



Bridge Practice Guidelines

Arizona Department of Transportation – Bridge Group



Bridge Practice Guidelines

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PURPOSE

The purpose of these guidelines is to document the practices and procedures of the project development process specific to ADOT bridge design projects for ADOT Bridge Group Staff. Consultants should also refer to these guidelines as a reference for requirements on project deliverables for bridge projects for both ADOT and local agency projects administered by ADOT.

The Guidelines are intended to be used for general direction. It will continue to be the responsibility of the user to ensure that these guidelines are applied properly and modified where appropriate with the necessary approvals. The guidelines should be used with judgment to ensure that the unique aspects of each particular design are properly considered.

STRUCTURE IDENTIFICATION

The procedures for structure identification are established by the National Bridge Inspection Standards (NBIS).

NBIS Bridge Definition

A bridge is defined as a structure with supports over a depression or obstruction, having a passageway for traffic, and an opening of 20 feet or more measured along the center of the roadway. This definition includes concrete box culverts, arches, and metal pipe culverts. It includes multiple pipes, only when the clear distance between openings is less than half of the smaller contiguous opening. Please refer to the Specifications for the National Bridge Inventory (SNBI) item B.G.01 Bridge Geometry for examples of bridge lengths.

Structure Name

Names of State bridges are reviewed and approved by the Bridge Inspection Section. The proposed bridge name shall be provided on the structure application form that is available from the Bridge Inspection Section. The structure name/number application form can be obtained by contacting the Bridge Group Inspection Section. Structures are named in accordance with the kind of facility that goes under or over the principal route. Overpasses carrying one-way traffic will also include the direction of traffic as part of the name.

Term	Description
Bridge	The term "bridge" is usually reserved for structures over water courses or canyons.
Overpass	A structure carrying the principal route over a highway, street or railroad.
Underpass	A structure which provides for passage of the principal route under a highway, street, railroad or other feature.
Traffic Interchange (T.I.)	An overpass or underpass is also called a T.I. if on and off ramps are provided to the intersecting roadway.

Viaduct	A structure of some length carrying a roadway over various features such as streets, waterways or railroads.
Tunnel	A structure carrying a roadway through a hill or mountain.
Pedestrian Overpass	A structure carrying a pedestrian walkway over a roadway.
Pedestrian Underpass	A structure which provides for passage of a pedestrian walkway under a roadway.

The name of the bridge shall feature the road or route it is carrying, when spanning another roadway or railroad or waterway/feature it is crossing. Culverts that meet the definition of a bridge under the NBIS, shall feature the name of the type of culvert, i.e. RCB for reinforced box culvert or CMP for Corrugated Metal Pipe as examples.

Examples of common structure names are provided for reference in determining an appropriate structure name:

- Hog Tank Wash RCB
- Desert Wash CMP
- Rio De Flag Arch Culvert
- Jimmie Kerr Blv UPRR OP
- Grant St UP

Structure Number

Each defined 'bridge' has a unique number assigned by the Bridge Inspection Section according to the group of numbers allotted to each maintenance responsibility. Twin or parallel structures are numbered individually if there is an open median.

Structure number identification remains unique and permanent to that structure. The structure number will be retired only for structures totally removed, for one of two twin structures where the median is closed by subsequent construction or for transfer between state and local agency jurisdiction.

The structure numbers allotted to each maintenance responsibility category are as follows:

Structure Number	Maintenance Responsibility Category
0001-2999	ADOT bridges
3000-3999	Federal jurisdiction bridges (not inspected by ADOT normally)
4000-7499	ADOT culverts
7500-19999	Local jurisdiction bridges and culverts
20000-29999	ADOT bridges (continued)
30000-39999	ADOT culverts (continued)

Station (Principal Route)

The station identification of the structure is located along a construction centerline of the principal route on or under the structure as determined from the State Highway System Log.

For *overpass* structures with the principal route on the structure, the beginning bridge station is used which is located at the backwall of abutment 1.

For *underpass* structures with the principal route under the structure, use the station of the point of intersection between the principal route under and the construction centerline on the structure.

For *culvert* structures, use the station of the point of intersection between the principal route and the construction centerline of the culvert.

Route and Milepost

The principal route and milepost identification shall be shown on all plan sheets. The milepost of the route on or under the structure is determined from the Arizona Highway System Milepost Log. The milepost is recorded to the nearest 1/100th of a mile as calculated from the Station (Principal Route).

BRIDGE DESIGN PHASES

General

The design of a major structure consists of three design phases: Initial Design, Preliminary Design and Final Design.

All project deliverables shall follow Project Management Group's Stage Deliverable Checklist, available on ADOT's Project Management Website.

The **Initial Design Phase** consists of examination of bridge concepts including type, length and depth. These studies may be prepared prior to submitting a project in the 5 Year Program or in conjunction with the preparation of a Project Assessment (PA) or a Design Concept Report (DCR).

During the development of all scoping documents involving bridge construction projects, Accelerated Bridge Construction (ABC) methods shall be evaluated. See the ABC Guidelines, flowchart, and matrix on the ADOT Bridge Group website.

The **Preliminary Design Phase** consists of two distinct activities. The first activity is the

Alternatives and Selection Study Phase where different bridge types with varying span lengths, girder spacings and foundation types are investigated along with other structure types and comparative cost estimates. This activity results in a Preliminary Bridge Selection Report which will be distributed for comments and provide the Geotechnical Engineer with the required information to perform a final drilling program and produce a Final Geotechnical Report. The second activity consists of finalizing the Bridge Selection Report based on the Final Bridge Hydraulics Report and Final Geotechnical Report.

The **Final Design Phase** consists of performing the required design calculations, drawing the plan sheets, preparing a final estimate and preparing the Special Provisions for bridge related items.

Initial Design Phase

The Initial Design Phase consists of developing an Initial Bridge Study. The purpose of the Initial Bridge Study is to:

- Provide the structure depth for setting profile grades. Minimum vertical clearance for a bridge should be established based on future roadway configuration. For bridges spanning over railroads, minimum vertical clearance shall be based on the most recent railroad grade separation guidelines.
- Establish the best possible early cost estimate.
- Allow for Bridge Group input in scoping activity.
- Familiarize Bridge Design with upcoming projects.
- Describe and document the design assumptions used in the development stage.
- Document the existing bridge condition, including waterway adequacy if appropriate, for bridge replacement projects.

Up to three studies could be made during this phase; one as a study to determine a project's merits prior to becoming a project to be included in the 5 Year Program, one as for development of the Project Assessment, and one as information for development of a Design Concept Report. The purpose of these studies is to develop as early as possible a feasible type of structure, cost and design restrictions for each site. The completeness of the study will depend on when the study is performed. For example, a study for a Design Concept Report should have more information than a pre-programmed study. Each of the three possible study times should be viewed as part of a continuous effort to define the scope of the project with each new study building on the previous study.

An Initial Bridge Study will be performed for all major bridge projects to be nominated to the 5 Year Program by the Bridge Group or the Districts prior to nomination. For existing bridges, this study will be performed in conjunction with the Bridge Candidate List for the Highway Bridge Replacement and Rehabilitation Program to help determine which candidate bridges should be programmed for replacement. Close coordination with the Bridge Management Section, Drainage Section and the Districts will be required.

An Initial Bridge Study will be performed for all major structures during the Project Assessment Stage. If a study has already been performed, the original study should be updated and enhanced based on whatever additional data has become available. The project manager will initiate the process and establish the schedule for this activity.

When consensus can not be reached at the Project Assessment Stage, the project will require a Design Concept Report. Previous studies should be used as a basis for a new Initial Bridge Study; however, additional alignments will be investigated requiring additional studies of alternates.

On projects involving rehabilitation or replacement of existing bridges, the project manager shall identify the historical significance of the bridge before concept studies are initiated. The historical significance is determined from the Arizona Historic Bridge Inventory, listed on ADOT's Environmental Planning: Cultural Resources webpage. Criteria for being considered a historic bridge involves a variety of characteristics: the bridge may be a particularly unique example of the history of engineering; the crossing itself might be significant; the bridge might be associated with a historical property or area; or historical significance could be derived from the fact the bridge was associated with significant events or circumstances.

For projects where existing bridges are involved, a thorough review of the Bridge Inspection File and coordination with the Bridge Management Section will be required. The major study emphasis will be to verify the condition of the existing bridge, to develop concepts for replacement including the feasibility of widening or rehabilitating versus replacement, and to determine project costs. At this stage, bridge costs will be based on square feet of deck.

These Initial Bridge Studies are concepts based on the best available information and are subject to change. Assumptions used as the basis for these studies should be clearly documented and items that are likely to be subject to change as more information is obtained should be identified.

An Initial Bridge Study will consist of a title sheet, report body, and concept sketch.

The report body should contain the following at minimum:

GENERAL:

This section should contain a general discussion of the project including location of the bridge and purpose of the study.

EXISTING ROADWAY:

This section should contain a discussion of the existing roadway geometrics including identification of any deficiencies.

EXISTING DRAINAGE:

This section should contain a discussion of the hydrology and hydraulics of the site including design Q, high water, capacity, bank protection and scour vulnerability of existing bridge.

EXISTING BRIDGE:

This section should contain a discussion of the bridge geometrics and condition of the existing bridge including: rating of the deck and superstructure, adequacy of existing bridge rail, whether bridge is designed for a future wearing surface, the seismic vulnerability, condition of the bearings, expansion joints and approach slabs and a recommendation on whether the bridge could be widened or rehabilitated.

ALTERNATES:

This section should contain a discussion of the various alternates investigated including: structure type, superstructure depth, girder spacing, column type and spacing, foundation alternates, construction phasing, Accelerated Bridge Construction (ABC) alternatives, traffic handling and costs. (For the Accelerated Bridge Construction (ABC) guidelines, see the ADOT Bridge Group website.)

Preliminary Design Phase

Preliminary design consists of two distinct activities: (1) performing concept studies and producing a Preliminary Bridge Selection Report, (2) development of preliminary plans for the chosen alternate and finalizing the Bridge Selection Report.

Preliminary Bridge Selection Report

The Preliminary Bridge Selection Report consists of performing concept studies as a continuation of the Initial Bridge Study. These studies involve investigating alternate superstructure and foundation types including variations of span length, structure depth and number of girders to determine the best bridge type and arrangement for a particular site. This portion of the

Preliminary Design Phase is an iterative phase where assumptions must be made and later verified or modified during the process. Detailed in-depth design should not be performed in this phase unless it is necessary to confirm the adequacy of the concept.

When performing the concept studies the following shall be considered as a minimum:

- Cost
- Constructability
- Maintenance
- Aesthetics

Sketches should be made of the various alternates.

During this phase, both the vertical and horizontal clearances should be checked to ensure that the adequate clearances are provided. Inadequate vertical clearance will necessitate a change in either profile grade or superstructure depth while inadequate horizontal clearance may necessitate a change in span length.

During this phase, the geotechnical aspects of the site should be considered since the foundation type and associated cost may influence the type of bridge selected. A desktop study consisting of a limited geotechnical review of geological conditions and historical geotechnical data is recommended, provided this information is available.

During this phase, the traffic requirements must be investigated including any detours or phasing requirements. These details should be worked out with Traffic Design.

Bridges over Waterways

For waterway crossings, the Preliminary Design Phase will require coordination with the Drainage Section or the drainage consultant, as applicable. The designer should obtain the Bridge Hydraulics Report and thoroughly review the contents before starting the concept study phase.

Widenings

On projects involving widenings, in addition to the requirements for new bridges, the following items should be investigated during the Preliminary Design Phase:

- **Historical significance**- Comments from the environmental review process concerning the historical significance of the structure, if any, should be added to the discussion of the historical significance contained in the Initial Bridge Study.

- **Superstructure & deck-** The existing structure should be checked for structural adequacy. The main superstructure girders should be checked for adequacy to carry the appropriate design live load. If the bridge does not rate sufficiently high, the girders may need to be strengthened, re-spaced or replaced, or a new bridge may be recommended. The deck slab should also be checked. Decks that are severely overstressed may require replacement. Widening with in-kind superstructure should be the preferred method, however other superstructure types should be investigated, when necessary, for vertical clearance limitations or other constraints. The use of steel superstructures to widen an existing concrete superstructure or vice versa is not allowed.
- **Deck joints-** The condition of the existing deck joints should be investigated. If the existing joints are not working or are inadequate, they may require replacement.
- **Bearings-** The condition of the existing bearings should be investigated. If the existing bearings are not performing adequately, they may require modification or replacement. This can affect cost and traffic phasing.
- **Diaphragms-** The condition of existing diaphragms on steel girder bridges should be investigated. The need for this or any other repair work should be determined at this time.
- **Foundations-** The existing foundations should be checked for adequacy against predicted scour and if inadequate, appropriate means taken to upgrade the foundations against failure.
- **Scour potential-** The existing waterway opening should be checked to ensure that it can properly handle the design frequency event. Assessment of scour vulnerability and condition of bank protection should be included.
- **Approach or anchor slabs-** The need for adding approach slabs and/or anchor slabs, if missing, should be investigated.
- **Railing-** The adequacy of existing bridge rail, that would be left in place, should be investigated.
- **Seismic-** The need for earthquake retrofit measures should be determined.
- **Utilities-** Existing or proposed utility conflicts should be investigated.

When the above items have been investigated, preliminary design can proceed by studying alternatives. Possible alternatives include: widening to one side, widening symmetrically on both

sides or replacing the bridge with a new structure. Approximate costs based on preliminary quantities and unit costs associated with each solution will be required.

Approval

When a decision has been reached concerning the type of bridge selected, the justification for the choice along with comparative cost estimates and sketches should be summarized in the Preliminary Bridge Selection Report. This report should be submitted to the Section Leader and State Bridge Engineer for approval.

When approved, the Preliminary Bridge Selection Report should be presented to the Geotechnical Engineer for their use in conducting a final geotechnical investigation. The geotechnical engineer will require strength and service limit states to begin preparation of the field investigation plan. Conservative values will result in deeper borings and a costlier and longer investigation.

Bridge Selection Report

The finalization of the Bridge Selection Report is the second activity in the preliminary design phase. This activity involves incorporating the contents of the final Bridge Hydraulics Report and final Bridge Geotechnical Report into the Preliminary Bridge Selection Report to produce a final Bridge Selection Report and develop the preliminary plans for the approved alternative. The preliminary plans consist of the General Plan and the General Notes and Quantities Sheets. The preliminary plans are not considered complete until the Bridge Hydraulics Report and Bridge Geotechnical Report are received and incorporated in the plans.

Final Design Phase

The Final Design Phase consists of performing the required structural analysis for the bridge and drawing the required details for the development of the construction drawings, producing the final cost estimate and preparing the Special Provisions. This phase should not start until the preliminary documents have been approved.

Final design consists of two phases: the first phase consists of designing and producing drawings for the Stage III document submittal, the second phase consists of completing the Stage IV final documents.

Stage III (60%)

This activity involves completion of most of the structural analysis; some of the drawings (see the Plan Review checklistS), a preliminary cost estimate with quantities and unit costs; and any required special provisions. The use of historical bid items can provide a beginning basis for unit costs, but must be adjusted to reflect the current market.

This phase will also include reviewing the 60% project plans, submitting comments and attending the office and/or field review. At this stage, plans shall be submitted to the Bridge Management Section (BMS) for Load Rating of proposed design and comments. The load rating requirements may be found in the ADOT Bridge Design Guidelines (BDG) Section 5.1 (for Concrete) and Section 6.1 (for Steel).

Stage IV (95%)

This activity consists of incorporating the Stage III review comments in the design, completing the structural analysis and drawings, producing final quantities and a final cost estimate, and reviewing the Special Provisions. At this stage, Bridge Management Section (BMS) shall confirm that the Load Rating previously performed at 60% is still valid for the 95% design.

When the project design is complete and quantities are calculated, a cost estimate shall be made. Unit costs shall be coordinated with input from the Contract and Specifications Section (C&S). Unit prices should be adjusted for site location, size of project and other pertinent data.

PS & E Submittal - Stage V (100%)

The Plans, Specifications, and Estimate (PS & E) Submittal is the final stage of the design of the project. All documents shall be sealed as identified in Project Management Group's checklist for signed and sealed documents. This submittal shall be made when scheduled and requested by the ADOT Project Manager.

Design Quality Control and Quality Assurance

All of the bridge design phases noted above shall follow a quality control and quality assurance process. In-house design projects performed by ADOT Bridge Group shall follow the ADOT Design Quality Guidelines. Before any submittal is made, the quality assurance manager shall ensure the QC/QA Summary Form along with other applicable forms and checklists have been completed in compliance with the Design Quality Guidelines. The checklists for plan reviews are provided as an appendix in these guidelines, to assist in-house staff and consultants in understanding the minimum requirements to provide in each stage submittal for specific bridge types and components. (See Appendix C: Plan Review checklists)

In addition to the review of bridge documents, the Engineer should review the project plans for consistency between the bridge plans and the civil and traffic plans. Items such as roadway profiles, bearings, and width should be reviewed.

Other items which should be reviewed include the appropriate use of Standard Drawings including such design features as reinforced concrete box culverts (CBC), retaining walls, pipe headwalls and tubular sign supports. Items involving special design should be given oversight

review. Such items might include light poles, sign supports, tubular signs, FMS, retaining walls, CBCs, miscellaneous structural items, sound walls and Barrier Summary Sheets.

Bid Advertisement

The Bid Advertisement Date is the date the project is scheduled to be advertised. Once the advertisement is posted, questions and clarifications may be posed by interested bidders. Addendums to the plans, special provisions, or bid items may be required to address such inquiries and address necessary corrections to the final project documents.

Bid Opening

The Bid Opening is the date when the bids are opened. This activity normally ends the design phase. The construction contract for the project is then awarded at the next scheduled Arizona Transportation Board meeting.

Post Design Services

Post design services include the following activities: attending partnering sessions, making plan changes as a result of errors or changed conditions, approving falsework and shop drawing submittals, supervising structural steel inspections, producing Record Drawings, reviewing the final Record structural drawings for evaluation of design work and study for improvement, and reviewing drilled shaft integrity testing with the geotechnical engineer.

Review of Integrity Testing Results for Drilled Shafts

While final acceptance of a foundation from structural integrity perspective is the responsibility of the structural engineer-of-record (SEOR), providing input to the SEOR from a geotechnical perspective is part of the responsibilities of the geotechnical engineer-of-record (GEOR). Acceptance of foundations should include a joint review and evaluation by the GEOR and SEOR of all collected records, measurements, and inspection records including post-construction measurements.

While a spread footing constructed in a shallow excavation can be readily evaluated through construction records and visual inspection, a drilled shaft requires specialty structural integrity evaluation procedures. The structural integrity of a drilled shaft may be evaluated using non-destructive test (NDT) procedures such as the crosshole sonic logging (CSL), gamma-gamma logging (GGL), and/or thermal integrity profiling (TIP). Each of these methods has limitations. For example, the CSL procedure can only evaluate the condition of concrete between the tubes, the GGL has an effective radius of detection of approximately 3-inches, while TIP results are a function of the subsurface conditions (geomaterials, layers, water table location, etc.) and time of test with respect to the peak curing temperature which may vary over the drilled shaft.

The evaluations by the GEOR and SEOR shall be performed by independent assessments of the test data provided by the tester. The GEOR and SEOR shall provide a collaborative final evaluation that is submitted to the project ADOT Resident Engineer. The GEOR and SEOR may prepare a separate document detailing their findings appended to the original submittal from the tester.

COMPLIANCE REVIEW PROCEDURES

General

All ADOT administered projects including State and Local Public Agency (LPA) projects will go through the compliance review process. An ADOT Bridge Group representative will be assigned to each project to facilitate the review. ADOT in-house design projects will be reviewed by the Bridge Group Standards Engineer. Consultant design projects will be reviewed by the appropriate design section. The scope and intent of the compliance review shall be consistent regardless of project delivery method. Review will be performed of all project documents, including, but not limited to the following: scoping documents, plans, specifications, estimates and reports. The compliance review process does not relieve the designer or Engineer of Record from their responsibilities towards the project.

Review Scope

Compliance reviews shall be performed at the project submittal stages. The review scope includes verification of conformance to bridge design criteria, AASHTO Design Specifications, ADOT Bridge Guidelines, appropriate use of the bridge standard drawings, special provisions, and applicable federal or local agency requirements. The compliance review will not involve the verification of calculations, plan review of sheets in terms of quality control, or verification of structure type and any other major design selections.

Comments made in any previous stages should be addressed. The Bridge Group Representative performing the review should be available to attend any comment resolution meetings and/or provide clarification to comments as needed.

COMPUTING APPROXIMATE QUANTITIES

General Guidelines

The Purpose of this section is to establish guidelines and methods for the computation of approximate quantities for bridges and related structures and to identify the proper Bid Item Numbers. Quantities are used in the preparation of the Engineer's estimates and in establishing bid schedules. Contractors use the quantities as a basis for making contract bids. Sample approximate quantities sheets, Table 1, are provided to show the accuracy required for calculations.

