

Colorado Department of Transportation Staff Bridge Bridge Detail Manual	Chapter: 5 Effective: June 30, 2024 Supersedes: November 19, 2021
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General Information – Summary of Quantities

5.1 Purpose

The purpose of this drawing is to present complete and accurate general information and summary of quantities.

5.2 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.

5.3 General Notes and Design Data

The Designer and Detailer shall prepare this data for each project. Structural Worksheet B-100-1 shall be used as a guide. If design criteria varies over the bridge, areas shall be designated in plans. Only those notes and data which are applicable to the project shall be used. The section cut symbol as described in Chapter 2 should be shown on this drawing.

Notes that are sheet or item specific shall be included on the appropriate sheet, e.g. notes specific to abutments shall be on the abutment sheets.

5.4 Summary of Quantities

A complete summary of quantities with appropriate sub-notes shall be placed on the drawing. The item numbers, descriptions, units, quantities, and totals shall be verified from the summary sheet and shall be given in the order shown in the Colorado Department of Transportation Item Book. These quantities shall be prepared as outlined in the Colorado Department of Transportation Bridge Design Manual Subsection 18.2 Computation of Quantities and Subsection 18.3 Bid Items and Quantities. In the past only 3 digit item codes were used, but for all current projects the full eight digit cost item code shall be used. Each bridge shall have its own total column. When this table becomes too big to fit on a sheet with the notes and index of drawings it may be placed on a sheet by itself.

Spreadsheet versions of this table that are embedded, linked or pasted as a picture into the sheet are acceptable. Arial Font is preferred. In this case, the guidelines below may not be applicable. See Appendix B – Microstation Configuration Details for additional information.

The following guidelines as shown in Fig. 5.4-1 are suggested starting points when constructing the Summary of Quantities table:

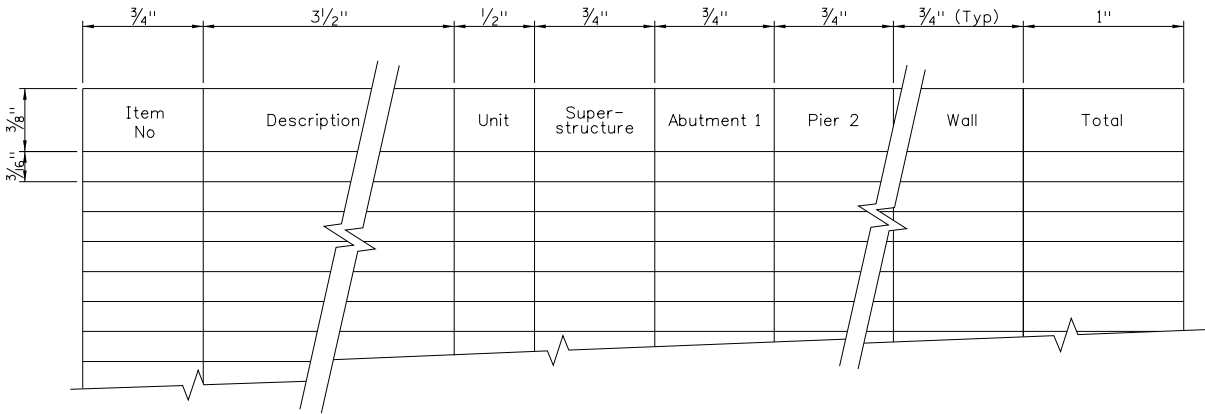


Fig. 5.4-1

The sample column headings pertain to a new bridge project. For repair work, walls, etc. the column headings would be changed to fit the specific job. Substructure elements are to be numbered as follows: Abutment 1, Pier 2, Pier 3, ..., Pier n-1, Abutment n.

Historically, the practice was to have blank lines between each cost item, two blank lines left after the last 403 and 502 cost items, and a minimum of 6 blank lines left at the bottom of the table. These extra lines were left for the Region to use as needed for as-builts. Except for the blanks between each cost item, the other blank lines are generally not necessary.

