SNBI Substructure and Foundation Identification Guide



BRIDGE ASSET MANAGEMENT

November 5, 2026

Introduction

This guide is published by the Idaho Transportation Department Bridge Asset Management Group for the use in conjunction with the Idaho Manual for Bridge Evaluation (IMBE), 2026 Edition and the FHWA Specifications for the National Bridge Inventory (SNBI). Particularly IMBE Appendix 4.1 – EXAMPLE INSPECTION REPORT for STRUCTURE. The information published here is solely a guide to be used with judgment by certified inspectors. It is likely that some types or variations of substructures and foundations have not been included in this guide. If assistance is needed contact Bridge Asset Management either Patty Fish at patty.fish@itd.idaho.gov or Seth Crawford at seth.crawford@itd.idaho.gov with pictures, and any available plans. The Bridge Asset Management Group will assist in determining the appropriate classification. Some of the following examples include other SNBI coding values, besides B.SB.04. Example sketches are from the FHWA Bridge Inspector's Reference Manual (BIRM) (2022 NBIS). Example Descriptions come in part from the BIRM and other FHWA documents. All pictures are the property of the Idaho Transportation Department.

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Example 5 & 5a	**P01**	**Pier**	**wall**
	A06	**Abutment**	**gravity**
	A07	**Abutment**	**counterfort or buttressed**
Example 6	**A08**	**Abutment**	**pile bent with lagging**

	A09	**Abutment**	**crib**
	A10	**Abutment**	**cellular/vaulted**
Example 7	**A11**	**Abutment**	**reinforced soil mass**
Example 8 &10	**A12**	**Abutment**	**footing or cap only**

Concrete and Steel Culverts and Frames	
Example 11	**Concrete Cast in Place Stiffleg (3 sided frame) not underfill with an asphalt membrane and asphalt overlay or underfill**
Example 12	**Precast Concrete ConSpan B Series (3 sided frame), No deck**
Example 13	**Precast Concrete ConSpan O Series (3 sided frame), No deck**
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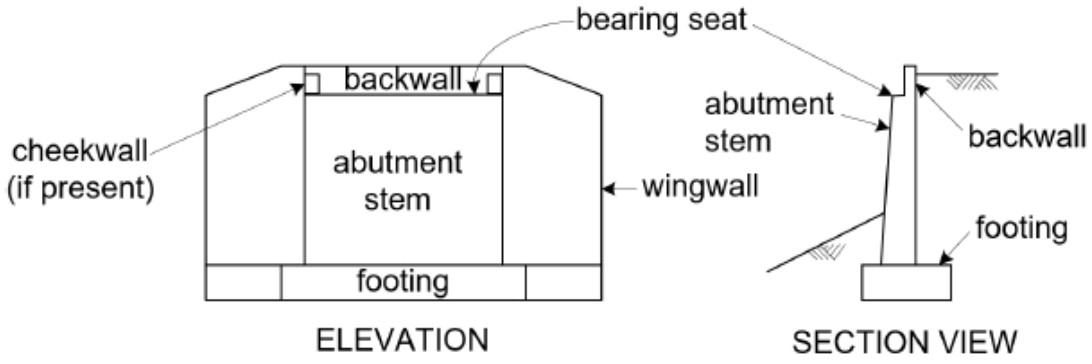
Example 17	**Concrete Cast in Place Box Culvert (4 sided frame)**
Example 18	**Steel Corrugated Plate Pipe Culvert**

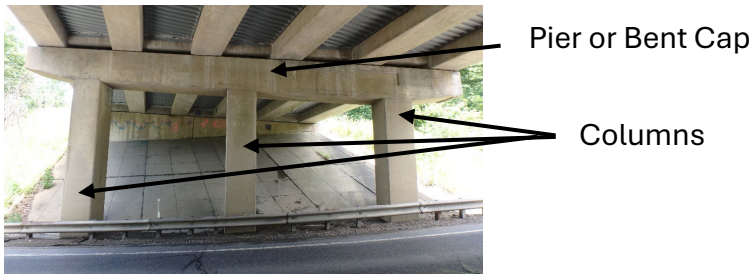
Example 1 – Cantilever/Wall Abutment –



Sketch of Full Height Abutment

Description - Cantilever abutments serve two purposes. They need to retain the soils behind the ends of the bridge, and they need to support the bridge superstructure. Some wall abutments are referred to as stub abutments. These abutments are made as short as possible and are installed at the top of fill embankments. Stub abutments usually only retain soils that are slightly higher than the superstructure thickness.

Example 1 – Pier/multiple column



Multiple column pier or bent

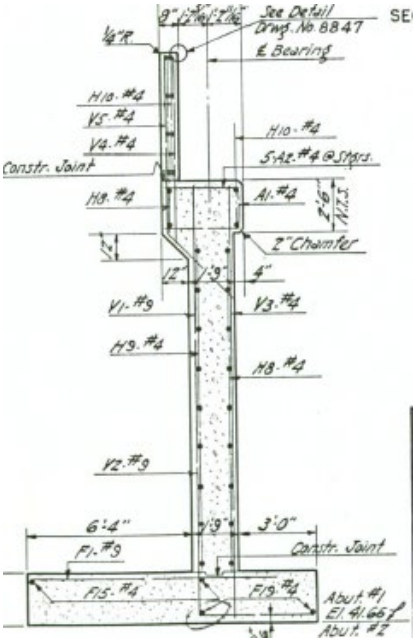
Description - There is no functional difference between piers and bents. Both serve as an intermediate support between abutments. A pier generally has only one column or shaft supported by one footing. Bents have a cap supported by two or more columns with each column supported by an individual footing. Bents may also utilize piles instead of columns.

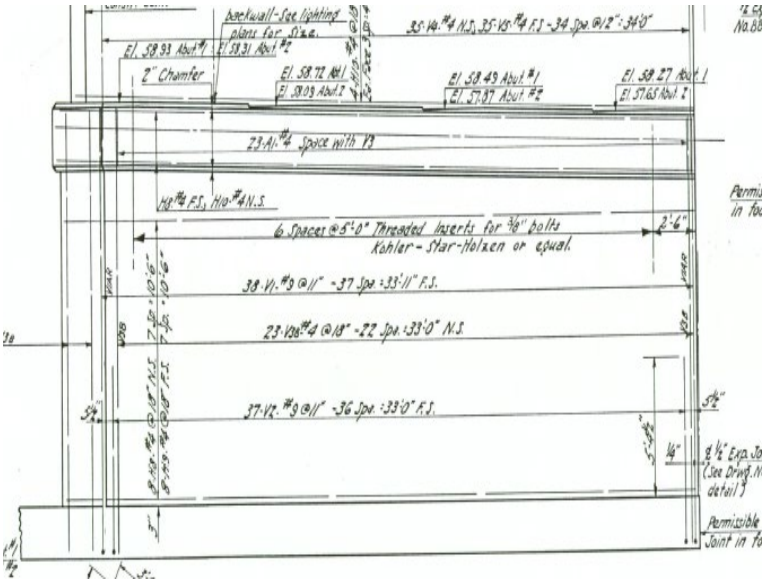
Example 1 - Cantilever/Wall Abutment,

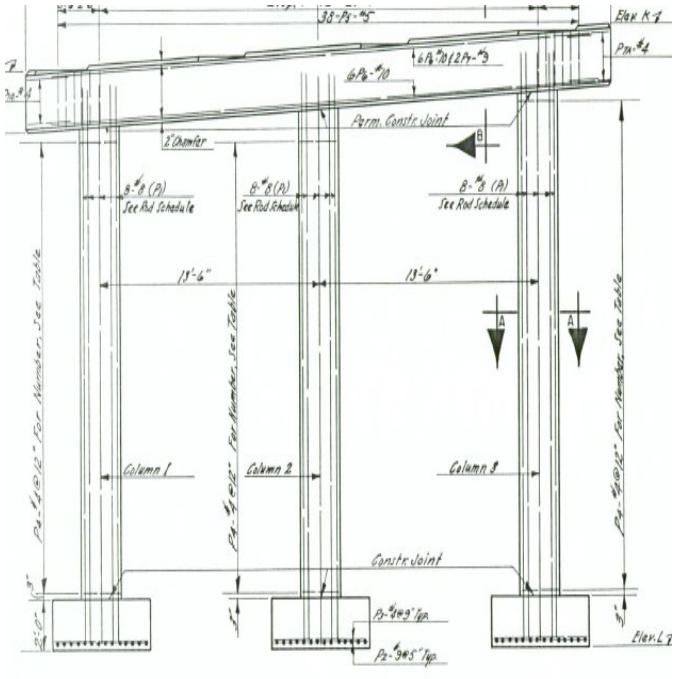
BrKey 14570 SH 52 over UPRR mp 1.291











Joint between each half of Abutment and gap between Pier Caps (symmetrical)

BrKey 14570 SH 52 over UPRR

CG Item 60
9 to 0 - Condition Rating 6 from Inspection Report

SNBI Item B.SB.01	**SNBI Item B.SB.01**	**SNBI Item B.SB.02**	**SNBI Item B.SB.02**	**SNBI Item B.SB.03**	**SNBI Item B.SB.03**
A01	P01	2	7	C01-Reinforced Concrete Cast in Place	C01-Reinforced Concrete Cast in Place

SNBI Item B.SB.04	**SNBI Item B.SB.04**	**SNBI Item B.SB.05**	**SNBI Item B.SB.06**	**SNBI Item B.SB.06**	**SNBI Item B.SB.07**	**SNBI Item B.SB.07**
A01 – Abutment – cantilever/ wall	P03 – Pier – multiple column	0-None	F01 – Footing – not on rock	F01 – Footing – not on rock	0-None	0-None

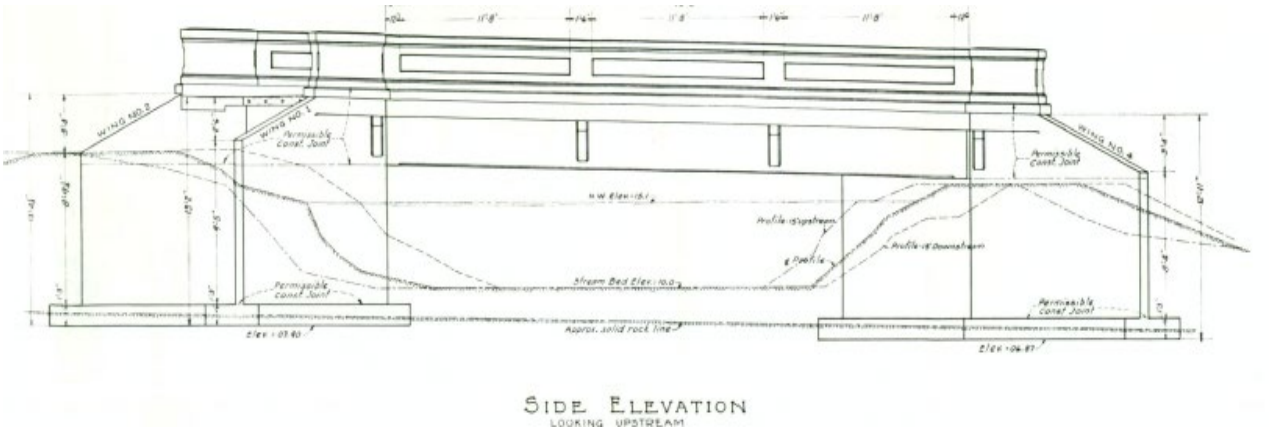
SNBI Item B.C.03
9 to 0 -Condition Rating 5

Element	**SNBI Item B.E.01**	**SNBI Item B.E.02**	**SNBI Item B.E.03**	**SNBI Item B.C.01**	**SNBI Item B.C.02**	**SNBI Item B.C.03**	**SNBI Item B.C.04**
RC Abutment	215		128	117	10	1	0
RC Column	205		42	5	24	13	0
RC Pier Cap	234		449	269	104	76	0

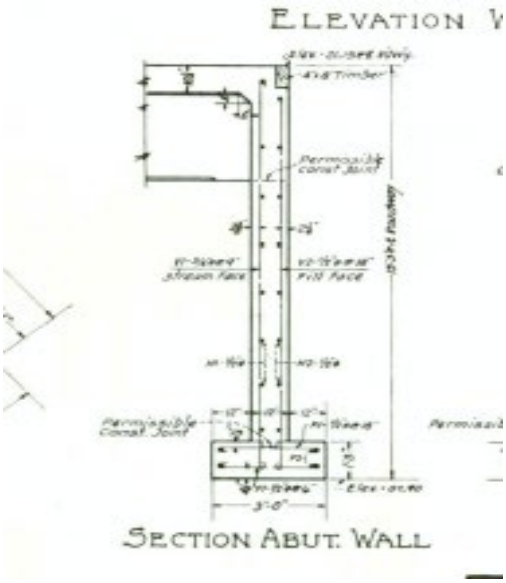
Example 1a – Cantilever/Wall Abutment

BrKey 13040 SH 25 over L Canal mp 8.51





SIDE ELEVATION
LOOKING UPSTREAM



ELEVATION W

SECTION ABUT. WALL



BrKey 13040 SH 25 over L Canal mp 8.51

CG Item 60
9 to 0 - Condition Rating 6 from Inspection Report

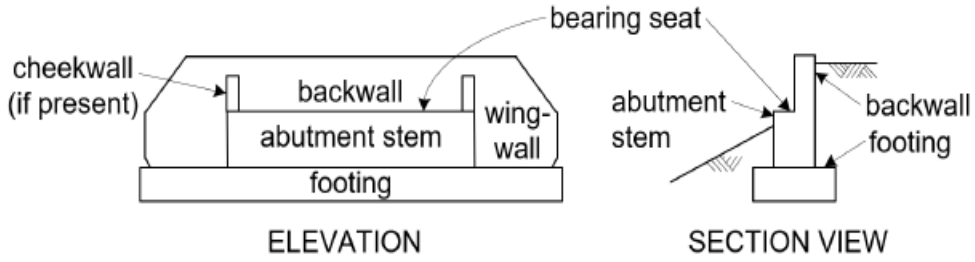
SNBI Item B.SB.01	**SNBI Item B.SB.02**	**SNBI Item B.SB.03**
A01	2	C01-Reinforced Concrete Cast in Place

SNBI Item B.SB.04	**SNBI Item B.SB.05**	**SNBI Item B.SB.06**	**SNBI Item B.SB.07**	**SNBI Item B.SB.07**
A01 – Abutment – cantilever/ wall	0-None	F02 – Footing – on rock	0-None	0-None

SNBI Item B.C.03
9 to 0 -Condition Rating 6

Element	**SNBI Item B.E.01**	**SNBI Item B.E.02**	**SNBI Item B.E.03**	**SNBI Item B.C.01**	**SNBI Item B.C.02**	**SNBI Item B.C.03**	**SNBI Item B.C.04**
RC Abutment	215		52	33	6	13	0

Example 2 – Stub Abutment



Sketch of Stub Abutment

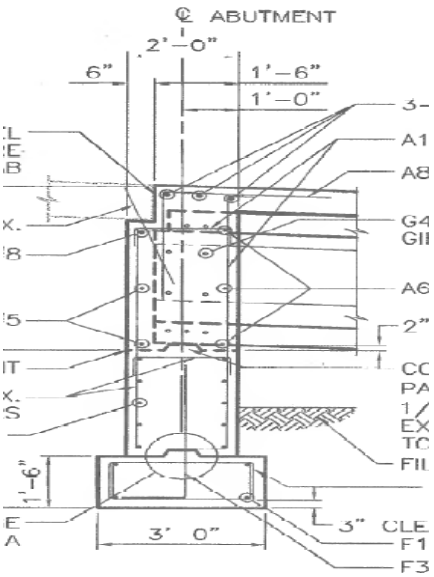
Description - Some wall abutments are referred to as stub abutments. These abutments are made as short as possible and are installed at the top of fill embankments. Stub abutments usually only retain soils that are slightly higher than the superstructure thickness.

