

BRIDGE PRACTICE GUIDELINES

SECTION 1- GENERAL

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PURPOSE

The purpose of these Guidelines is to document ADOT Bridge Group design criteria and to provide guidance on interpretations of the various AASHTO publications and other documents as related to highway bridges and appurtenant structures.

The Guidelines are intended to be used for general direction. It will continue to be the responsibility of the designer 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. Refer to the Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges prepared by FHWA and the Arizona Structure Inventory prepared by ADOT Bridge Management Section.

Bridge Definition

"A 'bridge' is defined as a structure including supports erected over a depression or an obstruction, as water, highway or railway and having a track or passageway for carrying traffic or other moving loads and having an opening measured along the center of the roadway of more than 20 feet between undercopings of abutments or springlines of arches or extreme ends of openings for multiple boxes; it may include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening."

Structure Name

Names of State bridges are assigned by the Bridge Management Section Leader. Structures are named in accordance with the kind of facility that goes under or over the principal route. A traffic interchange structure will have "T.I." as part of the name. Overpasses carrying one-way traffic will also include the direction of traffic as part of the name. The name is limited to a 20 digit field.

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.

Structure Number

Each defined 'bridge' has a unique number assigned by the Bridge Management 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	State jurisdiction bridges
3000-3999	Federal jurisdiction bridges
4000-7999	State jurisdiction culverts
8000 and above	Local jurisdiction bridges and culverts

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, under 20 feet use the station of the point of intersection between the principal route and the construction centerline of the culvert. For culvert structures 20 feet and over, use the station of the beginning backwall.

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.

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). These studies will form the basis for the Bridge Selection Report and provide the Geotechnical Engineer with sufficient information to order one or two initial borings to be used in providing a preliminary foundation recommendation.

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 Bridge Geotechnical Report. The second activity consists of finalizing the Bridge Selection Report based on the final Bridge Hydraulics Report and Bridge 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

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.
- 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 Bridge Management Section, Drainage Section and the Districts will be required. These studies will examine the condition of qualified existing bridges to determine which bridges should be developed into replacement projects.

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 Structure Inventory and 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. A copy of the Arizona Structure Inventory is on file.

For projects where existing bridges are involved, a thorough review of the Bridge Inspection File and coordination with 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 foot 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. Refer to figures 1,2 and 3 for a sample of format and contents.

**FIGURE 1
INITIAL BRIDGE STUDY TITLE SHEET**

ARIZONA DEPARTMENT OF TRANSPORTATION

BRIDGE GROUP

BRIDGE DESIGN SECTION A, B or C

INITIAL BRIDGE STUDY

DATE

HIGHWAY NAME

PROJECT NAME

PROJECT NUMBER

TRACS NUMBER

BRIDGE NAME

EXISTING STRUCTURE NUMBER

MILEPOST

Prepared by _____

Date _____

FIGURE 2 INITIAL BRIDGE STUDY REPORT BODY

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.

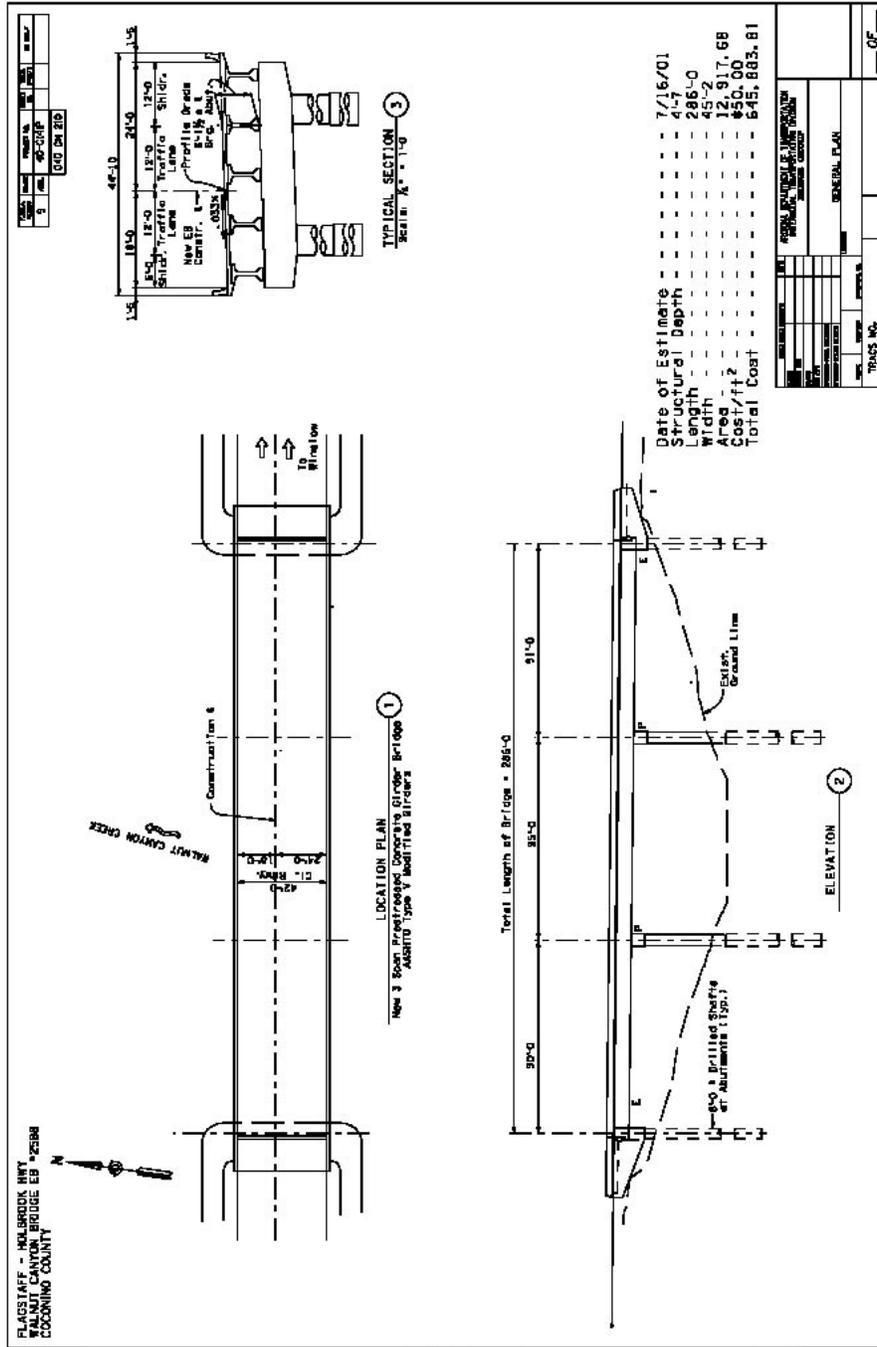
EXISTING BRIDGE:

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, traffic handling and costs.