5.5 Index of Drawings

A complete index of drawings, in sequence, shall appear on the drawing with the appropriate reference drawing number. The title in the index shall be the same as the title given in the title block of each drawing.

Drawings for new bridges or structures should be generally arranged in the following sequence as applicable. This sequence provides the information to approximate the construction sequence. See specific chapters for additional drawing details.

- GENERAL INFORMATION & SUMMARY OF QUANTITIES
- GENERAL LAYOUT
- ENGINEERING GEOLOGY
- BRIDGE HYDRAULIC INFORMATION

CONSTRUCTION LAYOUT
CONSTRUCTION PHASING
FOOTING, PILING AND CAISSON LAYOUT
ABUTMENT DETAILS
WINGWALL DETAILS
PIER DETAILS
BEARING DETAILS
GIRDER LAYOUT (if required)
GIRDER DETAILS (Precast or Steel)
DECK / SUPERSTRUCTURE DETAILS
GIRDER DETAILS (Cast-in-Place)
EXPANSION DEVICE DETAILS (if in the superstructure)
PRECAST PANEL DECK FORMS
DRAIN DETAILS (if in the superstructure)
EXCAVATION AND BACKFILL DETAILS (if different than M-standards)
STRUCTURE BACKFILL DETAILS (as appropriate)
BRIDGE RAIL DETAILS
LIGHTING DETAILS
FENCE DETAILS
APPROACH SLAB DETAILS
EXPANSION DEVICE DETAILS (if in the approach slab)
DRAIN DETAILS (if in the approach slab)
SLOPE PAVING DETAILS
BRIDGE DECK ELEVATIONS

For repair plans, the index should include sheets for General Information, Summary of Quantities, Layouts and details as required.

5.6 Bridge Description

The area reserved for the bridge description contains room for approximately six (6) lines of notes using 0.07 inch text height. Lines one (1) through three (3) shall be used for the bridge description which should include the number of spans, span type, span lengths and bridge type. Following is a list of the more commonly used bridge descriptions as they are to appear on the drawing. Often it shall become necessary to describe special designs not listed below; the special descriptions shall be verified from Appendix "C" of the Colorado Department of Transportation Structure Inventory Coding Guide or the Field Log of Structures books. Span is defined as span perpendicular to centerline of box, for concrete box culverts.

SAMPLE DESCRIPTIONS:

3 Span (40'-0", 60'-0", 40'-0") Bridge, Concrete slab and Girder.

1-Simple Span (65'-0") Bridge, Concrete Slab and Girder Prestressed.

3 Span (43'-0", 129'-0", 43'-0") Bridge, Concrete Slab and Prestressed Concrete I Girder.

3 Span (74'-6", 125'-0", 122'-6") Bridge, Concrete Slab and Prestressed Concrete U Girder.

3 Span (42'-6", 50'-0", 42'-6") Bridge, Concrete Slab and Prestressed Concrete Box Girder, side by side.

2-Span (75'-0", 75'-0") Bridge, CIP Concrete Box Girder, Multiple.

4-Span (40'-0", 70'-0", 70'-0", 40'-0") Bridge, Welded Girder, Composite.

2-Cell (18'-0" X 7'-0" X 200'-0") Concrete Box Culvert.

Lines four (4) through six (6) shall complete the bridge description as follows:

Line (4) Over or Under _____

Line (5) _____ Roadway Curb to Curb. _____ Bent Angle

Line (6) _____ Curbs or Walks. Type _____ Bridge Rail.

Line 4

- Show proper notation in regard to structure being "over" or "under" a crossing.
- If the bridge is on the project line and goes over a crossroad, then the word "over" is correct.
- If the project line goes under a bridge or a crossroad, the word "under" shall be used.

Examples:

- 1) If the project line is on I 25 going under 86th Avenue, the correct notation would be "under 86th Avenue".
- 2) If the project line is on 86th Avenue going over I 25, the correct notation would be "over I 25".