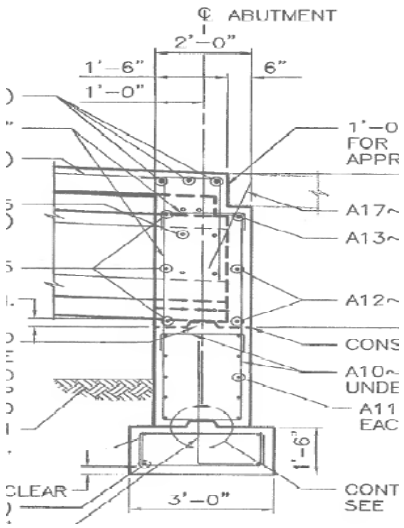
Example 2 –

Stub Abutment on MSE Wall Abutment – BrKey 21297 Ustick Rd over Settlers Canal mp 10.310









BrKey 21297 Ustick Rd over Settlers Canal mp 10.310

CG Item 60
9 to 0 - Condition Rating 8 from Inspection Report

SNBI Item B.SB.01	**SNBI Item B.SB.02**	**SNBI Item B.SB.03**
A02	2	C01 – Reinforced Concrete – cast-in-place

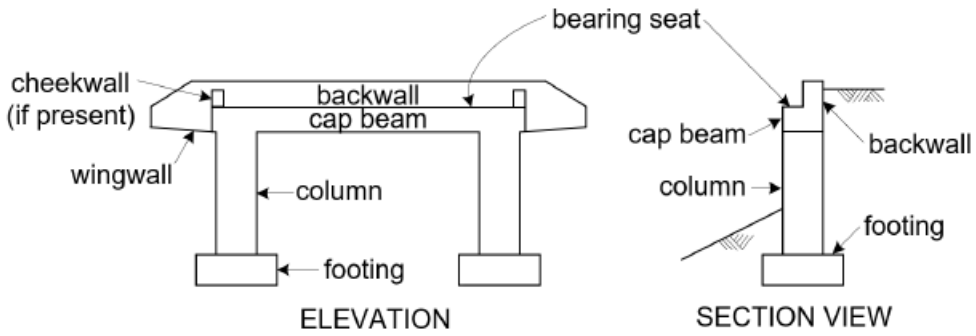
SNBI Item B.SB.04	**SNBI Item B.SB.05**	**SNBI Item B.SB.06**	**SNBI Item B.SB.07**
A02 – Abutment – stub	0-None	F03 – Footing – on reinforced soil	0-None

SNBI Item B.C.03
9 to 0 -Condition Rating 8

Element	**SNBI Item B.E.01**	**SNBI Item B.E.02**	**SNBI Item B.E.03**	**SNBI Item B.C.01**	**SNBI Item B.C.02**	**SNBI Item B.C.03**	**SNBI Item B.C.04**
RC Abutment	215		91	79	11	1	0
RC Approach Slab	321		6970	3485	3485	0	0
Wearing Surface	510	321	6970	0	6970	0	0
Cracking (RC)	1130	321	6970	3485	3485	0	0
Concrete Rein Steel Protective Sys	520	321	6970	6970	0	0	0

Note: The bridge is founded on MSE walls, this should be noted in the Additional Information portion of the Bridge Inspection Report along with any defects. The RC Approach Slab and associated defects or sub elements are Bridge Management Elements and are typically not reported to FHWA.

Example 3 – Open/Spill through Abutment & Pier Multiple Column



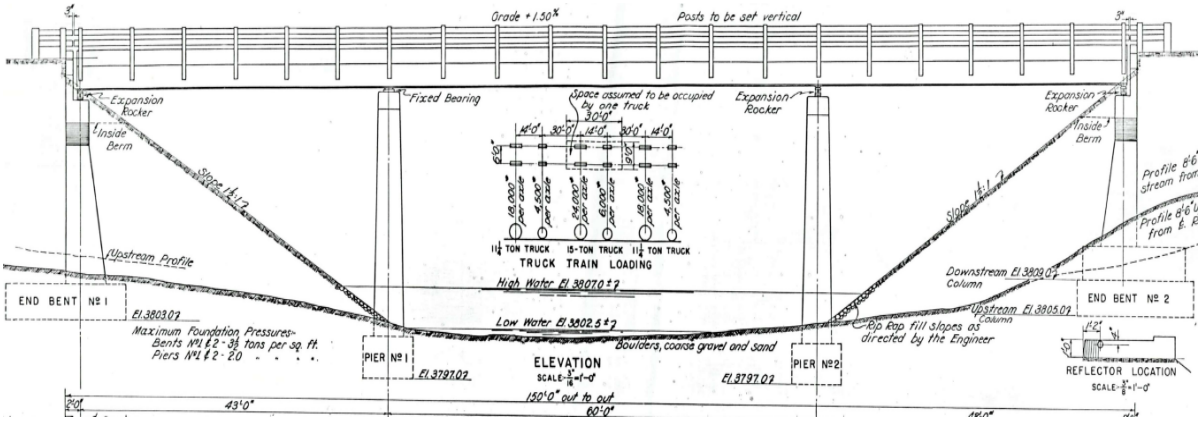
Spill Through/Open Abutment

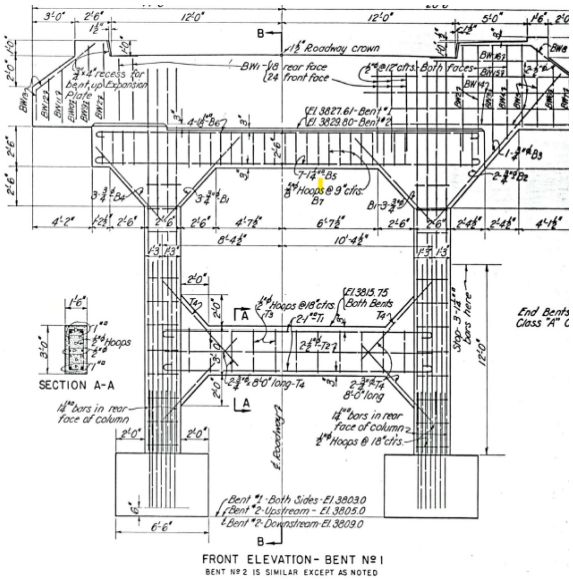
Description - Spill-through, or open, abutments tend to be similar in construction to multi-column piers. Instead of being retained by a solid wall, the approach roadway embankment extends on a slope below the bearing seat and between (through) the supporting columns. Only the topmost few feet of the embankment are actually retained by the abutment cap. Spill through/open abutment disadvantages include a tendency for the fill to settle around the columns since good compaction is difficult to achieve in the confined spaces. Excessive erosion or scour may also occur in the fore slope.

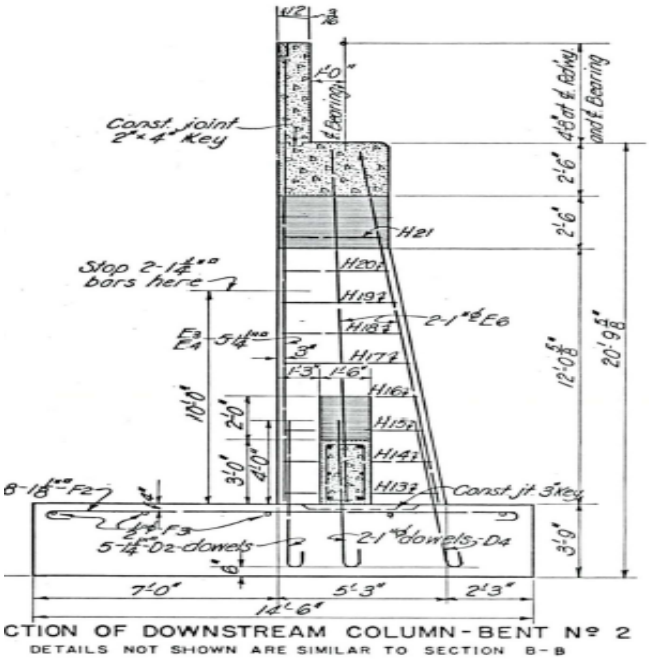
Example 3 – Open/Spill through Abutment & Pier Multiple Column

BrKey 12890 SH 21 over Clear Cr mp 72.697



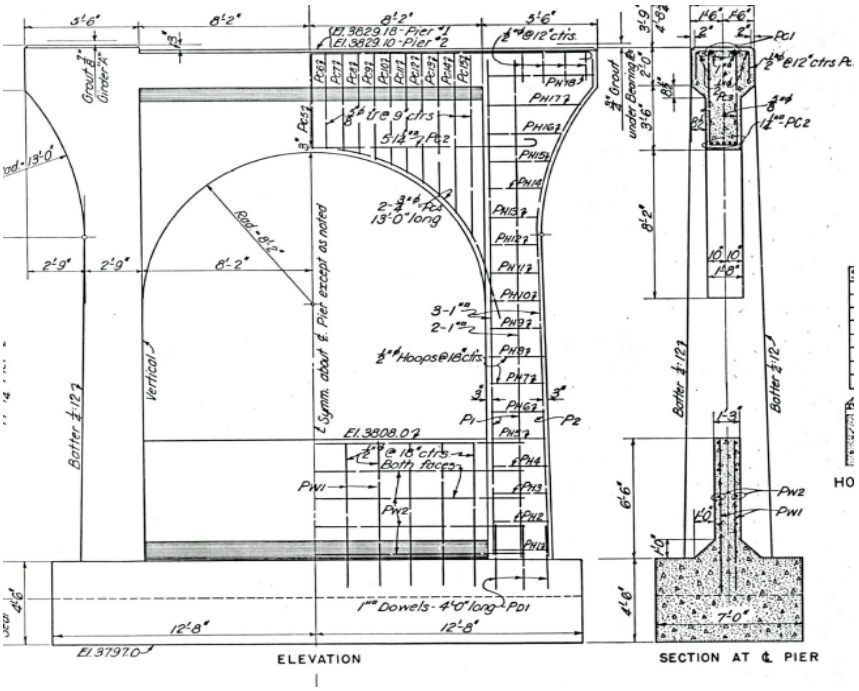






CTION OF DOWNSTREAM COLUMN-BENT Nº 2

DETAILS NOT SHOWN ARE SIMILAR TO SECTION B-B



BrKey 12890 SH 21 over Clear Cr mp 72.697

CG Item 60
9 to 0 - Condition Rating 5 from Inspection Report

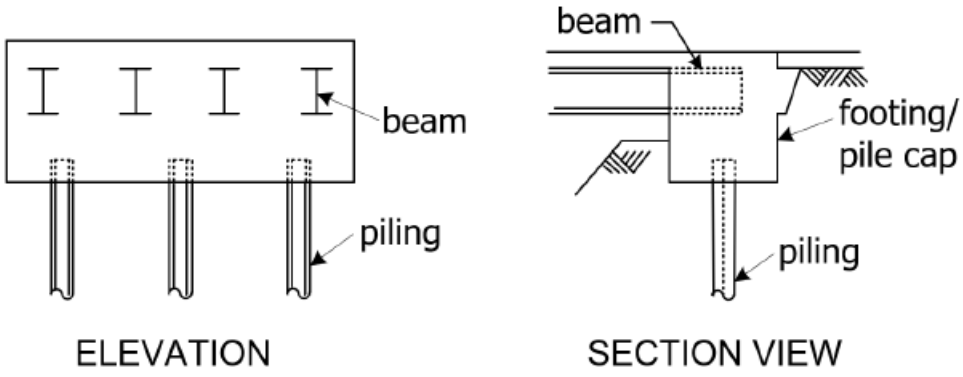
SNBI Item B.SB.01	**SNBI Item B.SB.01**	**SNBI Item B.SB.02**	**SNBI Item B.SB.02**	**SNBI Item B.SB.03**	**SNBI Item B.SB.03**
A01	P01	2	2	C01-Reinforced Concrete Cast in Place	C01-Reinforced Concrete Cast in Place

SNBI Item B.SB.04	**SNBI Item B.SB.04**	**SNBI Item B.SB.05**	**SNBI Item B.SB.06**	**SNBI Item B.SB.06**	**SNBI Item B.SB.07**	**SNBI Item B.SB.07**
A03 – Open/spill through	P03 – Pier – multiple column	0-None	E02 – Earth – unreinforced soil	E02 – Earth – unreinforced soil	0-None	0-None

SNBI Item B.C.03
9 to 0 -Condition Rating 5

Element	**SNBI Item B.E.01**	**SNBI Item B.E.02**	**SNBI Item B.E.03**	**SNBI Item B.C.01**	**SNBI Item B.C.02**	**SNBI Item B.C.03**	**SNBI Item B.C.04**
RC Abutment	215		55	35	13	7	0
RC Column	205		4	3	0	1	0
Pier Cap	234		55	53	0	2	0

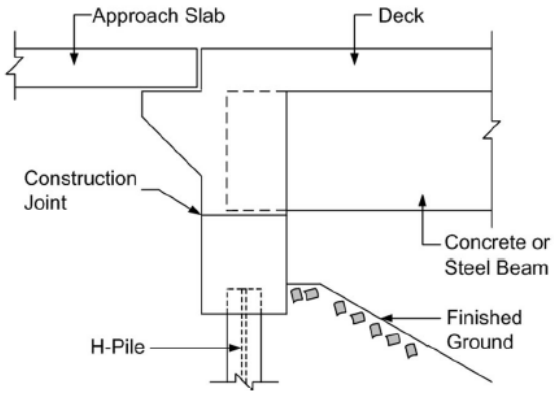
Example 4 - Integral Abutment Bridge



Sketch of Integral Abutment

Description - Most bridges have superstructures that are independent of the substructure to accommodate bridge length changes due to thermal effects. Expansion devices such as deck joints and expansion bearings provide for thermal movements but can deteriorate quickly and create a wide range of maintenance demands for the bridge. In extreme cases, lack of movement due to failed expansion devices can lead to undesirable stresses in the bridge. Integral abutments supported by a single row of piles provide a solution to these problems.

In this design, the superstructure and substructure are integral and act as one unit without an expansion joint or bearing (see Figure 14.2.16). Relative movement of the abutment with respect to the backfill enables the structure to adjust to thermal expansions and contractions. Pavement joints at the ends of approach slabs are typically provided to accommodate the relative movement between the bridge and the approach roadway pavement.