FIGURE 3 INITIAL BRIDGE STUDY CONCEPT SKETCH



Preliminary Design

Preliminary design consists of three 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 and (3) obtaining FHWA approval of 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. Since a preliminary drilling program has been performed following the Initial Design Phase, a preliminary Bridge Geotechnical Report will be available for use in determining foundation type and costs.

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

The need for a deck protection system and type of system will be determined during this phase. Details of the system should be worked out with Bridge Management Section.

Bridges over Waterways

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

Widenings/Rehabilitation

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

- Comments from the environmental 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.
- 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, respaced or replaced, or a new bridge may be recommended. The deck slab should also be checked. Decks that are severely overstressed may require replacement.
- The condition of the existing deck joints should be investigated. If the existing joints are not working or are inadequate, they may require replacement.
- 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.
- 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. Welded diaphragms have caused past problems.
- The existing foundations should be checked for adequacy against predicted scour and if inadequate, appropriate means taken to upgrade the foundations against failure.
- 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.
- The need for adding approach slabs and/or anchor slabs, if missing, should be investigated.
- The adequacy of existing bridge rail, that would be left in place, should be investigated.

- The need for earthquake retrofit measures should be determined.
- 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.

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. There may be up to a six month delay between ordering drilling and receiving a recommendation.

FHWA Approval

This activity consists of obtaining FHWA approval of the Bridge Selection Report for Federal Aid Projects. Upon receipt of FHWA approval, the Preliminary Plans are considered complete and the Final design of the bridge may start.

Final Design

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

This activity involves completion of most of the structural analysis; some of the drawings, a preliminary cost estimate with quantities and unit costs; and any required special provisions.

This phase will also include reviewing the 60% project plans, submitting comments and attending the office and/or field review.

Stage IV

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.

When the project design is complete and quantities are calculated, a cost estimate shall be made. Unit costs may be obtained from the latest copy of the Unit Cost Summary and from the Bridge Group Bridge Costs Records. Unit prices should be adjusted for site location, size of project and other pertinent data.

PS & E Submittal - Stage V

The Plans, Specifications and Estimate (PS & E) Submittal is the final review of the project. This submittal shall be made when requested by the Control Desk. Complete plans and final quantities should always be finished by this date.

Bid Advertisement Date

The Bid Advertisement Date is the date the project is advertised. The Active Project Status Report refers to this date as the Bid Date. When requested by the Control Desk, the complete, signed and stamped tracings shall be sent to the Control Desk for printing of the bid sets.

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 as-built plans and reviewing the final as-built structural drawings for evaluation of design work and study for improvement.

BRIDGE PROJECT ENGINEER'S RESPONSIBILITY

General

Bridge Project Engineers are to be assigned to all new projects in which structure plans are required. The Bridge Engineer or Bridge Designer will be designated as the Bridge Project Engineer when the project study report or final Project Assessment becomes available and will be responsible for project delivery for all structure related items thru PS & E completion and subsequent construction contract completion.

Bridge Project Engineers are hereby given the authority and will be responsible for seeing that all Bridge Group design features comprising the PS & E package on projects are delivered on time, within budget, and in conformance with standards, to meet established schedules. Such features include structure plans for bridges, earth retaining structures, hydraulic structures, highway sign and lighting support structures, specifications for structures, and cost estimates for structures.

Bridge Project Engineers may also have responsibility for coordinating work efforts for completion of all work tasks if they are assigned as Project Managers according to the provisions of the Project Management process.

Selection of Bridge Project Engineers

Bridge Designers and Bridge Engineers interested in being selected as Bridge Project Engineers must obtain their Professional Engineer License and they must exhibit a majority of the following skills or traits:

- Has developed the technical skill.
- Gets along well with people.
- Is an innovator.
- Has initiative.
- Communicates effectively.
- Is practical.
- Has leadership abilities and will make decisions.
- Keeps abreast of technical developments.

- Has an understanding of ADOT policies and procedures.
- Understands the importance of project deadlines.

Duties of Bridge Project Engineers

A Bridge Project Engineer is assigned to support or act as the Project Leader or Project Manager and to direct the specific work effort assigned to Bridge Group. The duties of the Bridge Project Engineer shall include:

- Remain completely knowledgeable about the specific project tasks assigned.
- Direct the project work activities assigned.
- Coordinate with the project leader or project manager, as appropriate, on schedule, budget and quality control.
- Provide input for establishing a project's network model and on a continuous basis, provide input to update schedule data in the Management Scheduling and Control System.
- Review all preliminary reports for the project.
- Review bridge maintenance records for widening and rehabilitation projects.
- Review prior commitments to other agencies and coordinate commitments with ADOT policies.
- Direct preparation of Bridge Selection Reports and submit for approval as required.
- Coordinate structural details and design features within the project. Conduct meetings with designers and detailers as required.
- Work closely with other groups and services so that decisions in these areas are timely and consistent throughout the project.
- Attend scheduled progress meetings and site visits and provide information as required.
- Submit structure plans, special provisions and cost estimate on schedule.
- Coordinate all bridge construction liaison activities such as shop drawing review, construction modifications and final as-building.

CONSULTANT REVIEW PROCEDURES

General

This section is intended to provide procedures to be followed by the Bridge Design Sections in their review of consultant designs. The intent of these procedures is to produce consultant designs which have the same appearance (format and content) as ADOT Bridge Group in-house designs and to promote consistency among the three Design Sections and the consultants.

A Project Engineer will be assigned to each consultant review project. Large bridge projects will usually also have a designer assigned to the project to assist in the review.

Documentation

Reviews will be performed on scoping documents such as Project Assessments or Design Concept Reports whether prepared by a consultant or ADOT. Reviews will also be performed on consultant bridge designs at the 30%, 60%, 95% and 100% stages.

All submittals shall be stamped with the date received and a log book of all consultant review submittals shall be kept by each Section. The log shall track the type of review document, the date each submittal is received, the date when comments are due, and the date comments are returned.

An official project review file, consisting of hard grey filing folders, and a working file should be maintained for each project. The official project review file shall be organized the same as for in-house designs with a title sheet, an index and correspondence on the left side and review comments on the right side. The working file shall contain the submittal documents, special provisions and reviewer calculations.