Line 5

- Give “Roadway curb-to-curb” dimension in feet and inches 40’-6”.
- Give “Bent Angle” as detailed on the plans.

Line 6

- Give “Curb” or “Walk” dimensions in feet and inches 1’-3”, 5’-0”.

5.7 Work Description (for Repair Projects)

The work description shall describe what work is being done, e.g. type of rail replacement; joint replacement; etc.

5.8 Title Block

This drawing is titled “GENERAL INFORMATION & SUMMARY OF QUANTITIES” and shall be so indicated in the title block.

GENERAL NOTES

- Except as shown on the plans, structure excavation and backfill shall be in accordance with W-206-2.
- Expansion joint material shall meet AASHTO Specification M213.
- All exposed concrete bridge surfaces shall receive a Class 1, surface finish, to one foot below the ground line.
- The following structural steel shall be AASHTO M270 Grade 36 (ASTM A-36):
diaphragms, expansion devices and miscellaneous steels noted.
- The following structural steel shall be AASHTO M270 Grade 50 (ASTM A-572):
piling and bridge rolling posts and base plates.
- All bolts shall be 7/8" diameter, high strength, unless otherwise noted.
- Leveling pads are ungrouted bearings. They shall be cut or milled from AASHTO M270 Grade 50, as described in tables 705-1 and 705-2, with a diameter (shore "A") hardness of 60.
- Grade 60 reinforcing steel is required.
- Reinforcing steel at superstructure (deck, approach slabs, abutments and wingwalls above bearing seat elevation) shall be galvanized coated.
- Reinforcing steel at substructure (abutments and wingwalls below bearing seat elevation) shall be uncoated.
- All the provisions for bridge deck concrete shall also apply to approach slab concrete.
- The Contractor shall be responsible for the stability of the structure during construction. Precast deck forms are required.
- Mechanically Stabilized Backfill shall be used at abutments.
- For structure number installation, see Standard S-614-12.
- All longitudinal and transverse dimensions are measured horizontally and include no correction for grade.
- The information shown on these plans concerning the type and location of underground utilities is not guaranteed to be accurate. The Contractor is responsible for making his 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 at least 10 days prior to any excavation or other earthwork.
- Existing Bridge Rail Type 10R recently installed to be removed and salvaged and delivered to CDDT R2 Maintenance.



Cross Reference Drawing Number (if blank or dash, reference is to same sheet)

DESIGN DATA

- AASHTO LRFD Bridge Design Specifications, 8th Edition (2017)
- Design Method: Load and Resistance Factor Design
- Live Load: HL-93 (design truck or tandem, and design lane load)
- Dead Load: Assume 36 lbs. per sq. ft. for bridge deck overlay
Assume 5 lbs. per sq. ft. for permanent steel deck forms
- Reinforced Concrete: Class D Concrete: $f_c = 4,500$ psi
- Precast Prestressed Concrete Girders: Class PS concrete: $f_c =$ (see details)
Prestressing Steel: $f_s = 270,000$ psi
- Reinforcing Steel: $f_y = 80,000$ psi
- Structural Steel: Grade 36 $f_y = 36,000$ psi
AASHTO M270 (ASTM A709) Grade 50 $f_y = 50,000$ psi

SEISMIC DESIGN CRITERIA

- Earthquake Design method: Force Based (General Provisions per LRFD 3.10.2.1.)
- Longitude = 105.9742° W
- AASHTO Spectrum for 74 PE in 75 years (1000yr Return Period)
- Period S_a (sec) (0.77 RCA - Site Class D, 0.2 0.160 SS - Site Class D, 1.0 0.042 S1 - Site Class D)
- Spectral Response Accelerations: $A_s = F_g F_a F_C A_s$, $S_b = F_g F_s$, and $S_{D1} = F_w S_1$
 $F_g = 1.600$, $F_a = 1.600$, $F_v = 2.400$
 $S_b = 0.0$, $S_{D1} = 0.123$ As - Site Class D, 0.0 0.042 S1 - Site Class D, 1.0 0.101 S1 - Site Class D
- Operational Class: Seismic Design Category: Zone = 1 or Category = A
- Response Modification Factors: R-Factor: 1.0 (Connections)

