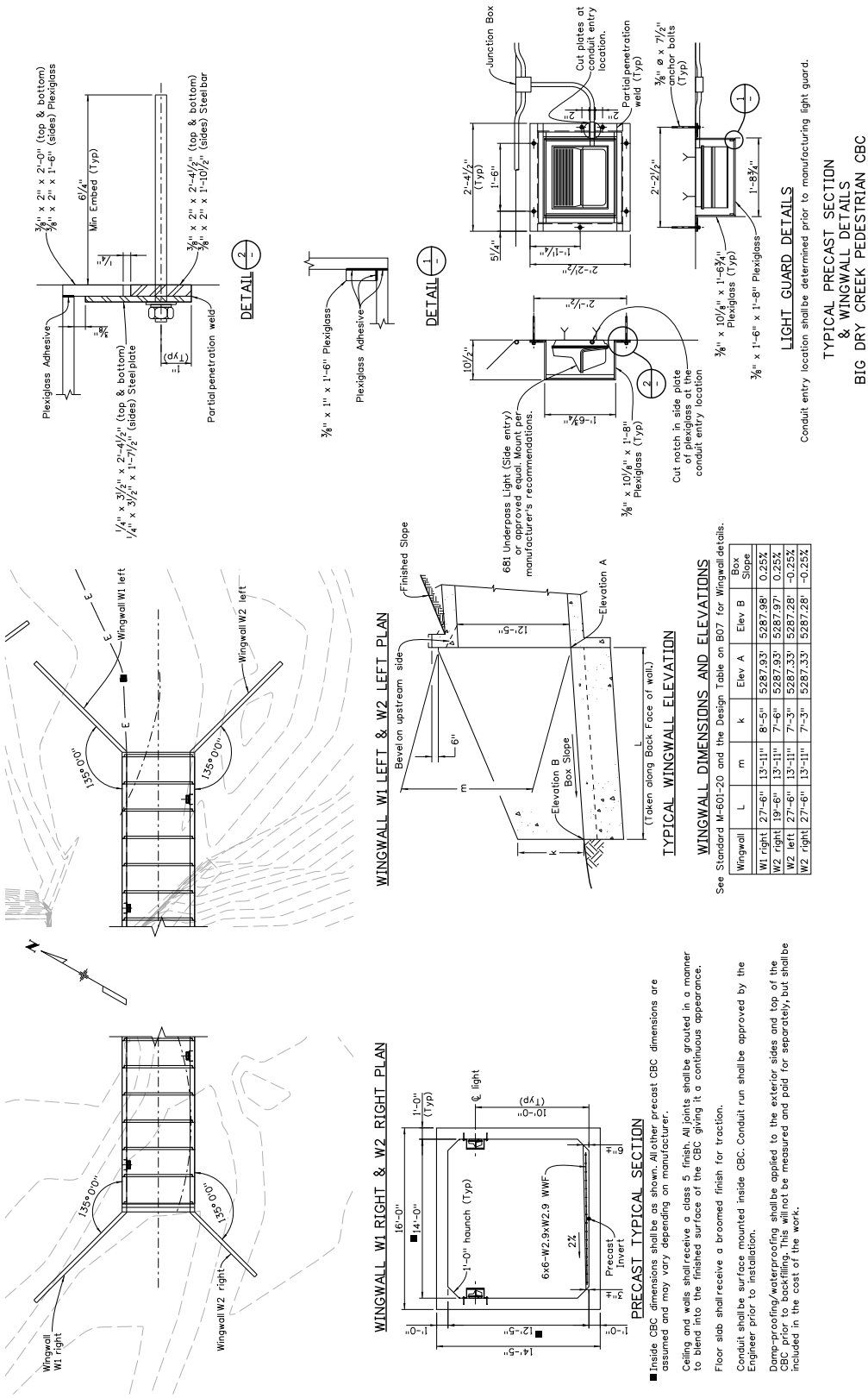


Fig 15.2.10-1 CBC General Layout



Wingwall	L	m	k	Elev A	Elev B	Box Slope
W1 right	27'-6"	13'-11"	8'-5"	5287.93'	5287.98'	0.25%
W2 right	19'-6"	13'-11"	7'-6"	5287.93'	5287.97'	0.25%
W2 left	27'-6"	13'-11"	7'-3"	5287.33'	5287.28'	-0.25%
W2 right	27'-6"	13'-11"	7'-3"	5287.33'	5287.28'	-0.25%