Review comments should be returned to the project manager and be submitted on a Bridge Group Comment Review Form. A copy of all review comments shall be kept in the Official Project Review File.

Reviews

At each review stage, the reviewer should verify that all previous comments have been resolved and are properly reflected in the new submittal. When all old comments have been resolved, the old submittal documents may be discarded.

Reviews should be made to ensure that each submittal meets the requirements for the appropriate submittal stage. Reviews should also verify major features of the design but should not include number by number calculation checks. Calculations will not usually be submitted unless requested by the reviewer.

30% Submittal

For a 30% submittal, the following items should be included as a minimum:

- General Plan
- Bridge Selection Report
- Cost Estimate
- Final Bridge Geotechnical Report
- Final Bridge Hydraulics Report

Review of 30% submittals should be limited to ensuring that the proper bridge type, span lengths, widths and structure depth have been selected. An independent preliminary superstructure analysis should be performed to verify the structure depth. The reviewer should also check for consistency between the Geotechnical and Hydraulics Reports as related to the recommended foundation type. The General Plan and General Notes and Quantity Sheets should be complete except for the quantity box. Unit costs should be reviewed and bid items compared to the Approximate Quantity Manual guidelines.

60% Submittal

For a 60% submittal the following items should be included as a minimum:

- 60% Bridge Plans
- Superstructure completed
- Boring logs completed
- Substructure started
- Draft Bridge Special Provisions
- Cost Estimate including Bid Items, Item numbers and unit costs

Review of 60% submittals should consist of ensuring that major bridge items have not changed from the 30% submittal and that all 30% comments have been incorporated into the plans. The deck and superstructure designs should be checked. The superstructure plan sheets should be complete. The reviewer should verify that the substructure is consistent with the Bridge Geotechnical Report.

95% Submittal

For a 95% submittal the following items should be included as a minimum:

- 95% Bridge Plans
- Final Special Provisions
- Final Cost Estimate

Review of 95% submittals should consist of ensuring that 60% review comments have been incorporated into the plans. A review of the substructure for clarity and completeness should be made.

100% Submittal

The 100% submittal should be reviewed to ensure that the 95% comments have been incorporated into the plans and that all outstanding issues have been resolved.

Project Review

In addition to the review of bridge documents, the reviewer 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 CBCs, 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.

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. Box Culvert quantities are to be computed in accordance with the Reinforced Concrete Box Culvert Manual.

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 error 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. 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.

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.
			fC= 3000 C.Y.	fC= 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

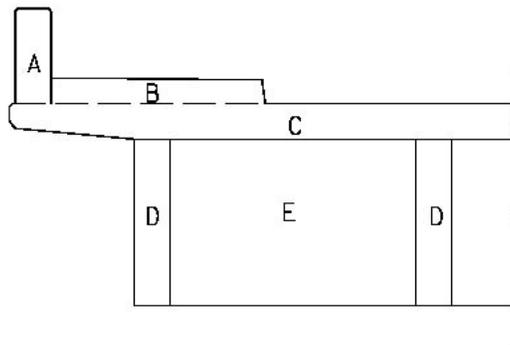
AS-BUILT

TABLE 2
SAMPLE APPROXIMATE QUANTITIES FOR CONCRETE

ARIZONA DEPARTMENT OF TRANSPORTATION
APPROXIMATE QUANTITIES

TRACS NO.: _____ SHEET 1 OF 3
 STATION _____ STRUCTURE NAME _____ NB/EB _____ DATE: 3-15-2001
 _____ SB/WB _____ BY ABC CHKD DEF
 PROJ. NO.: _____ OTHER: _____
 CLASS "S" f^c = _____ psi STRUCT. BKFL. STRUCTURAL EXCAVATION
FOR: Superstructure-Class 'S' Concrete

ITEM DESCRIPTION	UNIT DEPTH (ft)	UNIT WIDTH (ft)	UNIT LENGTH (ft)	NO OF UNITS (PER ITEM)	TOTAL	
					CU. FT	REVISION
Class "S" f ^c =3000						
Parapet "A"	1.500	0.920	160.000	1	2	442
Curb "B"	0.750	1.250	160.000	1	2	300
						742 / 27=27 c. y.
Class "S" f ^c =4500						
Deck "C"	0.542	41.333	160.000	1	1	3,584
Girders-Inter. "D"	3.167	1.167	48.000	7	2	2,484
Girders-ends "D"	3.167	1.167	25.080	7	2	1,298
Diaph. @abut. "E"	2.250	1.292	37.170	1	2	216
Diaph.-Inter. "E"	2.167	0.833	4.830	6	2	105
						7,687 / 27 c. y. = 285 c. y.
						ROUND TO NEAREST _____ CUBIC FOOT.
						ROUND TO NEAREST CUBIC YARD (TO BE COMPARED WITH CHECK SET).
CARRY TO THREE DECIMAL PLACE ACCURACY.						



IT IS RECOMMENDED THAT SMALL SKETCHES BE DRAWN OF PARTS BEING FIGURED.

Bid Item Numbers for concrete quantities vary based on the specific concrete strength. If a concrete strength not shown is required, Bid Item Number 6010010 should be used. A list of Bid Item Numbers, Items and Units for various concrete strengths follows:

ITEM NO.	ITEM	UNIT
6010001	STRUCTURAL CONCRETE (CLASS S) (F'c=2500PSI)	CY
6010002	STRUCTURAL CONCRETE (CLASS S) (F'c=3000PSI)	CY
6010003	STRUCTURAL CONCRETE (CLASS S) (F'c=3500PSI)	CY
6010004	STRUCTURAL CONCRETE (CLASS S) (F'c=4000PSI)	CY
6010005	STRUCTURAL CONCRETE (CLASS S) (F'c=4500PSI)	CY
6010006	STRUCTURAL CONCRETE (CLASS S) (F'c=5000PSI)	CY
6010007	STRUCTURAL CONCRETE (CLASS S) (F'c=5500PSI)	CY
6010010	STRUCTURAL CONCRETE (CLASS S) (F'c=)	CY

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 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.