INDEX OF DRAWINGS

- GENERAL INFORMATION
- GENERAL LAYOUT
- ENGINEERING GEOLOGY
- BRIDGE HYDRAULIC INFORMATION
- CONSTRUCTION LAYOUT DETAILS
- FOUNDATION LAYOUT AND DETAILS
- ABUTMENT DETAILS (2 OF 2)
- WINGWALL DETAILS
- PRESTRESSED CONCRETE I
- INTERMEDIATE DIAPHRAGM
- DECK DETAILS - SEAN
- PRECAST PANEL DECK FORM (1 OF 2)
- PRECAST PANEL DECK FORM (2 OF 2)
- TRANSITION DETAILS (1 OF 2)
- TRANSITION DETAILS (2 OF 2)
- MECHANICALLY STABILIZED BACKFILL
- BRIDGE DECK ELEVATIONS
- ROADWAY APPROACHES

BRIDGE DESCRIPTION

Single span (80'-0" long US1) bridge, concrete prestressed I girder (CPG) US885 over S-1 road. Right side curb to curb, Bent angle 90°. 44'-0" Roadway curb to curb. Bent angle 90°. 1'-6" curbs. Type 10MASH bridge rail with BRDM-GR3 transition.

SUMMARY OF QUANTITIES

Item No	Description	Unit	Superstructure		H-13-H		Approach Slabs	Total
			Abut 1	Abut 2	Abut 1	Abut 2		
202-00400	Removal of Bridge	EA	1					1
206-00000	Structure Excavation	CY		210	210			420
206-00065	Structure Backfill (Flow-Fill)	CY		6.5	6.5			13
206-00100	Structure Backfill (Class 1)	CY		330	330			660
206-00200	Structure Backfill (Class 2)	CY		80	80			160
403-34721	Hot Mx Asphalt (Grading SX) (75) (PG 58-28)	TON	75			33		108
408-01100	Joint Sealant	LF				176		176
502-00460	Pile Tip	EA		7	7			14
502-00500	Complete Joint Penetration (CJP) Splice	EA		7	7			14
502-02010	Dynamic Pile Test	EA		1	1			2
502-11274	Steel Piling (HP 12x74)	LF		276	295			571
515-00124	Waterproofing (Membrane)(Spray Applied)	SY	453			196		649
601-03040	Concrete Class D (Bridge)	CY	168	24	24	81.9		298
602-00000	Reinforcing Steel	LB		5440	5440			10,880
602-00010	Reinforcing Steel (Galvanized)	LB	38495			11965		50,460
606-01400	Transition Type BR 10M-GR3	EA	4					4
606-11035	Bridge Rail Type 10 MASH	LF	265					265
613-01200	2 Inch Electrical Conduit (Plastic)	LF	600					600
618-01145	Prestressed Concrete I (CBT 45)	LF	364					364

NOTES:

- See Roadway plans for additional quantities related to embankment protection at abutments.
- The 4 pull boxes (24"x36"x24") shown in the general layout shall not be paid separately, but shall be included in the work for pay item 615 - Electrical Conduit.

SUMMARY OF QUANTITIES

Example 5-2

GENERAL NOTES

All work shall be done in accordance with the Colorado Department of Transportation 2017 Standard Specifications for Road and Bridge Construction and as noted in the drawings.

Unless otherwise noted, dimensions contained in these plans are calculated from the 'As Constructed' Plans. These 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 Contractor shall be responsible for the stability of the structure during all phases of construction.

The Contractor may stockpile repair material at own risk. All unused material shall remain property of the Contractor. CDOT will not repurchase leftover materials or pay any restocking fees.

The Contractor shall protect pedestrians and traveling public from any falling debris during the construction work. Any debris which falls on paths or roadways shall be included in the cost of the work. Debris will not be measured and paid for separately, but shall be included in the cost of the work.