Fig 15.2.10-2 CBC Precast Details

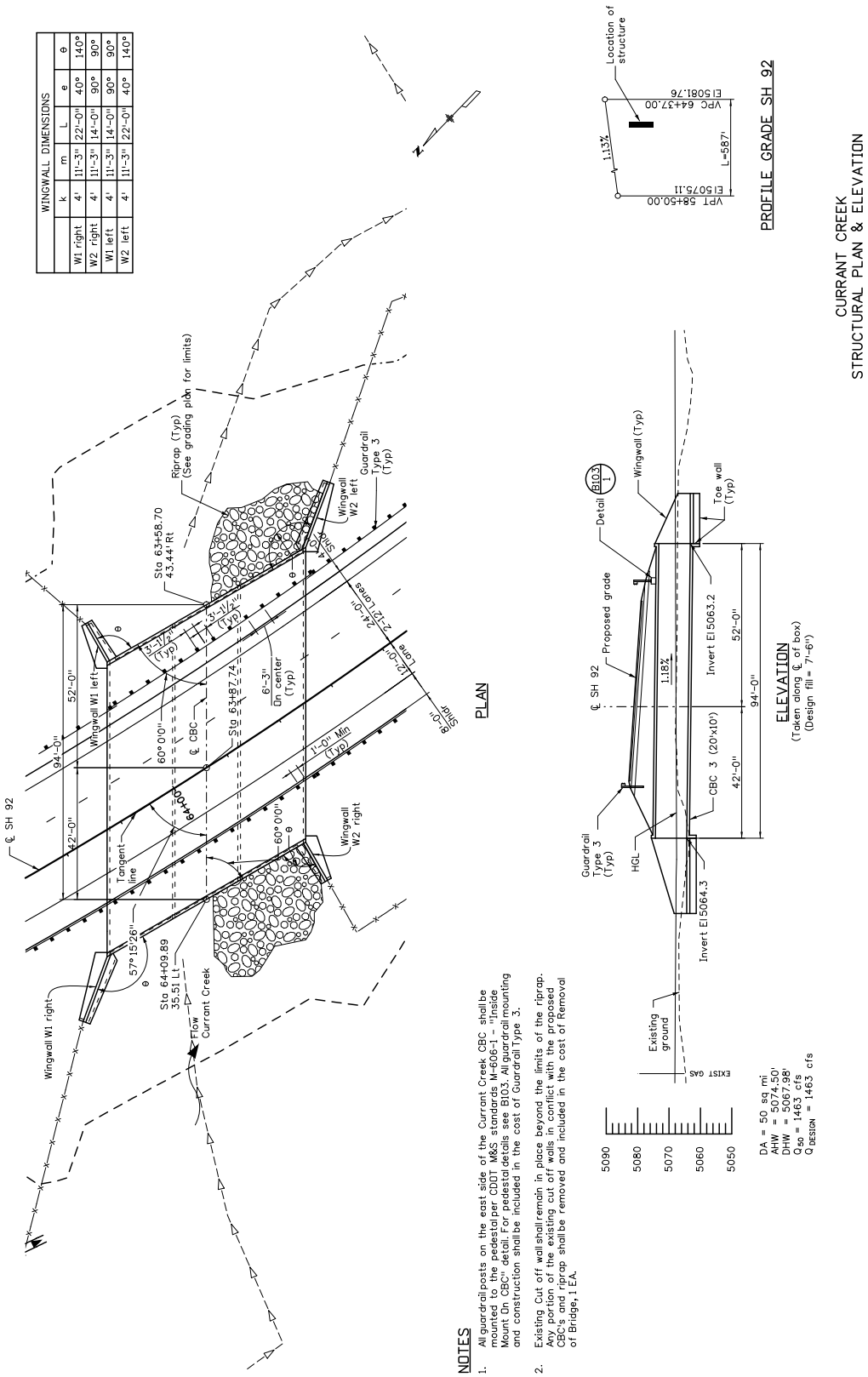


Fig 15.2.10-3 Cast in Place General Layout

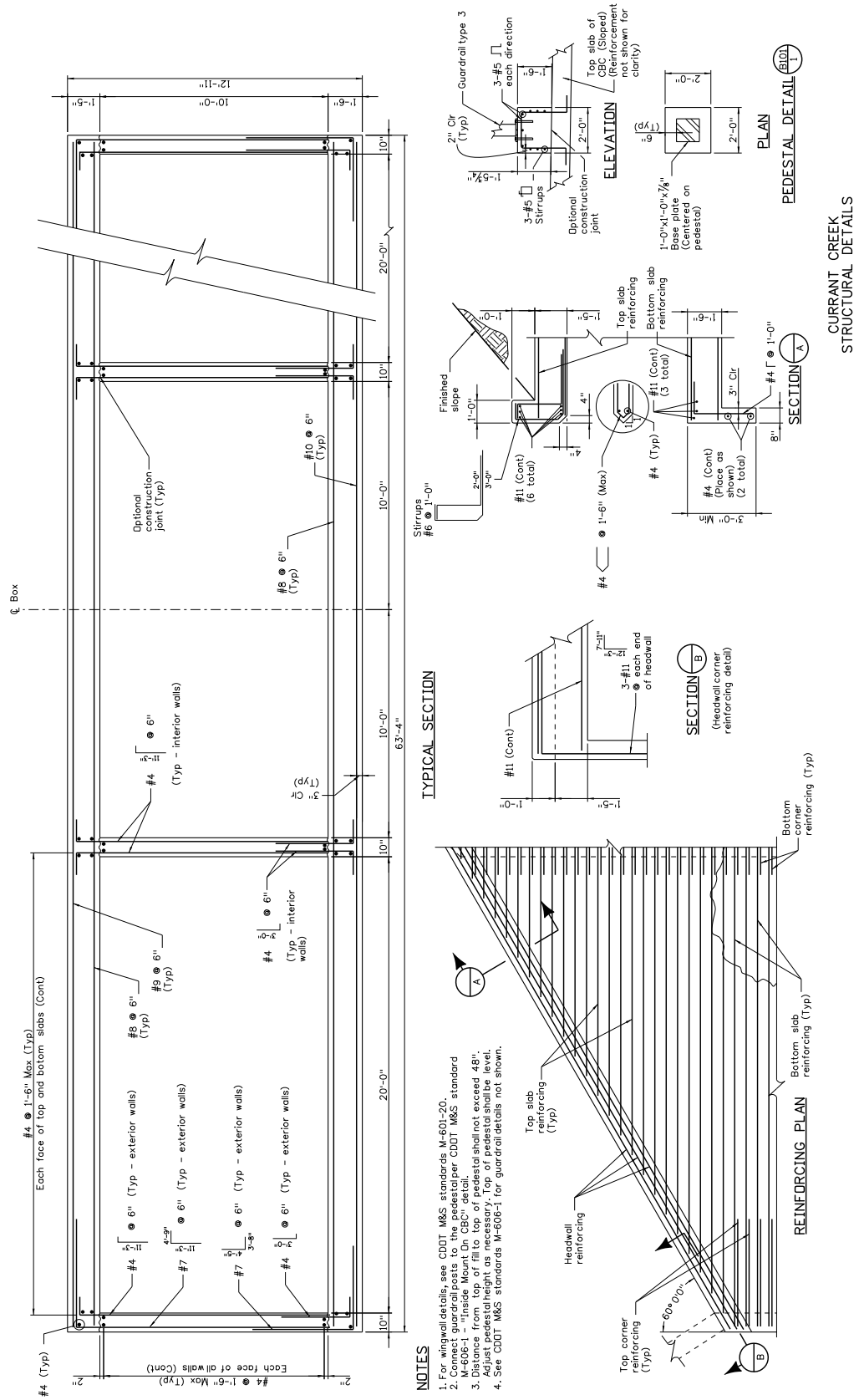


Fig 15.2.10-4 CBC Cast in Place Details