A second set of computations for each structure should be made by a checker independently of the original calculations. This rigorous check is needed to minimize errors and prevent the omission of a major item.

Small sketches of the items being calculated should be shown on the calculation sheets when the item description is not completely self-explanatory. The effort made to keep the calculation sheets easy to follow will be invaluable during back-checking.

This section identifies commonly used Standard Bid Items with Descriptions, Materials, Construction Requirements, Methods of Measurements and Basis of Payments in accordance with ADOT Standard Specifications. If a new Bid Item is required, a Special Provision will have to be written. The Contracts and Specifications Section should be contacted for the proper number to be used.

If the structure drawings do not give enough information to compute the quantities, it is evident they are deficient and should be revised.

Concrete

The total figure of each item entered in the approximate quantities table as superstructure, pier or abutment is to be rounded to the nearest C.Y. The degree of accuracy required in deriving this total is outlined on Table 2, titled "Sample Approximate Quantities for Concrete".

In cases where the designer has used more than one class or strength of concrete, caution should be exercised so that each part of the item figured is grouped in the proper class and strength of concrete. Bid Item Numbers for concrete quantities vary based on the specific concrete strength. Refer to the ADOT Contracts and Specifications website for the latest Pay Item list.

Table 1: Approximate Quantities

APPROXIMATE QUANTITIES

ITEM	STRUCT. EXCAV. C.Y.	STRUCTURE BACK FILL C.Y.	CLASS 'S' CONCRETE		REINF. STEEL LBS.	STRUCT. STEEL LBS.	PEDESTRIAN RAIL L.F.	SLOPE PAVING S.Y.	60" DIA. DRILLED SHAFT L.F.
			f' C= 3000 C.Y.	f' C= 4500 C.Y.					
ABUT. #1	60	10	20		2,105			400	
PIER #1	65	15	64		4,885				110
PIER #2	75	15	64		4,885				
ABUT. #2	65	10	20		2,105			400	115
SUPERSTRUCTURE			21	268	51,520	132,415	238		
TOTALS	265	50	189	268	65,500	132,415	238	800	225
AS-BUILT									

Diagram illustrating rounding instructions for the table data:

- ROUND TO NEAREST 5 C.Y. (points to STRUCT. EXCAV. C.Y.)
- ROUND TO NEAREST C.Y. (points to STRUCTURE BACK FILL C.Y.)
- ROUND TO NEAREST 5 LBS. (points to CLASS 'S' CONCRETE f' C= 3000 C.Y.)
- ROUND TO NEAREST FOOT (points to REINF. STEEL LBS.)
- ROUND TO NEAREST FOOT (points to STRUCT. STEEL LBS.)
- ROUND TO NEAREST 5 S.Y. (points to SLOPE PAVING S.Y.)
- ROUND TO NEAREST FOOT (points to 60" DIA. DRILLED SHAFT L.F.)

Table 2: Sample Approximate Quantities For Concrete

ARIZONA DEPARTMENT OF TRANSPORTATION APPROXIMATE QUANTITIES							
TRACS NO.: _____				SHEET __ OF __			
STRUCTURE NAME _____				DATE: _____			
PROJ. NO.: _____				BY: _____ CHKD BY: _____			
FOR: Superstructure-Class 'S' Concrete							
ITEM DESCRIPTION	UNIT DEPTH* (ft)	UNIT WIDTH* (ft)	UNIT LENGTH* (ft)	NO. OF UNITS (PER ITEM)	NO. OF ITEMS	TOTAL	
						CU. FT**	CU. YD***
Class "S" f'c=3000							
Parapet "A"	1.5	0.92	160	1	2	442	
Curb "B"	0.75	1.25	160	1	2	300	
						742	742 / 27= 27 CY
Class "S" f'c=4500							
Deck "C"	0.542	41.333	160	1	1	3,584	
Girders-Inter. "D"	3.167	1.167	48	7	2	2,484	
Girders-ends "D"	3.167	1.167	25.08	7	2	1,298	
Diaph. @abut. "E"	2.25	1.292	37.17	1	2	216	
Diaph.-Inter. "E"	2.167	0.833	4.83	6	2	105	
						7,687	7,687 / 27 = 285 CY
* Carry to 3 decimal place accuracy.							
** Round to the nearest cubic foot.							
*** Round to the nearest cubic yard (to be compared with the check set).							
IT IS RECOMMENDED THAT SMALL SKETCHES BE DRAWN OF PARTS BEING FIGURED.							

Reinforcing Steel

The total accumulated figure for each listed Item (Abutment, Pier, Superstructure, etc.) used for reinforcing steel in the approximate quantities table is rounded to the nearest 5 pounds.

The following items are omitted from reinforcing steel weights:

- Round smooth bars or bolts.
- Reinforcing in piles or reinforcing extending into abutments or piers from piles or drilled shafts. For reinforcing transitioning from a drilled shaft to a column, refer to the Drilled Shafts Section.
- Reinforcement not shown on the project drawings required for anchorage zone recess blocks, duct ties and grillage assemblies as recommended by the post-tensioning system used.

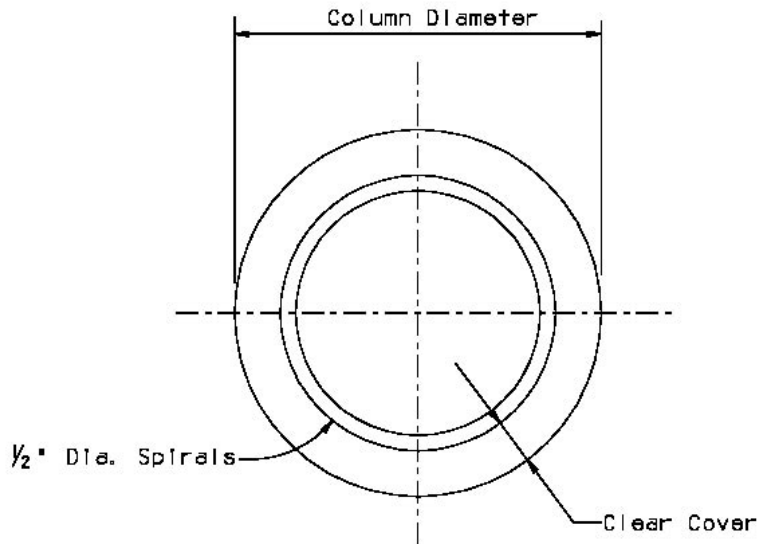
The length of each item of reinforcement not detailed on the drawings is figured to the nearest 3 inches. An amount of 2 feet is added for any lap not detailed. A lap is figured for every 40 running feet of bar. As an example, a bar required to be 90 feet in length would have a length of 4 feet added to it for 2 laps unless detailed for 46 feet or more. For lapped ends of loops, a total of 8 inches is considered adequate for all sizes of bars. Section 5, Table 1, 2 and 3 give the additional length of bar needed for end hooks on stirrups, dowels, etc. according to the size of the bars in consideration. Table 3, below, is given for the weights of standard deformed reinforcing bars.

Table 3: Weights Of Deformed Reinforcing Bars (Lbs)

SIZE	#2	#3	#4	#5	#6	#7
WEIGHT	0.167	0.376	0.668	1.043	1.502	2.044
SIZE	#8	#9	#10	#11	#14	#18
WEIGHT	2.670	3.400	4.303	5.313	7.65	13.60

Table 4, shown below, is given for weight of ½” diameter spiral reinforcing for round concrete columns according to the diameter, cover, and pitch.

Table 4: Weights Of ½” Spirals Per Vertical Foot (Lbs)



Col. Dia. (Ft.)	Clear Cover (inches)	Pitch (inches)								
		3	3 ½	4	4 ½	5	5 ½	6	9	12
7'-0	2	55.6	47.7	41.7	37.1	33.4	30.3	27.8	18.6	14.1
	3	54.2	46.5	40.7	36.1	32.5	29.6	27.1	18.2	13.7
	6	50	42.9	37.5	33.3	30	27.1	25	16.8	12.7
6'-6	2	51.4	44.1	38.6	34.3	30.8	28	25.7	17.3	13
	3	50	42.9	37.5	33.3	30	27.1	25	16.8	12.7
	6	45.8	39.3	34.4	30.5	27.5	25	22.9	15.4	11.6
6'-0	2	47.2	40.5	35.4	31.5	28.3	25.8	23.6	15.9	12
	3	45.8	39.3	34.4	30.5	27.5	25	22.9	15.4	11.6
	6	41.6	35.7	31.2	27.7	25	22.7	20.8	14	10.6
5'-6	2	43	36.9	32.3	28.7	25.8	23.5	21.5	14.5	11
	3	41.6	35.7	31.2	27.7	25	22.7	20.8	14	10.6

	6	37.4	32.1	28.1	24.9	22.5	20.4	18.7	12.6	9.6
	2	38.8	33.3	29.1	25.9	23.3	21.2	19.4	13.1	9.9
5'-0	3	37.4	32.1	28.1	24.9	22.5	20.4	18.7	12.6	9.6
	6	33.2	28.5	24.9	22.2	19.9	18.1	16.6	11.3	8.6
	2	34.6	29.7	26	23.1	20.8	18.9	17.3	11.7	8.9
4'-6	3	33.2	28.5	24.9	22.2	19.9	18.1	16.6	11.3	8.6
	6	29	24.9	21.8	19.4	17.4	15.8	14.5	9.9	7.6
	2	30.4	26.1	22.8	20.3	18.3	16.6	15.2	10.4	7.9
4'-0	3	29	24.9	21.8	19.4	17.4	15.8	14.5	9.9	7.6
	6	24.8	21.3	18.6	16.6	14.9	13.5	12.4	8.6	6.6
	2	26.2	22.5	19.7	17.5	15.7	14.3	13.1	9	6.9
3'-6	3	24.8	21.3	18.6	16.6	14.9	13.5	12.4	8.6	6.6
	6	20.6	17.7	15.5	13.8	12.4	11.3	10.3	7.2	5.6
	2	22	18.9	16.5	14.7	13.2	12	11	7.6	5.9
3'-0	3	20.6	17.7	15.5	13.8	12.4	11.3	10.3	7.2	5.6
	6	16.4	14.1	12.3	11	9.9	9	8.2	5.9	4.6
	2	17.8	15.3	13.4	11.9	10.7	9.7	8.9	6.3	4.9
2'-6	3	16.4	14.1	12.3	11	9.9	9	8.2	5.9	4.6
	6	12.2	10.5	9.2	8.2	7.3	6.7	6.1	4.6	3.7
	2	13.6	11.7	10.2	9.1	8.2	7.4	6.8	5	4
2'-0	3	12.2	10.5	9.2	8.2	7.3	6.7	6.1	4.6	3.7
	6	8	6.9	6	5.4	4.8	4.4	4	3.5	3

Table 5 shows the required accuracy for computation of reinforcing weights. As illustrated in the sample, a short description of the item being figured will be beneficial for comparing quantities between estimator and checker.

Table 5: Sample Approximate Quantities For Reinforcing Steel

ARIZONA DEPARTMENT OF TRANSPORTATION APPROXIMATE QUANTITIES						
TRACS NO. _____				SHEET __ OF __		
STRUCTURE NAME: _____				DATE: _____		
PROJECT NO: _____				BY: ____	CHKD: ____	
<u>Reinforcing Steel for Abutment #1</u>						
ITEM DESCRIPTION	BAR SIZE	WT PER FOOT (LBS)	LENGTH (FT)*	NO. PER ITEM	NO. OF ITEMS	WEIGHT (LBS)
Cap beam long.	#5	1.043	40.75	11	1	468
Back wall long.	#4	0.668	38	8	1	203
Hoops in cap	#4	0.668	13	37	1	321
Back wall verticals	#4	0.668	4	76	1	203
Wing cap long.	#5	1.043	12	6	2	150
Hoop in wing cap	#4	0.668	10.75	7	2	101
Wing long.	#5	1.043	9.5	12	2	238
Wing long.	#4	0.668	9.5	8	2	96
Wing stirrups	#4	0.668	15	11	2	220
Parapet verticals	#4	0.668	4.25	22	2	126
					TOTAL	2,126
*ROUND TO NEAREST 3 INCHES UNLESS DETAILED ON PLANS						Use 2,125 lbs.

Quantities for epoxy coated reinforcing steel shall be separated from regular reinforcing steel quantities. Refer to the ADOT Contracts and Specifications website for the latest Pay Item list.

Structural Steel

The total figure for structural steel as entered in the approximate quantities table under the item “Superstructure” is to be rounded to the nearest 5 pounds. The degree of accuracy required in computing this total is outlined on Table 6, titled “Sample Approximate Quantities for Structural Steel”.

Structural steel weights are not figured for concrete structures; that is, structures that are dependent on reinforced or prestressed concrete slabs, girders or beams for their load carrying capacity. The cost of structural steel for these structures is included in the price bid for the concrete or other items.

Inclusion List for Structural Steel

1. Structural steel for use in bridge structures consists of rolled shapes, plate girders, shear connectors, plates, bars, angles and other items as defined in this inclusion list. Areas and weights of steel sections may be found in the AISC Manual of Steel Construction. As shown in the AISC Manual, the weight of rolled beams is given in pounds per linear foot. In figuring weight for welded plate girders, it is necessary that each plate differing in width, thickness or length be listed separately. **The weight of plates greater than 36 inches in width should be increased by a percentage of the basic weight according to Table 7 below. This is to allow for the ASTM permissible overrun of plates.**
2. BOLTS - All fasteners shall be high-strength bolts, AASHTO M164 (ASTM A325) or AASHTO M253 (ASTM A490). Weights of components, including washers, may be found in the AISC Manual of Steel Construction. Add 3% if galvanized.
3. WELDS - The weight of fillet welds shall be included in the weight of structural steel. In Table 9 below, a weight per linear foot is given for different sizes of fillet welds. For butt welds, plug welds, etc. no addition or deduction is made for weight calculations.
4. The weight of deck drains should be included in the weight of structural steel for the deck.

Exclusion List for Structural Steel

1. Erection bolts.
2. Pedestrian rail and accessories.
3. Bumper (nose) angles for approach slabs.
4. Steel “H” piling or steel encased in concrete piles.
5. Fabricated steel supports or strengthened sections for erection.
6. Deck joint assemblies.
7. Abutment and pier steel bearings

Structural Steel (Miscellaneous)

All other structural steel items including rockers, rollers, bearing plates, pins and nuts, plates, shapes for bridge sign supports, corresponding weld metal, nuts and bolts, and similar steel items not covered in other contract items will be measured for payment as structural steel (miscellaneous).

Quantities should be separated by grade for structural steel. For steel bridges, A36 steel should be listed under Item No. 6040001, while other grades should be listed under Item No. 6040002, with the appropriate grade filled in between the parentheses. Structural steel weights are not figured for concrete structures. Refer to the ADOT Contracts and Specifications website for the latest Pay Item list.

Table 6: Sample Approximate Quantities For Structural Steel

ARIZONA DEPARTMENT OF TRANSPORTATION APPROXIMATE QUANTITIES							
TRACS NO.: _____					SHEET ____ OF ____		
STRUCTURE NAME: _____					DATE: _____		
PROJECT NO. : _____					BY: _____		CHKD: _____
Structural Steel Calculation							
ITEM DESCRIPTION	UNIT SIZE	UNIT WEIGHT (PER FT)	UNIT LENGTH (FT)	NO OF UNITS (PER ITEM)	NO OF ITEMS	TOTAL	
						WEIGHT	REVISION
Main Girders	W36x135	135	247.16	5	1	166,833	
Cover PL@Pier #1	PL 3/8x11	14	13	2	10	3,640	
Cover PL@Pier #1	Ends	9.56	1.5	2	20	574	
Cover PL@Pier #2	PL 5/8x11	23.4	16	2	5	3,744	
Cover PL@Pier #2	Ends	15.9	1.5	2	10	477	
Splices	PL ½x11½	19.6	2.54	2	20	1,992	
Bolts in Splices	7/8"Ø	0.924		94	20	1,737	
Welds for Cover PL	5/16" Fillet	0.166	204	1	5	169	
Shear Connector Studs	¾"Øx4"	0.615				415	
Stiff PL	PL ½ x5	8.5	2.83	20	1	481	
Welds for above	5/16" Fillet	0.166	7.78	114	1	147	
Diaphragms	MC18x42.7	42.7	7	8	1	2,391	
Diaphragms	C15x33.9	33.9	7	44	1	10,441	
Bolts for above	7/8"Ø	1.101		114	8	1,004	
Stiff PL	PL ¾x5	12.8	2.8	30	1	1,086	
Stiff PL	PL 3/8x5	6.38	2.83	8	8	1,155	
Exp Joint	3x3x3/8	7.2	28	2	2	806	
Anchors for above	5/8Ø	1.33	29	1	2	77	
Welds	¼ Fillet	0.106	29	0.167	4	2	
					Total	201,629	Lbs.
		Round TOTAL TO NEAREST 5 LBS.			Use	201,630	Lbs.

Table 7: Structural Steel Plate Weight Increase Expressed In Percentage Of Nominal Weight

Specified Thickness (Inches)	Over 36 to 48 Incl	Over 48 to 60 excl	60 to 72 excl	72 to 84 excl	84 to 96 excl	96 to 108 excl	108 to 120 excl	120 to 132 excl	132 to 144 excl	144 to 168 excl	168 and over
3/16" to 1/4" excl		4	4.5	5	6	7	8	9			
1/4" to 5/16"	3	3.5	4	4.5	5	6	7	8	9.5		
5/16" to 3/8"	2.5	3	3.5	4	4.5	5	6	7	8	9.5	
3/8" to 7/16"	2.3	2.5	3	3.5	4	4.5	5	6	7.5	8	9
7/16" to 1/2"	2	2.3	2.5	3	3.5	4	4.5	5	6.5	7	8
1/2" to 5/8"	2	2	2.3	2.5	3	3.5	4	4.5	5.5	6	6
5/8" to 3/4"	2	2	2	2.3	2.5	3	3.5	4	4.5	5	6
3/4" to 1"	1.8	2	2	2	2.3	2.5	3	3.5	4	4.5	5.5
1" to 2" Incl.	1.8	1.8	2	2	2	2.3	2.5	3	3.5	4	4.5

Table 8: Weight Of Stud Shear Connectors

Stud Diameter	Weight in pounds per 100 studs having in-place length of				
	3 in.	4 in.	5 in.	6 in.	7 in.
1/2	21.0	27.0	33.0	45.0	39.0
5/8	33.6	43.2	52.8	72.0	62.4
3/4	49.0	61.5	74.0	99.0	86.5
7/8	64.0	81.0	98.0	132.0	115.0

Table 9: Weight Of Welds Per Linear Foot (Lbs)- 45° Fillet Weld

SIZE	1/8"	3/16"	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"
WEIGHT	0.027	0.060	0.106	0.166	0.239	0.326	0.425	0.538
SIZE	5/8"	11/16"	3/4"	13/16"	7/8"	15/16"	1"	
WEIGHT	0.664	0.804	0.956	1.12	1.30	1.50	1.70	

Structural Excavation

Each amount of structural excavation as shown in the approximate quantities table for items such as abutments and piers is to be rounded to the nearest 5 Cu. Yds.

Structural excavation limits for piers are bounded on the sides by vertical planes 1'-6" outside the limits of the footing, by the ground line on the top and the bottom of the footing on the bottom. When neat line excavation is called for on the plans or by the standard, the volume not excavated shall be deducted from the above.

Structural excavation for abutments is figured with the same limits as described for pier excavation. In many instances abutments are built on approach fills. The depth of structural excavation into the approach fill is figured from the berm elevation to the bottom of the abutment cap beam and no neat line excavation is figured.

For pier footings and abutment cap beams on piles, do not use neat line excavation.

Excavation for abutment wings has the same 1'-6" limit as the main cap beam and neat line excavation where applicable.

See the standard Structural Detail Drawings on the ADOT Bridge Group website for typical Structural Excavation limits. Refer to the ADOT Contracts and Specifications website for the latest Pay Item list.

Structure Backfill

Each amount of structure backfill as shown in the approximate quantities table for items such as abutments and piers is to be rounded to the nearest 5 cubic yards.