One inch of pavement shall be removed from the structure as indicated in the plans and replaced with two inches of hot mix asphalt to the grade and cross slope on the existing concrete deck.

Vary asphalt thickness or adjust as necessary to eliminate ponding condition at the NE corner of the bridge.

Before removal, the Contractor shall verify the existing HMA thickness on the bridge deck and approach slabs in accordance with the Special Provision Removal of Asphalt Mat (Planing).

The transition between final grade of HMA on the bridge to the final grade on the approaches shall be transitioned at 1" per 25' ft.

Repair quantities are approximate. Final location shall be determined by the Engineer. Payment will be for the actual area repaired and material used as approved by the Engineer. Repair quantities will be measured and paid for at the unit price for the appropriate bid item.

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

LEGEND



INDEX OF DRAWINGS

- B01. GENERAL INFORMATION SUMMARY OF QUANTITIES
- B02. PLAN & GIRDER REPAIR DETAILS
- B03. ABUTMENT, PIER & CURB REPAIR DETAILS
- B04. BRIDGE EXPANSION JOINT (ASPHALTIC PLUG)

DESIGN DATA

AASHTO LRFD Design Specifications, Eighth Edition.
Concrete Patching Material: See Special Provision
Reinforcing Steel: See Special Provision
Fy = 60,000 psi

SUMMARY OF QUANTITIES

Item No	Description	Unit	Quantity	As-Built
202-00240	Removal of Asphalt Mat (Planing)	SY	1,150	
202-00506	Removal of Portions of Present Structure	SF	45	
403-34671	Hot Mix Asphalt (Grading SX) (100) (FG 76-28)	TON	125	
518-01001	Bridge Expansion Joint (Asphaltic Plug)	LF	147	
519-01000	Epoxy Resin (Injection)	LF	120	
601-06102	Concrete (Patching)	CF	15	
602-00000	Reinforcing Steel	LB	40	

▲ For information only. See Roadway Plans.

CONCRETE REMOVAL AND PATCHING NOTES

The Contractor shall encut around the removal area to a depth of 1 inch prior to removal operations as directed by the Engineer. All saw residue material shall be properly contained and not allowed to run off.

Cure shall be taken in removing concrete from reinforcing steel to prevent damage. Any concrete removed that is determined to be unusable by Contractor actions, as determined by the Engineer, shall be replaced at the Contractor's expense.

Clean and prepare existing concrete surfaces and reinforcing for placement of new concrete, in accordance with Sections 202 and 601 of the Specifications prior to placement of new concrete.

After removal of concrete, all exposed rebar shall be cleaned of all loose concrete by chipping and/or sandblasting, and this shall be included in the cost of the work.

Rebuild all concrete surfaces to the original dimensions as directed by the Engineer.

BRIDGE DESCRIPTION

SH 115, 16 spans US 60 at WP 13,957.
2-Span concrete slab and prestressed concrete girder (CPG).
249'-0" Length, BF abut to BF abut.
44'-6" out to out width, 3° skew.
New rail type 10R in 2012.
Built in 1973.

WORK DESCRIPTION

1. Mill 1" asphalt and place 2" new asphalt.
2. Place Bridge Expansion Device (Asphalt Plug) at both abutments and pier.
3. Repair damaged concrete area located at the right corner of Abutment 3.
4. Repair damaged concrete area located at forward right end wall of Pier 2 and at Pier cap.
5. Epoxy inject the cracks in web of girder 2F.