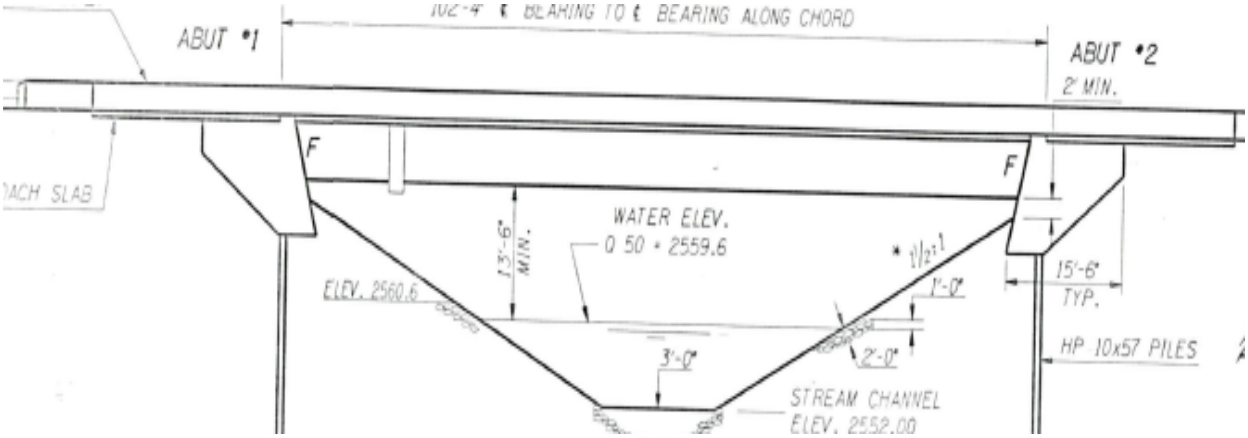


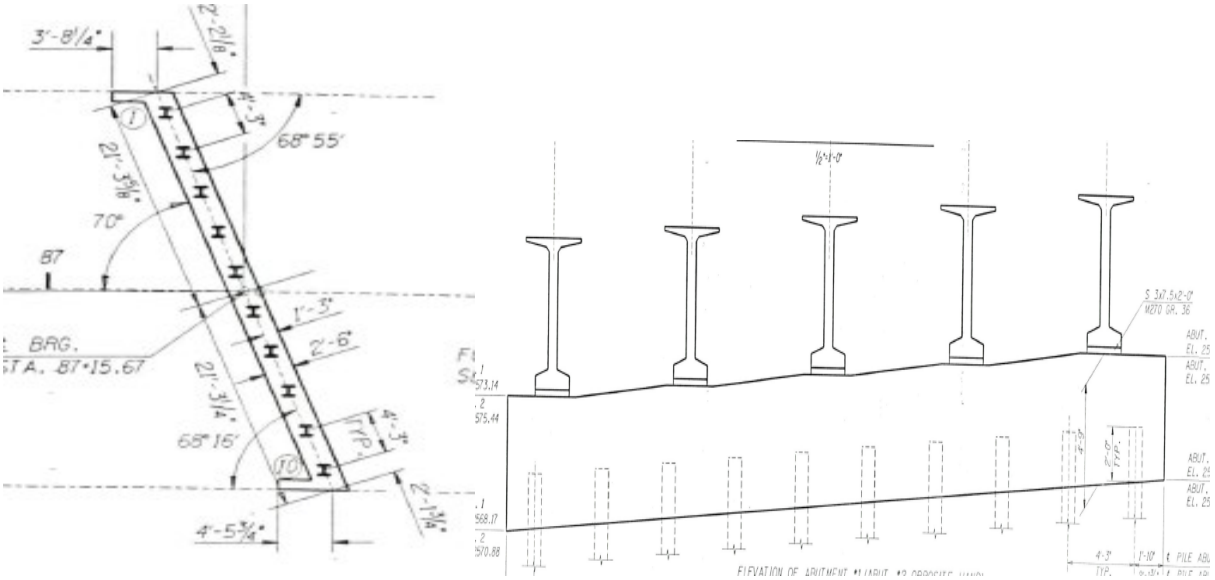
Integral Abutment Schematic

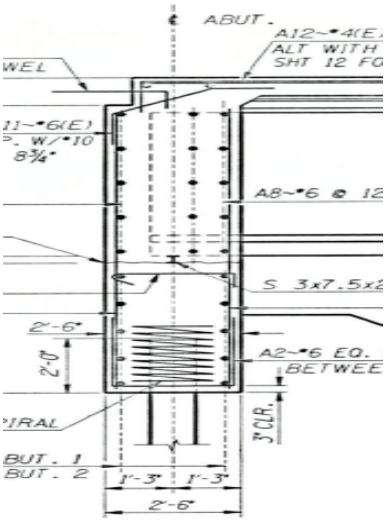
<u>Example 4</u> - Integral Abutment Bridge-

BrKey 18161 US 95 over Keithly Cr mp 106.53









Integral Abutment – The superstructure is integral with and rigidly connected to the substructure and piling foundation.

BrKey 18161 Keithly Cr

CG Item 60
9 to 0 - Condition Rating 6 from Inspection Report

SNBI Item B.SB.01	**SNBI Item B.SB.02**	**SNBI Item B.SB.03**	**SNBI Item B.SB.04**
A01	2	C01-Reinforced Concrete Cast in Place	A04-Abutment - Integral

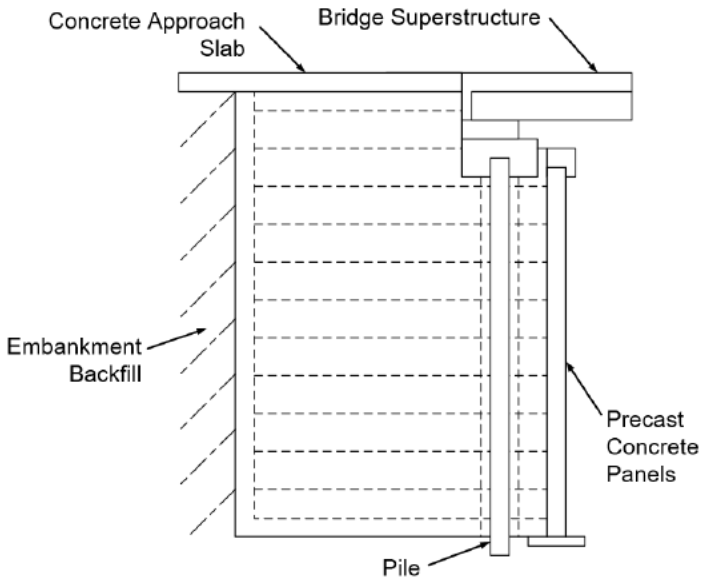
SNBI Item B.SB.05	**SNBI Item B.SB.06**	**SNBI Item B.SB.07**
0-None	P01-Pile – steel H-shape	0-None

SNBI Item B.C.03
9 to 0 -Condition Rating 6

Element	**SNBI Item B.E.01**	**SNBI Item B.E.02**	**SNBI Item B.E.03**	**SNBI Item B.C.01**	**SNBI Item B.C.02**	**SNBI Item B.C.03**	**SNBI Item B.C.04**
RC Abutment	215		85	79	6	0	0

Note: The inspection report does not indicate that any of the steel H piling are exposed, so there is no element for the piling.

Example 4a - Integral Abutment Bridge on MSE Wall

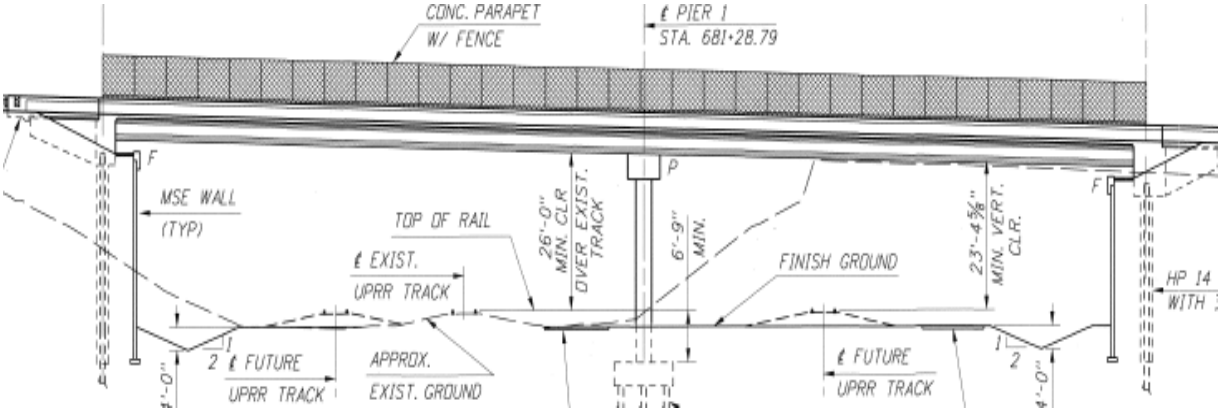


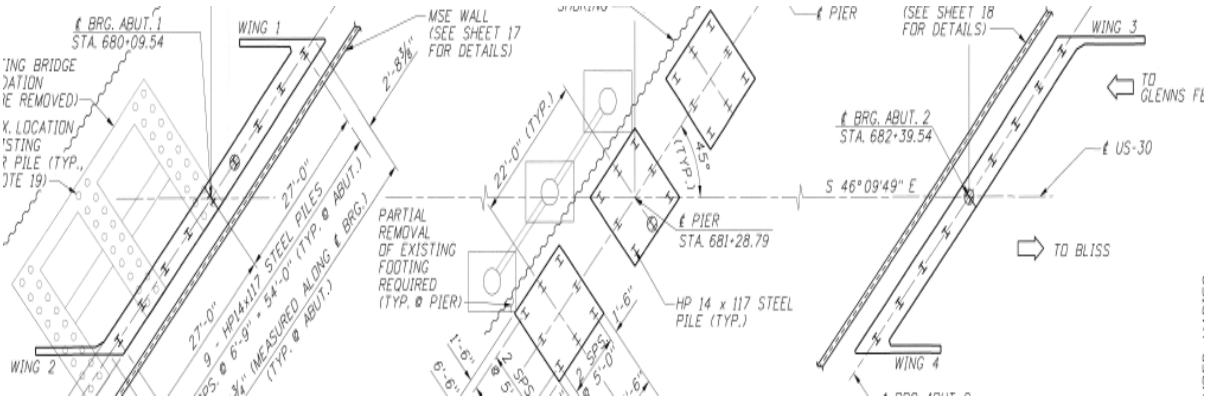
Cross Section - Mechanically Stabilized Earth Abutment

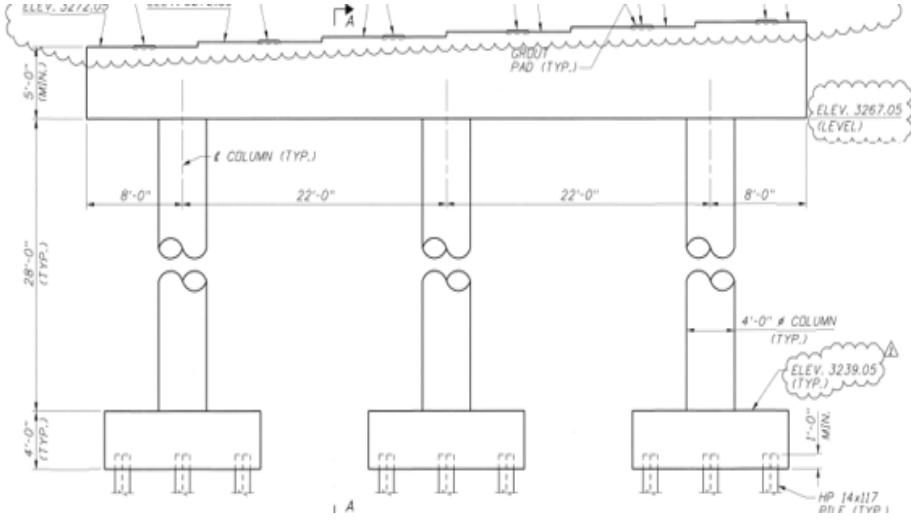
Description - A Mechanically Stabilized Earth (MSE) abutment typically consists of precast concrete panels, soil reinforcing strips (flat strips or welded bar grids typically made of galvanized steel or geosynthetics), and backfill to create a structural unit for supporting the superstructure and approach roadway embankment (see Figure 14.2.18). The reinforced soil mass consists of select granular backfill. The tensile reinforcements and their connections may be proprietary, and may employ metallic (i.e., strip- or grid-type) or polymeric (i.e., sheet-, strip-, or grid-type) reinforcement (see Figure 14.2.19). The soil reinforcing strips hold the wall facing panels in position and provide reinforcement for the soil. Geotextiles may be used to cover the joint between the panels. Geotextiles are placed behind the precast panels to keep the soil from escaping through the joints. These geotextiles still enable excess water to flow out.

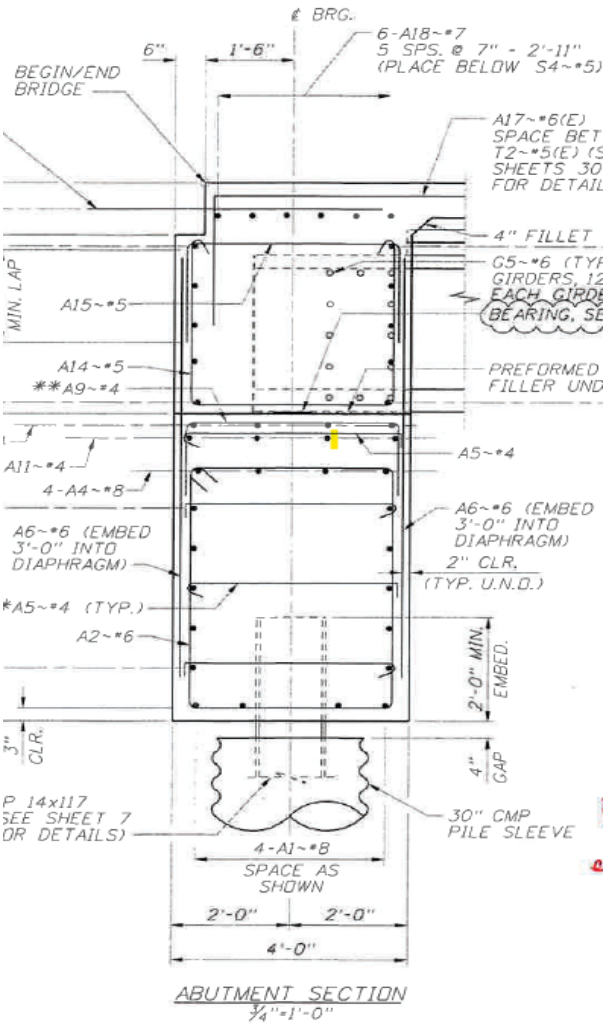
Example 4a - Integral Abutment Bridge- BrKey 13546 US 30 over UPRR Bliss RROP mp 142.82











ABUTMENT SECTION
3/4"=1'-0"

BrKey 13546 US 30 over UPRR Bliss RROP

CG Item 60
9 to 0 - Condition Rating 8 from Inspection Report

SNBI Item B.SB.01	**SNBI Item B.SB.01**	**SNBI Item B.SB.02**	**SNBI Item B.SB.02**	**SNBI Item B.SB.03**	**SNBI Item B.SB.03**	**SNBI Item B.SB.04**	**SNBI Item B.SB.04**
A01	P01	2	1	C01-Reinforced Concrete Cast in Place	C01-Reinforced Concrete Cast in Place	A04-Abutment - Integral	P03 – Pier – multiple column

SNBI Item B.SB.05	**SNBI Item B.SB.06**	**SNBI Item B.SB.06**	**SNBI Item B.SB.07**
0-None	P01-Pile – steel H-shape	P01-Pile – steel H-shape	0-None