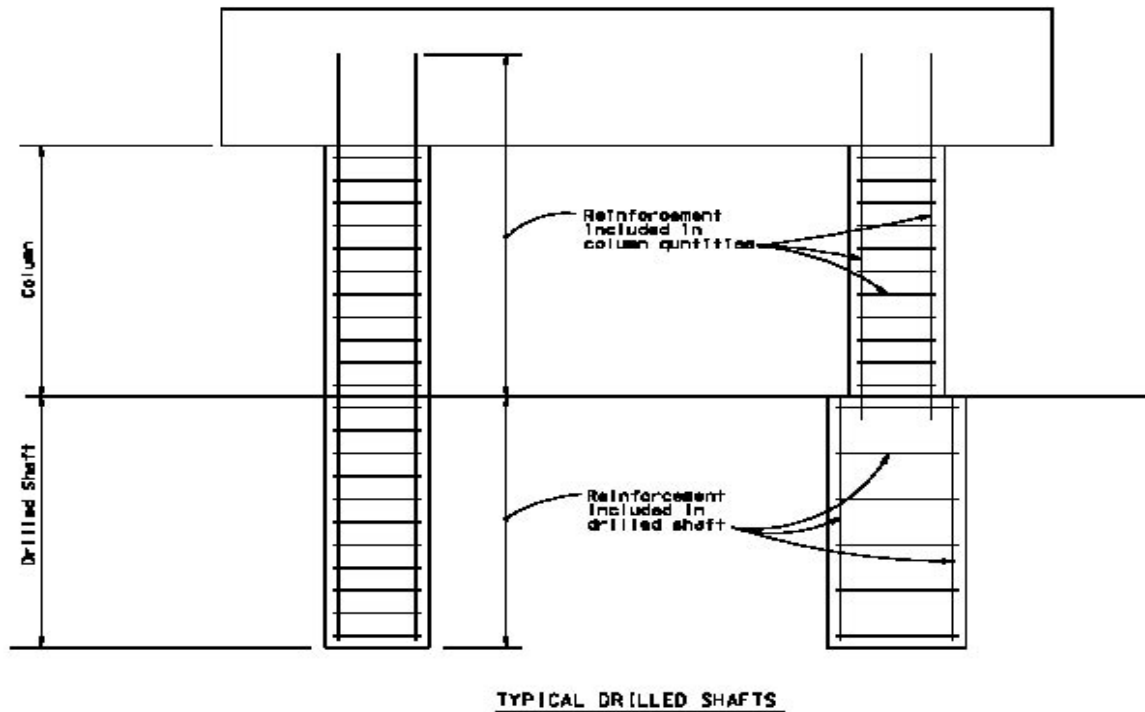
When an abutment falls *below* the existing ground level, structure backfill is figured within structural excavation limits on the approach slab side of the abutment only. When an abutment is built *above* the existing ground level, an additional area under the approach slab is added. Measuring is to be parallel to the centerline of the roadway. The abutment wings enclose this area.

Structure backfill is required for piers only when the pier falls within the roadway prism. When the roadway is on one side of a pier only, structure backfill is figured only on the side of the pier. See the standard Structural Detail Drawings on the ADOT Bridge Group website for typical Structural Excavation limits. Refer to the ADOT Contracts and Specifications website for the latest Pay Item list.

Drilled Shafts

Drilled shaft and rock socket quantities are calculated to the nearest lineal foot and are calculated separately for each diameter of drilled shaft. Refer to the ADOT Contracts and Specifications website for the current Pay Item list. The items for drilled shafts include excavation and disposal of spoils; drilling slurry; metal casing (permanent and temporary); steel reinforcing; Portland cement concrete; any needed forming, curing and finishing; exposing of concrete and the subsequent repair of foundations; furnishing all materials, equipment, and labor for splicing of reinforcing steel; all labor, conduit, and equipment for CSL and GGL; all required testing and test reports; and any confirmation shafts.

Figure 1: Reinforcing Steel Limits for Column vs. Drilled Shaft



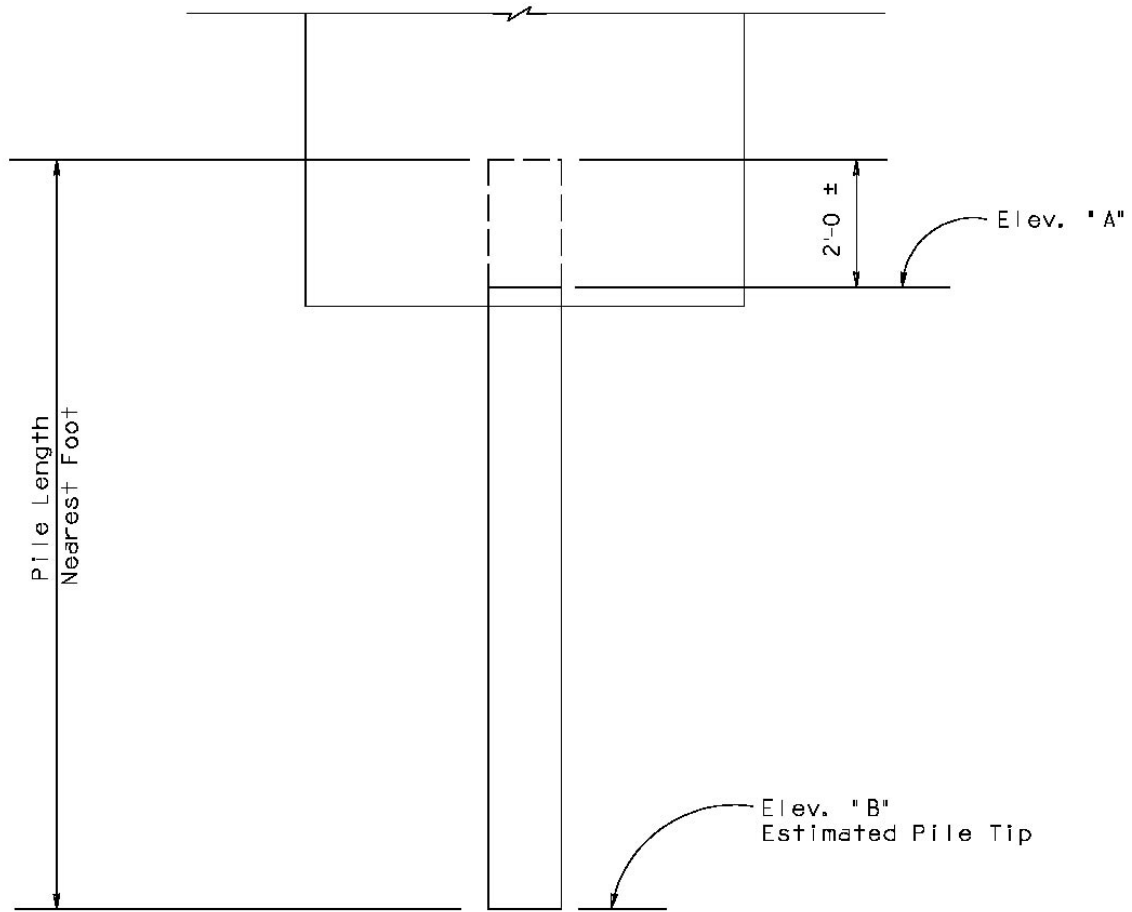
Driven Piles

Driven piles consist of H-piles, pipe piles and precast piles. Payment is divided into furnishing the pile, driving the pile, and splicing (when required).

When an H-pile is specified other than the sizes listed in the ADOT pay items list, use one of the open parenthesis pay item numbers within the 603XXXX series and place the pile size in the parenthesis. When driven piles other than H-piles are specified, items 6030195 should be used and the type of pile used placed in the parenthesis.

When piles must be driven deeper than specified on the plans to develop their strength, the contractor is paid to splice a new section onto the portion of the pile already driven. The cost equals five times the bid price for furnishing the piles. For quantity and payment purposes, two feet is added to the estimated length of a pile. Refer to the ADOT Contracts and Specifications website for the current Pay Item list.

Figure 2: Length Of Piling



$$\text{Length} = (\text{Elev. "A"} - \text{Elev. "B"}) + 2'-0 \text{ (To nearest zero)}$$

Precast Prestressed Concrete Members

Precast prestressed concrete members include AASHTO (standard or modified) I-girders, bulb tee girders, other wide flange I-girders, double tee beams, box beams, and voided slabs. The bid items are calculated by the linear foot. The total sum of the lengths of all girders are rounded to the nearest foot. The bid item includes reinforcing, concrete, prestressing strand, anything else embedded in the girder and also includes transportation and erection in place.

Refer to the ADOT Contracts and Specifications website for the latest Pay Item list.

Miscellaneous Items

Refer to the ADOT Contracts and Specifications website for the latest Pay Item list.

POST DESIGN SERVICES

General Provisions

The bridge design teams are advisors to the Resident Engineers for the construction of bridges and other structural related work. All communication, documents and correspondence should flow from and back to the Resident Engineer. The Resident Engineer or designated representative shall be kept informed of all pertinent structural information related to the project.

Pre-Construction Conference and Partnering Meeting

The Resident Engineer holds a conference following the award of the contract to review with the contractor and other stakeholders the requirements of the construction contract and to establish lines of communication. The Bridge Project Engineer will attend the meeting for all assigned projects containing major structures. The bridge designers and/or the Bridge Design Section Leader may also attend depending on the complexity of the project.

Working Drawings

Working drawings are furnished by the contractor and shall include such detailed drawings and design sheets as may be required to perform the work that is not included with the contract documents furnished by the department. Examples of working drawing types related to structures include:

- Falsework drawings
- Forming plans for cast-in-place concrete
- Precast girder details

- Structural steel fabrication drawings
- Temporary works, shoring, cofferdams, temporary bridges
- Post-tensioning details
- Sign structure details
- Expansion joint details
- Bearing details
- Bridge railing details
- Proprietary retaining wall details
- Proprietary sound barrier wall details
- Precast and stay-in-place deck panels
- Miscellaneous proprietary details
- Mechanical Stabilized Wall Systems (MSE)

Review of Working Drawings

See the ADOT Standard Specifications, Section 105.03 “Plans and Working Drawings” for information on preparation and reviewing of working drawings.

Working drawings for bridges over or adjacent to railroad tracks shall be reviewed and sent to the Resident Engineer who will then forward the drawings to the appropriate railroad company for their review and approval.

Falsework Drawings

All falsework submittals shall have sealed calculations provided with the working drawing submittal(s).

Refer to ADOT Standard Specifications, Section 601-3.02 “Falsework and Forms” and the ADOT Construction Manual for guidance. See also the “Falsework & Forms Review Checklist”.

The reviewer may use the following general references in reviewing falsework drawings:

- AASHTO. “Guide Design Specifications for Bridge Temporary Works”, Current Edition.
- AASHTO. “Construction Handbook for Bridge Temporary Works”, Current Edition.
- ACI. “Formwork for Concrete”, 8th Edition. (Publication SP-4), Current Edition.
- American Wood Council. “National Design Specification for Wood Construction”, Current Edition.
- Caltrans. “Falsework Manual”, Current Edition.

Proprietary products shall be used in accordance with the manufacturer’s instructions and

recommendations. Any deviation from such instructions or recommendations must be approved in writing by the manufacturer and submitted with the drawings.

Soil Bearing Pressure

A soil bearing pressure of 3,000 psf will normally be considered acceptable for analysis of falsework mudsills when no soils testing data is available and the soil will be in a dry condition. The use of soil pressures greater than this value must be supported by soil tests. The soil under mudsills must be protected from saturation by providing adequate drainage, etc.

A bearing pressure of 5,000 psf will normally be considered acceptable for mudsills supported on asphaltic pavements. Bearing pressures exceeding this value shall not be used unless data is submitted that would justify the allowance of a higher stress.

Metal Mesh for Construction Joints

See ADOT Standard Specification 601-3.02(C)(1) for expanded metal mesh requirements.

Overhang Brackets

The use of overhang brackets which require welding or any other detrimental attachment method of the bracket to any portion of a steel girder or the shear steel (slab ties) of a concrete girder will not be allowed.

See ADOT Standard Specification 601-3.02(A) regarding modification of girders to support falsework & forming.

CIP Box Girder Bridges

The bottom slab, web walls and diaphragms of CIP box girder bridges shall be placed monolithically unless noted otherwise on the contract plans.

Cast-in-place box girder bridges supported on falsework systems containing a traffic opening should be designed for zero tension. The reviewer must check with the designer to be sure that the superstructure was designed for zero tension. This applies only to those portions of the superstructure falling within the post-tensioned frame having the traffic opening. When the superstructure has been designed for zero tension, cracking of the bottom slab and girder webs during placement of the concrete deck is not critical and need not be analyzed.

However, the bottom slab and girder webs of CIP box girder bridges designed for concrete

tensions greater than zero must not be allowed to crack during placement (loading) of the deck. Therefore, the falsework designer must analyze and ensure that cracking of the girder webs and bottom slab will not occur in such cases when the superstructure is being cast on conventional falsework. This is especially true at larger falsework spans such as at traffic openings.

Superstructures being cast on earthen falsework fills need not be checked for cracking.

The determination of falsework settlement/deflections and the proper adjustment of falsework grades shall be the responsibility of the Contractor and its Professional Engineer.

For CIP, post-tensioned, box girder bridges containing hinges, the reviewer shall verify that the Contractor's falsework drawings include a method to adjust the superstructure elevation at the hinge. The adjustment may be required prior to the hinge closure pour to match the superstructure grades and provide a smooth ride. The project plans will give the dead load requirements for the adjustment locations. Adjustment methods such as jacking pits, jacking towers and counterweights may be used depending upon the superstructure falsework method. Also, the hinge must be designed to carry the additional span loading shifted to the hinge area during the post-tensioning process.

Falsework Traffic Openings

Falsework Requirements

To ensure that traffic handling is given proper consideration in the early design stages, it is necessary to identify traffic handling and falsework assumptions in the Bridge Selection Report. If falsework is to be used, the horizontal and vertical clearances shall be shown on the General Plan. Usually, one of the following listed conditions will prevail:

1. Traffic will be routed around the construction site.
2. Traffic will pass through the construction site.
 - a. No falsework allowed over traffic. This restriction would require precast concrete or steel superstructure with field splices located clear of traffic.
 - b. Stage construction required. Stage construction must be detailed on the plans. Construction joints or hinges would be required.
 - c. Falsework openings required. The size and number of openings must be shown.

General discussions and a table of falsework openings are covered under "Falsework Clearances".

Falsework Use

When traffic must pass through the construction site, three possible conditions exist:

- Condition 2a is limited to sites which can be spanned by precast members or where steel is competitive in cost.
- Condition 2b- The staged construction option of Condition 2b is not always feasible while the presence of a hinge is a permanent disadvantage.
- Condition 2c is used for all other cases when it is necessary to route traffic through the construction site. The elimination of permanent obstructions by using longer spans and eliminating shoulder piers will usually outweigh objections to the temporary inconvenience of falsework during construction.

Falsework Clearances

For cast-in-place structures, the preferred method of construction is to route traffic around the construction site and to use earth fills for falsework. This provides an economical solution, a safe working area and eliminates possible problems associated with the design, approval, construction and performance of falsework including the possible effect of excessive deflections of falsework on the structure.

When the street or highway must be kept open and detours are not feasible, falsework shall be used with openings through which traffic may pass. Because the width of traffic openings through falsework can significantly affect costs, special care should be given to minimizing opening widths consistent with traffic and safety considerations. The following should be considered:

1. Staging and traffic handling requirements.
2. The width of the approach roadway that will exist at the time the bridge is constructed.
3. Traffic volumes and percentage of trucks.
4. Vehicular design speed.
5. Desires of local agencies.
6. Controls in the form of existing facilities.
7. The practical problems of falsework construction.
8. Consideration for pedestrian requirements.

The minimum width of traffic openings through falsework for various lane and shoulder requirements shall be as shown in Table 10. The resulting falsework span shown in Table 10 is the minimum span. When a temporary concrete barrier is used, two feet of safety margin per side is allowed for deflection. When a blocked-out "W" beam is used, four feet of safety margin per side is allowed for deflection. Refer to Figure 3. The normal spans may be reduced or

increased if other forms of protection are used depending on the required space for installation and deflection. The actual width of traffic openings through falsework and the resulting falsework span to be used in design shall be determined by the Traffic Design Section and shall be stated in the Bridge Selection Report.

To establish the grade line of a structure spanning an existing street or highway, allowance must be made for depth of falsework, where used, to provide the clearance needed to permit traffic through the work area during construction. The minimum allowances to be made for depth of falsework shall be as shown in Table 11 and shall be based on the actual falsework openings determined by Traffic Design Section.

The minimum vertical clearance for falsework over freeways shall be 16 feet 0 inches.

Figure 3: Typical Falsework Opening

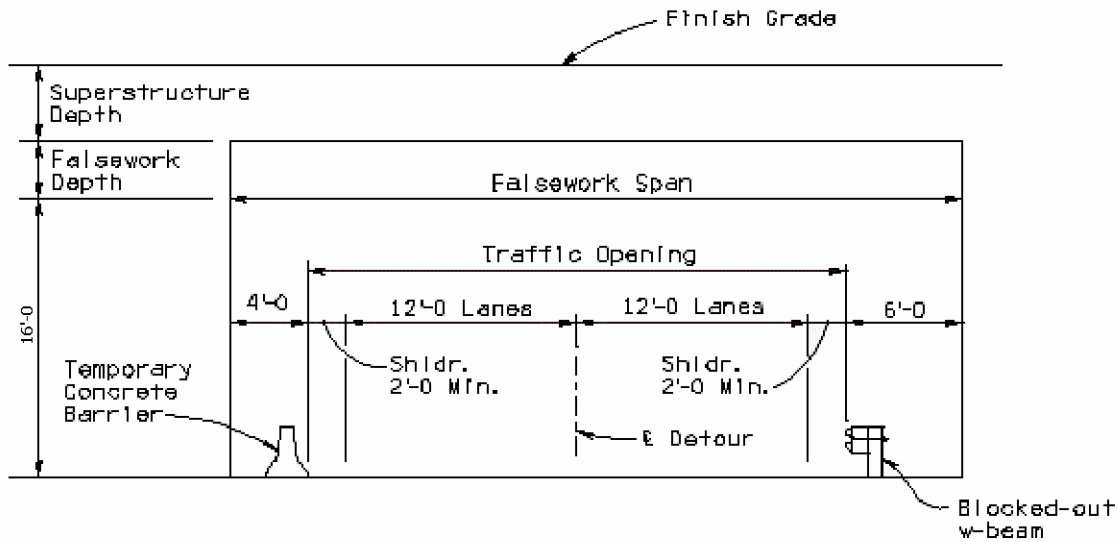


Table 10: Falsework Span Requirements for Freeways & Non-Freeways

Detour Roadway		Minimum Width of Traffic Opening*	Resulting Falsework Span*	
No. of Detour Lanes	Detour Shoulder Widths		Using Temporary Conc. Barrier	Using Blocked-out "W" beam
1	2' & 2'	16'	24'	28'
2	2' & 2'	28'	36'	40'
3	2' & 2'	40'	48'	52'
4	2' & 2'	52'	60'	64'

NOTE*: Traffic Opening and Falsework Span are measured normal to detour centerline.

Table 11: Minimum Required Falsework Depth

Falsework Opening (FT)	24	28	36	40	48	52	60	64
Max 2300 lb / ft DL per girder line	1'-7	1'-8	1'-11	2'-8	3'-0	3'-6	3'-7	3'-9
2300 - 3100 lb / ft DL per girder line	1'-8	1'-10	2'-8	2'-11	3'-6	3'-8	3'-9	3'-10

NOTES: (1) DL based on 160 pcf concrete. (2) Table 2 is based on the superstructure concrete being designed for zero tensile stress at the falsework openings. Superstructures designed with concrete tensile stresses can significantly increase the required falsework depths shown in the table and amount of falsework required. (3) Structures with greater than 3100 lb/ft Dead Load per girder line will require additional analysis to define the required falsework depths.

Forming Plans for Cast-In-Place Concrete

Formwork drawings and calculations are required for the cast-in-place girders (webs) on box girder bridges. These drawings shall go through the same submittal and review process as falsework drawings. Formwork drawings are intended to assist the Contractor in developing a well thought-out plan and avoid unforeseen problems during the concrete pours of these very important (and difficult to repair) bridge members.

Precast Girder Details

The working drawings should also include the “Fabrication Details”. These details describe how the girders will be fabricated (i.e. placing and curing of concrete, jacking and releasing of the strands, etc.) and should also include calculations for the elongation of the strands during the jacking process.

Concrete mix designs that may accompany the “Fabrication Details” should be forwarded to the Structural Materials Engineer in the Materials Group for review and approval.

Steel Girder Details

Shop welded splices in steel girders will not be allowed unless permitted by the plans and specifications. When permitted, the locations of the welded shop splices and welding procedures for the splices must be shown on the working drawings.

Post-Tensioning Details

Refer to Section 602 “Prestressing Concrete” of the ADOT Standard Specifications and the ADOT Construction Manual for specific guidance.

General Zone and Local Zone reinforcing requirements shall be reviewed by the Bridge Design Engineer to ensure that the original design assumptions are reflected by the post-tensioning working drawings. If the post-tensioning components shown on the working drawings are different from the original design assumptions, a change order may be required to revise the general zone and/or local zone reinforcing details.