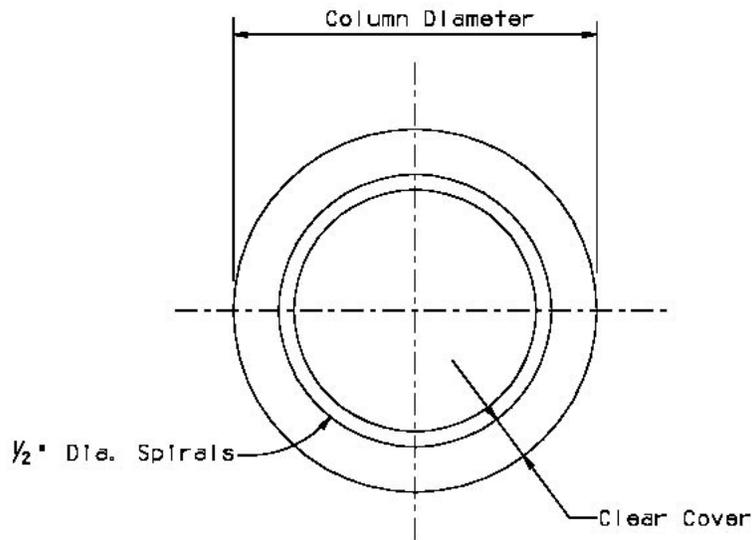
The length of each item of reinforcement not detailed on the drawings is figured to the nearest 3 inches. An amount of 2 feet is added for any lap not detailed. A lap is figured for every 40 running feet of bar. As an example, a bar required to be 90 feet in length would have a length of 4 feet added 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 IN LBS OF DEFORMED REINFORCING BARS

SIZE	#2	#3	#4	#5	#6	#7
WEIGHT	.167	.376	.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

A special Table 4, shown below, is given for weight of 1/2" diameter spiral reinforcing for round concrete columns according to the diameter, cover and pitch.

TABLE 4
WEIGHTS OF 1/2" SPIRALS PER VERTICAL FOOT



Col. Dia. (Ft.)	Clear Cover (inches)	Pitch (inches)								
		3	3 1/2	4	4 1/2	5	5 1/2	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	50.0	42.9	37.5	33.3	30.0	27.1	25.0	16.8	12.7
6'-6	2	51.4	44.1	38.6	34.3	30.8	28.0	25.7	17.3	13.0
	3	50.0	42.9	37.5	33.3	30.0	27.1	25.0	16.8	12.7
	6	45.8	39.3	34.4	30.5	27.5	25.0	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	12.0
	3	45.8	39.3	34.4	30.5	27.5	25.0	22.9	15.4	11.6
	6	41.6	35.7	31.2	27.7	25.0	22.7	20.8	14.0	10.6
5'-6	2	43.0	36.9	32.3	28.7	25.8	23.5	21.5	14.5	11.0
	3	41.6	35.7	31.2	27.7	25.0	22.7	20.8	14.0	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
4'-6	2	34.6	29.7	26.0	23.1	20.8	18.9	17.3	11.7	8.9
	3	33.2	28.5	24.9	22.2	19.9	18.1	16.6	11.3	8.6
	6	29.0	24.9	21.8	19.4	17.4	15.8	14.5	9.9	7.6
4'-0	2	30.4	26.1	22.8	20.3	18.3	16.6	15.2	10.4	7.9
	3	29.0	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
3'-6	2	26.2	22.5	19.7	17.5	15.7	14.3	13.1	9.0	6.9
	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
3'-0	2	22.0	18.9	16.5	14.7	13.2	12.0	11.0	7.6	5.9
	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	11.0	9.9	9.0	8.2	5.9	4.6
2'-6	2	17.8	15.3	13.4	11.9	10.7	9.7	8.9	6.3	4.9
	3	16.4	14.1	12.3	11.0	9.9	9.0	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'-0	2	13.6	11.7	10.2	9.1	8.2	7.4	6.8	5.0	4.0
	3	12.2	10.5	9.2	8.2	7.3	6.7	6.1	4.6	3.7
	6	8.0	6.9	6.0	5.4	4.8	4.4	4.0	3.5	3.0

Special attention is called to the sample approximate quantities for weights on Table 5, which 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.

Quantities for epoxy coated reinforcing steel shall be separated from regular reinforcing steel quantities. A list of Bid Item Numbers, Items and Units for reinforcing steel follows:

ITEM NO.	ITEM	UNIT
6050002	REINFORCING STEEL	LB
6050012	REINFORCING STEEL (EPOXY COATED)	LB

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.

TABLE 5
SAMPLE APPROXIMATE QUANTITIES FOR REINFORCING STEEL

ARIZONA DEPARTMENT OF TRANSPORTATION APPROXIMATE QUANTITIES							
TRACS NO. _____		STRUCTURE NAME				SHEET <u>2</u> OF <u>3</u>	
STATION _____		NORTHERN AVE. UP		NB/EB <input checked="" type="checkbox"/>		DATE <u>3-15-01</u>	
PROJ. NO.: <u>I-10-4(24)</u>				SB/WB <input type="checkbox"/>		BY <u>ABC</u> <u>CHKD</u> <u>DEF.</u>	
REINF. STEEL <input type="checkbox"/>		STRUCT. STEEL <input type="checkbox"/>		FOR <u>Abutment #1</u>			
ITEM DESCRIPTION	UNIT SIZE	UNIT WEIGHT (PER FT)	UNIT LENGTH (FT)	NO OF UNIT (PER ITEM)	NO OF ITEMS	TOTAL	
						WEIGHT	REVISION
Cap beam long.	#5	1.043	40.75	11	1	468	
Back wall long.	#4	.668	38.00	8	1	203	
Hoops in cap <input checked="" type="checkbox"/>	#4	.668	13.00	37	1	321	
Back wall verticals	#4	.668	4.00	76	1	203	
					Subtotal	1,195	
Wing cap long.	#5	1.043	12.00	6	2	150	
Hoop in wing cap	#4	.668	10.75	7	2	101	
Wing long.	#5	1.043	9.50	12	2	238	
Wing long.	#4	.668	9.50	8	2	96	
Wing stirrups <input type="checkbox"/>	#4	.668	15.00	11	2	220	
Parapet verticals	#4	.668	4.25	22	2	126	
					Subtotal	931	
STANDARD WEIGHT FROM TABLE 4							
					Total	2,126	
					Use	2,125 lbs.	
					ROUND TOTAL TO		
					NEAREST 5 LBS.		