SNBI Item B.C.03
9 to 0 -Condition Rating 6

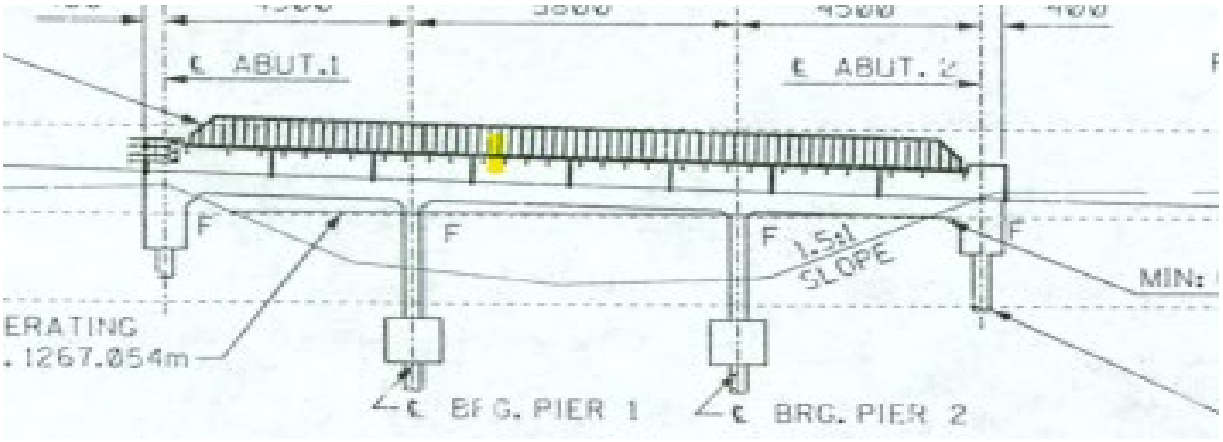
Element	**SNBI Item B.E.01**	**SNBI Item B.E.02**	**SNBI Item B.E.03**	**SNBI Item B.C.01**	**SNBI Item B.C.02**	**SNBI Item B.C.03**	**SNBI Item B.C.04**
RC Abutment	215		119	119	0	0	0
RC Conc Pier Cap	234		60	60	0	0	0
RC Column	205		3	2	1	0	0

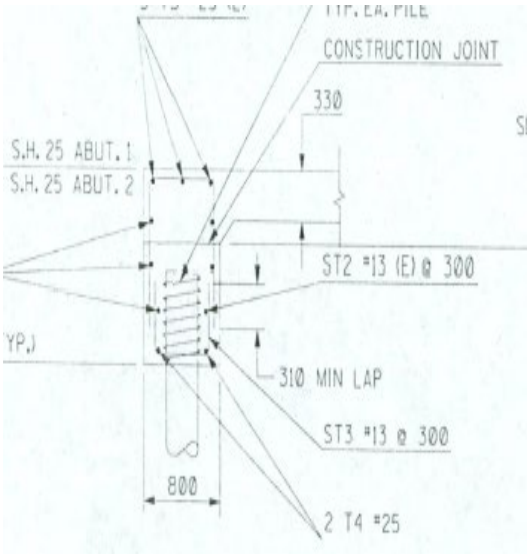
Note: The inspection report does not indicate that any of the steel H piling are exposed, so there is no element for the piling. Also, for clarification, when CMP is used around the piling it is to isolate the piling from the surrounding MSE wall backfill and horizontal reinforcement or straps and minimize any lateral force from the piling to the MSE retaining wall and panels. It is not considered as a Foundation Protective System (B.SB.07).

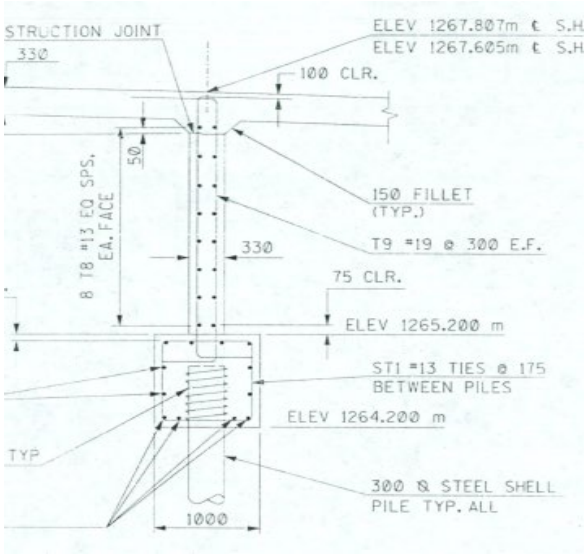
Example 4b - Integral Abutment Bridge-

BrKey 13071 SH 25 over B-4 Canal mp 50.88









BrKey 13071 SH 25 over B-4 Canal mp 50.88

CG Item 60
9 to 0 - Condition Rating 7 from Inspection Report

SNBI Item B.SB.01	**SNBI Item B.SB.01**	**SNBI Item B.SB.02**	**SNBI Item B.SB.02**	**SNBI Item B.SB.03**	**SNBI Item B.SB.03**	**SNBI Item B.SB.04**	**SNBI Item B.SB.04**
A01	P01	2	2	C01-Reinforced Concrete Cast in Place	C01-Reinforced Concrete Cast in Place	A04-Abutment - Integral	P01 – Pier – wall

SNBI Item B.SB.05	**SNBI Item B.SB.06**	**SNBI Item B.SB.06**	**SNBI Item B.SB.07**
0-None	P02-Pile – steel pipe	P02-Pile – steel pipe	0-None

SNBI Item B.C.03
9 to 0 -Condition Rating 7

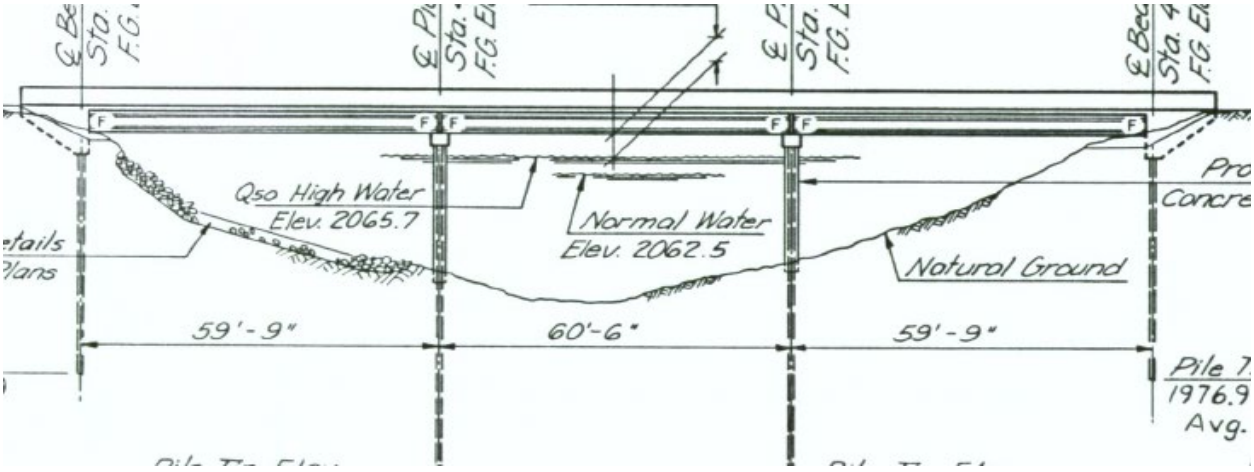
Element	**SNBI Item B.E.01**	**SNBI Item B.E.02**	**SNBI Item B.E.03**	**SNBI Item B.C.01**	**SNBI Item B.C.02**	**SNBI Item B.C.03**	**SNBI Item B.C.04**
RC Abutment	215		154	139	15	0	0
RC Conc Pier Wall	210		154	130	20	4	0

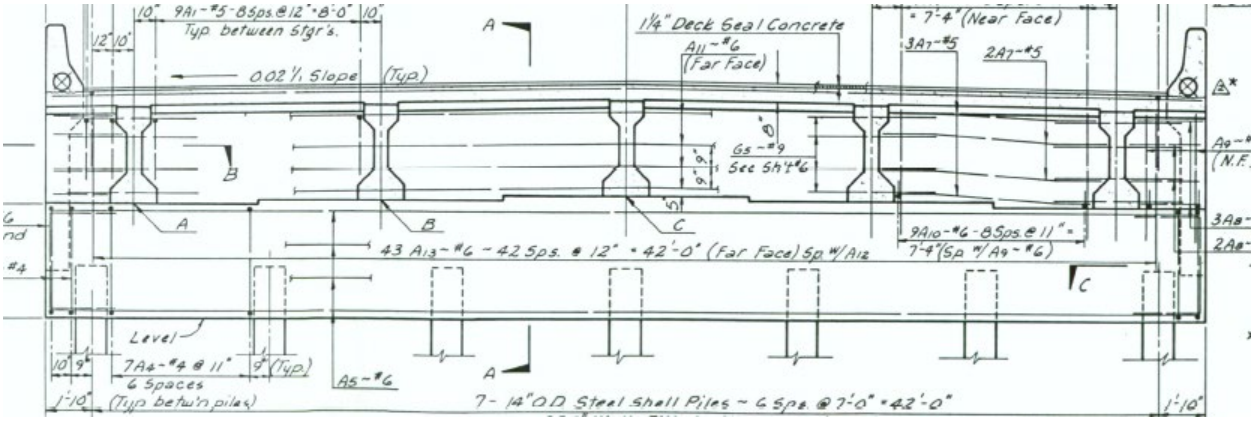
Note: More typically integral abutments have steel H-piling, in this case the integral abutments have steel shell piles integral with the deck slab.

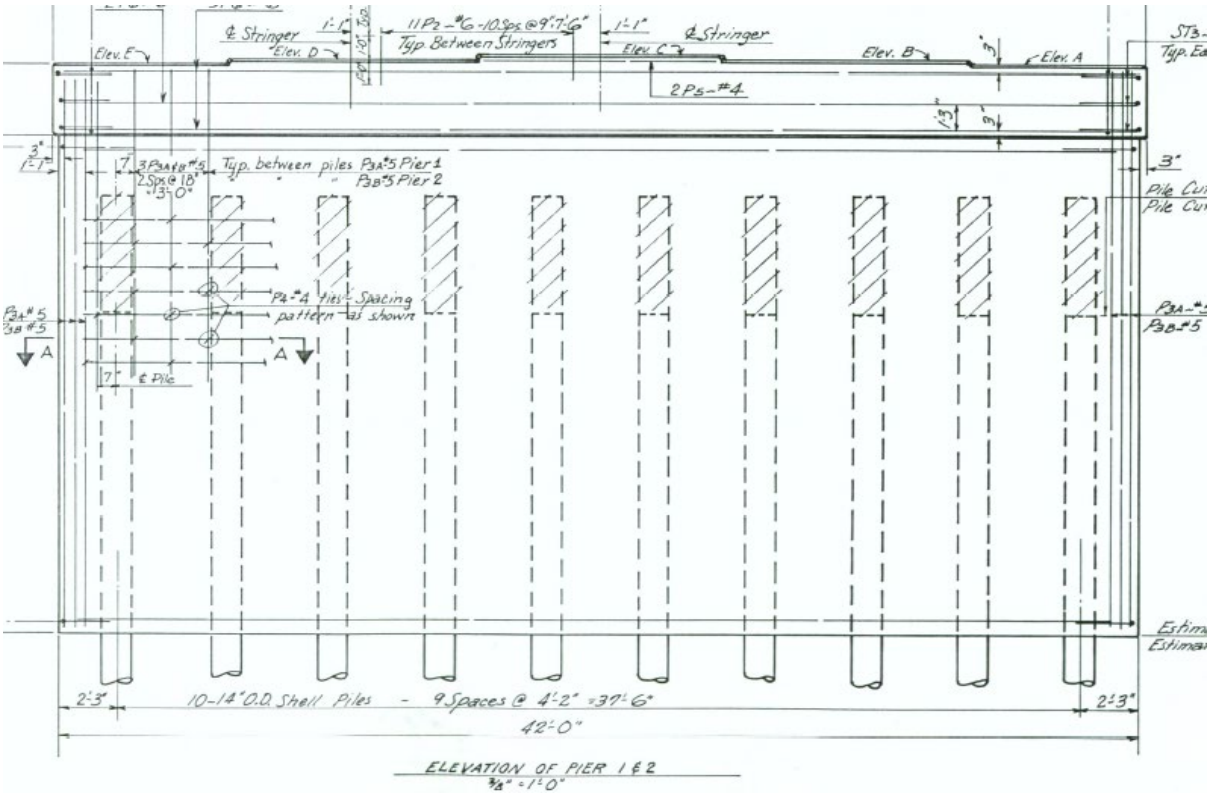
<u>Example 4c</u> - Integral Abutment Bridge-

BrKey 19035 SH 200 over Pack River mp 38.68

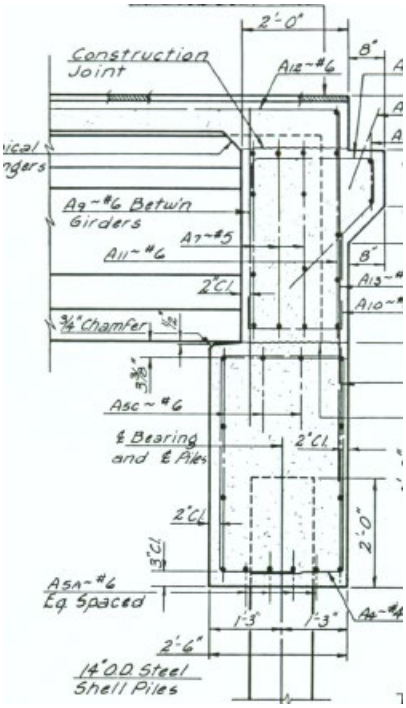




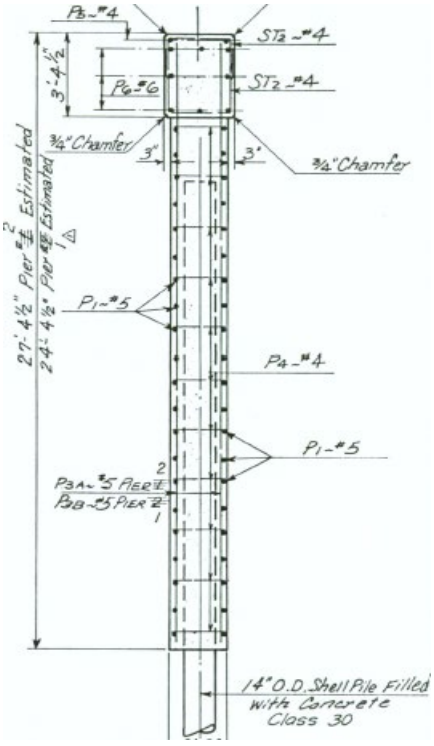




℄ Stringer
Elev. E
Elev. D
11 P2 - #6 - 10 Sps @ 9"-7'-6"
Typ. Between Stringers
℄ Stringer
Elev. C
Elev. B
Elev. A
2 P5 - #4
Typ. between piles P3A #5 Pier 1
P3B #5 Pier 2
P4 - #4 ties - Spacing pattern as shown
℄ Pile
10-14" O.D. Shell Piles - 9 Spaces @ 4'-2" = 37'-6"
42'-0"
ELEVATION OF PIER 1 & 2
3/8" = 1'-0"



2'-0"
Construction Joint
A12 - #6
A9 - #6 Betw'n Girders
A7 - #5
A11 - #6
2" Cl.
3/4" Chamfer
A5C - #6
℄ Bearing and ℄ Piles
2" Cl.
A5A - #6 Eq. Spaced
2'-6"
14" O.D. Steel Shell Piles



P5 - #4
ST2 - #4
P6 - #6
ST2 - #4
3/4" Chamfer
3/4" Chamfer
P1 - #5
P4 - #4
P1 - #5
P3A - #5 Pier 2
P3B - #5 Pier 2
14" O.D. Shell Pile Filled with Concrete Class 30

BrKey 19035 SH 200 over Pack River mp 38.68

CG Item 60
9 to 0 - Condition Rating 5 from Inspection Report

SNBI Item B.SB.01	**SNBI Item B.SB.01**	**SNBI Item B.SB.02**	**SNBI Item B.SB.02**	**SNBI Item B.SB.03**	**SNBI Item B.SB.03**	**SNBI Item B.SB.04**	**SNBI Item B.SB.04**
A01	P01	2	2	C01-Reinforced Concrete Cast in Place	C01-Reinforced Concrete Cast in Place	A04-Abutment - Integral	P01 – Pier – wall

SNBI Item B.SB.05	**SNBI Item B.SB.06**	**SNBI Item B.SB.06**	**SNBI Item B.SB.07**
0-None	P02-Pile – steel pipe	P02-Pile – steel pipe	0-None

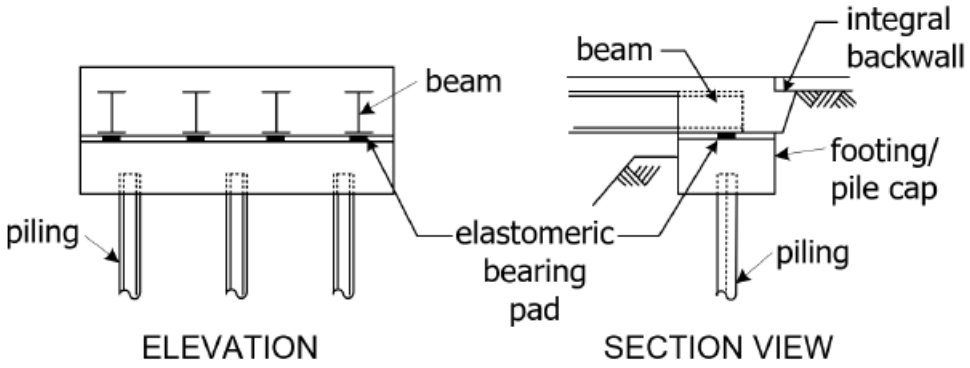
SNBI Item B.C.03
9 to 0 -Condition Rating 5

Element	**SNBI Item B.E.01**	**SNBI Item B.E.02**	**SNBI Item B.E.03**	**SNBI Item B.C.01**	**SNBI Item B.C.02**	**SNBI Item B.C.03**	**SNBI Item B.C.04**
RC Abutment	215		92	92	0	0	0
RC Conc Pier Wall	210		85	0	37	48	0
Steel Pile	225		10	0	0	10	0
RC Pier Cap			85	77	9	0	0

Note: The inspection report does not indicate that any of the steel piles are exposed at the abutment, so there is no element for the abutment piling.