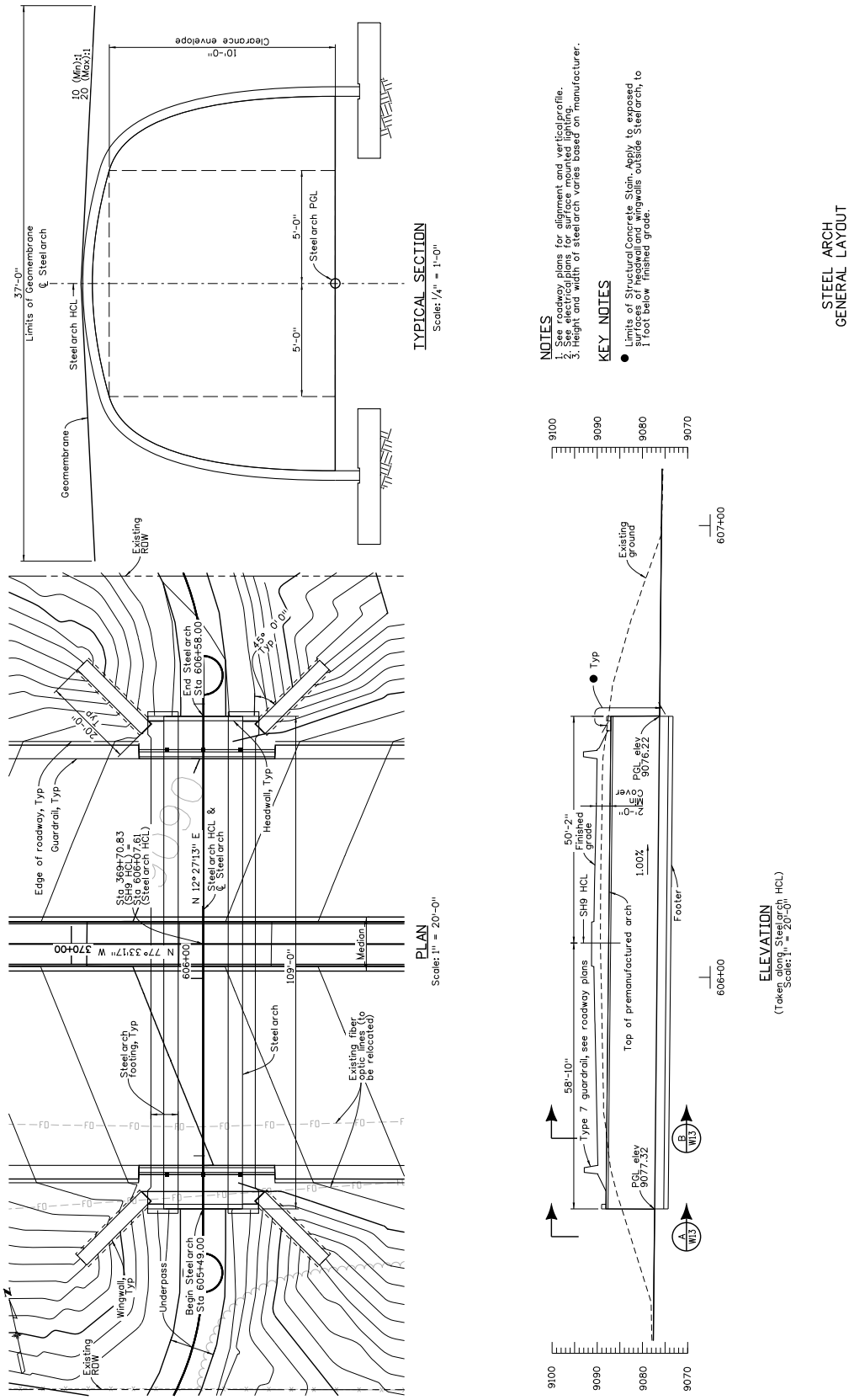


Fig 15.2.10-5 Steel Arch General Layout

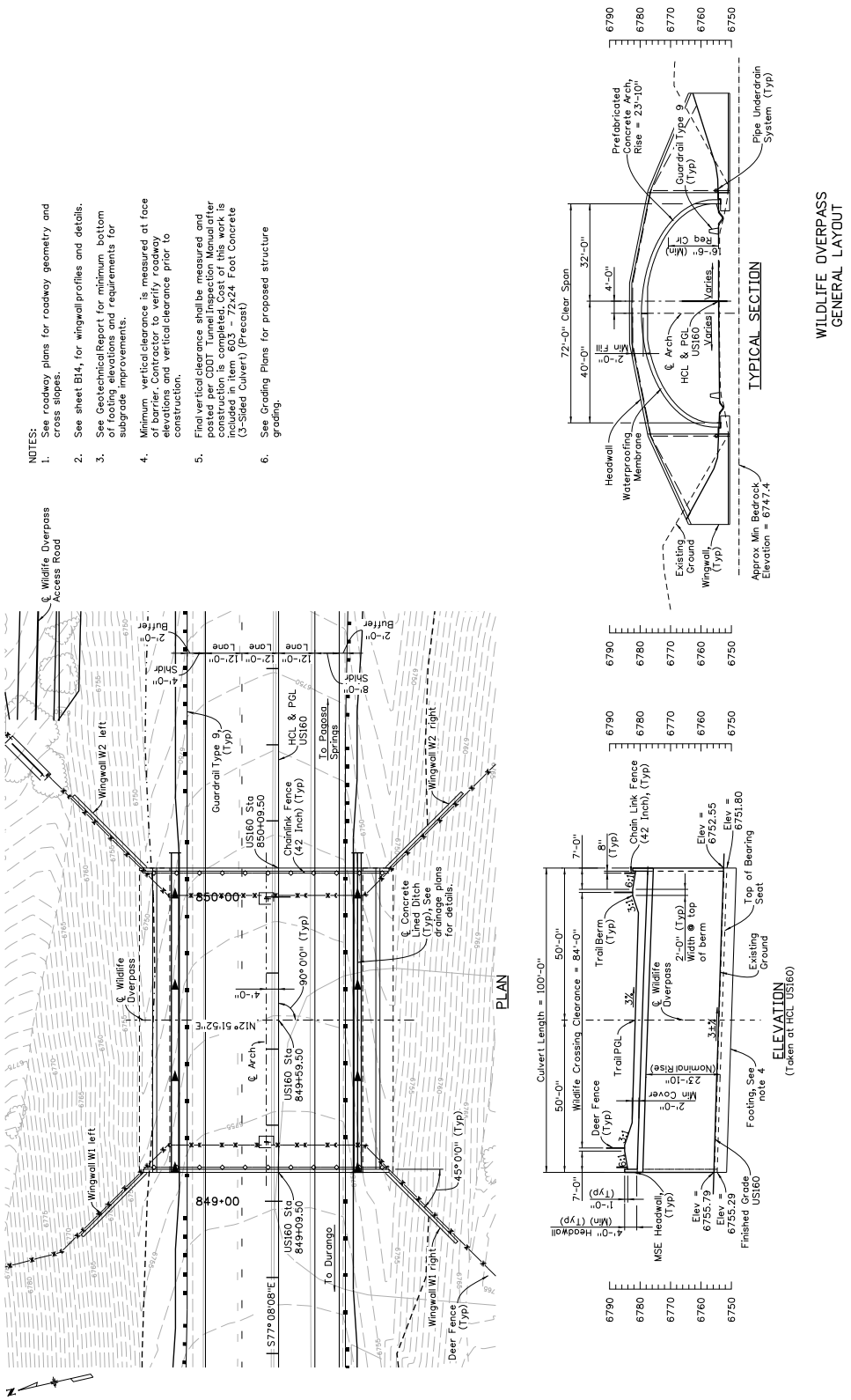
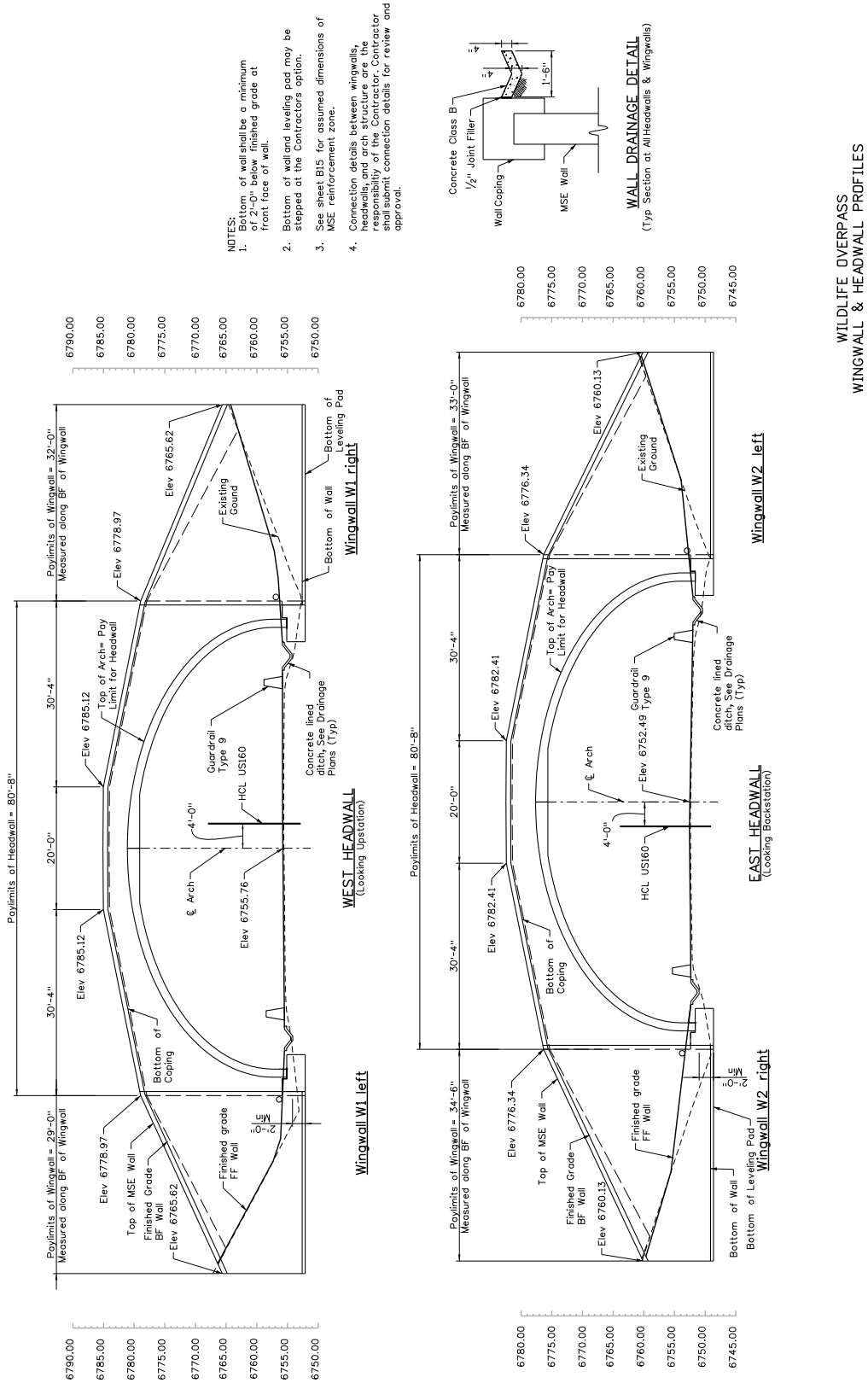