The duct Lay Out Line (LOL) dimensions should be accurately shown on the working drawing to within 1/8 inch of the theoretical dimension. The LOL dimensions are typically measured from the bottom of the superstructure (soffit) to the bottom of the duct. Spacing of the LOL dimensions along the tendon paths should not exceed 15 feet in order to provide adequate field layout control.

Sign Structure Details

Refer to the Structure Detail Drawings SD 9: Traffic Structures series on the ADOT Bridge Group website or the project plans for such sign structure mounts on bridge fascias

Inspection of sign structure details for SD 9 series standards and sign structures mounted on bridge fascias will require shop inspection per 604-3.04 of the ADOT Standard Specifications.

NOTE: Bridge Group is not responsible for tapered tube or ground mounted signs. Working drawings for tapered tube or ground mounted signs shall be forwarded to Traffic Group or the consultant engineer for review and the Resident Engineer so notified.

Expansion Joint Details

Refer to Structure Detail Drawings SD 3: Deck Joints series on the ADOT Bridge Group website or the project plans for special joint details. Standard deck joint assemblies do not require shop inspection per section 604.3.04 of the ADOT Standard Specifications.

Modular expansion joint details and shop drawings shall be reviewed and sealed calculations shall accompany the working drawing submittal. These joints shall be inspected per the requirements of section 604-3.04 of the ADOT Standard Specifications.

Bearing Details

Working drawings for bearing pads and neoprene strip type bearings shall be reviewed by the Bridge Design Engineer.

Working drawings and load testing requirements for high-load multi-rotational bearings (pot, disc and spherical bearings) and any specially designed sliding bearings will be reviewed and approved by the Bridge Design Engineer.

Bridge Traffic Railing and Pedestrian Railing Details

Working drawings for bridge traffic railing and pedestrian railing will be reviewed and approved by the appropriate Bridge Design Engineer.

Shop inspection of steel bridge traffic railing will be required per section 604-3.04 of the ADOT Standard Specifications. Shop inspection for bridge pedestrian railing will not be required.

Field Engineering

At the request of the Resident Engineer, the Bridge Project Engineer shall provide the Resident Engineer with field assistance on construction problems involving structures.

The Bridge Project Engineer shall not direct the contractor at any time. Recommendations or advice concerning construction shall be made to the Resident Engineer or designated representative only.

In-House Designs

The Bridge Project Engineer and/or designated team members should visit the work site of major bridge construction projects at specified milestones such as: foundation pour, girder placement, deck pour, etc. The Bridge Project Engineer shall coordinate/schedule the visits with the Resident Engineer.

Solutions to construction problems that will result in a change from the original design plans will require approval from the Bridge Design Engineer and shall be discussed with the Section's Bridge Design Leader.

The Bridge Project Engineer is responsible for resolving field problems on all in-house designs shown in the contract drawings as well as problems associated with details in the "Bridge Group Standard Drawings".

Consultant Designs

The Bridge Design Sections will play an advisory role in construction problems that affect the designs of consultants and therefore such construction problems should be referred to the consultant. Since ADOT is the owner of the structure(s) and will have final responsibility for the integrity and maintenance of the structure(s), it is the responsibility of the Bridge Design Sections to participate in the problem-solving process with the consultant designer to arrive at a consensus. In addition, the Bridge Design Sections may be required to make the final decision in situations where the consultant and contractor cannot agree on a timely solution to the problem.

In general, the Bridge Design Sections will provide assistance to Resident Engineers on construction problems of a structural nature.

Value Engineering Proposals

The Bridge Design Sections will participate in the review of Value Engineering Proposals submitted to the Resident Engineer if the proposal is structural in nature or may affect a structure. Participants should include the Design Section Leader, the Bridge Project Engineer, and the Bridge Designer.

Proposals to change the basic design of a bridge will not be considered. Savings solely from the

elimination or reduction of a bid item will not be considered as a Value Engineering Proposal. Refer to section 104.13 of the ADOT Standard Specifications for more information.

Accurate time records shall be maintained for all Value Engineering Proposal reviews. If the Value Engineering Proposal is accepted, the cost for review and investigation of the Proposal as well as subsequent costs that may be realized by the Bridge Designer will be deducted from the estimated savings. The District is responsible for preparing the necessary Change Order and determining the final net savings or costs that will be split between the Contractor and the Department.

The hourly rate(s) for review will be set by the Bridge Project Engineer.

CONSTRUCTION JOINT & DECK POUR GUIDELINES

General Provisions

The type of structure and method of construction, combined with sound engineering judgment, should be used in determining the number and location of superstructure construction joints. The use of construction joints should be minimized for ease of construction and subsequent cost savings. Some items which should be considered are:

1. Method of construction - earthen fill falsework, conventional falsework or girder bridge without falsework.
2. Phase construction because of physical constraints such as traffic handling.
3. Span length and estimated rotation and deflection.
4. Degree of fixity at abutments and piers.
5. Effects of locating a construction joint in a region of negative moment.
6. Volume of concrete to be poured without a joint
7. Consequences of a continuous pour, including adverse effects caused by a breakdown during the pour. The Contractor may not be able to get the proposed amount of concrete delivered on schedule, or pour at the rate they are proposing. If a Contractor is requesting to do a continuous pour, the ADOT Engineer should check with the District and Materials Group to verify that the proposed pour is feasible.

Reference is made to the ADOT Standard Specifications for Road and Bridge Construction, Subsection 601-3.03 "Placing Concrete" and Subsection 601-3.04 "Joints in Major Structures".

Longitudinal Construction Joints

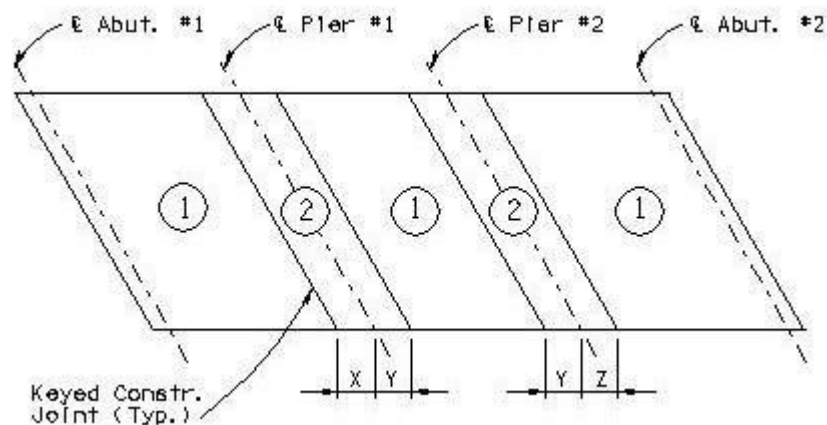
Longitudinal construction joints in bridge decks and/or superstructures should be identified as optional unless required by construction phasing. The optional deck joints should be placed on lane lines or at the center of structure. All longitudinal construction joints should be keyed.

Precast Concrete Girder Bridges

Precast concrete girder bridges made **continuous over supports** shall have transverse construction joints placed so that the girders undergo their positive moment deflections prior to the final pour over the negative moment areas of the fixed piers or abutments. There shall be no horizontal construction joint between fixed pier diaphragm or fixed abutment diaphragm and the deck.

Girder bridges will usually require details on the plans showing a plan view with joint locations, deck pour sequence and direction of pour, if required. There should be a minimum of 12 hours between adjacent pours. Construction joints where required should be parallel to the centerline of the pier. Their location will be near the point of minimum dead load plus live load moment and shear. This distance is generally one-quarter of the span length from the pier if the adjacent spans are approximately equal length. Following is a typical example of a deck pour schedule with notes for a typical precast concrete girder bridge with expansion seat-type abutments:

Figure 4: Deck Pour Schedule Example (Precast Concrete Girder)



POUR NOTES:

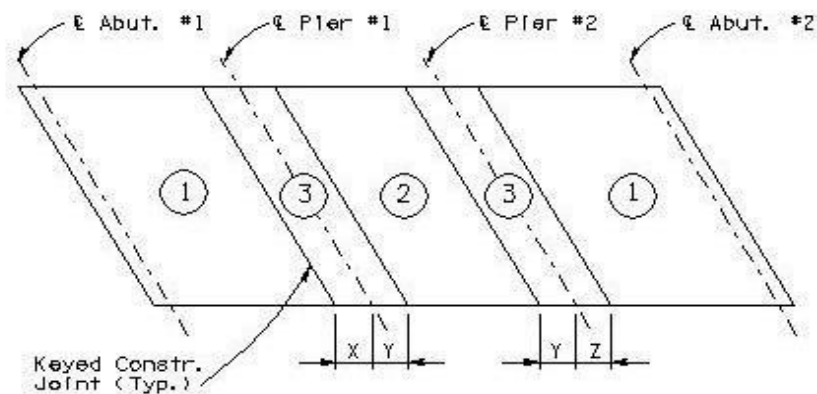
1. Numbers 1 & 2 indicate the placing sequence of deck concrete. Pour the #2 (negative moment) sections a minimum of 12 hours after the adjacent #1 (positive moment) sections have been poured.
2. Intermediate diaphragms, expansion pier diaphragms and expansion abutment diaphragms shall be poured prior to the deck pour.
3. Fixed pier and fixed abutment diaphragms shall be poured concurrent with the deck pour.
4. The Contractor shall submit a Deck Pour Schedule to the Engineer for approval prior to placing concrete.
5. Continuous pours may be proposed by the Contractor, for review and approval by the Engineer. Such proposals shall include pour rates, initial set times based on the approved concrete mix design, direction of pour and terminations of the deck pour sequence.

Steel Girder Bridges

The effects of uplift and allowing a continuous pour should be considered when developing deck pour schedules for **multi-span continuous** steel girder bridges. The required rate of pour should be compared to the quantity of concrete to be placed and the potential for poured sections to set up and develop tensile stresses from pours in adjacent spans shall be considered when determining the need for construction joints. Consideration must be given to the potential for negative moment stresses in the deck due to placement of positive moment pours in adjacent spans.

Girder bridges will usually require details on the plans showing a plan view with joint locations, deck pour sequence and direction of pour, if required. Except where otherwise required, there should be a minimum of 12 hours between adjacent pours. Construction joints, where required, should be parallel to the centerline of the pier. Their location should be near the point of dead load counterflexure. Following is a typical example of a deck pour schedule with notes for a typical steel girder bridge with expansion seat-type abutments:

Figure 5: Deck Pour Schedule (Steel Girder)



POUR NOTES:

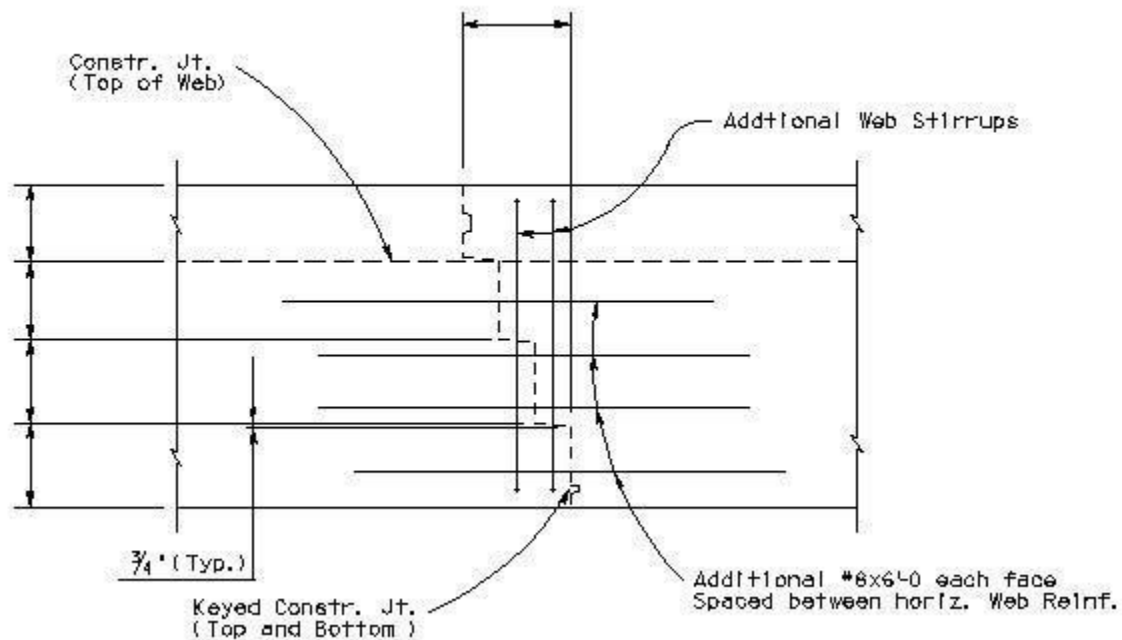
1. Numbers 1, 2, & 3 indicate placing sequence of deck concrete. Pour #2 sections a minimum of 48 hours after the #1 sections have been poured. Pour #3 sections a minimum of 12 hours after adjacent #1 & #2 sections have been poured.
2. As an alternate, #1 and #2 sections may be poured consecutively in sequence in one direction only. The rate of pour shall be such that each new section shall be poured before the previously poured adjacent section has set.
3. Sections #2 and #3 may be poured consecutively but only in the direction from #2 to #3, and a minimum of 48 hours after the adjacent #1 section has been poured.
4. The Contractor shall submit a Deck Pour Schedule to the Engineer for approval prior to placing concrete.
5. Continuous pours may be proposed by the Contractor, for review and approval by the Engineer. Such proposals shall include pour rates, initial set times based on the approved concrete mix design, direction of pour and terminations of the deck pour sequence.

Cast-In-Place Box Girder Bridges

Box girder bridges made continuous over supports shall have transverse construction joints placed so that the webs undergo their positive moment falsework deflections prior to the final pour over the negative moment areas of the fixed piers or abutments if the superstructure formwork is supported on conventional falsework. The transverse construction joints may be omitted if the superstructure formwork is supported on earthen fill. The webs and all diaphragms should be poured concurrently with the bottom slab. Transverse construction joints where required should be parallel to the centerline of the pier. Their location near the inflection point is generally one-quarter of the span length from the pier if the adjacent spans are approximately equal length.

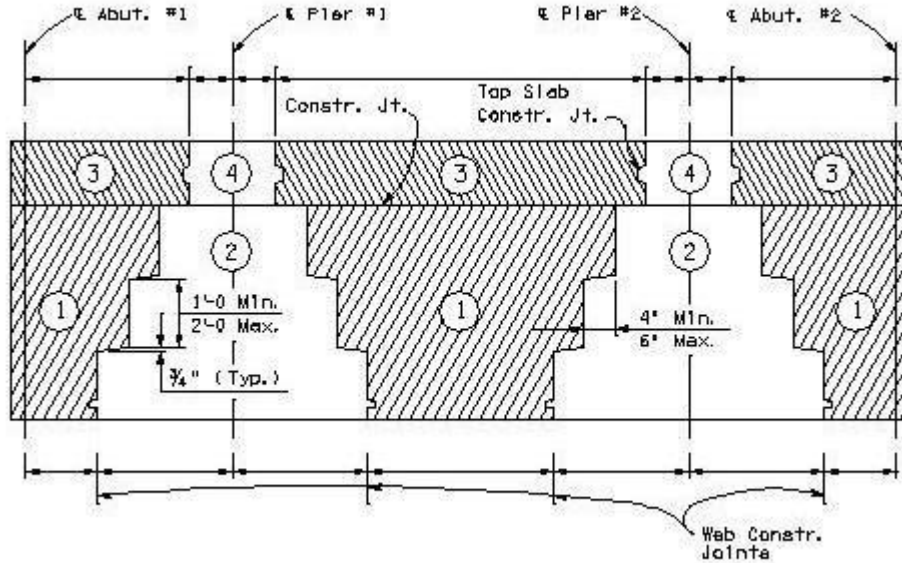
Following is a typical example of required details and notes for a cast-in-place box girder bridge with integral fixed piers and expansion seat-type abutments.

Figure 6: Web Construction Joint Detail (CIP Box Girder)



NOTE: Web stirrups shown in above detail are in addition to the web stirrups spacing shown on sheet ___ of ___. Adjust spacings as required to maintain minimum clearances for concrete placement and vibration.

Figure 7: Pour Schedule (CIP Box Girder)



Pour Notes:

1. Numbers 1 & 2 indicate placing sequence of bottom slab, girder web and diaphragm concrete.
2. Numbers 3 & 4 indicate the placing sequence of the top slab.
3. There shall be a 12 hour minimum interval between adjacent pours.
4. Sections 3 & 4 may be poured consecutively but only in the direction from 3 to 4, and a minimum of 12 hours after the adjacent #3 section has been poured.
5. For bridges constructed on earth fill, the web and top slab construction joints are optional.
6. The Contractor shall submit a Pour Schedule to the Engineer for approval prior to placing concrete.
7. Continuous pours may be proposed by the Contractor, for review and approval by the Engineer. Such proposals shall include pour rates, initial set times based on the approved concrete mix design, direction of pour and terminations of the deck pour sequence.

APPENDIX A: STANDARD PLAN NOTES

The following is a list of typical standard plan notes for bridge projects. It is the designer's responsibility to add or revise notes as applicable.

GENERAL NOTES

1. Construction Specification: Arizona Department of Transportation Standard Specifications for Road and Bridge Construction, Edition of 2021.
2. Design Specifications: AASHTO LRFD Bridge Design Specifications, 8th Edition, 2017.
3. AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 1st Edition, 2015.
4. Dead Load: Dead Load includes an allowance of 25 pounds per square foot for future wearing surface and 15 pounds per square foot for stay-in-place metal deck formwork.
5. Dead Load (for box girder bridges): Dead Load includes an allowance of ___ pounds per square foot for forms that will be left in place.
6. Loading Class: HL-93 Design Vehicular Live Load
7. Composite Design - Dead load carried by girders only.
8. The bridge site is classified as Site Class ___ Spectral Acceleration Coefficients:
 Period 0.0 sec (PGA) = ___g, (As) = ___g.
 Period 0.2 sec (Ss) = ___g, (SDs) = ___g.
 Period 1.0 sec (S1) = ___g, (SD1) = ___g.
 This bridge is assigned to Seismic Zone ___.
9. Inventory and operating ratings for HL-93 design vehicular live load are in accordance with the Load and Resistance Factor Rating Method of the AASHTO Manual for Bridge Evaluation, ___ Edition.
 Inventory Rating LRFR (HL-93) = ___
 Operating Rating LRFR (HL-93) = ___
10. All concrete shall be Class "S" unless noted otherwise.
11. Reinforcing steel shall conform to ASTM Specification A615. All reinforcing shall be furnished as Grade 60.
12. All reinforcing steel located in, or that portion extending into the deck, barriers, and approach slabs shall be epoxy coated.
13. All bends and hooks shall meet the requirements of AASHTO LRFD Article 5.10.2. All bend dimensions for reinforcing steel shall be out-to-out of bars. All placement dimensions for reinforcing steel shall be to the center of bars unless noted otherwise.
14. All reinforcing steel shall have 2 inch clear cover unless noted otherwise.
15. All mechanical splices shall conform to the requirements for mechanical connections in Section 605-3.02 of the ADOT Standard Specifications for Road and Bridge Construction.

16. Stresses:

Deck	$f'c = 4.5$ ksi
Barriers	$f'c = 4.0$ ksi
Substructure	$f'c = 3.5$ ksi
All other Class "S" concrete	$f'c = 3.0$ ksi
Grade 60 transverse deck reinf.	$fs = 24.0$ ksi
All other Grade 60	$fy = 60.0$ ksi
Structural steel, Grade ____	$fy = ___$ ksi
Prestressing steel	$fpu = ___$ ksi
(____ dia. 7-wire Low Relaxation Strand)	

17. Barriers shall be constructed after spans have taken dead load deflection. Barriers shall not be slip formed.
18. Barriers shall be constructed after post-tensioning, but may be constructed prior to falsework removal. Barriers shall not be slip formed.
19. Chamfer all exposed corners 3/4" unless noted otherwise.
20. Construction joints shall be intentionally roughened to an amplitude of 1/4" unless noted otherwise, and be cleared of dirt, oil, and otherwise deleterious materials. Mechanical splices may be used at all construction joints and formed joints where reinforcing must pass between pours, unless noted otherwise.
21. Dimensions shall not be scaled from drawings.
22. Existing bridge stations, elevations, and dimensions shown are based on Record Drawing plans and do not necessarily correspond to existing structure conditions. Stations, elevations, and dimensions measured in the field may vary from those shown. The Contractor shall verify all relevant dimensions in the field prior to fabrication of any material. Any discrepancies shall be brought to the attention of the Engineer and shall be resolved prior to proceeding with the work.