More typically integral abutments have steel H-piling, in this case the integral abutments have steel shell piles integral with the superstructure.

Example 5 – Semi-integral Abutment Bridge



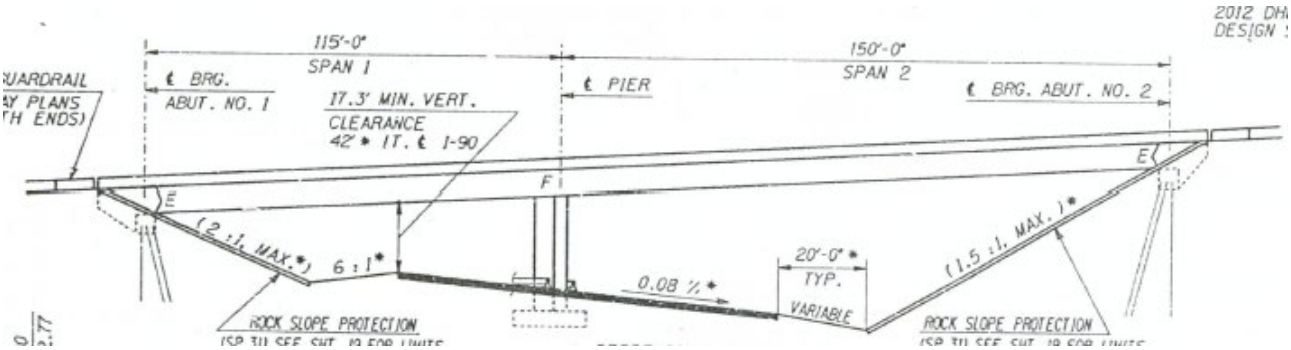
Sketch of Semi-Integral Abutment

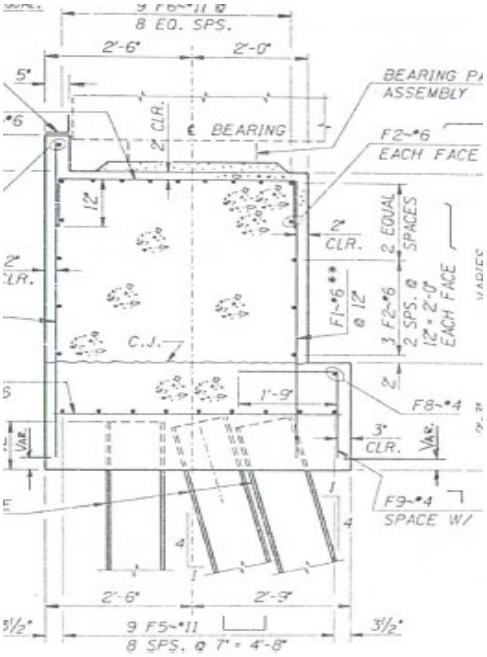
Description - Semi-integral abutments may be similar to integral abutments, however, the superstructure and the top of the abutment act as one unit, but the bottom portion acts independently of the superstructure. This is achieved by a joint between the top and bottom portions of the abutment that provides for unrestrained rotation and thermal movement.

Example 5 – Semi-integral Abutment Bridge

BrKey 16898 Yellowstone Trail over I-90 mp 100.09







Semi-integral abutment – The superstructure is allowed to move back and forth against the fill and sits on bearings on the substructure.

BrKey 16898 Yellowstone Trail over I-90

CG Item 60
9 to 0 - Condition Rating 5 from Inspection Report

SNBI Item B.SB.01	**SNBI Item B.SB.01**	**SNBI Item B.SB.02**	**SNBI Item B.SB.02**	**SNBI Item B.SB.03**	**SNBI Item B.SB.03**	**SNBI Item B.SB.04**	**SNBI Item B.SB.04**
A01	P02	2	1	C01- Reinforced Concrete Cast in Place	C01- Reinforced Concrete Cast in Place	A05- Abutment – semi-integral	P01- Pier – wall

SNBI Item B.SB.05	**SNBI Item B.SB.05**	**SNBI Item B.SB.06**	**SNBI Item B.SB.06**	**SNBI Item B.SB.07**	**SNBI Item B.SB.07**
0-None	0-None	P01- Pile – steel H-shape	F02 – Footing – on rock	0-None	0-None

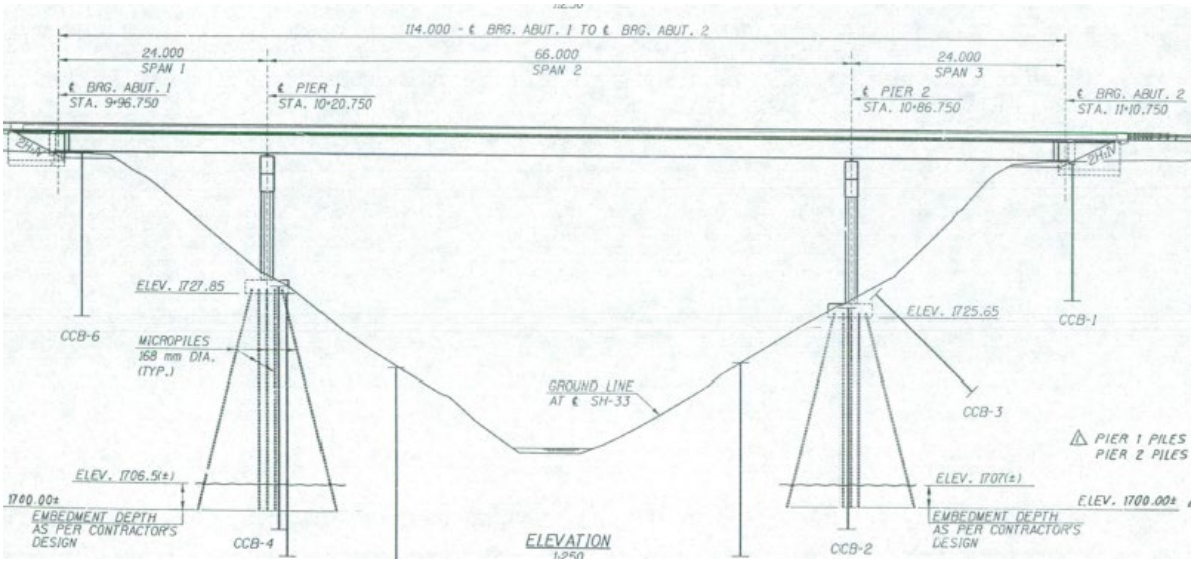
SNBI Item B.C.03
9 to 0 -Condition Rating 5

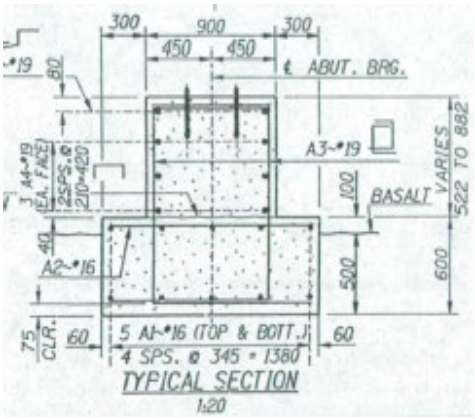
Element	**SNBI Item B.E.01**	**SNBI Item B.E.02**	**SNBI Item B.E.03**	**SNBI Item B.C.01**	**SNBI Item B.C.02**	**SNBI Item B.C.03**	**SNBI Item B.C.04**
RC Pier Wall	210		12	0	0	0	0
RC Abutment	215		85	79	6	0	0

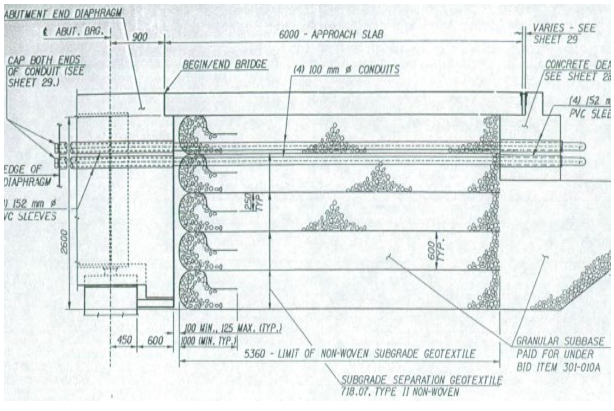
Example 5a – Semi-integral Abutment Bridge

BrKey 13946 SH 33 over Canyon Cr mp 115.51









Semi-integral abutment – The superstructure is allowed to move back and forth against the fill and sits on bearings on the substructure.

BrKey 13946 SH 33 over Canyon Cr

CG Item 60
9 to 0 - Condition Rating 8 from Inspection Report

SNBI Item B.SB.01	**SNBI Item B.SB.01**	**SNBI Item B.SB.02**	**SNBI Item B.SB.02**	**SNBI Item B.SB.03**	**SNBI Item B.SB.03**	**SNBI Item B.SB.04**	**SNBI Item B.SB.04**
A01	P02	2	2	C01-Reinforced Concrete Cast in Place	C01-Reinforced Concrete Cast in Place	A05-Abutment – semi-integral	P01-Pier – wall

SNBI Item B.SB.05	**SNBI Item B.SB.05**	**SNBI Item B.SB.06**	**SNBI Item B.SB.06**	**SNBI Item B.SB.07**	**SNBI Item B.SB.07**
0-None	0-None	F02 – Footing – on rock	P07 – Pile - micropile	0-None	0-None

SNBI Item B.C.03
9 to 0 -Condition Rating 8

Element	**SNBI Item B.E.01**	**SNBI Item B.E.02**	**SNBI Item B.E.03**	**SNBI Item B.C.01**	**SNBI Item B.C.02**	**SNBI Item B.C.03**	**SNBI Item B.C.04**
RC Pier Wall	210		27	27	0	0	0
RC Abutment	215		92	92	0	0	0
RC Pier Cap	234		84	84	0	0	0

Note: The inspection report does not indicate that any of the micro piling are exposed, so there is no element for the piling at the piers.

<u>Example 6</u> – Pile Bent with Lagging- BrKey 29627 S Mtn View Rd over S Fk Palouse R mp 9.7





BrKey 29627 S Mtn View Rd over S Fk Palouse

CG Item 60
9 to 0 - Condition Rating 6 from Inspection Report

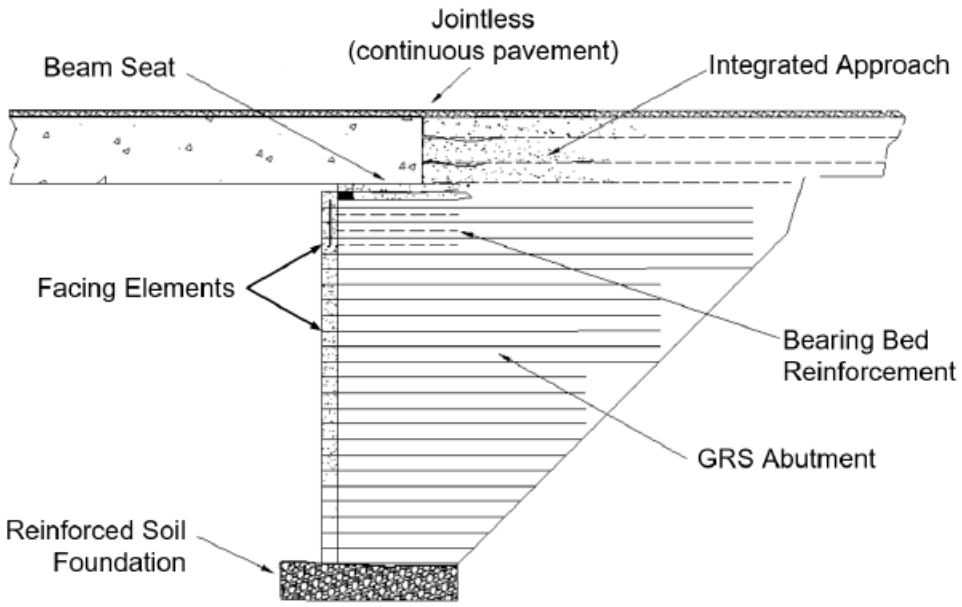
SNBI Item B.SB.01	**SNBI Item B.SB.02**	**SNBI Item B.SB.03**	**SNBI Item B.SB.04**
A01	2	S01- Steel – rolled shapes	A08 - Abutment – pile bent with lagging

SNBI Item B.SB.05	**SNBI Item B.SB.06**	**SNBI Item B.SB.07**
C01 - paint	P01-Pile – steel H-shape	C01 - paint

SNBI Item B.C.03
9 to 0 -Condition Rating 6

Element	**SNBI Item B.E.01**	**SNBI Item B.E.02**	**SNBI Item B.E.03**	**SNBI Item B.C.01**	**SNBI Item B.C.02**	**SNBI Item B.C.03**	**SNBI Item B.C.04**
Steel Abutment	219		49	30	19	0	0
Steel Pile	225		14	8	6	0	0

Example 7 – Earth – reinforced soil mass



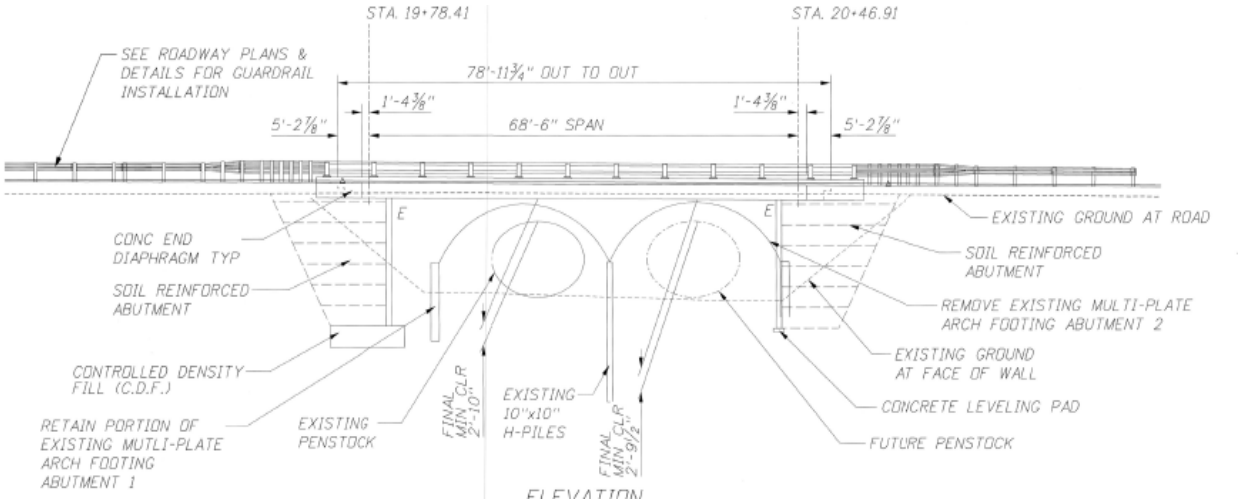
Cross Section - Geosynthetic Reinforced Soil Abutment

Description - GRS abutments are basically constructed on a level surface starting with a base structure of common, but high quality, cinder blocks. Structural backfill is then placed and compacted with a sheet of geosynthetic reinforcement, which can be a series of polymer sheets or grids. These materials are layered until the designed height is attained. GRS abutments, which are internally supported, use friction to hold the blocks in union and obtain their strength through proper spacing of the layers of reinforcement.