Fig 15.2.10-6 Overpass Arch General Layout



WILDLIFE OVERPASS
WINGWALL & HEADWALL PROFILES

Fig 15.2.10-7 Overpass Wall Layout

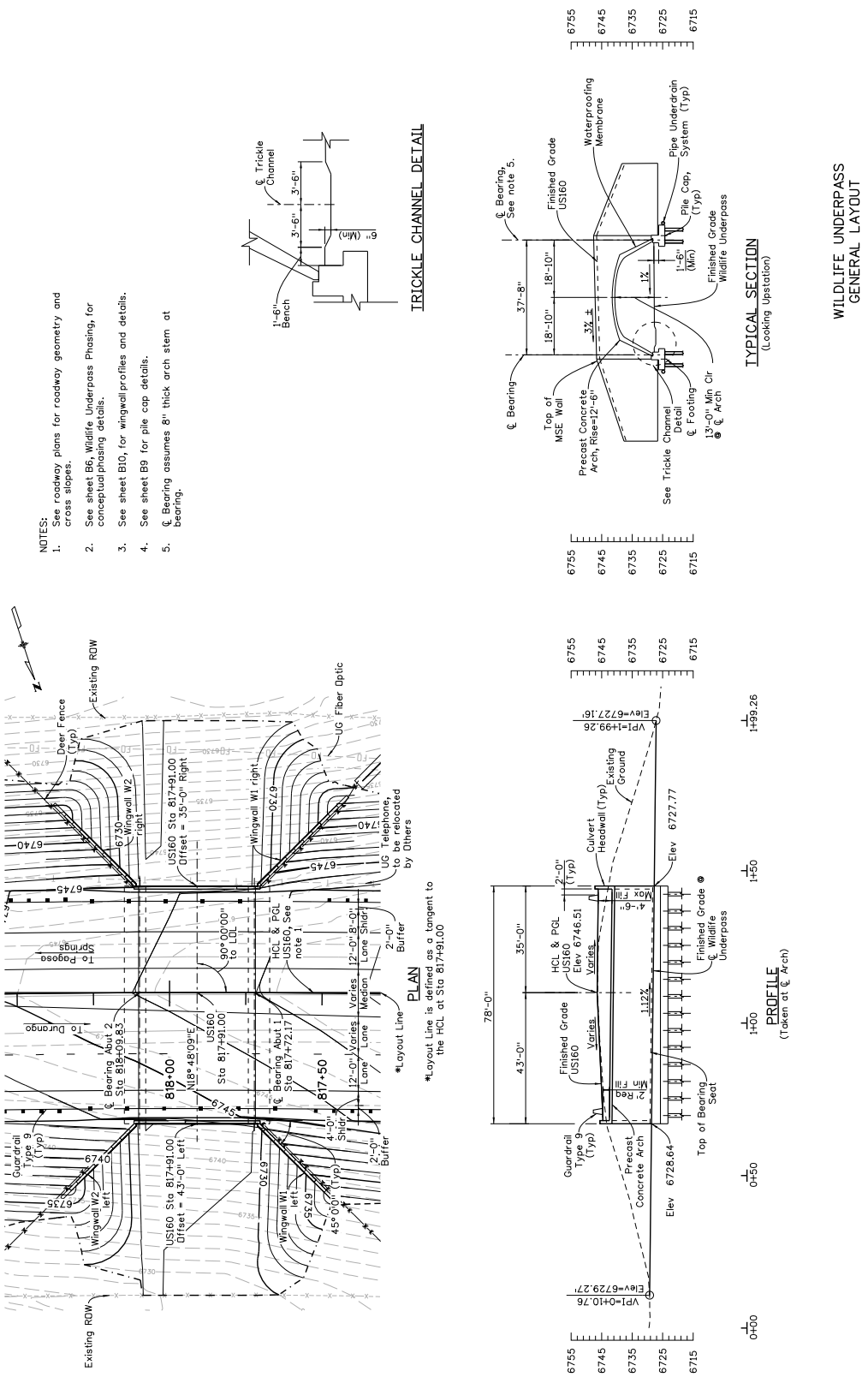


Fig 15.2.10-8 Underpass General Layout

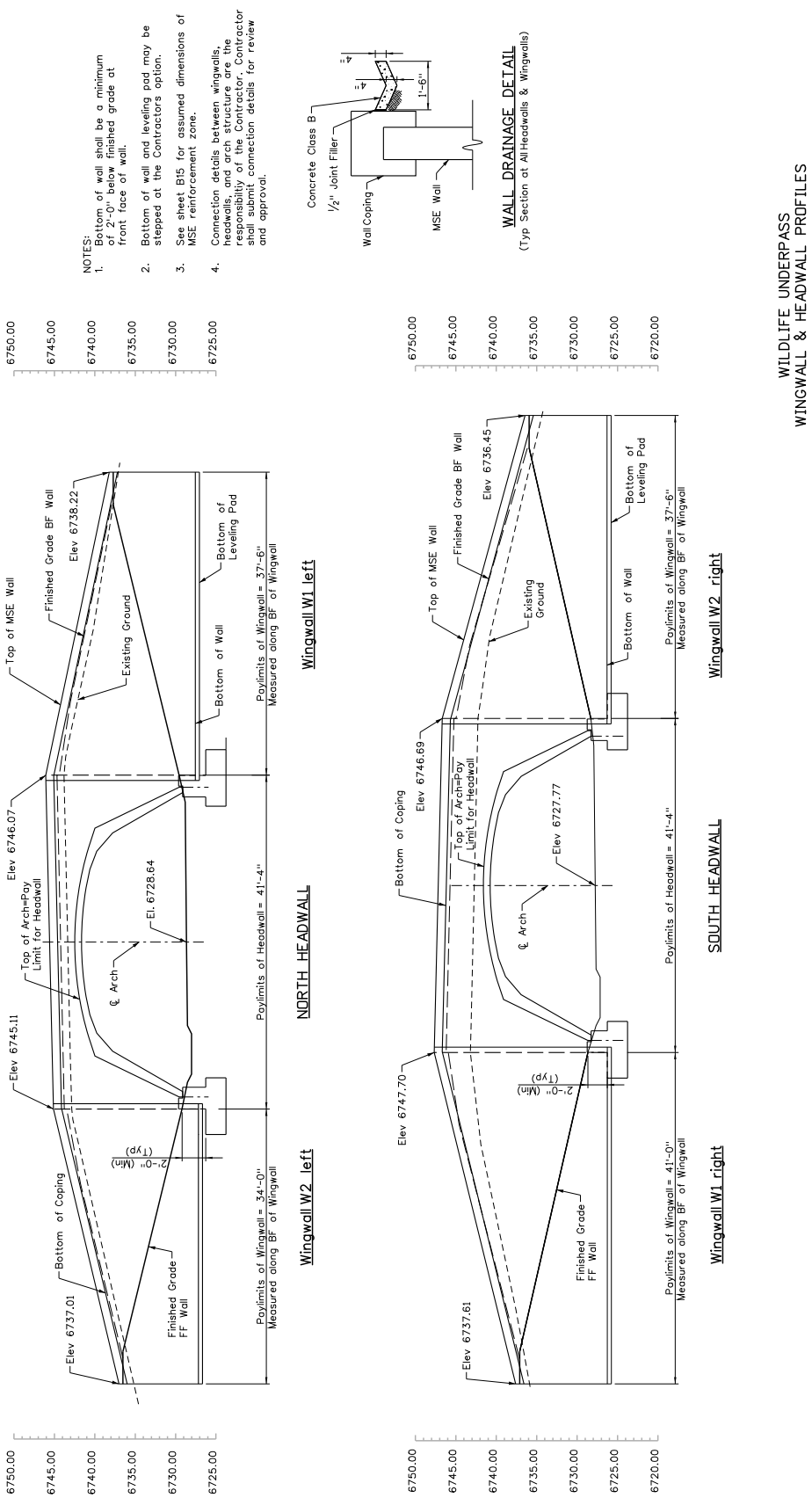


Fig 15.2.10-9 Underpass Wall Layout

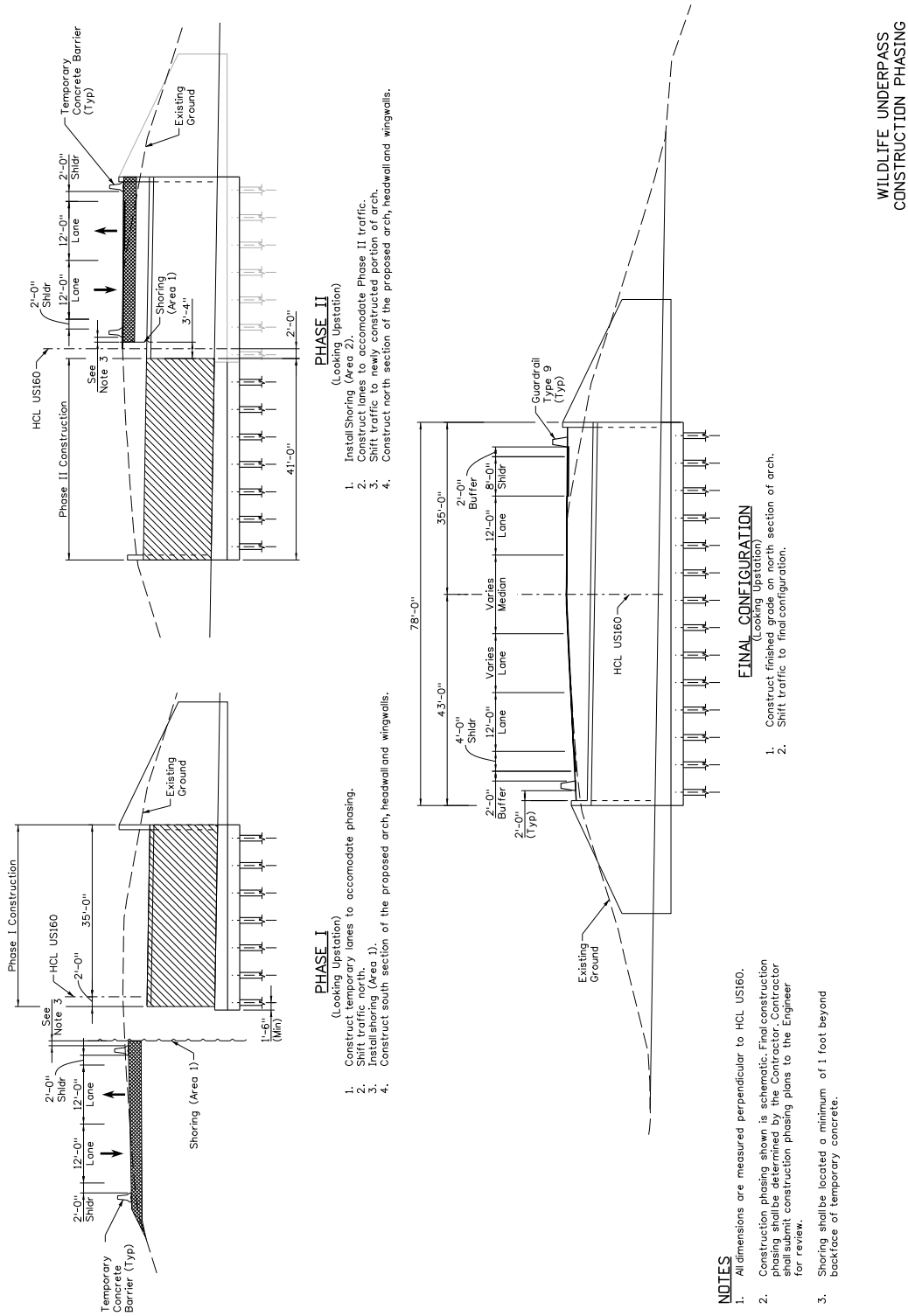


Fig 15.2.10-10 Underpass Construction Phasing

15.2.11 PEDESTRIAN BRIDGE EXAMPLES

Pedestrian bridges will generally follow the detail requirements as a bridge structure already laid out in this manual. Additional information may appear as necessary to fully depict required work, including necessary ramp details to the structure. The structure examples shown here are a guide only, each structure shall be evaluated for applicability of examples and worksheets on a case by case basis. The items to be shown in the drawings for pedestrian bridges are similar to the items identified in the various bridge item chapters.