TABLE 6
SAMPLE APPROXIMATE QUANTITIES FOR STRUCTURAL STEEL

ARIZONA DEPARTMENT OF TRANSPORTATION								
APPROXIMATE QUANTITIES								
TRACS NO.:						SHEET _____	OF _____	
STATION	STRUCTURE NAME				NB/EB	DATE _____		
623+					SB/WB	BY _____	CHKD _____	
PROJ. NO. : I-10-4(24)								
REINF. STEEL	<input type="checkbox"/>	STRUCT STEEL	<input type="checkbox"/>	FOR _____				
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	14.00	13.00	2	10	3,640		
Cover PL@Pier #1	Ends	9.56	1.50	2	20	574		
Cover PL@Pier #2	PL 5/8x11	23.40	16.00	2	5	3,744		
Cover PL@Pier #2	Ends	15.90	1.50	2	10	477		
Splices	PL ½x11½	19.60	2.54	2	20	1,992		
Bolts in Splices	7/8 φ	.924		94	20	1,737		
Welds for Cover PL	5/16" Fillet	.166	204	1	5	169		
					Subtotal	183,622		
Shear Connector								
Studs	¾"φx4"	.615				415		
					Subtotal	415		
Stiff PL	PL ½ x5	8.5	2.83	20	1	481		
Welds for above	5/16" Fillet	.166	7.78	114	1	147		
Diaphragms	[18x42.7	42.7	7.0	8	1	2,391		
Diaphragms	[15x33.9	33.9	7.00	44	1	10,441		
Bolts for above	7/8"φ	1.101		114	8	1,004		
Stiff PL	PL ¾x5	12.80	2.80	30	1	1,086		
Stiff PL	PL 3/8x5	6.38	2.83	8	8	1,155		
Exp Joint	3x3x3/8	7.20	28.00	2	2	806		
Anchors for above	5/8φ	1.33	29.00	1	2	77		
Welds	¼ Fillet	.106	29.00	.167	4	2		
					Subtotal	885		
				Round TOTAL TO NEAREST 5 LBS. →		Total	201,629	Lbs.
						Use	201,630	Lbs.

Listed below are the items which are to be included or excluded in the total of structural steel:

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 A.I.S.C. Manual of Steel Construction. As shown in the A.I.S.C. 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 A.S.T.M. permissible overrun of plates.

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 70 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

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 A.I.S.C. 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.

TABLE 9
WEIGHT IN LBS OF WELDS PER LINEAR FOOT
45 degree fillet weld

SIZE	1/8	3/16	1/4	5/16	3/8	7/16	1/2	9/16
WEIGHT	.027	.060	.106	.166	.239	.326	.425	.538
SIZE	5/8	11/16	3/4	13/16	7/8	15/16	1"	
WEIGHT	.664	.804	.956	1.12	1.30	1.50	1.70	

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 with the parenthesis. Structural steel weights are not figured for concrete structures. A list of Bid Item Numbers, Items and units for various structural steel follows:

ITEM NO.	ITEM	UNIT
6040001	STRUCTURAL STEEL	LB
6040002	STRUCTURAL STEEL ()	LB
6040003	STRUCTURAL STEEL (MISC)	LB

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.

Figure 10, Structural Excavation Payment Limits, is shown for typical conditions. Actual payment limits for each structure shall be included with the structure drawings.

A list of Bid Item Numbers, Items and Units for structural excavation follows:

ITEM NO.	ITEM	UNIT
2030501	STRUCTURAL EXCAVATION	CY

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.

Structure backfill for abutments is figured as follows:

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. Figure 11, Structure Backfill Payment Limits, is shown for typical conditions. Actual payment limits for each structure shall be included with the structure drawings.

A list of Bid Item Numbers, Items and Units for structure backfill follows:

ITEM NO.	ITEM	UNIT
2030506	STRUCTURE BACKFILL	CY

FIGURE 10
STRUCTURAL EXCAVATION PAYMENT LIMITS.