LIVE LOAD DISTRIBUTION FACTOR TABLE

(Include live load distribution factors (LLDF) table when the bridge geometry falls outside the range of applicability to use the simplified equations for LLDF. See AASHTO LRFD 4.6.2. LLDF table is also required when a refined method of analysis is used, see LRFD 4.6.3.1. Specify which analysis method was used.)

LIVE LOAD DISTRIBUTION FACTORS			
Interior Girder		Exterior Girder	
Moment	Shear	Moment	Shear
0.XXXX	0.XXXX	0.XXXX	0.XXXX

STEEL SUPERSTRUCTURE NOTES

The following Steel Superstructure Notes may apply for steel bridge projects. It is the responsibility of the designer to revise, add, or delete items for special cases.

1. Girder and miscellaneous structural steel, including bearing plates, splice and gusset plates, etc., shall conform to ASTM A709 Grade ____.
2. Miscellaneous structural steel items consisting of bearing assemblies, bolts, shear studs, splice and gusset plates, welds, etc., are included in structural steel quantities.
3. All bolts for structural steel shall conform to ASTM F3125, Grade __, Type__ for use with weathering steel. All nuts for structural steel shall conform to ASTM A563 Grade__. All washers for structural steel shall conform to ASTM F436 Type __. Galvanization of bolts, nuts, or washers for use with weathering steel shall not be permitted.
4. For bolted connections, use __ inch diameter high strength bolts in __ inch diameter holes, unless noted otherwise. Bolt threads shall be excluded from all shear planes. Install bolt heads on the exterior face of exterior girders and on underside of top and bottom flanges for all girders. Faying surfaces for all bolted connections shall have a minimum surface condition factor of __ (Class__).
5. Installation of bolts shall conform to AASHTO as required by Section 604-3.08 of the ADOT Standard Specifications for Road and Bridge Construction.
6. Anchor Bolts shall conform to ASTM Specification F1554 Grade _____. Anchor Bolt Nuts shall conform to ASTM Specification A563 Grade _____. Anchor Bolt Washers shall conform to ASTM F436 Type __. Anchor Bolts, Anchor Bolt Nuts, and Anchor Bolt Washers shall be hot-dip galvanized in accordance with the requirements of Class __ of ASTM Specification A153.

7. Intermediate crossframe stiffeners and transverse stiffeners shall be normal to the top flange.
8. Bearing and Jacking stiffeners and girder ends shall be vertical under final dead load.
9. Welded stud shear connectors shall conform to ASTM A108 Grade 1015, 1018, or 1020 cold rolled steel. Solid or granular flux-filled studs shall be used. Studs shall be automatically end welded to the top flange with complete fusion. Install shear connectors in the field after installing deck forms.
10. Dimensions shown on the plans assume the ambient temperature of the girder to be ____ degrees F. Lengths used in fabrication should be corrected as required to accommodate temperature, grade, and camber.
11. The Stainless Steel Plate and the PTFE polymer of expansion units shall be protected from concrete and welding splatters and any other contaminants during the entire construction duration.
12. Stainless Steel shall conform to ASTM A167/A264. Sliding surfaces shall have a minimum #8 mirror finish Type 304.
13. The PTFE resin shall be of 100 percent virgin material, premium grade, meeting the requirements of ASTM D4894/D4895. The PTFE sheet shall be bonded directly to the stainless steel plate by vulcanization or with a two-component, medium viscosity epoxy resin, conforming to Fed Specs MMM-A-134, Type 1. The bond agent shall be applied on the full area of the contact surfaces.
14. Elastomeric bearing pads and PTFE surfaces are included in the pay item for structural steel.
15. Structural steel supplied for tension flanges, web plates, and splice plates shall meet the longitudinal Charpy V-notch Test in accordance with the requirements for Temperature Zone __.
16. Cold Finished Pin: Pins shall be cold finished carbon steel shafting conforming to ASTM Specification A108, grades 1016 to 1030 inclusive.

PAINTING

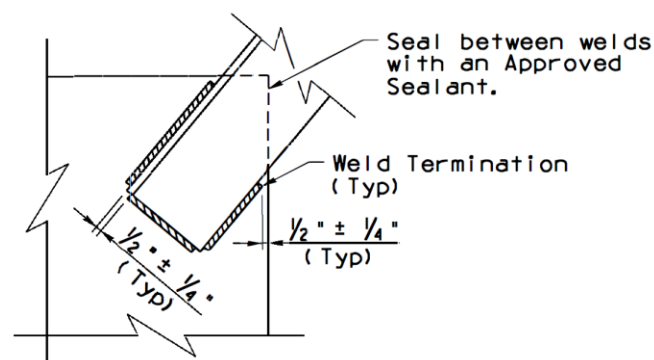
1. Structural steel shall be painted _____ (Color Chip No. ____) in conformance with the requirements of the specifications. Contact surfaces shall not be painted.
2. Structural Steel shall be painted at expansion joints as shown on the plans. The paint color shall match _____.

CLEANING

1. All steel shall be blast cleaned to SSPC-SP6, except areas to be painted shall be cleaned per SSPC-SP10. Areas blasted to SSPC-SP10 shall have an anchor pattern from 1 to 2.5 mils deep.

WELDING

1. All welding and weld testing shall conform to the requirements of the American Welding Society, ANSI/AASHTO/AWS D1.5 Bridge Welding Code latest edition, including interim revisions.
2. Tight-fit of stiffeners shall consist of at least one point bearing of the stiffener plate against the girder flange, with local clearance not to exceed 1/16 inch.
3. Only prequalified weld procedures and details shall be used unless noted otherwise on the plans or approved by the Engineer. All butt welded joints shall be full penetration welds.
4. Radiographic inspection shall be required for butt welds in tension and in stress reversal zones per current AWS requirements. Ultrasonic and Magnetic particle inspection of other welds shall be required as per current AWS requirements.
5. For all butt welds, punch marks shall be placed 1 inch from each edge and 6 inches away from the centerline of the splice prior to welding.
6. Surface Finishes - All flange butt welds shall be ground flush both sides, full width. Grinding striations shall be in the direction of stress. Web butt welds shall be ground flush on the fascia side of exterior girders.
7. The locations of any shop splice in the girder flange or web not shown on plans shall be approved by the Engineer. Shop splices will not be permitted in areas of high stress concentration.
8. The minimum distance between a welded web splice and a welded flange splice shall be 1'-0.
9. The methods of joint preparation for welding shown on the plans are based on the use of manual shielded metal arc welding. The use of this or any other welding process will be satisfactory only after the welding procedure has been submitted by the contractor and approved by the Engineer.
10. Cross Frame Welds shall be terminated from the edge of Gusset Plates, Fill Plates, and Angles as shown below:



POST-TENSIONED BOX GIRDERS

The following prestressing notes will apply for most post-tensioned box girder bridge projects. It is the responsibility of the designer to revise, add or delete items for special cases.

1. Concrete: f'_{ci} = ___psi minimum at time of stressing.
 f'_c = ___psi minimum after 28 days.
2. Low relaxation strand required.
3. Pjack force = ___ kips per bridge required at jacking ends. Pjack specified at the jacking ends includes friction losses, anchor set losses and provision for ___ psi loss in stress.
4. $A_s = P_{jack} / f'_s$. The total number of prestressing strands required shall be determined on the basis of $f'_s =$ ___ ksi and a strand area of ___ square inch per strand.
5. Tendons to be jacked to ___ f 's and anchored at an equivalent anchor set= ___ inches.
6. Design is based on $\mu = 0.25$ and $k = 0.0002$.
7. Contractor shall submit elongation and jacking calculations based on $\mu\alpha + KL =$ ___ and initial stress = ___ ksi at the point of no movement $[x] =$ ___.
8. Choose one of the following:
 - a. Tendons to be jacked from Abutment ___ only.
 - b. Tendons to be jacked from one end only.
 - c. Tendons may be jacked at both ends or one end only.
 - d. Tendons to be jacked from both ends.
9. At the contractor's option the prestressing force may vary up to $\pm 5\%$ from the theoretical equal force per girder provided the total Pjack is obtained and distributed symmetrically about the centerline of the typical section.
10. No more than $1/2$ of the prestressing force in any one girder may be stressed before an equal force is stressed in the adjacent girders. At no time during the stressing operation shall more than $1/6$ of the total prestressing force be applied eccentrically about the centerline of the structure.
11. Ducts shall be securely tied to the vertical stirrups at 4'-6" maximum spacing to prevent displacement during concrete placement. Shop drawings shall include duct tying details.
12. Reinforcing steel may be adjusted during the installation of prestressing ducts as required to provide planned clearances for the metal conduits, anchorages, jacks and equipment as approved by the Engineer.
13. Bearing plates shall be placed tightly against the forms which shall be braced and anchored to support their weight. Individual anchorage bearing plates shall be placed normal to the centerline of tendon.

PRESTRESSED PRECAST CONCRETE

The following prestressing notes will apply for most prestressed precast concrete bridge projects. It is the responsibility of the designer to revise, add or delete items for special cases.

Pretension Girder Notes:

___ dia 7 wire low relaxation strands.

P_i = ___ kips Initial Tension before losses.

P_w = ___ kips* Working force (total tension remaining after all losses)

f'_{ci} = ___ ksi minimum strength at transfer.

f'_c = ___ ksi minimum strength at 28 days.

All low relaxation strands shall be stressed to 0.75 fpu.

Girders shall be prestressed by the pretensioning method only. Use of masked strands will not be allowed.

*Elastic losses are included in this calculation.

In girder analysis, transformed sections for prestressing strands were used.

For deep girders being used in a location with a steep grade:

Precast girder ends shall be cast plumb to accommodate the effects of the vertical profile grade.

STAY-IN-PLACE DECK FORMS

1. Stay-in-place metal deck forms and support angles shall be galvanized in accordance with ASTM A123. All bolts shall conform to ASTM F3125, Grade A325. All bolts, nuts, and washers shall be galvanized in accordance with ASTM F2329.
2. The contractor shall determine the sizes of all bolts, welds, angles, etc. to support the required loads.
3. The details shown are general in nature. The contractor shall submit shop drawings showing details of the stay-in-place metal deck forms, including the method of installation and adjustment to the Engineer for approval.
4. Welding attachments to the top flange of steel girder shall not be allowed.
5. The deck forming system shall accommodate the deck build-up and maintain a constant thickness of the structural deck section.
6. No substitution for concrete in the deck form pans will be allowed.
7. The cost of stay-in-place metal deck forms and additional concrete in the deck form pans shall be included in the cost of deck concrete.
8. The support system for deck formwork shall not cause overstress or deformation to the permanent bridge members. For deck overhang support brackets bearing on the girder

web, the contractor is responsible for adequately supporting the girder web to prevent buckling due to the imposed loads. Working drawings and calculations shall be submitted to the Engineer for approval.

CONTINUITY CONNECTION

1. Extend ___ strands as shown, except at abutments and locations where strands are not identified for extension. Strands not identified for extension shall be cut to 1" maximum length from surface of girder end. Torch cutting of strands shall not be allowed.
2. Extended prestressing strands shall be bent to maintain a 2" clear cover for the exterior girder diaphragm fascia.

CONCRETE ANCHORS

1. Anchor bolts shall conform to ASTM Specification F1554 Grade ___.
2. Anchors shall be set at sufficient edge distance to avoid spalling or cracking of existing concrete.
3. Details of the anchorage system shall be submitted to the Engineer for approval prior to installation.

DOWELS (POST-INSTALLED EPOXY ANCHORS IN EXISTING CONCRETE)

When cutting reinforcing steel is NOT allowed, use the following notes:

Drill ___ inch diameter hole ___ inches deep for ___ ASTM Grade ___ dowel. Epoxy dowel in hole with an approved epoxy adhesive.

Diamond coring is not allowed.

Epoxy anchorage shall develop a tensile pullout strength of ___ kips for ___ dowels. Details of the anchorage system shall be submitted to the Engineer for approval prior to installation.

The Contractor shall use nondestructive equipment to locate existing reinforcing steel and verify potential conflicts prior to any drilling.

When cutting reinforcing steel IS allowed, use the following notes:

Diamond core ___ inch diameter hole ___ inches deep for ___ ASTM Grade ___ dowel. Epoxy dowel in hole with an approved epoxy adhesive.

Epoxy anchorage shall develop a tensile pullout strength of ___ kips for ___ dowels. Details of the anchorage system shall be submitted to the Engineer for approval prior to installation.

DRILLED SHAFT

1. Drilled shaft excavation is not permitted within 48 hours of the completion of concrete placement of an adjacent drilled shaft. An adjacent drilled shaft is any drilled shaft within four diameters, measured center to center.
2. No construction joint is allowed in the drilled shaft unless approved by the Engineer.
3. The Contractor shall be responsible for providing support of the reinforcing cage during fabrication, erection and placement of concrete. Plans showing reinforcing cage support and methods of erection shall be submitted to the Engineer for review and approval prior to construction.
4. The Contractor shall orient the drilled shaft reinforcing cage to avoid conflict with the reinforcement in the cap.
5. All reinforcing steel in the drilled shafts, including mechanical splices and reinforcing projecting into the cap, shall be included in the pay item for drilled shafts.

PILES

The following Pile Notes may apply for most bridge projects with pile foundations and should be shown on the Footing Layout Sheet. It is the responsibility of the designer to choose which notes apply and to revise or add items for special cases.

PILES:

1. Piles shall be ___ concrete piles.
Piles shall be ___ prestressed concrete piles.
Piles shall be ___. Pile steel shall conform to AASHTO M270 (ASTM A709) Grade ___.
2. Pile tips shall be reinforced with an approved cast steel pile point.
3. Minimum bearing shall be ___.
4. Estimated pile tip elevation shall be ___ at abutments and ___ at piers. Estimated length at abutments ___, at piers ___. Estimated pile length includes 2 feet for driving.
5. Piles shall be battered ___ as shown.
6. Fills shall be built to (Elevation or Top of Berm) and compacted before piles are driven. Excavation for abutment concrete shall be made after piles are in place.
7. Any pile which is driven to a bearing of 1-3/4 times the bearing given on the plans and which reaches a tip elevation within 3 feet of the estimated tip elevation shall be considered acceptable.
8. Piling shall be driven in predrilled holes through the roadway embankment. The predrilled holes shall have a diameter of not less than ___ inches. Backfill around piling to top of embankment with dry sand or pea gravel.

9. All piles shall be driven to absolute refusal in the ___ formation. After the tip reaches the formation and the penetration becomes 1/2" or less for ten consecutive blows, absolute refusal shall be met when the penetration for ten additional blows is 1/2" or less.
10. Pile Welding: Single V-Groove and Square Groove permitted for all positions.
11. Pile Welding: Single Bevel-Groove permitted for horizontal joints only.

PILE DATA TABLE			
Location	Pile Type	Pile Tip Elevation	Ultimate Capacity Compression (kips)
Abutment #1	Example: HP 14x102	Example: 4073.66	Example: 376
Abutment #2			

BRIDGE WIDENING

Original bridge built by _____ in (year) under Project _____. Bridge Widened in (year) under Project _____.

BRIDGE REFERENCE CHORD

The bridge reference chord is a line through the intersection of the centerline Bearing Abutment 1 and the construction centerline and through the intersection of the centerline Bearing Abutment 2 and the construction centerline. Skew is measured with respect to the Bridge Reference Chord. Deck slab, concrete barriers and abutment wingwalls shall be constructed on curves concentric with the construction centerline.

BARRIER REMOVAL

The contractor shall exercise due care in removal of concrete to prevent damage to the underside of the existing deck slab. The last 6 inches of structural concrete must be removed with a hand-operated jackhammer. All damage shall be repaired at no cost to the state.

REMOVAL NOTES

1. Existing reinforcing steel extending into concrete removed area shall be incorporated into new construction unless noted otherwise.
2. Existing reinforcing steel to be incorporated into new construction shall be straightened and cleaned. Any damage to this reinforcing steel shall be repaired or replaced at the Contractor's expense as approved by the Engineer.

3. The contractor shall take due care in removal of concrete to prevent damages to the remaining structures (abutments, studs and steel girders). The last 6" of structural concrete must be removed with a hand operated jackhammer. All damages shall be repaired at the Contractor's expense as approved by the Engineer.
4. The top flanges of the existing girders and shear studs to remain shall be cleaned and repaired as required up to the Engineer's satisfaction.

SPIRAL REINFORCEMENT

1. ___" diameter cold drawn steel wire conforming to AASHTO M 32M/M 32 except minimum tensile strength equals _____psi.
2. Anchorage of spiral reinforcement shall be provided by 1-1/2 extra turns of the spiral at the end of a spiral unit.
3. Splices in spiral reinforcement shall be lap splices of 48 bar diameters but not less than 12 inches or shall be welded.

FALSEWORK

1. The minimum vertical clearance for falsework over freeways shall be 16 feet 0 inches.

APPENDIX B: BRIDGE CONSTRUCTION OVERLOAD PROCEDURE

General Provisions

When economics, safety, or other reasons dictate that overload vehicles be allowed to haul excavation or borrow over bridge structures during construction, the affected bridges shall be designed in accordance with the criteria contained in this policy statement. As with all design criteria, good engineering judgment must be used in applying the criteria to the unique aspects of each project.

The decision to design structures for construction overloads must be made early in the project development. Details should be included with the Bridge Selection Report. To justify such action, there must be sufficient savings identified to offset the increased cost in constructing the bridges to withstand these heavier loads. A proposed scheme for hauling must be developed including identification of affected structures, identification of design load type, location of haul and return lines and identification of the method of lane delineation (use of concrete barriers). The decision to design bridges for construction overloads and the identification of the hauling scheme details must be made prior to initiation of any final bridge design. Where feasible, haul roads should be located such that the strengthened portion of the bridge will benefit future traffic.

The bridge designer must also identify whether temporary or permanent approach slabs are to be used and the method of dealing with joints and bearings.

Construction plans shall show the axle reactions of the design overload vehicle, the overload design criteria and the location of haul lanes and details. Construction overloads different than those shown on the plans will be allowed, provided they do not produce a more critical load than that produced by the specified design overload. The plans or special provisions should indicate that any vehicle may be used, provided the induced moments and shears are not greater than that of the design overload. It should be further stated that it is the contractor's responsibility to evaluate and make his own determination as to the acceptability of such a vehicle during the bidding process. The low bidder shall submit his proposed vehicle for approval by the Engineer.

Design Overloads

The bridge design engineer shall determine the overload vehicle that the bridge will be designed for which will meet the needs of the expected earthwork hauls necessary for the project.

Wearing Surfaces

The 25 psf future overlay should not be included in analyzing for overloads.

The usual procedure of treating the top 1/2 inch of the deck as a wearing surface is waived for design of construction overloads.

Deck Design

The deck shall also be designed for the dead load of temporary barriers. The deck shall have the same thickness across the entire width of the deck but the reinforcing may vary.

Superstructure Design

Individual girders for prestressed concrete bridges shall be designed for the following criteria (in ksi).

	DC + PRESTRESS	SERVICE LIMIT I	SERVICE LIMIT III
TENSION (KSI)	$\underline{0}$	$0.1896\sqrt{f'_c}$	$0.1896\sqrt{f'_c}$

Haul lanes shall be located on the bridge so that construction overloads will not become the critical load for the design of exterior girders.

The special provisions shall prohibit more than one loaded overload vehicle on a bridge at a time.

Design criteria for steel girder superstructures must be developed on a project specific basis. The designer shall develop the criteria consistent with the intent of these guidelines and submit for approval prior to design.

Substructure Design

Substructure units, including bearings, pier caps, columns and footings, shall be checked for the effects of the design overload vehicle.

Specifications

The following specifications should be added to the Special Provisions.

The Contractor may use any construction overload vehicle to haul excavation or borrow across the designated bridges provided the induced moments and shears are not greater than those of the design overload. It shall be the responsibility of the Contractor to evaluate and make his own determination as to the acceptability of such a vehicle during the bidding process. The Contractor shall submit his proposed vehicle for approval by the Engineer.

Overload bridges have been designed assuming only one loaded overload vehicle will be on the bridge at a time. It shall be the responsibility of the contractor to develop a plan to enforce this requirement and submit to the Engineer for approval.