Example 7 – Earth – reinforced soil mass –

BrKey 19176 Turner Rd over Pacificorp Penstock Bridge







BrKey 19176 Turner Rd over Pacificorp Penstock Bridge

CG Item 60
9 to 0 - Condition Rating 7 from Inspection Report

SNBI Item B.SB.01	**SNBI Item B.SB.02**	**SNBI Item B.SB.03**	**SNBI Item B.SB.04**
A01	2	E01- Earth – reinforced soil mass	A11 - Abutment – reinforced soil mass

SNBI Item B.SB.05	**SNBI Item B.SB.06**	**SNBI Item B.SB.07**
0 - None	E01-Earth – reinforced soil	0 - None

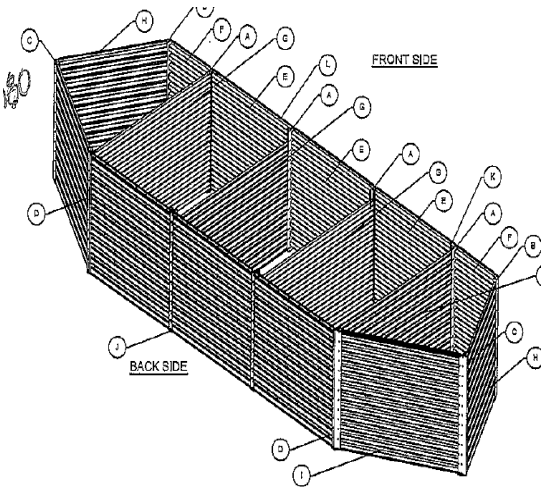
SNBI Item B.C.03
9 to 0 -Condition Rating 7

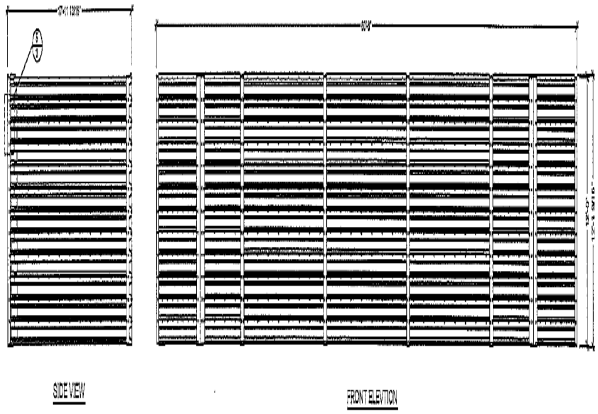
Element	**SNBI Item B.E.01**	**SNBI Item B.E.02**	**SNBI Item B.E.03**	**SNBI Item B.C.01**	**SNBI Item B.C.02**	**SNBI Item B.C.03**	**SNBI Item B.C.04**
Masonry Abutment	217		198	188	10	0	0

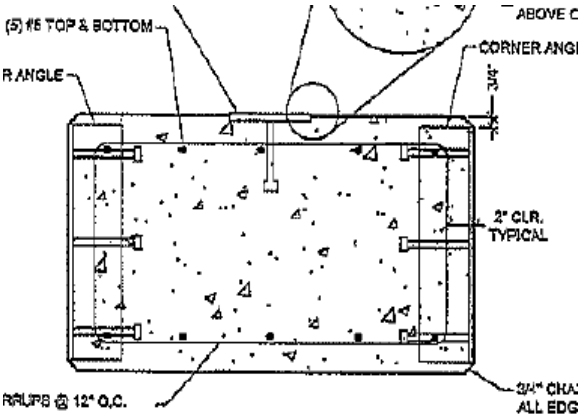
Example 8 BrKey 20236 STC4747; Big Canyon over Bear Cr mp 19.06

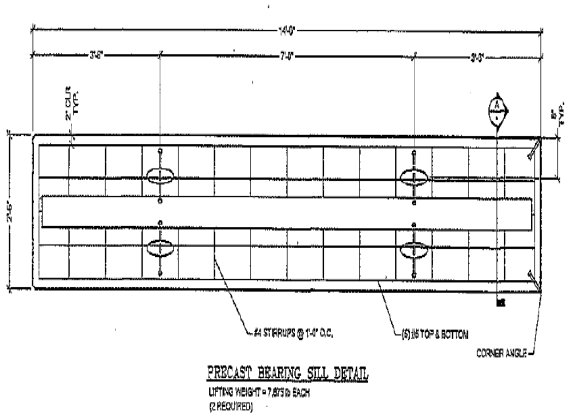












BrKey 20236 STC4747; Big Canyon over Bear Cr mp 19.06

CG Item 60
9 to 0 - Condition Rating 7 from Inspection Report

SNBI Item B.SB.01	**SNBI Item B.SB.02**	**SNBI Item B.SB.03**
A01	2	C02 – Reinforced Concrete - precast

SNBI Item B.SB.04	**SNBI Item B.SB.05**	**SNBI Item B.SB.06**	**SNBI Item B.SB.07**
A12 – Abutment – footing or cap only	0-None	F03 – Footing – on reinforced soil	C04-Coating – hot dip galvanizing

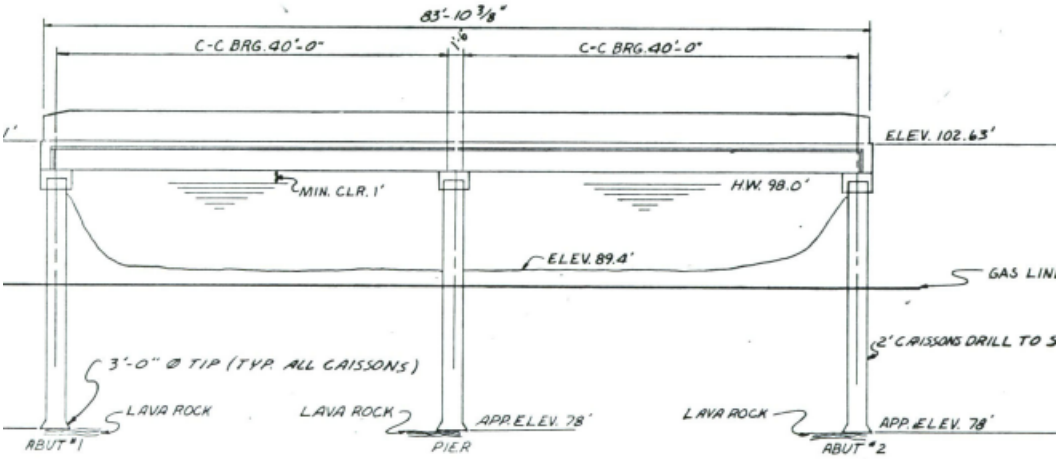
SNBI Item B.C.03
9 to 0 -Condition Rating 7

Element	**SNBI Item B.E.01**	**SNBI Item B.E.02**	**SNBI Item B.E.03**	**SNBI Item B.C.01**	**SNBI Item B.C.02**	**SNBI Item B.C.03**	**SNBI Item B.C.04**
RC Abutment	215		91	79	11	1	0

Note: This bridge has a combination of substructure systems, a ~61' long by 18' wide by 12' deep corrugated metal bin system backfilled with a compacted granular material and a precast concrete sill footing placed on top of the bin system. The bin system is not defined in the elements, but is described as the SNBI foundation component.

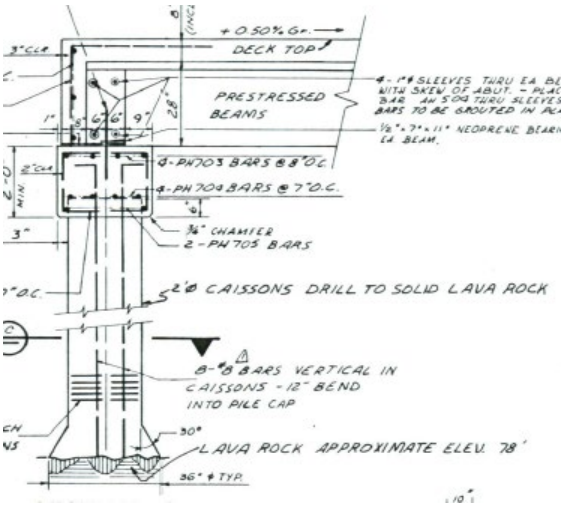
<u>Example 9</u> – Abutment – stub on drilled shafts - BrKey 22285 N 900 W over Aberdeen-Sprinfield Canal mp 0.06

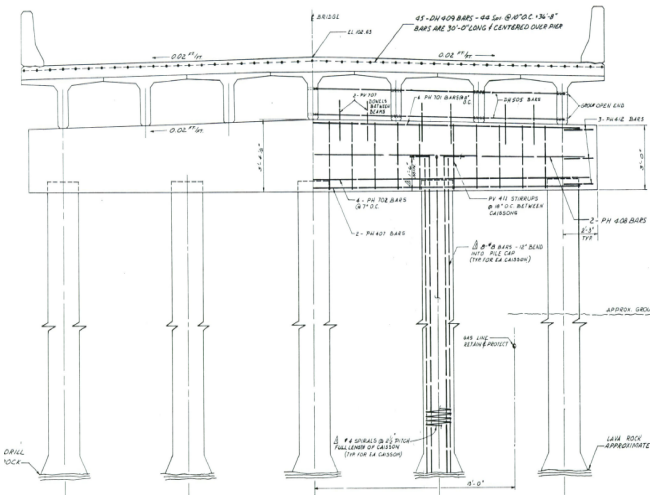












BrKey 22285 N 900 W over Aberdeen-Sprinfield Canal

CG Item 60
9 to 0 - Condition Rating 6 from Inspection Report

SNBI Item B.SB.01	**SNBI Item B.SB.01**	**SNBI Item B.SB.02**	**SNBI Item B.SB.02**	**SNBI Item B.SB.03**	**SNBI Item B.SB.03**
A01	P01	2	1	C01-Reinforced Concrete Cast in Place	C01-Reinforced Concrete Cast in Place

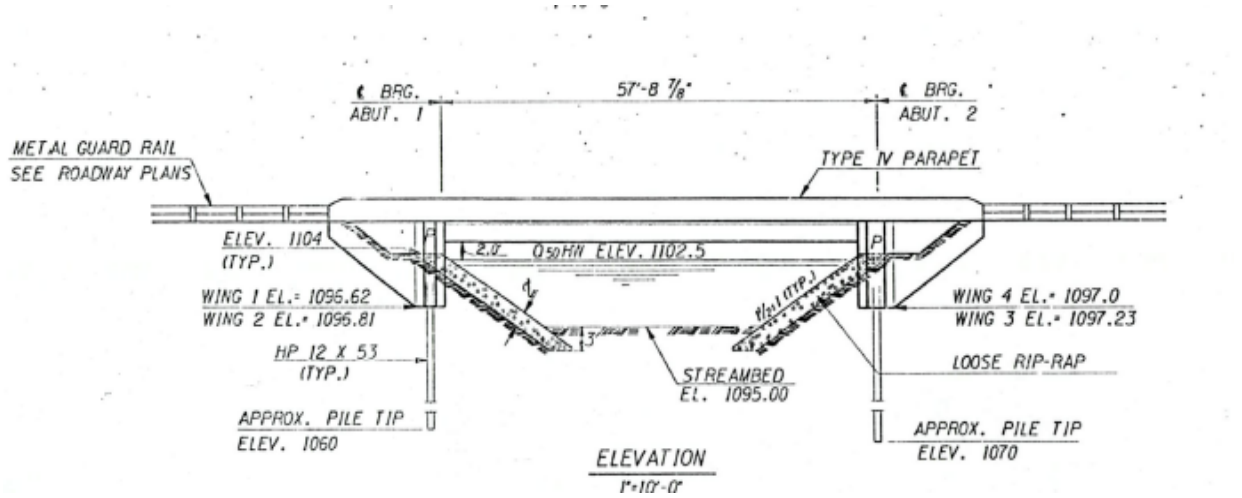
SNBI Item B.SB.04	**SNBI Item B.SB.04**	**SNBI Item B.SB.05**	**SNBI Item B.SB.06**	**SNBI Item B.SB.06**	**SNBI Item B.SB.07**	**SNBI Item B.SB.07**
A02 – Abutment - stub	P03 – Pier – multiple column	0-None	S02 – Drilled shafts – multiple	S02 – Drilled shafts – multiple	0-None	0-None

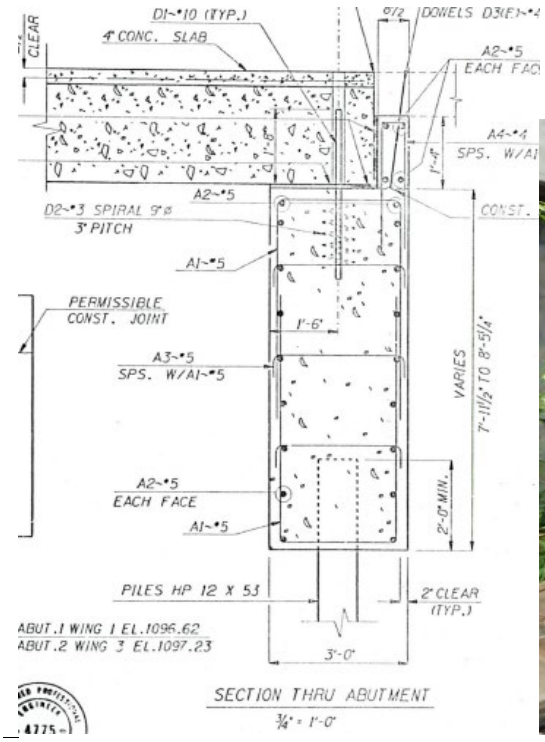
SNBI Item B.C.03
9 to 0 -Condition Rating 6

Element	**SNBI Item B.E.01**	**SNBI Item B.E.02**	**SNBI Item B.E.03**	**SNBI Item B.C.01**	**SNBI Item B.C.02**	**SNBI Item B.C.03**	**SNBI Item B.C.04**
RC Abutment	215		94	20	72	2	0
RC Column	205		11	11	0	0	0
Pier Cap	234		38	38	0	0	0