When a prefabricated pedestrian bridge is used, i.e. designed and supplied by the Contractor's fabricator, design load requirements for the substructure shall be shown. General depiction of requirements for the superstructure shall also be provided as well as what material is field placed and what is shop built.

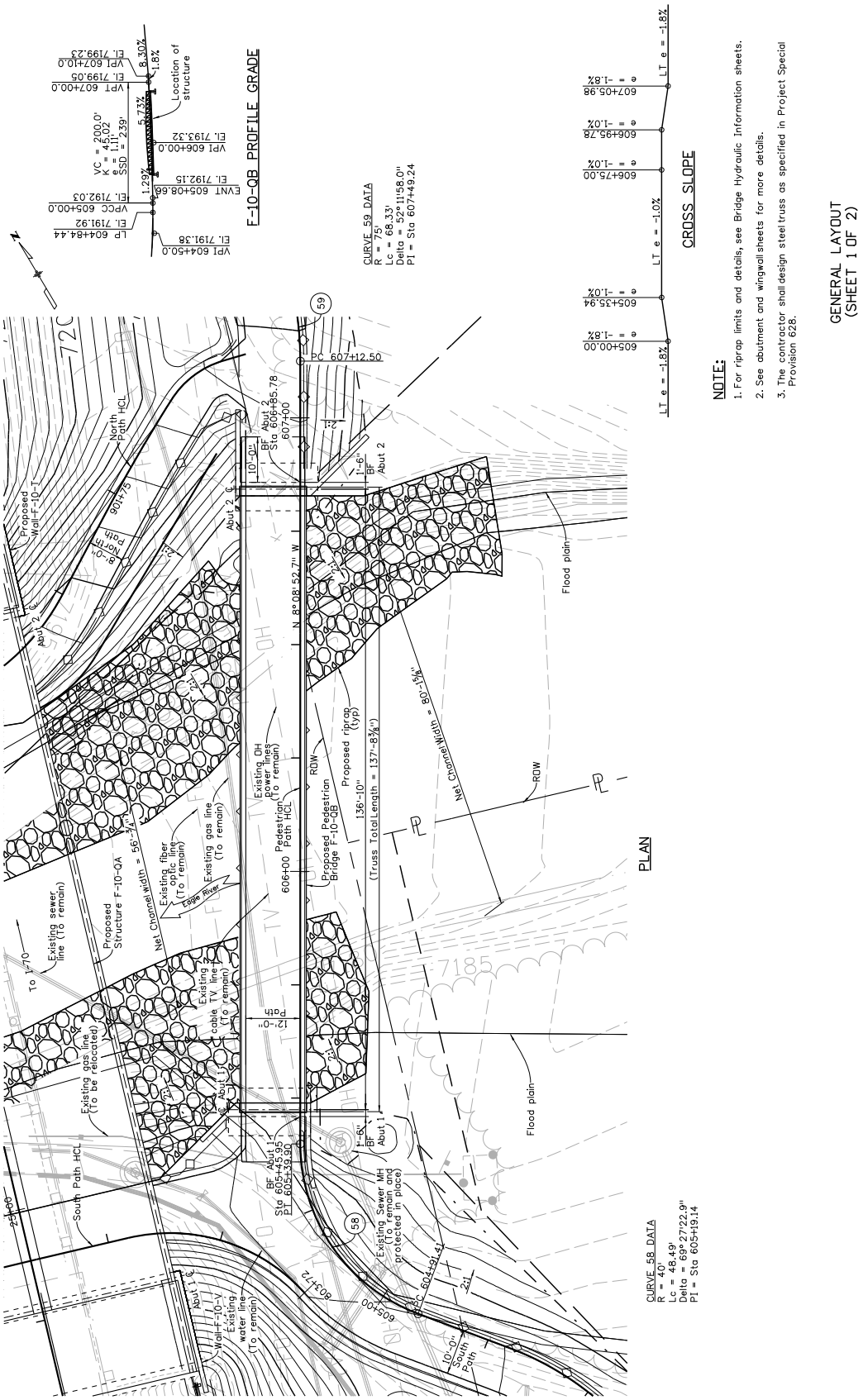


Fig 15.2.11-1 Pedestrian Bridge General Layout

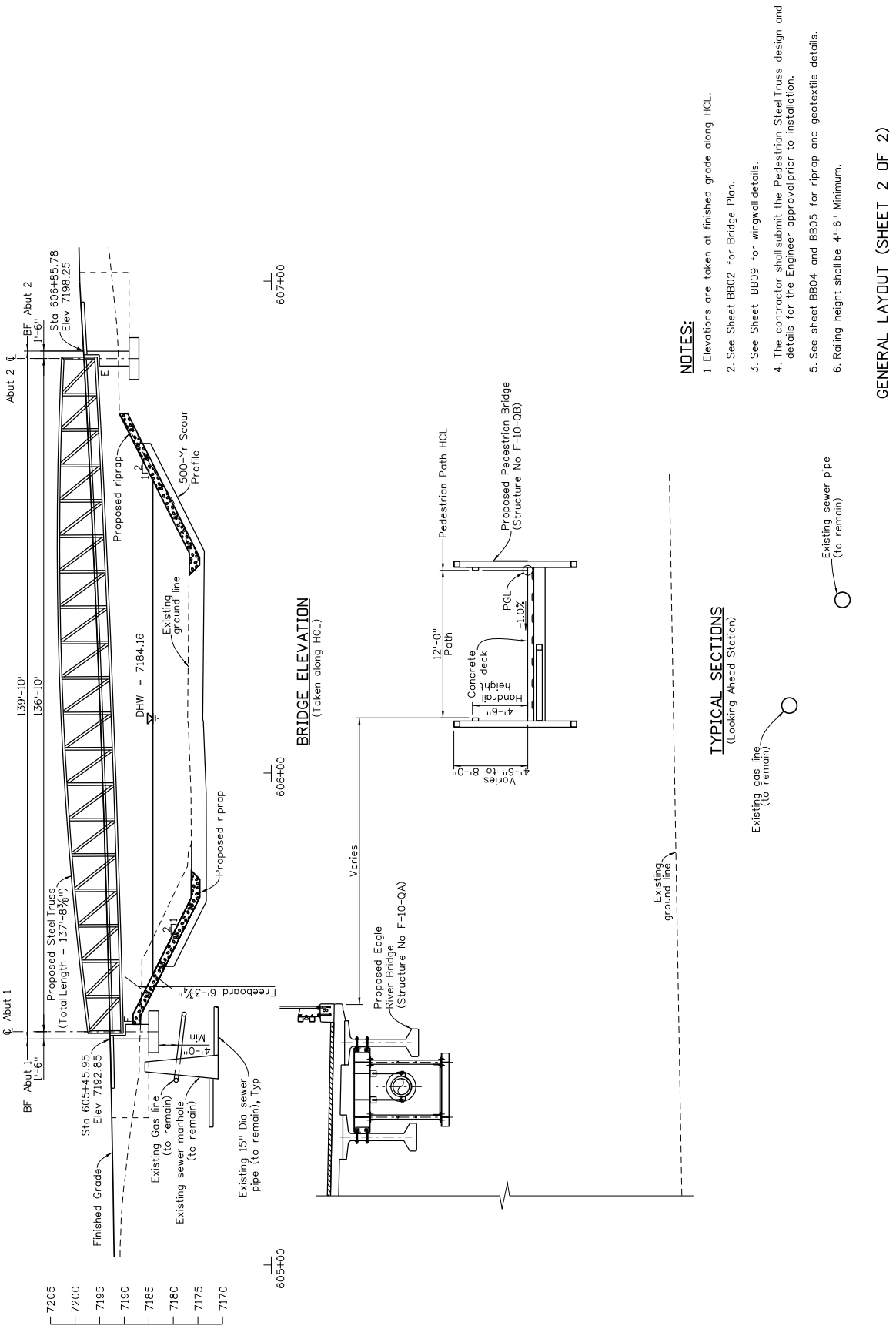


Fig 15.2.11-2 Pedestrian Bridge Layout

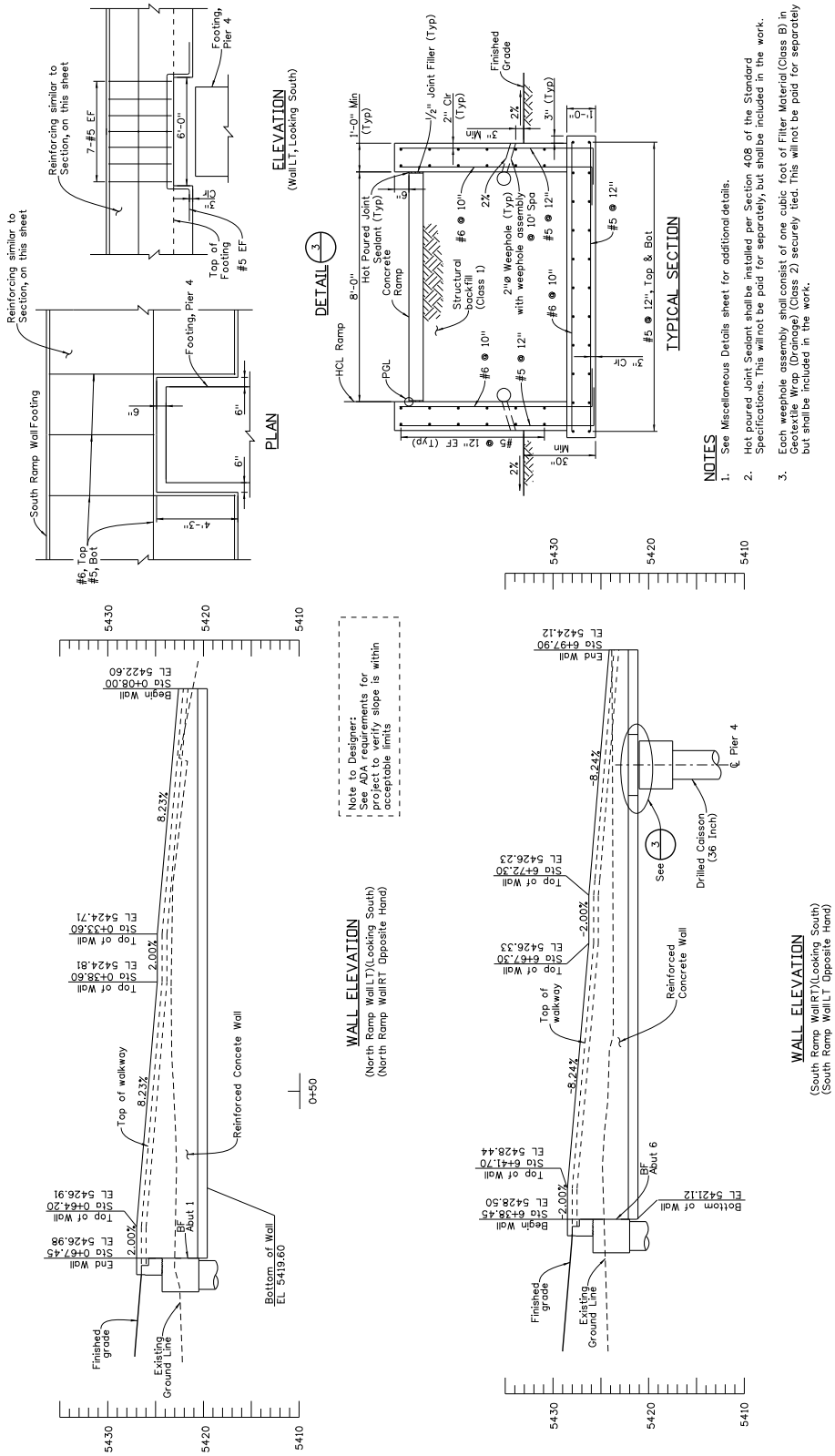


Fig 15.2.11-3 Pedestrian ramp details

15.2.12 NON S-STANDARD (SPECIAL) SIGN STRUCTURE EXAMPLES & CHECK ITEMS

Listed below is a summary of items that shall be checked and appear on the drawing, when applicable. Additional information shall appear, as required. The structure examples shown here are a guide only, each structure shall be evaluated for applicability of examples and worksheets on a case by case basis. Structure details shall match S-standard details wherever possible.

CHECK ITEMS

A) Identify Skew Angle.
B) Provide design criteria (design wind speed, gust effect factor, service life, etc).
C) Show connection details.
D) Show clearance requirements.
E) Show tube diameter (if monotube).