APPENDIX C: PLAN REVIEW CHECKLISTS

TRACS No.			
Stage No.			
Structure Name(s) and Number(s)			
Checker			
Conventionally Reinforced Concrete Slab, T-Girder, Box Girder Plan and Section:			
Plan and Section:	30%	60%	95%
Deck Plan:			
Show all dimensions necessary for construction of the deck		<input type="checkbox"/>	<input type="checkbox"/>
Dimension barriers, sidewalk, parapets, medians and roadway width to construction centerline		<input type="checkbox"/>	<input type="checkbox"/>
All centerline bearings labeled		<input type="checkbox"/>	<input type="checkbox"/>
Span length measured from centerline bearing abutments to centerline piers		<input type="checkbox"/>	<input type="checkbox"/>
Skew angle, if any		<input type="checkbox"/>	<input type="checkbox"/>
Deck drain spacing if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Approach slab length and callout		<input type="checkbox"/>	<input type="checkbox"/>
Barrier callouts		<input type="checkbox"/>	<input type="checkbox"/>
Location of sign support and luminaire blisters if applicable			<input type="checkbox"/>
Electrical conduits and junction boxes if applicable			<input type="checkbox"/>
Utilities centerlines if applicable			<input type="checkbox"/>
Show all dimensions necessary for construction of the deck		<input type="checkbox"/>	<input type="checkbox"/>
Transverse and longitudinal reinforcing (size, spacing and clearances)		<input type="checkbox"/>	<input type="checkbox"/>
Show additional top longitudinal reinforcing over the pier if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Longitudinal steel splices located in areas of minimum stress zones (shown in longitudinal sections)		<input type="checkbox"/>	<input type="checkbox"/>
Deck superelevation		<input type="checkbox"/>	<input type="checkbox"/>
Barrier, curb, and parapet details (locations, dimensions and reinforcing details)		<input type="checkbox"/>	<input type="checkbox"/>
Show and locate 3/4" V-drip groove on underside of deck when a steel rail barrier system is used		<input type="checkbox"/>	<input type="checkbox"/>
Deck overhang reinforcing to meet LRFD guidelines		<input type="checkbox"/>	<input type="checkbox"/>
Connection of the deck slab to the substructure details		<input type="checkbox"/>	<input type="checkbox"/>
Utility conduits if applicable		<input type="checkbox"/>	<input type="checkbox"/>

	30%	60%	95%
Superstructure Notes:			
All continuous horizontal bars in deck slab, and barriers may be spliced where required with minimum lap length as specified: (list reinforcing bar size and splices requirements)		<input type="checkbox"/>	<input type="checkbox"/>
Bars shall not be spliced within the required lap length of the adjacent bars.		<input type="checkbox"/>	<input type="checkbox"/>
Additional Details:			
Sign support and luminaire anchorages			<input type="checkbox"/>
Electrical conduits and pull boxes			<input type="checkbox"/>
Expansion Joint Detail and notes if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Temperature Correction Table if applicable			<input type="checkbox"/>
Pour Schedule Diagram and notes			<input type="checkbox"/>

TRACS No.			
Stage No.			
Structure Name(s) and Number(s)			
Checker			
Drilled Shaft Details:			
	30%	60%	95%
Drilled Shaft Notes:			
Total settlement value		<input type="checkbox"/>	<input type="checkbox"/>
Total unfactored axial load at the top of the drilled shaft before redundancy or group efficiency		<input type="checkbox"/>	<input type="checkbox"/>
Total unfactored axial load at the top of the drilled shaft after redundancy or group efficiency		<input type="checkbox"/>	<input type="checkbox"/>
Design pier scour depth		<input type="checkbox"/>	<input type="checkbox"/>
Embankment construction requirement		<input type="checkbox"/>	<input type="checkbox"/>
Orientation of drilled shaft reinforcing cage to avoid conflicts		<input type="checkbox"/>	<input type="checkbox"/>
Ground excavation and backfill requirement		<input type="checkbox"/>	<input type="checkbox"/>
Drilled shaft embedment length requirement		<input type="checkbox"/>	<input type="checkbox"/>
Test tubes requirement		<input type="checkbox"/>	<input type="checkbox"/>
Spiral notes		<input type="checkbox"/>	<input type="checkbox"/>
Mechanical coupler note		<input type="checkbox"/>	<input type="checkbox"/>
Splice notes and/or details			<input type="checkbox"/>
Drilled shaft table of elevations, lengths		<input type="checkbox"/>	<input type="checkbox"/>
Drilled Shaft at Abutment Elevation:			
All dimensions			<input type="checkbox"/>
Abutment cap soffit location		<input type="checkbox"/>	<input type="checkbox"/>
Embed shaft into cap beam 1 inch min, 3 inches max		<input type="checkbox"/>	<input type="checkbox"/>
Limit of drilled shaft in soil			<input type="checkbox"/>
Limit of drilled shaft in rock			<input type="checkbox"/>
Label elevations, top of shaft, top of rock layer if present, bottom of shaft			<input type="checkbox"/>
Diameter		<input type="checkbox"/>	<input type="checkbox"/>
Reinforcing steel and splice layout			<input type="checkbox"/>
Centerline of drilled shaft		<input type="checkbox"/>	<input type="checkbox"/>
Embedment length of main steel into cap			<input type="checkbox"/>
Drilled Shaft at Pier Elevation:			
All dimensions			<input type="checkbox"/>
Limit of formed column		<input type="checkbox"/>	<input type="checkbox"/>

	30%	60%	95%
Limit of drilled shaft in soil			<input type="checkbox"/>
Limit of drilled shaft in rock			<input type="checkbox"/>
Label elevations, top of shaft, top of rock layer if present, bottom of shaft			<input type="checkbox"/>
Diameter		<input type="checkbox"/>	<input type="checkbox"/>
Reinforcing steel and splice layout			<input type="checkbox"/>
Centerline of Drilled Shaft		<input type="checkbox"/>	<input type="checkbox"/>
Drilled Shaft Cross Sections:			
Centerline of abutment or pier		<input type="checkbox"/>	<input type="checkbox"/>
Centerline of drilled shaft		<input type="checkbox"/>	<input type="checkbox"/>
Radius			<input type="checkbox"/>
Number and size of vertical reinforcing bars			<input type="checkbox"/>
Show ties or spirals, pitch and size			<input type="checkbox"/>
Testing tubes (if required)			<input type="checkbox"/>
Minimum clearances		<input type="checkbox"/>	<input type="checkbox"/>
Tails, give angle and length			<input type="checkbox"/>

TRACS No.			
Stage No.			
Structure Name(s) and Number(s)			
Checker			
Foundation Layout:			
	30%	60%	95%
North arrow		<input type="checkbox"/>	<input type="checkbox"/>
Stream name and flow arrow		<input type="checkbox"/>	<input type="checkbox"/>
Construction centerline and Bridge Chord		<input type="checkbox"/>	<input type="checkbox"/>
Bearings		<input type="checkbox"/>	<input type="checkbox"/>
Centerlines of substructure units labeled (piers and abutments)		<input type="checkbox"/>	<input type="checkbox"/>
Numbering and stationing on centerlines bearing for all substructure units		<input type="checkbox"/>	<input type="checkbox"/>
Distance between all substructure units		<input type="checkbox"/>	<input type="checkbox"/>
Skew angle of bridge measured to construction centerline		<input type="checkbox"/>	<input type="checkbox"/>
Location of spread footing including centerline distance and dimensions		<input type="checkbox"/>	<input type="checkbox"/>
Locations of drilled shafts or piles, diameter of shafts, footings		<input type="checkbox"/>	<input type="checkbox"/>
Dimensions of footings		<input type="checkbox"/>	<input type="checkbox"/>
Existing topography showing contour lines of existing foundations and existing of utilities		<input type="checkbox"/>	<input type="checkbox"/>
Drilled shafts or piles numbered		<input type="checkbox"/>	<input type="checkbox"/>
Bottom footing elevations		<input type="checkbox"/>	<input type="checkbox"/>
Total settlement value		<input type="checkbox"/>	<input type="checkbox"/>
Service limit state factored net bearing resistance		<input type="checkbox"/>	<input type="checkbox"/>
Strength limit state factored net bearing resistance		<input type="checkbox"/>	<input type="checkbox"/>
Geotech note referring contractor to Geotechnical Report			<input type="checkbox"/>
For any bridge with H piles or Pipe piles refer to Geotech Report, Specs and other references for appropriate notes to be added to the plans			<input type="checkbox"/>
Abutment:			
	30%	60%	95%
Abutment Plan View:			
Centerline of bearing (This shall be the same as centerline of abutment)		<input type="checkbox"/>	<input type="checkbox"/>
Centerline of construction		<input type="checkbox"/>	<input type="checkbox"/>
Bridge reference chord		<input type="checkbox"/>	<input type="checkbox"/>
Skew angle of abutment		<input type="checkbox"/>	<input type="checkbox"/>

	30%	60%	95%
Dimensions of abutment, widths, lengths, and total length		<input type="checkbox"/>	<input type="checkbox"/>
Identify and dimension backwall and approach slab seat		<input type="checkbox"/>	<input type="checkbox"/>
Centerline of beams or girders with spacing		<input type="checkbox"/>	<input type="checkbox"/>
Beam or girder seat widths (step spacing)		<input type="checkbox"/>	<input type="checkbox"/>
Show location and orientation of bearing pads		<input type="checkbox"/>	<input type="checkbox"/>
Wingwall lengths, widths, skew and radius if applicable		<input type="checkbox"/>	<input type="checkbox"/>
North arrow		<input type="checkbox"/>	<input type="checkbox"/>
Show location and proper orientation of cable restrainers		<input type="checkbox"/>	<input type="checkbox"/>
Show Drilled shafts or piles with dashed lines, no need to callout or dimension		<input type="checkbox"/>	<input type="checkbox"/>
Show and dimension fillet between wingwall and abutment		<input type="checkbox"/>	<input type="checkbox"/>
Abutment Elevation View:			
All dimensions necessary for construction of the abutments		<input type="checkbox"/>	<input type="checkbox"/>
Elevation view of the abutment should show the footing or drilled shafts/piles		<input type="checkbox"/>	<input type="checkbox"/>
Beam or girder seat elevations			<input type="checkbox"/>
Backwall elevations given along the front face of backwall at the construction centerline and the RT and LT edge of deck		<input type="checkbox"/>	<input type="checkbox"/>
Give bottom of footing or cap beam elevations			<input type="checkbox"/>
Show weep drain holes and location for abutments on spread footings		<input type="checkbox"/>	<input type="checkbox"/>
Construction joints		<input type="checkbox"/>	<input type="checkbox"/>
Cut section markers		<input type="checkbox"/>	<input type="checkbox"/>
Show finish grade line for abutments on spread footings			<input type="checkbox"/>
Give all dimensions for the end blocks (also called cheek walls, shear walls)			<input type="checkbox"/>
Additional information:			
Note clarifying where the elevations are taken		<input type="checkbox"/>	<input type="checkbox"/>
Bearing pad orientation detail showing dimensions, skew			<input type="checkbox"/>
Note for construction of wingwalls concentric to construction centerline, give radius to outside wall of wingwall on plan view		<input type="checkbox"/>	<input type="checkbox"/>
Abutment Sections:			
Reinforcing steel with callouts			<input type="checkbox"/>
Centerline of anchor bolts/cable restrainer (when applicable)		<input type="checkbox"/>	<input type="checkbox"/>
Deck joint blockout area and callout		<input type="checkbox"/>	<input type="checkbox"/>
Approach slab seat details		<input type="checkbox"/>	<input type="checkbox"/>
Backwall steel details		<input type="checkbox"/>	<input type="checkbox"/>
Approach slab dowel called out		<input type="checkbox"/>	<input type="checkbox"/>
Dimensions necessary for construction			<input type="checkbox"/>

Weep holes if required		<input type="checkbox"/>	<input type="checkbox"/>
Geocomposite drainage material shown and called out		<input type="checkbox"/>	<input type="checkbox"/>
Show drilled shafts/or piles		<input type="checkbox"/>	<input type="checkbox"/>
Embedment of piles or drilled shaft into cap		<input type="checkbox"/>	<input type="checkbox"/>
Finish ground line		<input type="checkbox"/>	<input type="checkbox"/>
Construction joints		<input type="checkbox"/>	<input type="checkbox"/>
Utility blackout passing through the wall		<input type="checkbox"/>	<input type="checkbox"/>
Reinforcing steel with callouts			<input type="checkbox"/>
Reinforcing embedment, splice lengths			<input type="checkbox"/>
Stirrup spacing in cap beams			<input type="checkbox"/>
Construction joints			<input type="checkbox"/>
For PT box girders backwall steel doweling behind the anchorage blocks			<input type="checkbox"/>
Adequate reinforcing steel in end block (cheek walls, shear walls) for earthquake loading			<input type="checkbox"/>
The consultant plans have sufficient details to adequately construct the abutment.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Wingwall:			
	30%	60%	95%
Wingwall Elevation View:			
Dimensions necessary for construction			<input type="checkbox"/>
Reinforcing steel layout with bar callouts			<input type="checkbox"/>
Elevations at the top of wingwalls are given along the inside face of wingwall, at the construction centerline, as well as the end of the wingwall			<input type="checkbox"/>
If the wingwall cantilever from the abutment, show the elevation at the bottom of cap beam			<input type="checkbox"/>
If the wingwall is on a spread footing/or pile supported footing, show the elevation at the bottom of the footing.			<input type="checkbox"/>
Construction joint, locations and type			<input type="checkbox"/>
Finished ground line			<input type="checkbox"/>
Weep drain holes for wingwalls on footings			<input type="checkbox"/>
Wingwall Section:			
Reinforcing steel with call outs			<input type="checkbox"/>
Geocomposite drainage material shown and called out			<input type="checkbox"/>
Weep holes if required			<input type="checkbox"/>
Closed stirrups for cantilever wingwalls			<input type="checkbox"/>
Show bridge barrier alongside wingwall and filler between them			<input type="checkbox"/>

Pier:	30%	60%	95%
Plan View:			
Plan view of pier with all dimensions necessary for construction of the pier		<input type="checkbox"/>	<input type="checkbox"/>
Identify and number girders from left to right		<input type="checkbox"/>	<input type="checkbox"/>
Construction centerline, centerline pier, and centerline of bearings (Bridge reference chord when applicable)		<input type="checkbox"/>	<input type="checkbox"/>
Skew angle of pier		<input type="checkbox"/>	<input type="checkbox"/>
Centerline of beams or girders with spacing		<input type="checkbox"/>	<input type="checkbox"/>
Beam or girder seat widths (step spacing)		<input type="checkbox"/>	<input type="checkbox"/>
Bearing systems (pads, anchor bolts) with necessary dimensions and orientation		<input type="checkbox"/>	<input type="checkbox"/>
Show location and proper orientation of restrainers		<input type="checkbox"/>	<input type="checkbox"/>
Show shear keys for fixed piers of p/s girders		<input type="checkbox"/>	<input type="checkbox"/>
Show shear blocks for expansion piers of p/s girders		<input type="checkbox"/>	<input type="checkbox"/>
In PT box girder bridges built on falsework has additional steel been included below the construction joint		<input type="checkbox"/>	<input type="checkbox"/>
Cut section markers			<input type="checkbox"/>
Elevation View: (looking ahead station)			
Dimensions and elevations necessary for construction of the pier cap, columns and footing		<input type="checkbox"/>	<input type="checkbox"/>
Beam or girder seat elevations		<input type="checkbox"/>	<input type="checkbox"/>
Identify and number columns from left to right		<input type="checkbox"/>	<input type="checkbox"/>
Give bottom of footing or shaft cap beam elevations		<input type="checkbox"/>	<input type="checkbox"/>
Construction joints		<input type="checkbox"/>	<input type="checkbox"/>
Finished ground line			<input type="checkbox"/>
Cut section markers			<input type="checkbox"/>
Section Views:			
Reinforcing steel with bar call outs, spacing			<input type="checkbox"/>
Dimensions necessary for construction			<input type="checkbox"/>
Construction joints			<input type="checkbox"/>
Stirrups in cap beams should be lapped U-shape			<input type="checkbox"/>
If girder seat step heights are 4 inches or greater, step reinforcing should be provided.			<input type="checkbox"/>
Show column vertical steel embedment length into cap beam			<input type="checkbox"/>
Column tie bar detail (wrap of tie bar around vertical steel with 135 degree bend)			<input type="checkbox"/>
Clear cover to column reinforcing should include rustication thickness if applicable			<input type="checkbox"/>

TRACS No.				
Stage No.				
Structure Name(s) and Number(s)				
Checker				
General Plan:				
	< 30%	30%	60%	95%
Contours	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
North arrow	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Centerlines with directional bearings, bridge reference chord called out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Intersection points of centerlines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stations (100 ft intervals on all roadways)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Begin and end bridge stations (measured from backwall)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Show centerlines of abutment and piers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Curved construction lines should be labeled and the PC, PT and bearings given if they fall on or just off the bridge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Skews	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Approach roadway width	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Roadway clear width (from curb to curb)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Structure width from outside edge of deck to outside edge of deck	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Show traffic directional arrows and destination arrow labeled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cross slope	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Approach slabs and anchor slabs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Point of minimum vertical clearance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Toe and top of slopes			<input type="checkbox"/>	<input type="checkbox"/>
Riprap and slope paving			<input type="checkbox"/>	<input type="checkbox"/>
Stream flow arrow and stream name	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Name of railroad	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Horizontal clearance from track to face of pier	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Light blisters			<input type="checkbox"/>	<input type="checkbox"/>
Utilities locations			<input type="checkbox"/>	<input type="checkbox"/>
Show existing bridge footprint if applicable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Title stating:				
Plan	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bridge type description	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Contour interval	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Skew angle	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Scale	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Elevation View:	< 30%	30%	60%	95%
Overall bridge length (measured to backwall) and span lengths	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dimension from back of backwall to centerline of bearing abutment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stations and elevations at centerline bearing abutment and centerline of piers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Substructure elements shown and labeled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fixity (pinned, expansion, or fixed at abutments and piers)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Minimum vertical clearance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bottom of footing elevations			<input type="checkbox"/>	<input type="checkbox"/>
Estimated pile or drilled shaft tip elevations			<input type="checkbox"/>	<input type="checkbox"/>
Design high water mark	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Existing ground line	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Elevation reference scale	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proposed finish ground line	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Riprap, slope paving and slope rate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Top of berm elevation and width	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Highway signage and lighting			<input type="checkbox"/>	<input type="checkbox"/>
Title Stating:				
Elevation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Station and elevation reference	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Scale	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Typical Section:				
Section shown at pier or abutment for a single span bridge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Girder type called out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Out-to-out deck dimension	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Distance from edge of deck to construction centerline	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Traffic lanes, median, shoulder and barrier dimensions and labeled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Barrier type called out	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Total superstructure depth dimension	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Construction centerline and profile grade labeled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cross slopes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Column and/or shaft size called out			<input type="checkbox"/>	<input type="checkbox"/>
Ground line	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other Information:				
Highway, section, and county in upper left corner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Roadway profile grade diagram	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Horizontal curve data	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Hydraulic data	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Superelevation/transition diagram should be provided whenever all or a portion of the bridge is in transition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bridge Reference Chord note	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Existing bridge note	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Index of sheets (Foundation Data Sheets should follow the last bridge sheet and labeled SF-X.X...)			<input type="checkbox"/>	<input type="checkbox"/>
Title blocks (project and ADOT)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
General Notes and Quantities:				
	< 30%	30%	60%	95%
General Notes:				
Construction specification		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Proper design specifications		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Special design guides are used		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Welding codes		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dead load (future wearing surface and stay-in-place deck forms)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Live loading		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Composite design (note should indicate if transformed properties were used)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Seismic performance category			<input type="checkbox"/>	<input type="checkbox"/>
Inventory and operating ratings			<input type="checkbox"/>	<input type="checkbox"/>
Concrete class		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Structural steel class		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reinforcing steel class		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bent and hook requirements		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Reinforcing steel clear cover		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stresses requirements		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Barrier requirement		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chamfer note		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dimensions shall not be scaled note		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Quantity Stay-in-place form requirement		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Miscellaneous Notes:				
Standards lists		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fasteners		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Details:				
Section cut symbology (legend)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Quantity Table		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Quantity Table Items filled in		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Excavation and Backfill limits		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chamfer Detail (if detail is shown with note, then note is not needed under the General Notes)		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Phase Construction Details:				
	< 30%	30%	60%	95%
Traffic control sequence notes			<input type="checkbox"/>	<input type="checkbox"/>
Bridge sections showing phases, traffic opening, temporary barrier	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Limits of bridge removal and/or construction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Appropriate removal details for deck and parts of substructure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Construction phasing and closure pour details	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Temporary shoring notes if required			<input type="checkbox"/>	<input type="checkbox"/>

TRACS No.			
Stage No.			
Structure Name(s) and Number(s)			
Checker			
Miscellaneous Details:			
	30%	60%	95%
Expansion joint blockout detail, notes and temperature correction table		<input type="checkbox"/>	<input type="checkbox"/>
Restrainer Details use CADD cells, check that the thickness of the polystyrene has been filled in for an expansion restrainer		<input type="checkbox"/>	<input type="checkbox"/>
Elastomeric bearing pad details, notes		<input type="checkbox"/>	<input type="checkbox"/>
Deck drainage if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Utility supports			<input type="checkbox"/>
Overhead sign mounting details			<input type="checkbox"/>
Screen or sound walls details			<input type="checkbox"/>
Detail of barrier footing details beyond the end of approach slab			<input type="checkbox"/>
Handrail details if applicable			<input type="checkbox"/>
Post spacing for traffic rail if applicable			<input type="checkbox"/>