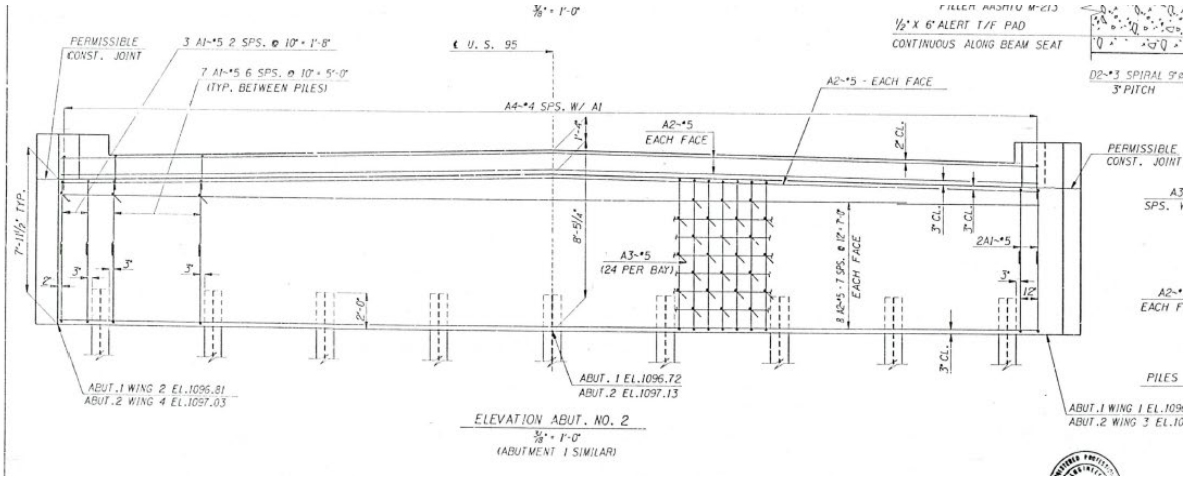
<u>Example 9a</u> – Abutment – stub on H piling - BrKey US 95 over Sweetwater Cr mp 297.26






D1-#10 (TYP.)
4" CONC. SLAB
DOWELS D3(E)-#4
A2-#5
EACH FACE
A4-#4
SPS. W/A1
A2-#5
D2-#3 SPIRAL 9"ø
3" PITCH
CONST.
A1-#5
PERMISSIBLE
CONST. JOINT
1'-6"
A3-#5
SPS. W/A1-#5
VARIES
7'-11½" TO 8'-5¼"
A2-#5
EACH FACE
A1-#5
2'-0" MIN.
PILES HP 12 X 53
2" CLEAR
(TYP.)
ABUT.1 WING 1 EL.1096.62
ABUT.2 WING 3 EL.1097.23
3'-0"
SECTION THRU ABUTMENT
¾" = 1'-0"




¾" = 1'-0"
PERMISSIBLE
CONST. JOINT
3 A1-#5 2 SPS. @ 10" = 1'-8"
7 A1-#5 6 SPS. @ 10" = 5'-0"
(TYP. BETWEEN PILES)
℄ U. S. 95
A4-#4 SPS. W/ A1
A2-#5
EACH FACE
A2-#5 - EACH FACE
½" X 6" ALERT T/F PAD
CONTINUOUS ALONG BEAM SEAT
D2-#3 SPIRAL 9"ø
3" PITCH
PERMISSIBLE
CONST. JOINT
7'-11½" TYP.
8'-5¼"
A3-#5
(24 PER BAY)
2A1-#5
ABUT.1 WING 2 EL.1096.81
ABUT.2 WING 4 EL.1097.03
ABUT. 1 EL.1096.72
ABUT.2 EL.1097.13
PILES
ELEVATION ABUT. NO. 2
¾" = 1'-0"
(ABUTMENT 1 SIMILAR)

Example 9a – Abutment – stub on H piling - BrKey US 95 over Sweetwater Cr mp 297.26

CG Item 60
9 to 0 - Condition Rating 7 from Inspection Report

SNBI Item B.SB.01	SNBI Item B.SB.02	SNBI Item B.SB.03
A01	2	C01-Reinforced Concrete Cast in Place

SNBI Item B.SB.04	SNBI Item B.SB.05	SNBI Item B.SB.06	SNBI Item B.SB.07
A02 – Abutment - stub	0-None	P01 – Piling – steel H-shape	0-None

SNBI Item B.C.03
9 to 0 -Condition Rating 7

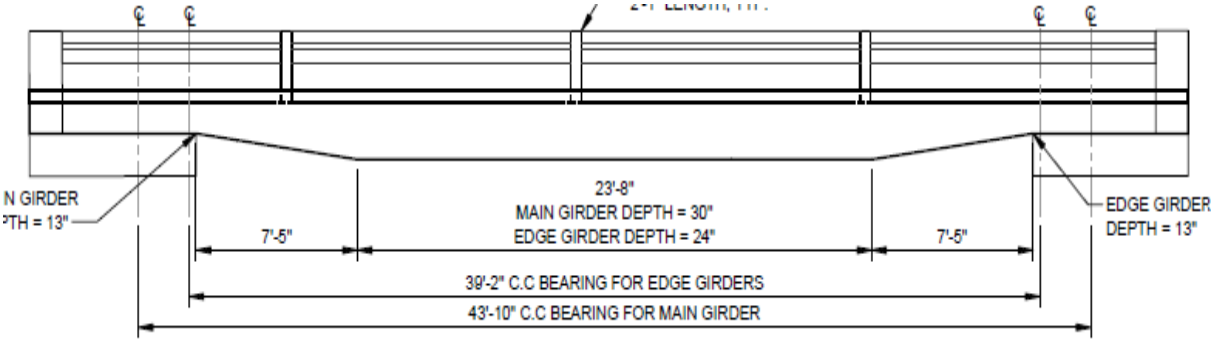
Element	SNBI Item B.E.01	SNBI Item B.E.02	SNBI Item B.E.03	SNBI Item B.C.01	SNBI Item B.C.02	SNBI Item B.C.03	SNBI Item B.C.04
RC Abutment	215	0	111	111	0	0	0

Notes on Pinned stub abutments on H piles-

Typically prestressed voided slabs are used with pinned stub abutments. The height of the stub abutments can vary depending on channel configuration and scour considerations. It is important to differentiate between an integral abutment and a pinned stub abutment. The top of the stub abutment is not cast integral with the superstructure but is considered to be pinned with rotation of the voided slab occurring at the bearing of the voided slab rather than development of a hinge in the H piles. Sometimes both ends of the voided slab are grouted to a dowel in the abutment while in some cases the one end of the voided slab may have free horizontal movement within the dowel void around the dowel.

Example 10 BrKey 28403 SW 3½ Ave over A Line Canal mp 0.19









BrKey 28403 SW 3½ Ave over A Line Canal mp 0.19

CG Item 60
9 to 0 - Condition Rating 6 from Inspection Report

SNBI Item B.SB.01	**SNBI Item B.SB.02**	**SNBI Item B.SB.03**
A01	2	C02 – Reinforced Concrete - precast

SNBI Item B.SB.04	**SNBI Item B.SB.05**	**SNBI Item B.SB.06**	**SNBI Item B.SB.07**
A12 – Abutment – footing or cap only	0-None	F01 – Footing – not on rock	0-None

SNBI Item B.C.03
9 to 0 -Condition Rating 6

Element	**SNBI Item B.E.01**	**SNBI Item B.E.02**	**SNBI Item B.E.03**	**SNBI Item B.C.01**	**SNBI Item B.C.02**	**SNBI Item B.C.03**	**SNBI Item B.C.04**
RC Abutment	215		60	58	2	0	0

Note: This bridge has an abutment footing composed of reinforced concrete blocks in good condition with some minor defects. Blocks are 22” wide x 22” high x 44” long. Blocks are barely visible but appear to be two blocks deep at bearing areas. They may be precast?

Concrete and Steel Culverts and Frames

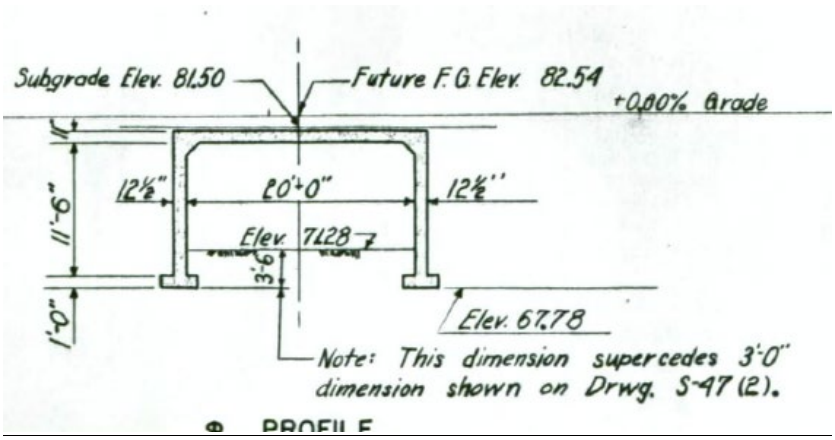
NOTE: The SNBI SUBSECTION 2.1: SPAN MATERIAL AND TYPE differs somewhat from ITD practice regarding concrete frames and culverts. According to the Introduction of Subsection 2.1 it indicates *"Do not report these data items for bridges and culverts under fill: B.SP.08 (Deck Interaction), B.SP.09 (Deck Material and Type), B.SP.11 (Deck Protective System), B.SP.12 (Deck Reinforcing Protective System), and B.SP.13 (Deck Stay-In-Place Forms)."*

In order to properly understand its inventory and condition of its bridges ITD considers it very important to include the top slab of 3 sided frames as a deck element whether it is underfill or not underfill, for the most part.

In general, a concrete or steel frame will not have a bottom. In general concrete or steel culverts will be enclosed on all sides and surrounded by soil.

Examples of SNBI Transitioning for Concrete and Steel Frames and Culverts

Example 11 – Concrete Cast in Place Stiffleg (3 sided frame) <u>not underfill with an asphalt membrane and asphalt overlay or underfill</u>



<u>BrKey 10065 Brady Gulch</u>

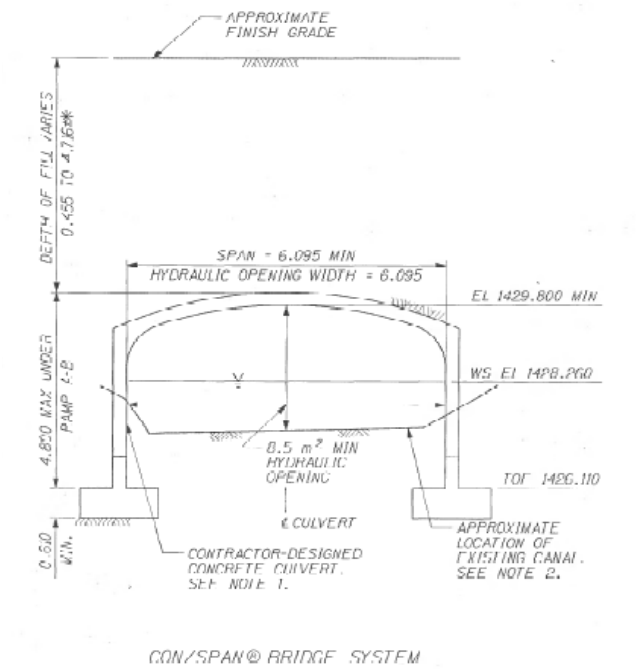
<u>CG Item 43A</u>	<u>CG Item 43B</u>	<u>CG Item 107</u>	<u>CG Item 108A</u>	<u>CG Item 108B</u>	<u>CG Item 108C</u>	<u>CG Item 58</u>	<u>CG Item 59</u>
1-Concrete	07-Frame	1-Concrete Cast in Place	6-Bituminous	0-None	0-None	9 to 0 - Condition Rating	9 to 0 - Condition Rating

SNBI Item B.SP.01	SNBI Item B.SP.02	SNBI Item B.SP.03	SNBI Item B.SP.04
M01	1	1	C01-Reinforced Concrete Cast in Place

SNBI Item B.SP.05	SNBI Item B.SP.06	SNBI Item B.SP.07	SNBI Item B.SP.08	SNBI Item B.SP.09	SNBI Item B.SP.10	SNBI Item B.SP.11	SNBI Item B.SP.12	SNBI Item B.C.01	SNBI Item B.C.02
6-Frame	F01-Frame - three sided	0-None	IM-Integral or Monolithic	C01-Reinforced Concrete Cast in Place	B01-Bituminous	0 - None	0 - None	9 to 0 - Condition Rating	9 to 0 - Condition Rating

SNBI Item B.SB.01	SNBI Item B.SB.02	SNBI Item B.SB.03	SNBI Item B.SB.04	SNBI Item B.SB.05	SNBI Item B.SB.06	SNBI Item B.SB.07	SNBI Item B.C.03
A01	2	C01 – Reinforced Concrete Cast in Place	A01 – cantilever/wall	0-None	F01-Footing not on rock	0 - None	9 to 0 - Condition Rating

Example 12 – Precast Concrete ConSpan B Series (3-sided frame), No deck



CG Item 43A	CG Item 43B	CG Item 107	CG Item 108A	CG Item 108B	CG Item 108C	CG Item 59
1-Concrete	07-Frame	N – Not applicable	N – Not applicable	N – Not applicable	N – Not applicable	9 to 0 - Condition Rating

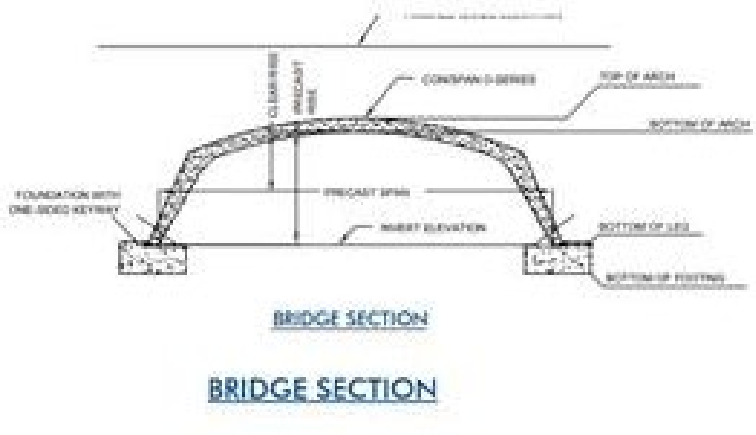
SNBI Item B.SP.01	SNBI Item B.SP.02	SNBI Item B.SP.03
M01	1	1

SNBI Item B.SP.04	SNBI Item B.SP.05	SNBI Item B.SP.06	SNBI Item B.SP.07	SNBI Item B.SP.08	SNBI Item B.SP.09 Deck Mt& Typ	SNBI Item B.SP.10	SNBI Item B.SP.11	SNBI Item B.SP.12	SNBI Item B.C.02
C02-Reinforced Concrete - precast	7-Buried	F01-Frame - three sided	0 - None		0 - None	0 - None	0 - None	0-None	9 to 0 - Condition Rating

SNBI Item B.SB.01	SNBI Item B.SB.02	SNBI Item B.SB.03	SNBI Item B.SB.04	SNBI Item B.SB.05	SNBI Item B.SB.06	SNBI Item B.SB.07	SNBI Item B.C.03
A01 - Abutment	2	C01 – Reinforced Concrete	A01 – cantilever/wall	0-None	F01-	0 - None	9 to 0 - Condition Rating

		Cast in Place			Footing not on rock		

Example 13 – Precast Concrete ConSpan O Series (3-sided frame), No deck



BRIDGE SECTION

BrKey 36050 N 3000 W Road over Badger Cr.