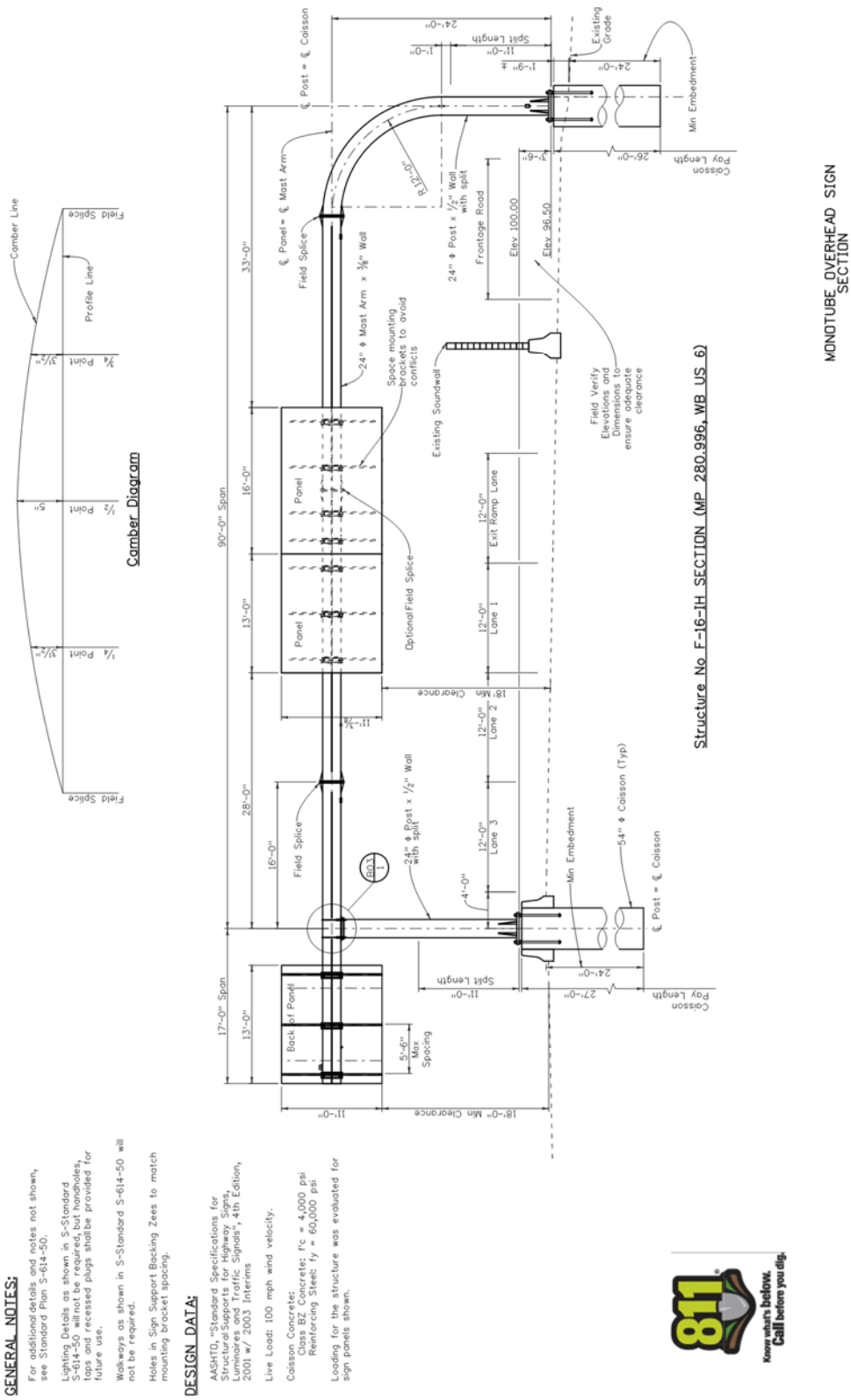


Fig 15.2.12-1 Monotube overhead sign

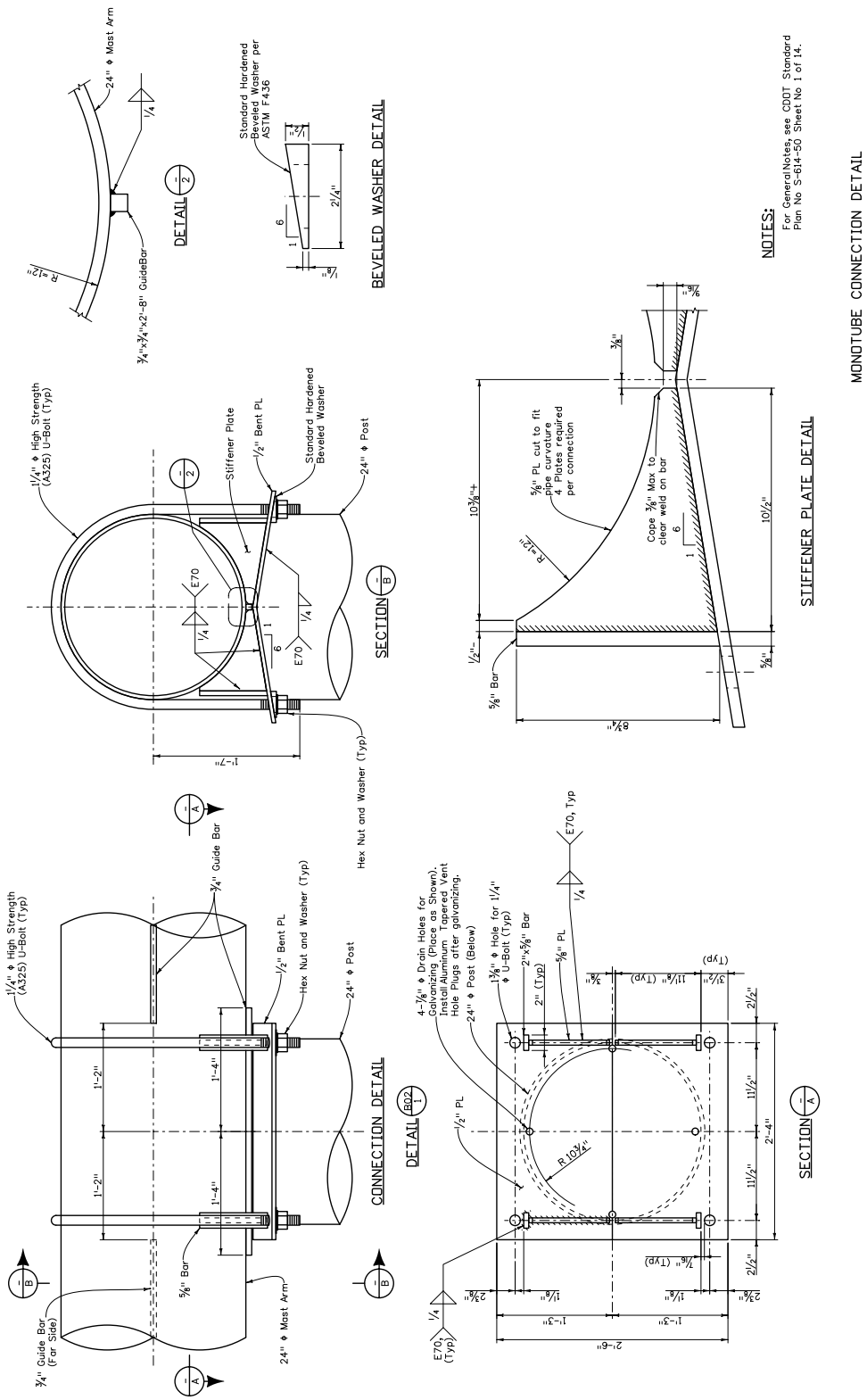


Fig 15.2.12-2 Monotube connection details