GENERAL INFORMATION & SUMMARY OF QUANTITIES

SUMMARY OF QUANTITIES

ITEM NO	DESCRIPTION	UNIT	SUPERSTRUCTURE	ABUTMENT 1	PIER 2	PIER 3	PIER 4	PIER 5	ABUTMENT 6	APPROACH SLABS	URBAN DESIGN	TOTAL
202-00401	REMOVAL OF BRIDGE (SPECIAL)	EA										1
202-00400	REMOVAL OF BRIDGE	EA										1
206-00000	STRUCTURE EXCAVATION	CY		1,085	82	80	62	50	909			2,278
206-00100	STRUCTURE BACKFILL (CLASS 1)	CY		1,286					1,067			2,353
206-00200	STRUCTURE BACKFILL (CLASS 2)	CY			66	65	50	40				221
206-01781	SHRIMP (AREA 1)	LS	1									1
206-01782	SHRIMP (AREA 2)	LS	1									1
206-00350	MECHANICAL REINFORCEMENT OF SOIL	CY		1,214					1,026			2,240
403-34751	HOT MIX ASPHALT (GRABING SX) (PS 64-28)	TON	541							56		597
503-00030	DRILLED CALSSON (30 INCH)	LF		185					145			330
503-00048	DRILLED CALSSON (48 INCH)	LF			132	132	168	132				564
504-04420	PRECAST PANEL FACING	SF		428								428
512-00101	BEARING DEVICE (TYPE 1)	EA		14					14			28
514-00201	PEDESTRIAN RAILING (STEEL/SPECIAL)	LF									727	727
515-00120	WATERPROOFING MEMBRANE	SY	3,339							346		3,685
518-01004	BRIDGE EXPANSION DEVICE (0 - 4 INCH)	LF		120					120			240
601-03040	CONCRETE CLASS D (BRIDGE)	CY	1,563	152	122	119	117	115	149	287	80	2,704
601-40005	OUT STONE VENEER (ASHLER)	SF									1,777	1,777
601-40400	STRUCTURAL CONCRETE STAIN	SY	981	116	259	252	256	256	183		1,215	3,518
602-00020	REINFORCING STEEL (EPOXY COATED)	LB	357,133	19,419	30,047	30,047	30,047	30,047	19,419	40,776	8,183	565,118
604-25000	VANE GRATE INLET (SPECIAL)	EA								2		2
606-11032	BRIDGE RAIL TYPE (DM/SPECIAL)	LF	769									769
613-00075	3/4 INCH ELECTRICAL CONDUIT	LF						120				120
613-01200	2 INCH ELECTRICAL CONDUIT (PLASTIC)	LF									1,378	1,378
613-01300	3 INCH ELECTRICAL CONDUIT (PLASTIC)	LF									355	355
613-01400	4 INCH ELECTRICAL CONDUIT (PLASTIC)	LF									441	441
613-13000	LUMINAIRE (LED)	EA						6				6
613-15200	RECESSED LIGHT (SPECIAL)	EA							44			44
618-01982	PRESSED CONCRETE BOX (DEPTH LESS THAN 32 INCHES)	SF	44,840									44,840
621-00411	STRUCTURE TEMPORARY ACCESS ROAD (LOCATION 1)	LS										1
621-00412	STRUCTURE TEMPORARY ACCESS ROAD (LOCATION 2)	LS										1

NOTES:

- Riprap, Topsoil and Geotextile quantities are shown in the Drainage Plans.
- For Lighting at Pier 5.
- Includes 7.36 CY for railing terminus columns at abutments and 29.42 CY for columns at piers and 43.28 CY for pilings.
- Includes 345 LB for railing terminus columns at abutments and 3,502 LB for columns at piers and 2,179 LB for pilings.
- Irrigation sleeve (PVC Conduit) in median.
- Irrigation sleeve (PVC Conduit) in right edge of deck.
- Two electrical conduits in left edge of deck, one electrical conduit in median, one electrical conduit in right edge of deck.
- One irrigation sleeve in right edge of deck.
- Removal of Pedestrian bridge.
- Includes 16 for stone columns and 28 for pilings.
- See Structure Selection Report for Structure Details (Location 1 and 2) for conceptual details.
- To facilitate phase I bridge and landslipping wall construction at the east abutment.
- Quantity includes 2X for splices not shown in the plans.

Example 5-5

SUMMARY OF QUANTITIES