TRACS No.			
Stage No.			
Structure Name(s) and Number(s)			
Checker			
Bank Protection:			
	30%	60%	95%
All the dimensions required necessary to construct bank protection			<input type="checkbox"/>
Bank protection layout			<input type="checkbox"/>
Bank protection contours			<input type="checkbox"/>
Slope			<input type="checkbox"/>
Materials			<input type="checkbox"/>
Bank protection type			<input type="checkbox"/>
Temporary Construction Access:			
	30%	60%	95%
Site plan showing access, construction footprint, staging areas		<input type="checkbox"/>	<input type="checkbox"/>
Notes		<input type="checkbox"/>	<input type="checkbox"/>
Detours		<input type="checkbox"/>	<input type="checkbox"/>
Construction method and sequence, if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Section view with details of temporary access, if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Hydraulic information if applicable		<input type="checkbox"/>	<input type="checkbox"/>
North arrow		<input type="checkbox"/>	<input type="checkbox"/>
Site plan showing access, construction footprint, staging areas		<input type="checkbox"/>	<input type="checkbox"/>
Foundation Data:			
	30%	60%	95%
General Plan of bridge showing the locations of all boring holes			<input type="checkbox"/>
North Arrow			<input type="checkbox"/>
Construction Centerline with station marks			<input type="checkbox"/>
Stream Flow Arrow			<input type="checkbox"/>
Notes Including Drilling Information and Boring Operations			<input type="checkbox"/>
Boring Log text should be at a legible size			<input type="checkbox"/>
Title block of the sheet should match the project information on the bridge sheets			<input type="checkbox"/>
Sheets should be numbered SF-X.XX, the first number should match the bridge sheet number and should be placed after the bridge sheets in the plan set			<input type="checkbox"/>

Retaining Walls:	30%	60%	95%
General Notes:			
Governing Specifications		<input type="checkbox"/>	<input type="checkbox"/>
Design Strengths of concrete and reinforcing steel		<input type="checkbox"/>	<input type="checkbox"/>
Material notes for concrete, reinforcing steel, steel or concrete piling, Sheet piling and lagging and drilled shaft		<input type="checkbox"/>	<input type="checkbox"/>
Design soil parameters		<input type="checkbox"/>	<input type="checkbox"/>
Wall design parameters and notes		<input type="checkbox"/>	<input type="checkbox"/>
Allowable bearing pressure		<input type="checkbox"/>	<input type="checkbox"/>
Pile/drilled shaft design loading		<input type="checkbox"/>	<input type="checkbox"/>
Special provisions		<input type="checkbox"/>	<input type="checkbox"/>
Construction sequence		<input type="checkbox"/>	<input type="checkbox"/>
Maintenance of traffic and phase construction		<input type="checkbox"/>	<input type="checkbox"/>
Special notes that are project or site specific		<input type="checkbox"/>	<input type="checkbox"/>
Estimate of Retaining Wall Quantities:			
Area of retaining wall			<input type="checkbox"/>
Reinforcing steel			<input type="checkbox"/>
Concrete			<input type="checkbox"/>
Excavation and Backfill			<input type="checkbox"/>
Piling or drilled shaft quantities			<input type="checkbox"/>
Miscellaneous quantities associated with wall (sealing, riprap, etc.)			<input type="checkbox"/>
Plan View:			
North arrow		<input type="checkbox"/>	<input type="checkbox"/>
Plan view of the wall		<input type="checkbox"/>	<input type="checkbox"/>
Plan view of the footing, for cast-in-place walls only		<input type="checkbox"/>	<input type="checkbox"/>
Horizontal alignment information including all complex geometric information		<input type="checkbox"/>	<input type="checkbox"/>
Beginning and ending wall work points by station and offset with respect to centerline of construction		<input type="checkbox"/>	<input type="checkbox"/>
Additional points as necessary to tie wall alignment to adjoining roadway alignment(s)		<input type="checkbox"/>	<input type="checkbox"/>
Walls are labeled clearly		<input type="checkbox"/>	<input type="checkbox"/>
Footing dimensions referenced to front face of the retaining wall for CIP walls only if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Drilled shaft size and spacing for CIP walls only			<input type="checkbox"/>
Pile size, batter, and spacing for CIP walls only			<input type="checkbox"/>
Utilities that may interfere with walls		<input type="checkbox"/>	<input type="checkbox"/>
Wall mounted signing and lighting blisters locations if applicable			<input type="checkbox"/>
Elevation View:			

Station with offset and elevation for each critical point on the wall			<input type="checkbox"/>
Length of wall segments and total wall length		<input type="checkbox"/>	<input type="checkbox"/>
Existing ground line along wall alignment if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Finished ground surface in front of the wall			<input type="checkbox"/>
Elevations of top of footings for CIP walls only			<input type="checkbox"/>
Footing elevation for pile or drilled shaft footings and the estimated pile or drilled shaft tip elevation for CIP wall only			<input type="checkbox"/>
Elevation of top of leveling pad and depth of undercut for MSE walls			<input type="checkbox"/>
Elevation of top and bottom of lagging and steel piling for a retaining wall with steel soldier pile and lagging			<input type="checkbox"/>
Approximate rock surface profile if applicable			<input type="checkbox"/>
Locations of construction and expansion joints		<input type="checkbox"/>	<input type="checkbox"/>
Show lengths of walls, height (H) and wall labels			<input type="checkbox"/>
Wall mounted signing and lighting blisters locations if applicable			<input type="checkbox"/>
Utilities passing through the wall if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Typical Wall Sections:	30%	60%	95%
CIP Retaining Walls:			
Reinforcing steel call outs and bar labeling when appropriate			<input type="checkbox"/>
Dimensions necessary for construction			<input type="checkbox"/>
Weep holes and geocomposite drainage material			<input type="checkbox"/>
Pile spacing and size or drilled shaft size			<input type="checkbox"/>
Embedment of piles or drilled shafts			<input type="checkbox"/>
Construction joints			<input type="checkbox"/>
Finished ground line in front of the wall			<input type="checkbox"/>
Finished grade behind the wall including any roadway and drainage features			<input type="checkbox"/>
Railing attachments to the top of walls should be cast in place anchors, sleeve connections or epoxy anchors (no expandable anchors allowed)			<input type="checkbox"/>
Appropriate clear cover called out for rustication details			<input type="checkbox"/>
MSE Retaining Walls:			
Coping dimensions			<input type="checkbox"/>
Dimensions necessary for construction			<input type="checkbox"/>
Label materials per required backfill parameters			<input type="checkbox"/>
CIP leveling pad			<input type="checkbox"/>
Existing ground line			<input type="checkbox"/>
Finished ground line in front of the wall			<input type="checkbox"/>

Finished grade behind the wall including any roadway and drainage features			<input type="checkbox"/>
Specific MSE wall design notes			<input type="checkbox"/>
Soldier Pile with Lagging Retaining Walls:	30%	60%	95%
Coping dimensions			<input type="checkbox"/>
Dimensions necessary for construction			<input type="checkbox"/>
Lagging type called out			<input type="checkbox"/>
Pile size			<input type="checkbox"/>
Bottom of pile tip elevation			<input type="checkbox"/>
Existing ground line			<input type="checkbox"/>
Finished ground line in front of the wall			<input type="checkbox"/>
Finished grade behind the wall including any roadway and drainage features			<input type="checkbox"/>
Specific soldier pile wall design notes			<input type="checkbox"/>
Soil Nail Retaining Walls:			
All dimensions necessary for construction			<input type="checkbox"/>
Show soil nails with vertical spacing			<input type="checkbox"/>
Show shotcrete wall with reinforcing			<input type="checkbox"/>
Show fascia wall			<input type="checkbox"/>
Finished grade behind the wall including any roadway and drainage features			<input type="checkbox"/>
Soil nail anchorage details			<input type="checkbox"/>
Soil nail table			<input type="checkbox"/>
Specific soil nail wall design notes			<input type="checkbox"/>
Weep holes and geocomposite drainage material			<input type="checkbox"/>
Allowable pullout resistance for nails			<input type="checkbox"/>
Miscellaneous Details:			
Architectural surface treatment detail if applicable			<input type="checkbox"/>
Wall expansion joint detail and joint notes for CIP walls			<input type="checkbox"/>
Any details needed for unusual wall geometry			<input type="checkbox"/>
Detail showing structural excavation and backfill limits			<input type="checkbox"/>
Details for utilities passing through the wall if applicable			<input type="checkbox"/>
Footing step detail for CIP walls			<input type="checkbox"/>
Detail at end of abutment wingwall and beginning of retaining wall to provide alignment (may be on bridge plans)			<input type="checkbox"/>

TRACS No.			
Stage No.			
Structure Name(s) and Number(s)			
Checker			
Post-Tensioned Box Girder:			
Plan and Section:	30%	60%	95%
Deck Plan View:			
Girder (web) spacing and relation to construction centerline		<input type="checkbox"/>	<input type="checkbox"/>
Label girders (webs)		<input type="checkbox"/>	<input type="checkbox"/>
Dimension barriers, sidewalks, parapets, medians and roadway width to construction centerline		<input type="checkbox"/>	<input type="checkbox"/>
All centerline bearings labeled		<input type="checkbox"/>	<input type="checkbox"/>
Span lengths measured from centerline to centerline		<input type="checkbox"/>	<input type="checkbox"/>
Skew angle if any		<input type="checkbox"/>	<input type="checkbox"/>
Diaphragm locations and thickness		<input type="checkbox"/>	<input type="checkbox"/>
3" diameter drain holes and 4" x 4" vent holes located on low side		<input type="checkbox"/>	<input type="checkbox"/>
Dimensions web flare, if required for post-tensioned bridges		<input type="checkbox"/>	<input type="checkbox"/>
Show the distance to the start of bottom slab flare at a pier if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Transverse reinforcing steel layout		<input type="checkbox"/>	<input type="checkbox"/>
Additional deck steel in the acute corners of bridges skewed greater than 20 degrees		<input type="checkbox"/>	<input type="checkbox"/>
Deck drain spacing, if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Approach slab length and callout		<input type="checkbox"/>	<input type="checkbox"/>
Barrier callouts		<input type="checkbox"/>	<input type="checkbox"/>
Location of sign support and luminaire blisters if applicable			<input type="checkbox"/>
Electrical conduits and junction boxes if applicable			<input type="checkbox"/>
Utilities centerlines if applicable			<input type="checkbox"/>
Superstructure Cross Section:			
Dimension of slabs, webs, overhangs, depth and girder spacing (show girder spacing below soffit)		<input type="checkbox"/>	<input type="checkbox"/>
Construction centerline		<input type="checkbox"/>	<input type="checkbox"/>
Transverse reinforcing top and bottom slabs (size, spacing and clearances)		<input type="checkbox"/>	<input type="checkbox"/>

Transverse reinforcing should be straight bars, truss bars are no longer used		<input type="checkbox"/>	<input type="checkbox"/>
Longitudinal reinforcing in webs and slabs		<input type="checkbox"/>	<input type="checkbox"/>
Stirrup details (since the exterior web lengths vary due to the superelevation, the exterior stirrup length should be labeled “varies”)		<input type="checkbox"/>	<input type="checkbox"/>
Stirrup tails in top slab turned inward		<input type="checkbox"/>	<input type="checkbox"/>
4” fillet at top of webs		<input type="checkbox"/>	<input type="checkbox"/>
Construction joints at top of web only		<input type="checkbox"/>	<input type="checkbox"/>
Deck superelevation		<input type="checkbox"/>	<input type="checkbox"/>
Show barrier, curb, and parapet locations, dimensions and reinforcing in deck. Call out SD reference.		<input type="checkbox"/>	<input type="checkbox"/>
Bar clearance		<input type="checkbox"/>	<input type="checkbox"/>
Show and locate ¾” V-drip groove on the underside of deck overhang when steel rail barrier system is used		<input type="checkbox"/>	<input type="checkbox"/>
Show utility blockouts if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Superstructure Notes:			
There shall be no construction joint between bottom slab and webs.		<input type="checkbox"/>	<input type="checkbox"/>
Interior webs shall be built vertical		<input type="checkbox"/>	<input type="checkbox"/>
All continuous horizontal bars in deck and soffit slabs, webs, diaphragms and barriers excluding transverse bars in top slab may be spliced where required with minimum lap length as specified: (list reinforcing bar size and splices requirements)		<input type="checkbox"/>	<input type="checkbox"/>
Deck transverse reinforcing splices, where required, shall be:			
Top bars shall be lapped at centerline cell		<input type="checkbox"/>	<input type="checkbox"/>
Bottom bars shall be lapped at centerline web		<input type="checkbox"/>	<input type="checkbox"/>
Bars shall not be spliced within the required lap length of the adjacent bars.		<input type="checkbox"/>	<input type="checkbox"/>
In PT box girder bridges built on falsework has additional steel been included below the construction joint		<input type="checkbox"/>	<input type="checkbox"/>
Additional Details:			
4” x 4” vent hole in diaphragm at top of bottom slab at low point (typ)		<input type="checkbox"/>	<input type="checkbox"/>
3” diameter drain hole with drip grooves in bottom slab. Place to miss reinforcing steel (typ) Detail should include screen		<input type="checkbox"/>	<input type="checkbox"/>
Web stirrup spacing diagram		<input type="checkbox"/>	<input type="checkbox"/>
Intermediate diaphragm Section showing all dimensions and reinforcing required to construct Diaphragm		<input type="checkbox"/>	<input type="checkbox"/>
Expansion Joint Detail and notes		<input type="checkbox"/>	<input type="checkbox"/>

Temperature Correction Table			<input type="checkbox"/>
Pour Schedule Diagram and notes			<input type="checkbox"/>
Web Construction Joint Detail and notes			<input type="checkbox"/>
Additional top longitudinal reinforcing over pier details if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Dead load camber diagram			<input type="checkbox"/>
Post-Tensioned Box Girder Diaphragm and Prestressing:			
	30%	60%	95%
Abutment Diaphragm Sheet:			
Sheet should contain part plan, vertical section thru web, vertical section between webs, part elevation thru blockouts and partial horizontal section thru webs and diaphragms		<input type="checkbox"/>	<input type="checkbox"/>
Reinforcing steel layout with call outs		<input type="checkbox"/>	<input type="checkbox"/>
All dimensions necessary for construction		<input type="checkbox"/>	<input type="checkbox"/>
Additional steel top and bottom slabs for bursting stresses		<input type="checkbox"/>	<input type="checkbox"/>
Local zone area identified on details		<input type="checkbox"/>	<input type="checkbox"/>
Local zone reinforcing the responsibility of the post-tensioner note		<input type="checkbox"/>	<input type="checkbox"/>
Web stirrup spacing for general zone		<input type="checkbox"/>	<input type="checkbox"/>
4 x 4 grillage behind the anchorage plate		<input type="checkbox"/>	<input type="checkbox"/>
Placement of utility ducts (if applicable)			<input type="checkbox"/>
Prestressing Details Sheet:			
Standard sheet layout has been used		<input type="checkbox"/>	<input type="checkbox"/>
Detail of duct and web flare		<input type="checkbox"/>	<input type="checkbox"/>
End elevation showing the assumed number of strands per duct configuration		<input type="checkbox"/>	<input type="checkbox"/>
Clearance requirements for ducts, should have 1 inch between ducts		<input type="checkbox"/>	<input type="checkbox"/>
Tendon path diagram with Local and General Zone dimensioned		<input type="checkbox"/>	<input type="checkbox"/>
Anchorage Zone notes		<input type="checkbox"/>	<input type="checkbox"/>
Prestressing Notes		<input type="checkbox"/>	<input type="checkbox"/>
Prestressing Notes shall be filled in with all relevant information for the design and construction		<input type="checkbox"/>	<input type="checkbox"/>
Check the configuration and constructability of the tendon path		<input type="checkbox"/>	<input type="checkbox"/>
Post-Tensioned Box Girders Screed Details:			
	30%	60%	95%
Screed Elevation Sheet:			
Deck plan (usually not to scale)		<input type="checkbox"/>	<input type="checkbox"/>
Dead Load Camber Diagram (may appear on superstructure sheet)		<input type="checkbox"/>	<input type="checkbox"/>
Approach slab finish grade elevation table		<input type="checkbox"/>	<input type="checkbox"/>
Anchor slab finish grade elevation table		<input type="checkbox"/>	<input type="checkbox"/>

Screeed Elevation Notes		<input type="checkbox"/>	<input type="checkbox"/>
Screeed Elevation Tables (May be on a separate sheet or sheets)			<input type="checkbox"/>
Screeed Rail Elevation Tables at 2.5 ft interval at edge of deck (May be on a separate sheet or sheets)			<input type="checkbox"/>
Falsework Elevation Sheet:			
Cross Section of bridge superstructure showing elevation points			<input type="checkbox"/>
Falsework elevation table			<input type="checkbox"/>
Falsework notes			<input type="checkbox"/>

TRACS No.			
Stage No.			
Structure Name(s) and Number(s)			
Checker			
Precast Prestressed Concrete:			
Plan and Section:	30%	60%	95%
Deck Plan View:			
Show all dimensions necessary for construction of the deck		<input type="checkbox"/>	<input type="checkbox"/>
Girder spacing and location from construction centerline		<input type="checkbox"/>	<input type="checkbox"/>
Label girders		<input type="checkbox"/>	<input type="checkbox"/>
Dimension barriers, sidewalk, parapets, medians and roadway width to construction centerline		<input type="checkbox"/>	<input type="checkbox"/>
All centerline bearings labeled		<input type="checkbox"/>	<input type="checkbox"/>
Span length measured from centerline bearing abutments to centerline piers		<input type="checkbox"/>	<input type="checkbox"/>
Dimension from centerline of bearing to centerline of pier		<input type="checkbox"/>	<input type="checkbox"/>
Centerline of intermediate diaphragm		<input type="checkbox"/>	<input type="checkbox"/>
Skew angle, if any		<input type="checkbox"/>	<input type="checkbox"/>
If curved, show chord girder lengths and angle for each girder (on girder layout plan)		<input type="checkbox"/>	<input type="checkbox"/>
Transverse reinforcing steel layout (may be a separate detail)		<input type="checkbox"/>	<input type="checkbox"/>
Deck drain spacing if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Approach slab length and callout		<input type="checkbox"/>	<input type="checkbox"/>
Barrier callouts		<input type="checkbox"/>	<input type="checkbox"/>
Additional deck steel in the acute corners of bridges skewed greater than 20 degrees		<input type="checkbox"/>	<input type="checkbox"/>
Location of sign support and luminaire blisters if applicable			<input type="checkbox"/>
Electrical conduits and junction boxes if applicable			<input type="checkbox"/>
Utilities centerlines if applicable			<input type="checkbox"/>
Typical Cross Section:			
Show all dimensions necessary for construction of the deck		<input type="checkbox"/>	<input type="checkbox"/>
Dimension of deck, overhangs, and girder spacing		<input type="checkbox"/>	<input type="checkbox"/>
Transverse and longitudinal reinforcing (size, spacing, and clearances)		<input type="checkbox"/>	<input type="checkbox"/>

Transverse reinforcing should be straight bars, truss bars are no longer used		<input type="checkbox"/>	<input type="checkbox"/>
Show additional top longitudinal reinforcing over the pier if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Deck superelevation		<input type="checkbox"/>	<input type="checkbox"/>
Barrier, curb, and parapet details (locations, dimensions and reinforcing details)		<input type="checkbox"/>	<input type="checkbox"/>
Show and locate ¾" V-drip groove on the underside of deck overhang when steel rail barrier system is used		<input type="checkbox"/>	<input type="checkbox"/>
Show stay-in-place deck forming if required		<input type="checkbox"/>	<input type="checkbox"/>
Deck overhang reinforcing to meet LRFD guidelines		<input type="checkbox"/>	<input type="checkbox"/>
Show all dimensions necessary for construction of the deck		<input type="checkbox"/>	<input type="checkbox"/>
Dimension of deck, overhangs, and girder spacing		<input type="checkbox"/>	<input type="checkbox"/>
Transverse and longitudinal reinforcing (size, spacing, and clearances)		<input type="checkbox"/>	<input type="checkbox"/>
All continuous horizontal bars in deck slab and barriers, excluding transverse bars in top slab, may be spliced where required with minimum lap length as specified: (list reinforcing bar size and splices requirements)		<input type="checkbox"/>	<input type="checkbox"/>
Deck transverse reinforcing splices, where required, shall be:	30%	60%	95%
Top bars shall be lapped at center of girder spacing		<input type="checkbox"/>	<input type="checkbox"/>
Bottom bars shall be lapped at centerline girder		<input type="checkbox"/>	<input type="checkbox"/>
Bars shall not be spliced within the required lap length of the adjacent bars.		<input type="checkbox"/>	<input type="checkbox"/>
For curved bridges, a note should identify how the <u>longitudinal</u> steel is placed (parallel to girders between girders, parallel to deck in the overhang)		<input type="checkbox"/>	<input type="checkbox"/>
For curved bridges, a note should identify how the <u>transverse</u> steel is placed		<input type="checkbox"/>	<input type="checkbox"/>
Additional Details:			
Sign support and luminaire anchorages			<input type="checkbox"/>
Electrical conduits and pull boxes			<input type="checkbox"/>
Girder shim plate details and table, if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Bearing pad orientation detail showing dimensions & skew, if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Bearing pad criteria and notes		<input type="checkbox"/>	<input type="checkbox"/>
Intermediate Diaphragm Section showing all dimensions and reinforcing required to construct diaphragm			<input type="checkbox"/>
Expansion Joint Detail and notes		<input type="checkbox"/>	<input type="checkbox"/>