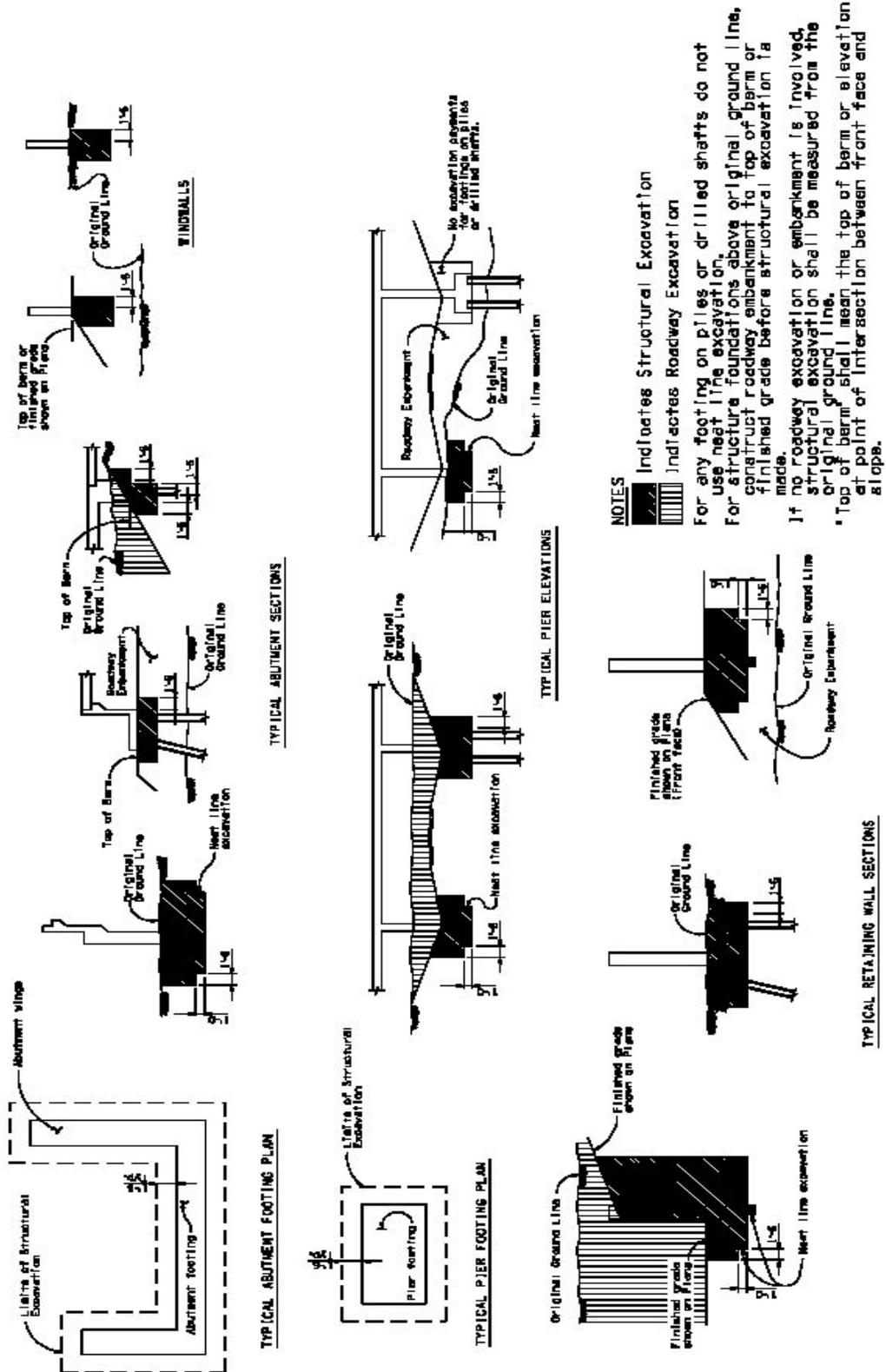
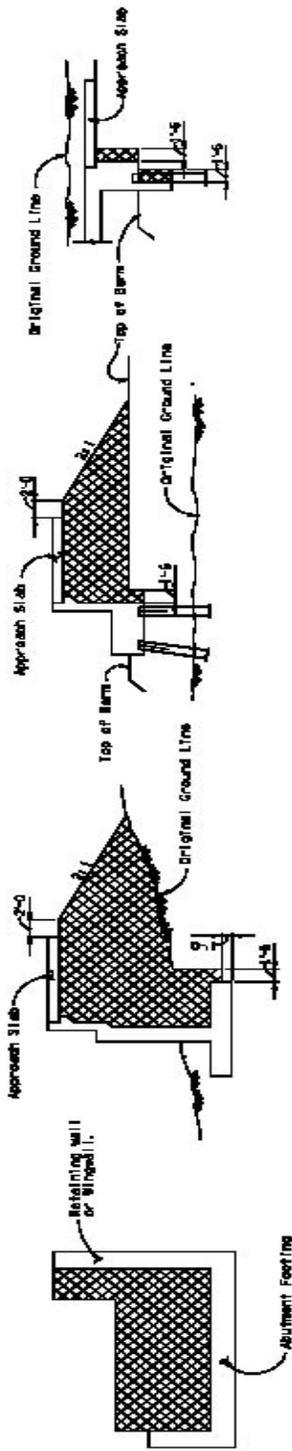
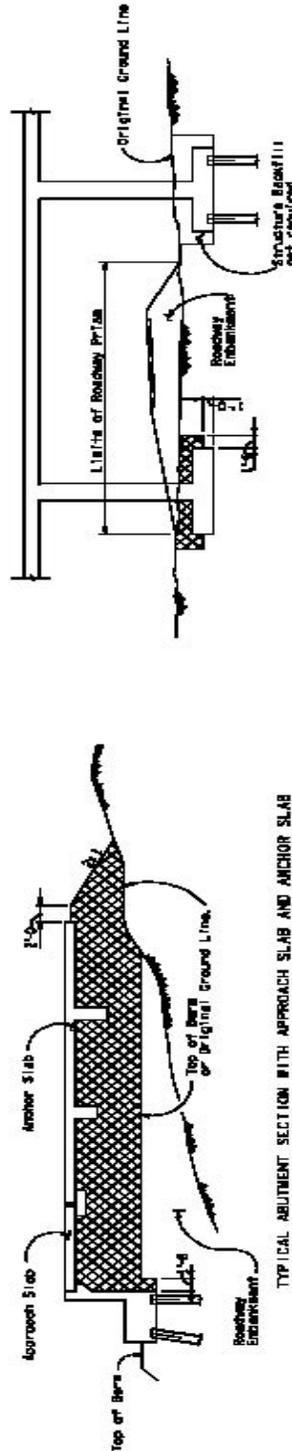


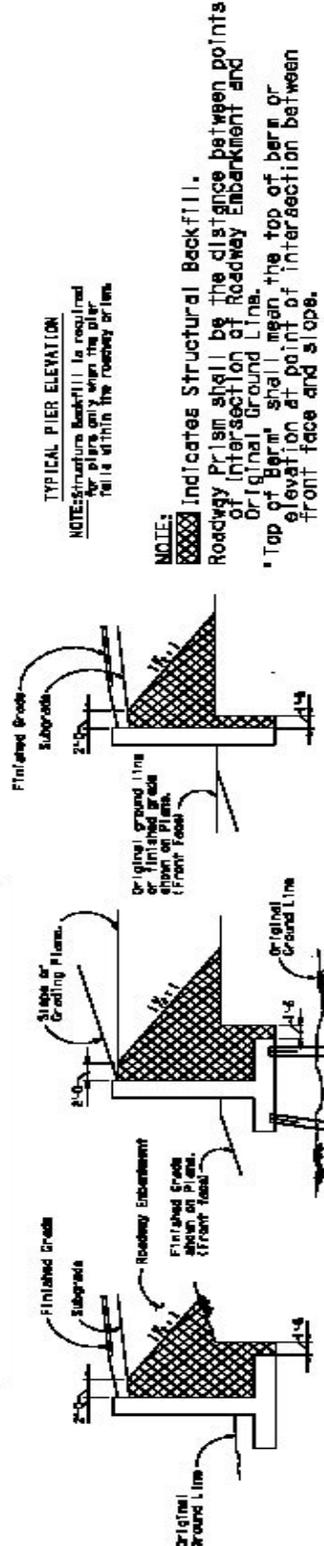
FIGURE 11
STRUCTURE BACKFILL PAYMENT LIMITS.



TYPICAL ABUTMENT SECTIONS WITH APPROACH SLABS



TYPICAL ABUTMENT SECTION WITH APPROACH SLAB AND ANCHOR SLAB



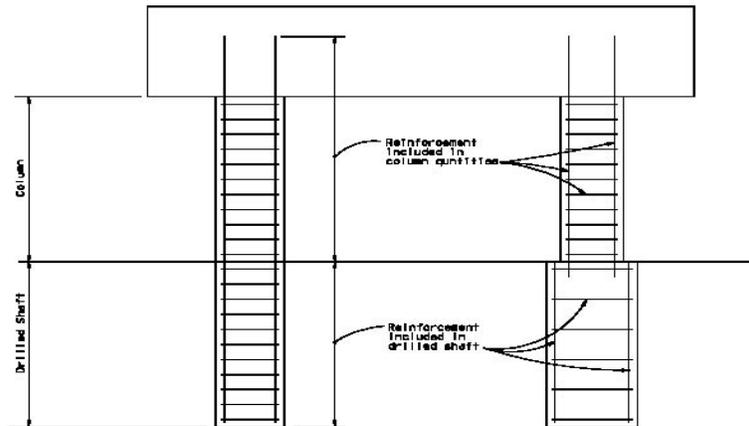
TYPICAL WALL SECTIONS

Drilled Shafts

Drilled shafts are bid by the linear foot. The item for drilled shafts includes the drilling, any casing, the concrete and all reinforcing steel embedded in the shaft. Quantities are rounded to the nearest foot for each sub item such as abutments and piers. Quantities are figured separately for each size and separated into two categories: drilled shafts drilled into rock and drilled shafts drilled into soil. Standard sizes are listed below. For special size shafts use Item Number 6090148 and fill in the specified diameter in inches within the parenthesis. For shafts in rock use Item Number 6091030 and fill in the specified diameter in inches within the parenthesis.