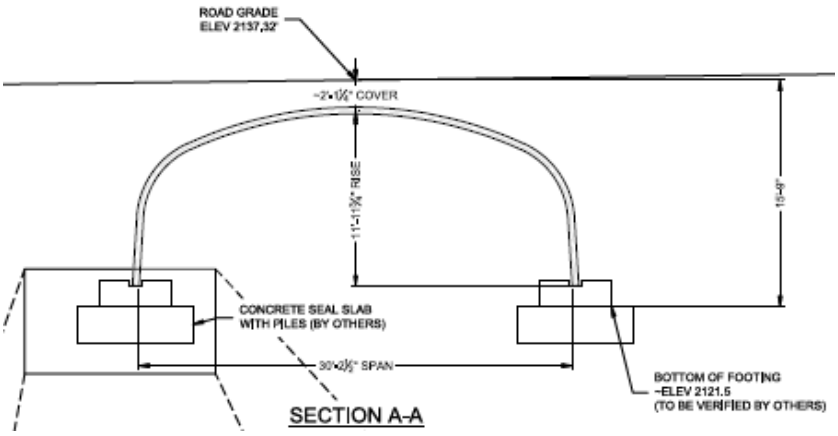
CG Item 43A	CG Item 43B	CG Item 60	CG Item 107	CG Item 108A	CG Item 108B	CG Item 108C	CG Item 59
1-Concrete	19 - Culvert		N – Not applicable	N – Not applicable	N – Not applicable	N – Not applicable	9 to 0 - Condition Rating

SNBI Item B.SP.01	SNBI Item B.SP.02	SNBI Item B.SP.03
M01	1	1

SNBI Item B.SP.04	SNBI Item B.SP.05	SNBI Item B.SP.06	SNBI Item B.SP.07	SNBI Item B.SP.08	SNBI Item B.SP.09	SNBI Item B.SP.10	SNBI Item B.SP.11	SNBI Item B.SP.12	SNBI Item B.C.02
C02- Reinforced Concrete - precast	7- Buried	F01- Frame - three sided	0 - none		0 - None	0 - None	0 - None	0- None	9 to 0 - Condition Rating

SNBI Item B.SB.01	SNBI Item B.SB.02	SNBI Item B.SB.03	SNBI Item B.SB.04	SNBI Item B.SB.05	SNBI Item B.SB.06	SNBI Item B.SB.07	SNBI Item B.C.03
A01 - Abutment	2	C01 – Reinforced Concrete Cast in Place	A01 – cantilever/wall	0-None	F01- Footing not on rock	0 - None	9 to 0 - Condition Rating

Example 14 – Steel BridgeCor Steel Box (3-sided frame), No Deck



BrKey 30051 Slaughter House Gulch

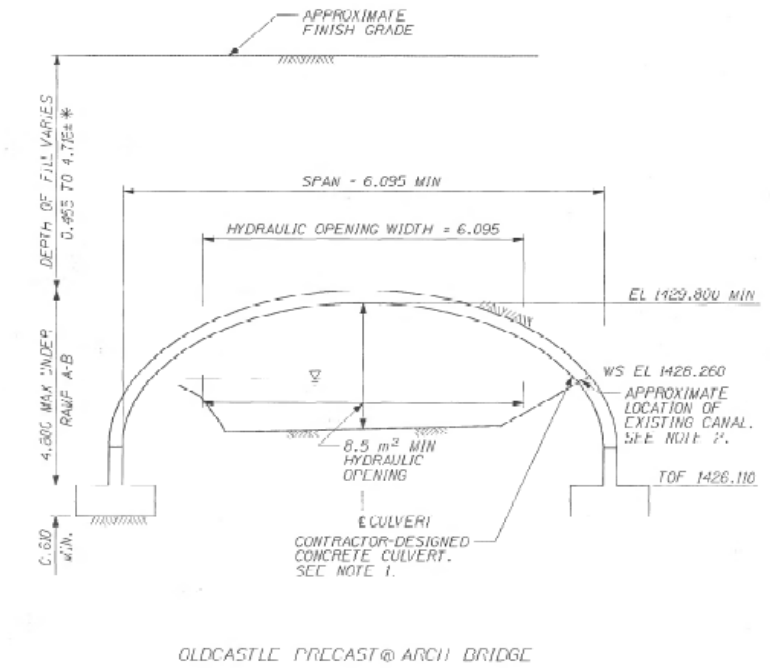
CG Item 43A	CG Item 43B	CG Item 60	CG Item 62	CG Item 107	CG Item 108A	CG Item 108B	CG Item 108C	CG Item 59
3- Steel	19 - Culvert	N- Use for all culverts	9 to 0 - Condition Rating	N – Not applicable	N – Not applicable	N – Not applicable	N – Not applicable	9 to 0 - Condition Rating

SNBI Item B.SP.01	SNBI Item B.SP.02	SNBI Item B.SP.03
M01	1	1

SNBI Item B.SP.04	SNBI Item B.SP.05	SNBI Item B.SP.06	SNBI Item B.SP.07	SNBI Item B.SP.08	SNBI Item B.SP.09	SNBI Item B.SP.10	SNBI Item B.SP.11	SNBI Item B.SP.12	SNBI Item B.C.02
S03 – Steel – bolted shapes	7- Buried	F01- Frame - three sided	C04 – hot dip galvanizing		0 - None	0 - None	0 - None	0- None	9 to 0 - Condition Rating

SNBI Item B.SB.01	SNBI Item B.SB.02	SNBI Item B.SB.03	SNBI Item B.SB.04	SNBI Item B.SB.05	SNBI Item B.SB.06	SNBI Item B.SB.07	SNBI Item B.C.03
A01 - Abutment	2	C01 – Reinforced Concrete Cast in Place	A12 – footing or cap only	0-None	P01- Steel H-shape	0 - None	9 to 0 - Condition Rating

Example 15 – Precast Concrete Arch Bridge, No Deck



OLDCASTLE PRECAST® ARCH BRIDGE

CG Item 43A	CG Item 43B	CG Item 60	CG Item 62	CG Item 107	CG Item 108A	CG Item 108B	CG Item 108C	CG Item 59
1-Concrete	19 - Culvert	N- Use for all culverts	9 to 0 - Condition Rating	N – Not applicable	N – Not applicable	N – Not applicable	N – Not applicable	9 to 0 - Condition Rating

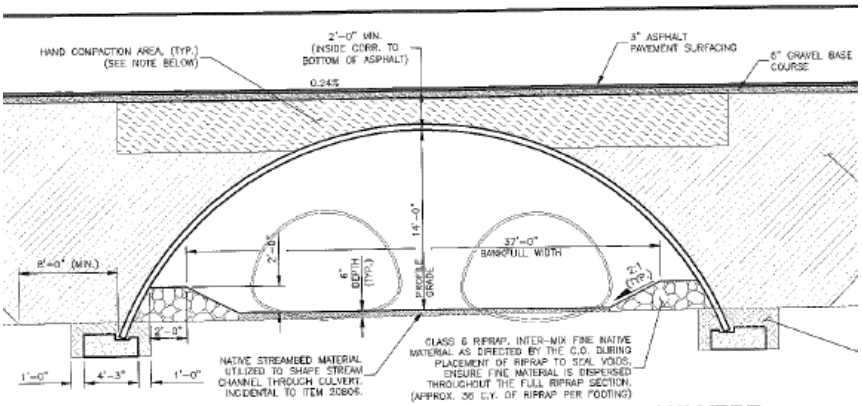
SNBI Item B.SP.01	SNBI Item B.SP.02	SNBI Item B.SP.03
M01	1	1

SNBI Item B.SP.04	SNBI Item B.SP.05	SNBI Item B.SP.06	SNBI Item B.SP.07	SNBI Item B.SP.08	SNBI Item B.SP.09	SNBI Item B.SP.10	SNBI Item B.SP.11	SNBI Item B.SP.12	SNBI Item B.C.02
C02- Reinforced Concrete - precast	7 – Buried	A01- Arch – under fill without spandrel	M02- sheet	IM- Integral or Monolithic	0 - None	0 - None	0 - None	0- None	9 to 0 - Condition Rating

SNBI Item B.SB.01	SNBI Item B.SB.02	SNBI Item B.SB.03	SNBI Item B.SB.04	SNBI Item B.SB.05	SNBI Item B.SB.06	SNBI Item B.SB.07	SNBI Item B.C.03
A01 - Abutment	2	C01 – Reinforced Concrete	A12 – footing or cap only	0-None	F01- Footing not on rock	0 - None	9 to 0 - Condition Rating

		Cast in Place					

Example 16 – Steel Structural Plate Arch Bridge, No Deck



TYPICAL SECTION - STRUCTURAL PLATE ARCH CULVERT

BrKey 29338 American Cr

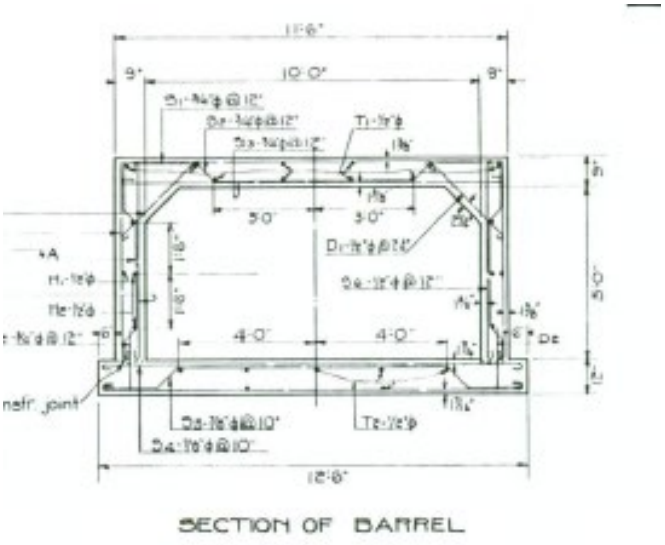
CG Item 43A	CG Item 43B	CG Item 60	CG Item 62	CG Item 107	CG Item 108A	CG Item 108B	CG Item 108C
3-Steel	19-Culvert	N- Use for all culverts	9 to 0 - Condition Rating	N-Not Applicable	N– Not Applicable	N– Not Applicable	N– Not Applicable

SNBI Item B.SP.01	SNBI Item B.SP.02	SNBI Item B.SP.03
M01	1	1

SNBI Item B.SP.04	SNBI Item B.SP.05	SNBI Item B.SP.06	SNBI Item B.SP.07	SNBI Item B.SP.08	SNBI Item B.SP.09	SNBI Item B.SP.10	SNBI Item B.SP.11	SNBI Item B.SP.12	SNBI Item B.C.02
S03 – Steel – bolted shapes	7-Buried	A01-Arch – under fill without spandrel	C04 – hot dip galvanizing		0 - None	0 - None	0 - None	0-None	9 to 0 - Condition Rating

SNBI Item B.SB.01	SNBI Item B.SB.02	SNBI Item B.SB.03	SNBI Item B.SB.04	SNBI Item B.SB.05	SNBI Item B.SB.06	SNBI Item B.SB.07	SNBI Item B.C.03
A01 - Abutment	2	C01 – Reinforced Concrete Cast in Place	A12 – footing or cap only	0-None	F01-Footing not on rock	0 - None	9 to 0 - Condition Rating

Example 17 – Concrete Cast in Place Box Culvert (4 sided frame)



BrKey 10020 US 2 over Carr Cr

CG Item 43A	CG Item 43B	CG Item 60	CG Item 62	CG Item 107	CG Item 108A	CG Item 108B	CG Item 108C
1 - Concrete	19-Culvert	N- Use for all culverts	9 to 0 - Condition Rating	N-Not Applicable	N– Not Applicable	N– Not Applicable	N– Not Applicable

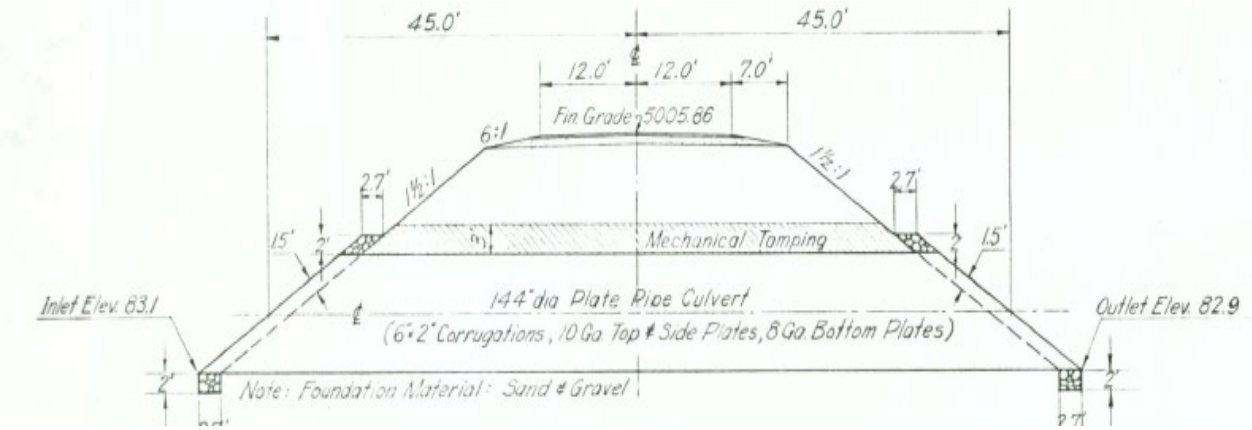
SNBI Item B.SP.01	SNBI Item B.SP.02	SNBI Item B.SP.03
C01	1	1

SNBI Item B.SP.04	SNBI Item B.SP.05	SNBI Item B.SP.06	SNBI Item B.SP.07	SNBI Item B.SP.08	SNBI Item B.SP.09	SNBI Item B.SP.10	SNBI Item B.SP.11	SNBI Item B.SP.12	SNBI Item B.C.04
C01– Reinforced concrete – cast-in-place	7- Buried	F02 - Frame – four sided	0 – None		0 - None	0 - None	0 - None	0- None	9 to 0 - Condition Rating

SNBI Item B.SB.01	SNBI Item B.SB.02	SNBI Item B.SB.03	SNBI Item B.SB.04	SNBI Item B.SB.05	SNBI Item B.SB.06	SNBI Item B.SB.07
A01 - Abutment	2	C01 – Reinforced	A01 – cantilever/wall	0-None	F01-	0 - None

		Concrete Cast in Place			Footing not on rock	

Example 18 – Steel Corrugated Plate Pipe Culvert



BrKey 15066 US 20 over Elk Cr

CG Item 43A	CG Item 43B	CG Item 60	CG Item 62	CG Item 107	CG Item 108A	CG Item 108B	CG Item 108C
3-Steel	19-Culvert	N- Use for all culverts	9 to 0 - Condition Rating	N-Not Applicable	N– Not Applicable	N– Not Applicable	N– Not Applicable

SNBI Item B.SP.01	SNBI Item B.SP.02	SNBI Item B.SP.03
C01	1	0

SNBI Item B.SP.04	SNBI Item B.SP.05	SNBI Item B.SP.06	SNBI Item B.SP.07	SNBI Item B.SP.08	SNBI Item B.SP.09	SNBI Item B.SP.10	SNBI Item B.SP.11	SNBI Item B.SP.12	SNBI Item B.C.04
S03 – Steel – bolted shapes	7-Buried	P02 - Pipe - Flexible	C04 - Hot dip galvanizing		0 - None	0 - None	0 - None	0-None	9 to 0 - Condition Rating

SNBI Item B.SB.01	SNBI Item B.SB.02	SNBI Item B.SB.03	SNBI Item B.SB.04	SNBI Item B.SB.05	SNBI Item B.SB.06	SNBI Item B.SB.07