Temperature Correction Table			<input type="checkbox"/>
Restrainer details		<input type="checkbox"/>	<input type="checkbox"/>
Pour Schedule Diagram and notes			<input type="checkbox"/>
Additional top longitudinal reinforcing over pier details, if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Details and notes for Stay-in-place deck forming		<input type="checkbox"/>	<input type="checkbox"/>
Precast Prestressed Concrete Details:			
	30%	60%	95%
All dimensions necessary for construction		<input type="checkbox"/>	<input type="checkbox"/>
Girder elevation showing stirrup spacing, c.g. of strands, hold-down point and threaded insert locations		<input type="checkbox"/>	<input type="checkbox"/>
Show bottom flange confinement reinforcing at end of girder		<input type="checkbox"/>	<input type="checkbox"/>
Show extension of strands for continuity in girder elevation		<input type="checkbox"/>	<input type="checkbox"/>
Reinforcing steel layout with call outs		<input type="checkbox"/>	<input type="checkbox"/>
Section thru end and midspan showing dimensions and strand pattern and reinforcement		<input type="checkbox"/>	<input type="checkbox"/>
Prestressing Notes with all relevant design information		<input type="checkbox"/>	<input type="checkbox"/>
Continuity details and note		<input type="checkbox"/>	<input type="checkbox"/>
Threaded insert details and notes		<input type="checkbox"/>	<input type="checkbox"/>
Shear keys, lateral tie details, and tensioning notes for box beams and voided slabs placed side by side		<input type="checkbox"/>	<input type="checkbox"/>
Pinned connection details at supports for box beams and voided slab girders		<input type="checkbox"/>	<input type="checkbox"/>
Top Flange Coping Detail (if applicable)		<input type="checkbox"/>	<input type="checkbox"/>
Precast Prestressed Concrete Diaphragm details:			
	30%	60%	95%
Plan view: (these details may be combined with abutment and pier plans)			
Show bearing pad orientation and call out size		<input type="checkbox"/>	<input type="checkbox"/>
Polystyrene with hardboard shown and called out for expansion diaphragms		<input type="checkbox"/>	<input type="checkbox"/>
Bituminous joint filler shown and called out for fixed diaphragms		<input type="checkbox"/>	<input type="checkbox"/>
Bituminous joint filler placed beneath the bottom of girder for fixed diaphragms		<input type="checkbox"/>	<input type="checkbox"/>
All dimensions for construction		<input type="checkbox"/>	<input type="checkbox"/>
Shear keys and fixed restrainer located for fixed diaphragms		<input type="checkbox"/>	<input type="checkbox"/>
Expansion restrainer shown and located for expansion diaphragms		<input type="checkbox"/>	<input type="checkbox"/>
Centerline of bearings, centerline of pier called out		<input type="checkbox"/>	<input type="checkbox"/>
Centerline of construction, skew, span chord identified		<input type="checkbox"/>	<input type="checkbox"/>

Show internal shear blocks for expansion piers		<input type="checkbox"/>	<input type="checkbox"/>
Horizontal section:	30%	60%	95%
Reinforcing steel layout with call outs		<input type="checkbox"/>	<input type="checkbox"/>
All dimensions for construction		<input type="checkbox"/>	<input type="checkbox"/>
Girder dowels shown and called out		<input type="checkbox"/>	<input type="checkbox"/>
Utility blockouts shown and located		<input type="checkbox"/>	<input type="checkbox"/>
Show internal shear blocks for expansion piers (if applicable)		<input type="checkbox"/>	<input type="checkbox"/>
Elevation Section:			
Reinforcing steel layout with call outs		<input type="checkbox"/>	<input type="checkbox"/>
Reinforcing steel through girders shown		<input type="checkbox"/>	<input type="checkbox"/>
Polystyrene with hardboard shown and called out for expansion diaphragms		<input type="checkbox"/>	<input type="checkbox"/>
Bituminous joint filler shown and called out for fixed diaphragms		<input type="checkbox"/>	<input type="checkbox"/>
Bituminous joint filler placed beneath the bottom of girder for fixed diaphragms		<input type="checkbox"/>	<input type="checkbox"/>
Shear keys and fixed restrainer located for fixed diaphragms		<input type="checkbox"/>	<input type="checkbox"/>
Restrainers shown		<input type="checkbox"/>	<input type="checkbox"/>
Show internal shear blocks for expansion piers		<input type="checkbox"/>	<input type="checkbox"/>
Dowels shown and called out		<input type="checkbox"/>	<input type="checkbox"/>
Utility blockouts shown and located if appropriate		<input type="checkbox"/>	<input type="checkbox"/>
Additional steel at blockout if appropriate		<input type="checkbox"/>	<input type="checkbox"/>
Section through Diaphragms:			
Reinforcing steel layout with call outs		<input type="checkbox"/>	<input type="checkbox"/>
All dimensions for construction		<input type="checkbox"/>	<input type="checkbox"/>
Shear key shown for fixed diaphragms		<input type="checkbox"/>	<input type="checkbox"/>
Centerline of bearing or pier shown when appropriate		<input type="checkbox"/>	<input type="checkbox"/>
Fillet between deck and diaphragm		<input type="checkbox"/>	<input type="checkbox"/>
Construction joint between deck and diaphragm for expansion diaphragms only		<input type="checkbox"/>	<input type="checkbox"/>
Expansion joint blockout shown and called out for expansion diaphragm		<input type="checkbox"/>	<input type="checkbox"/>
Adequate spacing between expansion diaphragms at piers		<input type="checkbox"/>	<input type="checkbox"/>
1-1/2 inch chamfer on bottom corners of diaphragms		<input type="checkbox"/>	<input type="checkbox"/>
Dowels shown		<input type="checkbox"/>	<input type="checkbox"/>
Class of concrete called out		<input type="checkbox"/>	<input type="checkbox"/>
Stirrup clearance		<input type="checkbox"/>	<input type="checkbox"/>
Additional Details: (may appear on other sheets)			
Joint Form Detail		<input type="checkbox"/>	<input type="checkbox"/>
Joint filler at steps		<input type="checkbox"/>	<input type="checkbox"/>

Section at an internal shear key, if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Camber Detail Sheet:			
	30%	60%	95%
Deck plan		<input type="checkbox"/>	<input type="checkbox"/>
Deflection diagram, showing release, initial and final girder position		<input type="checkbox"/>	<input type="checkbox"/>
Deflection table giving release, initial and final deflections at tenth points		<input type="checkbox"/>	<input type="checkbox"/>
Approach slab finish grade elevation table		<input type="checkbox"/>	<input type="checkbox"/>
Anchor slab finish grade elevation table		<input type="checkbox"/>	<input type="checkbox"/>
Section through girder and deck showing buildup adjustment and cross slope		<input type="checkbox"/>	<input type="checkbox"/>
Notes:			
Deflection notes		<input type="checkbox"/>	<input type="checkbox"/>
Screed Elevation Notes		<input type="checkbox"/>	<input type="checkbox"/>
Note for buildup at supports		<input type="checkbox"/>	<input type="checkbox"/>
Screed Elevation Tables (at 10th point intervals)			<input type="checkbox"/>
Screed Rail Elevation Tables (2.5 ft. interval at edge of deck)			<input type="checkbox"/>

TRACS No.			
Stage No.			
Structure Name(s) and Number(s)			
Checker			
Steel:			
Framing and Elevation Plan:	30%	60%	95%
Plan View:			
Girder spacing and location from construction centerline and/or reference line		<input type="checkbox"/>	<input type="checkbox"/>
Label and dimension all centerline of bearings		<input type="checkbox"/>	<input type="checkbox"/>
Skew angle		<input type="checkbox"/>	<input type="checkbox"/>
Label Girders		<input type="checkbox"/>	<input type="checkbox"/>
Location of all diaphragms and/or cross frames		<input type="checkbox"/>	<input type="checkbox"/>
Location of splices and stiffeners		<input type="checkbox"/>	<input type="checkbox"/>
Total length of the structure along the construction centerline and length of each span		<input type="checkbox"/>	<input type="checkbox"/>
Elevation View:			
For rolled section give size and weight call out		<input type="checkbox"/>	<input type="checkbox"/>
For plate girders, show sizes of the web plate, top and bottom flange plates, web welds		<input type="checkbox"/>	<input type="checkbox"/>
Shear connector location and spacing		<input type="checkbox"/>	<input type="checkbox"/>
Intermediate, bearing and auxiliary stiffeners		<input type="checkbox"/>	<input type="checkbox"/>
Splice locations and details		<input type="checkbox"/>	<input type="checkbox"/>
Cover plate sizes, locations, and details		<input type="checkbox"/>	<input type="checkbox"/>
Locate and dimension longitudinal web stiffener plate, if applicable, (not a common detail and not recommended per Guidelines, eliminate when possible)		<input type="checkbox"/>	<input type="checkbox"/>
Distance from centerline of bearing to centerline of splices and Dimensions for flange transition points for each girder		<input type="checkbox"/>	<input type="checkbox"/>
Total length of each girder		<input type="checkbox"/>	<input type="checkbox"/>
Adequate clearance between shear studs and splice plates		<input type="checkbox"/>	<input type="checkbox"/>
Locate tension flange zones		<input type="checkbox"/>	<input type="checkbox"/>
Steel Superstructure Notes:			
Weight of shear connectors is included in the weight of structural steel.		<input type="checkbox"/>	<input type="checkbox"/>

Intermediate stiffeners shall be normal to flanges except they shall be vertical if the slope of the girders exceeds 3/8 inches/foot		<input type="checkbox"/>	<input type="checkbox"/>
Bearing stiffeners shall be vertical.		<input type="checkbox"/>	<input type="checkbox"/>
For bolted connections, the diameter of the bolt & the diameter of the bolt hole is listed. Fasteners are called out as high-strength bolts, either AASHTO M164 (ASTM A325) or AASHTO M253 (ASTM A490).		<input type="checkbox"/>	<input type="checkbox"/>
Note for type of Shear connectors		<input type="checkbox"/>	<input type="checkbox"/>
Location of any shop splice in the girder flange or web not shown on plans must be approved by the Engineer. Shop splices will not be permitted in areas of high stress concentration.		<input type="checkbox"/>	<input type="checkbox"/>
Structural steel supplied for girder flange, web plates, and any other identified members shall conform to the Charpy V-notch Impact Test requirements in the Standard Specifications, Section 604.		<input type="checkbox"/>	<input type="checkbox"/>
Identify Non-Redundant Steel Tension Members (NSTMs, formerly referred to as Fracture Critical Members), when applicable, and any special testing requirements		<input type="checkbox"/>	<input type="checkbox"/>
Note that certain cross frames may have to be left loose or not installed until deck concrete is placed		<input type="checkbox"/>	<input type="checkbox"/>
Steel Details:	30%	60%	95%
Field Splice Details:			
Plan view(s) showing flange splice plates sizes and thickness, bolt layout and spacing		<input type="checkbox"/>	<input type="checkbox"/>
Elevation view showing flange and web splice plate size and thickness and web bolt layout and spacing		<input type="checkbox"/>	<input type="checkbox"/>
Show shim plates, if required		<input type="checkbox"/>	<input type="checkbox"/>
Show centerline of splice		<input type="checkbox"/>	<input type="checkbox"/>
Cross Frames or Diaphragms Details:			
Elevation views of abutment, pier, and intermediate cross frames or diaphragms with actual cross-slope(s)		<input type="checkbox"/>	<input type="checkbox"/>
Bearing stiffener plate size		<input type="checkbox"/>	<input type="checkbox"/>
Member sizes of cross frames or diaphragms		<input type="checkbox"/>	<input type="checkbox"/>
Plan view of cross frames or diaphragms, as needed		<input type="checkbox"/>	<input type="checkbox"/>
Callout gusset plates		<input type="checkbox"/>	<input type="checkbox"/>
Weld and clip details		<input type="checkbox"/>	<input type="checkbox"/>
Bolt layout of attachments to stiffeners		<input type="checkbox"/>	<input type="checkbox"/>
Stiffener Details (bearing, diaphragm, and intermediate):			
Details should show all plate sizes, welds, corner clips		<input type="checkbox"/>	<input type="checkbox"/>

Bearing stiffener details at piers should show proper attachment to flanges, welded to the compression flange, bolted with a connection plate to the tension flange		<input type="checkbox"/>	<input type="checkbox"/>
Bearing stiffeners at abutments shall be welded to both flanges		<input type="checkbox"/>	<input type="checkbox"/>
Intermediate diaphragm stiffeners shall be welded to the compression flange and bolted with a connection plate to the tension flange		<input type="checkbox"/>	<input type="checkbox"/>
Other web stiffeners shall not be welded to flanges, show a small gap between stiffener and tension flange, tight fit to the compression flange		<input type="checkbox"/>	<input type="checkbox"/>
Shear Connector Detail:			
Show the stud size and spacing		<input type="checkbox"/>	<input type="checkbox"/>
Steel Deck Plan and Typical Section:			
	30%	60%	95%
Show all dimensions necessary for construction of the deck		<input type="checkbox"/>	<input type="checkbox"/>
Girder centerlines		<input type="checkbox"/>	<input type="checkbox"/>
Dimension barriers, sidewalk, parapets, medians, and roadway width to construction centerline		<input type="checkbox"/>	<input type="checkbox"/>
All centerline bearings labeled		<input type="checkbox"/>	<input type="checkbox"/>
Span length measured from centerline bearing abutments to centerline piers		<input type="checkbox"/>	<input type="checkbox"/>
Skew angle, if any		<input type="checkbox"/>	<input type="checkbox"/>
Show additional steel over the piers with proper development length per AASHTO		<input type="checkbox"/>	<input type="checkbox"/>
Show additional steel in the acute corners of the deck slab		<input type="checkbox"/>	<input type="checkbox"/>
Transverse reinforcing steel layout		<input type="checkbox"/>	<input type="checkbox"/>
Deck drain spacing, if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Approach slab length and callout		<input type="checkbox"/>	<input type="checkbox"/>
Barrier callouts		<input type="checkbox"/>	<input type="checkbox"/>
Location of sign support and luminaire blisters, if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Electrical conduits and junction boxes, if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Utilities centerlines, if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Typical Cross Section:			
Show all dimensions necessary for construction of the deck		<input type="checkbox"/>	<input type="checkbox"/>
Dimension of deck, overhangs, and girder spacing		<input type="checkbox"/>	<input type="checkbox"/>
Transverse and longitudinal reinforcing (size, spacing and clearances)		<input type="checkbox"/>	<input type="checkbox"/>
Transverse reinforcing should be straight bars, truss bars are no longer used		<input type="checkbox"/>	<input type="checkbox"/>

Show additional top longitudinal reinforcing over the pier if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Deck superelevation		<input type="checkbox"/>	<input type="checkbox"/>
Barrier, curb, and parapet details (locations, dimensions and reinforcing details)		<input type="checkbox"/>	<input type="checkbox"/>
Show and locate ¾" V-drip groove on the underside of the deck overhang		<input type="checkbox"/>	<input type="checkbox"/>
Show stay-in-place deck forming, if required		<input type="checkbox"/>	<input type="checkbox"/>
Deck overhang reinforcing to meet LRFD guidelines		<input type="checkbox"/>	<input type="checkbox"/>
Superstructure Notes should be provided and contain the following information in some format:	30%	60%	95%
All continuous longitudinal bars in deck slab, and barriers excluding transverse bars in top slab may be spliced where required with minimum lap length as specified: (list reinforcing bar size and splices requirements)		<input type="checkbox"/>	<input type="checkbox"/>
Deck transverse reinforcing splices, where required, shall be:			
Top bars shall be lapped at center of girder spacing		<input type="checkbox"/>	<input type="checkbox"/>
Bottom bars shall be lapped at centerline girder		<input type="checkbox"/>	<input type="checkbox"/>
Bars shall not be spliced within the required lap length of the adjacent bars.		<input type="checkbox"/>	<input type="checkbox"/>
For curved bridges, a note should identify how the <u>longitudinal</u> steel is placed (parallel to girders between girders, parallel to deck in the overhang)		<input type="checkbox"/>	<input type="checkbox"/>
For curved bridges, a note should identify how the <u>transverse</u> steel is placed		<input type="checkbox"/>	<input type="checkbox"/>
Additional Details:			
Sign support and luminaire anchorages			<input type="checkbox"/>
Electrical conduits and pull boxes			<input type="checkbox"/>
Bearing pad orientation detail showing dimensions & skew, if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Bearing pad criteria and notes		<input type="checkbox"/>	<input type="checkbox"/>
Sole plate details		<input type="checkbox"/>	<input type="checkbox"/>
Expansion Joint Detail and notes		<input type="checkbox"/>	<input type="checkbox"/>
Temperature Correction Table			<input type="checkbox"/>
Pour Schedule Diagram and notes			<input type="checkbox"/>
Additional top longitudinal reinforcing over pier details, if applicable		<input type="checkbox"/>	<input type="checkbox"/>
Details and notes for Stay-in-place deck forming		<input type="checkbox"/>	<input type="checkbox"/>
Show blocking diagram for continuous girders, if applicable		<input type="checkbox"/>	<input type="checkbox"/>

Show dead load Camber diagram		<input type="checkbox"/>	<input type="checkbox"/>
Steel Bearing Details:			
	30%	60%	95%
Bearing Details (Steel or Proprietary):			
Bearing layout diagram showing the bearing type and orientation for each beams at all substructure locations		<input type="checkbox"/>	<input type="checkbox"/>
Plan view of the bearing showing all items necessary for their fabrication, including anchor bolt locations		<input type="checkbox"/>	<input type="checkbox"/>
Elevation view labeling all items included in the bearing device along with any dimensions, welding or bonding		<input type="checkbox"/>	<input type="checkbox"/>
Bearing type identified as fixed, expansion, guided or non-guided		<input type="checkbox"/>	<input type="checkbox"/>
Show all finish dimensions (do not call out as plate sizes)		<input type="checkbox"/>	<input type="checkbox"/>
Bearing dimensions (including beveled sole plate, sole plate and masonry plates)		<input type="checkbox"/>	<input type="checkbox"/>
Anchor bolt details in masonry plates (number, diameter, and embedment length)		<input type="checkbox"/>	<input type="checkbox"/>
Pintle details		<input type="checkbox"/>	<input type="checkbox"/>
Sole plates shall be beveled to grade for steel girders, unless recessed for pins		<input type="checkbox"/>	<input type="checkbox"/>
Fixed bearing keeper shall be shop welded to sole plate, when applicable		<input type="checkbox"/>	<input type="checkbox"/>
Include sole or masonry plates		<input type="checkbox"/>	<input type="checkbox"/>
Sole plate should be larger than girder flange so field welding will not be necessary		<input type="checkbox"/>	<input type="checkbox"/>
For most applications, sole plates should be anchored to the substructure; slotted holes would be required at expansion supports		<input type="checkbox"/>	<input type="checkbox"/>
Any bearing detail notes not covered in the General Notes sheet		<input type="checkbox"/>	<input type="checkbox"/>
The following Bearing information are required on plans when proprietary bearing types are specified:			
Bearing type (fixed, non-guided expansion and guided expansion)			<input type="checkbox"/>
Vertical uplift			<input type="checkbox"/>
Vertical dead load			<input type="checkbox"/>
Vertical dead load + live load + impact			<input type="checkbox"/>
Seismic load			<input type="checkbox"/>
Movement capacity			<input type="checkbox"/>
Rotational capacity			<input type="checkbox"/>
Horizontal loads			<input type="checkbox"/>
Miscellaneous items (e.g. PTFE data, guides, stiffeners etc.)		<input type="checkbox"/>	<input type="checkbox"/>

<p>The bearing design and installation shall be such that all elements between upper and lower masonry plates can be removed for replacement or repair.</p>		<input type="checkbox"/>	<input type="checkbox"/>
<p>Initial offset for expansion bearings due to shortening, shrinkage, and creep</p>		<input type="checkbox"/>	<input type="checkbox"/>
<p>Note: See the Special Provisions for testing requirements and other specifications. (Most current Special Provisions shall be used.)</p>		<input type="checkbox"/>	<input type="checkbox"/>