A list of Bid Item Numbers, Items and Units for drilled shafts follows:

ITEM NO.	ITEM	UNIT
6090018	DRILLED SHAFT FOUNDATION (18")	LF
6090024	DRILLED SHAFT FOUNDATION (24")	LF
6090030	DRILLED SHAFT FOUNDATION (30")	LF
6090036	DRILLED SHAFT FOUNDATION (36")	LF
6090042	DRILLED SHAFT FOUNDATION (42")	LF
6090048	DRILLED SHAFT FOUNDATION (48")	LF
6090054	DRILLED SHAFT FOUNDATION (54")	LF
6090060	DRILLED SHAFT FOUNDATION (60")	LF
6090066	DRILLED SHAFT FOUNDATION (66")	LF
6090072	DRILLED SHAFT FOUNDATION (72")	LF
6090078	DRILLED SHAFT FOUNDATION (78")	LF
6090084	DRILLED SHAFT FOUNDATION (84")	LF
6090096	DRILLED SHAFT FOUNDATION (96")	LF
6090148	DRILLED SHAFT FOUNDATION ()	LF
6091030	DRILLED SHAFTS (ROCK) ()	LF



TYPICAL DRILLED SHAFTS

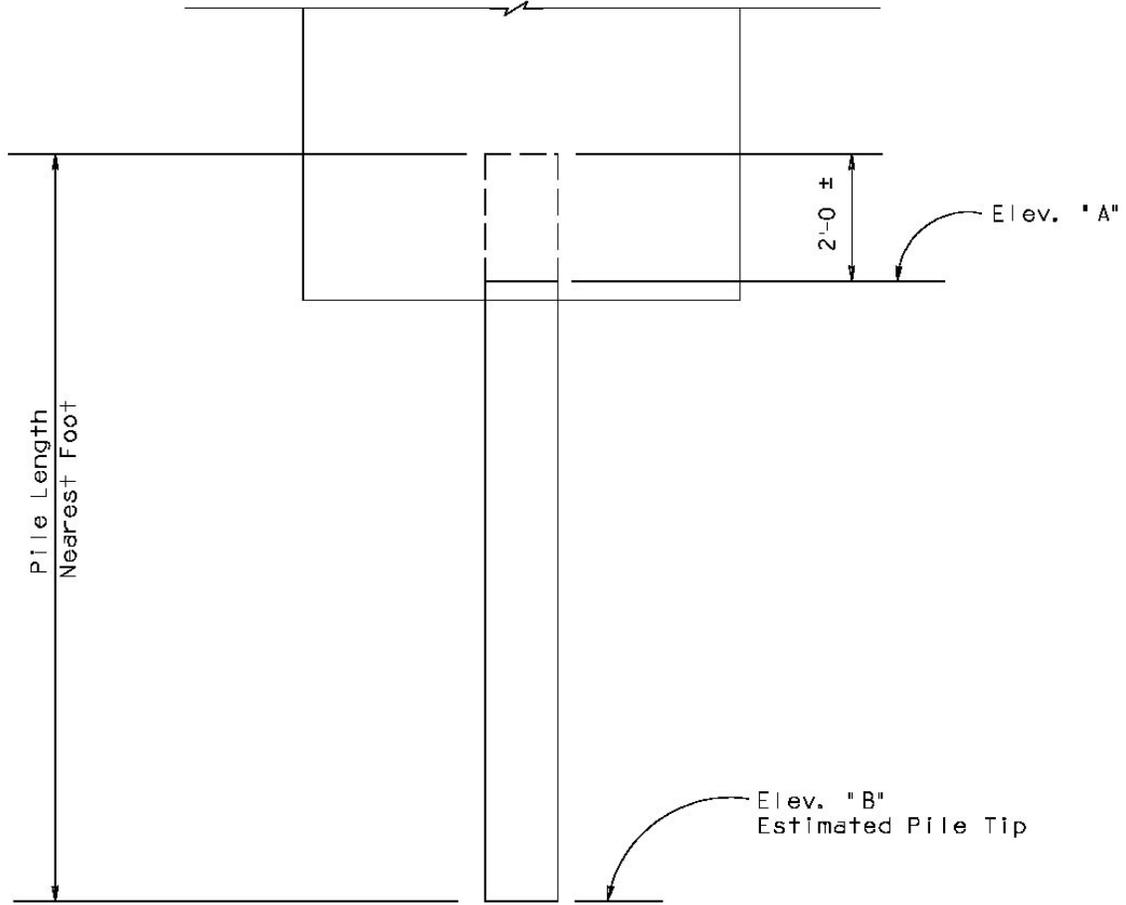
Driven Piles

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. There is no direct estimate for splicing. When an H-pile is specified other than the four sizes shown, items 6030012 and 6030194 should be used and the size placed in the parenthesis. When driven piles other than H-piles are specified, items 6030194 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 Figure 12 for a diagram.

A list of Bid Item Numbers, Items and Units for driven piles follows:

ITEM NO.	ITEM	UNIT
6030003	FURNISHING PILES (STEEL) (HP12x53)	LF
6030005	FURNISHING PILES (STEEL) (HP12x74)	LF
6030008	FURNISHING PILES (STEEL) (HP14x89)	LF
6030010	FURNISHING PILES (STEEL) (HP14x117)	LF
6030012	FURNISH HP PILES	LF
6030013	FURNISH PILES ()	LF
6030190	DRIVE HP 12 x 53 PILES	LF
6030191	DRIVE UP 12 x 74 PILES	LF
6030192	DRIVE HP 14 x 89 PILES	LF
6030193	DRIVE HP 14 x 117 PILES	LF
6030194	DRIVE HP PILES ()	LF
6030195	DRIVE PILES ()	LF
6030303	SPLICING PILE STEEL (5 TIMES UNIT PRICE OF 6030003)	EA
6030305	SPLICING PILE STEEL (5 TIMES UNIT PRICE OF 6030005)	EA
6030308	SPLICING PILE STEEL (5 TIMES UNIT PRICE OF 6030008)	EA
6030310	SPLICING PILE STEEL (5 TIMES UNIT PRICE OF 6030010)	EA
6030312	SPLICING PILE STEEL (5 TIMES UNIT PRICE OF 6030012)	EA
6030313	SPLICING PILE (5 TIMES UNIT PRICE OF 6030013)	EA

FIGURE 12
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 consist of AASHTO standard or modified I-girders, 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.

A list of Bid Item Numbers, Items and Units for these members follows:

ITEM NO.	ITEM	UNIT
6014950	PRECAST, P/S MEMBER (AASHTO TYPE 2 GIRDER)	LF
6014951	PRECAST, P/S MEMBER (AASHTO TYPE 3 GIRDER)	LF
6014952	PRECAST, P/S MEMBER (AASHTO TYPE 4 GIRDER)	LF
6014953	PRECAST, P/S MEMBER (AASHTO TYPE 5 GIRDER)	LF
6014954	PRECAST, P/S MEMBER (AASHTO TYPE 6 GIRDER)	LF
6014955	PRECAST, P/S MEMBER (AASHTO TYPE 5 MOD. GR.)	LF
6014956	PRECAST, P/S MEMBER (AASHTO TYPE 6 MOD. GR.)	LF
6014957	PRECAST, P/S MEMBER (BOX BEAM TYPE BI-36)	LF
6014958	PRECAST, P/S MEMBER (BOX BEAM TYPE BII-36)	LF
6014959	PRECAST, P/S MEMBER (BOX BEAM TYPE BIII-36)	LF
6014960	PRECAST, P/S MEMBER (BOX BEAM TYPE BIV-36)	LF
6014961	PRECAST, P/S MEMBER (BOX BEAM TYPE BI-48)	LF
6014962	PRECAST, P/S MEMBER (BOX BEAM TYPE BII-48)	LF
6014963	PRECAST, P/S MEMBER (BOX BEAM TYPE BII-48)	LF
6014964	PRECAST, P/S MEMBER (BOX BEAM TYPE BIV-48)	LF
6014965	PRECAST, P/S MEMBER (VOIDED SLAB TYPE SI-36)	LF
6014966	PRECAST, P/S MEMBER (VOIDED SLAB TYPE SII-36)	LF
6014967	PRECAST, P/S MEMBER (VOIDED SLAB TYPE SII-36)	LF
6014968	PRECAST, P/S MEMBER (VOIDED SLAB TYPE SIV-36)	LF
6014969	PRECAST, P/S MEMBER (VOIDED SLAB TYPE SI-48)	LF
6014970	PRECAST, P/S MEMBER (VOIDED SLAB TYPE SII-48)	LF
6014971	PRECAST, P/S MEMBER (VOIDED SLAB TYPE SIII-48)	LF
6014972	PRECAST, P/S MEMBER (VOIDED SLAB TYPE SIV-48)	LF
6014973	PRECAST, P/S MEMBER ()	LF

Miscellaneous Items

A list of miscellaneous Bid Item Numbers, Items and Units follows:

ITEM NO.	ITEM	UNIT
2020002	REMOVE BRIDGE	LUMP SUM
2020008	REMOVAL OF STRUCTURAL CONCRETE	LUMP SUM
2020009	REMOVAL OF STRUCTURAL CONCRETE	CY
6010501	BRIDGE REPAIR	LUMP SUM
6010801	BRIDGE DECK DRAIN ASSEMBLY	LS
6010831	GROOVE BRIDGE DECK	SQ YD
6011130	32 IN. F-SHAPE BRIDGE CONCRETE BARRIER AND TRANSITION (SD 1.01)	LF
6011131	42 IN. F-SHAPE BRIDGE CONCRETE BARRIER AND TRANSITION (SD 1.02)	LF
6011132	COMBINATION PEDESTRIAN-TRAFFIC BRIDGE RAILING (SD 1.04)	LF
6011133	PEDESTRIAN FENCE FOR BRIDGE RAILING SD 1.04 (SD 1.05)	LF
6011134	TWO TUBE BRIDGE RAIL (SD 1.06)	LF
6011371	APPROACH SLAB (SD 2.01)	SF
6011372	ANCHOR SLAB-TYPE 1 (SD 2.02)	SF
6011373	ANCHOR SLAB-TYPE 2 (SD 2.03)	SF
6015101	RESTRAINERS, VERTICAL EARTHQUAKE (FIXED)	EA
6015102	RESTRAINERS, VERTICAL EARTHQUAKE(EXPANSION)	EA
6015200	HIGH-LOAD MULTI-ROTATIONAL BEARINGS	EA
6020001	PRESTRESSING CAST-IN-PLACE CONCRETE	LS
6041001	JACKING BRIDGE SUPERSTRUCTURE	LUMP SUM
6050101	PLACE DOWELS	EA
6050201	LOAD TRANSFER DOWELS	EA
6060040	BRIDGE SIGN STRUCTURE (TUBULAR) (40' TO 70')	EA
6060041	BRIDGE SIGN STRUCTURE (TUBULAR) (70' TO 94')	EA
6060042	BRIDGE SIGN STRUCTURE (TUBULAR) (94' TO 106')	EA
6060043	BRIDGE SIGN STRUCTURE (TUBULAR) (106' TO 130')	EA
6060044	BRIDGE SIGN STRUCTURE (TUBULAR) (130' TO 142')	EA
6060045	TUBULAR FRAME SIGN STRUCTURE (TYPE 1F) (SD 9.20)	EA
6060046	TUBULAR FRAME SIGN STRUCTURE (TYPE 2F) (SD 9.20)	EA
6060047	TUBULAR FRAME SIGN STRUCTURE (TYPE 3F) (SD 9.20)	EA
6060048	TUBULAR FRAME SIGN STRUCTURE (TYPE 4F) (SD 9.20)	EA
6060075	FOUNDATION FOR TUBULAR FRAME SIGN STRUCTURE (TYPE 1F) (SD 9.20)	EA
6060076	FOUNDATION FOR TUBULAR FRAME SIGN STRUCTURE (TYPE 2F) (SD 9.20)	EA

6060078	FOUNDATION FOR TUBULAR FRAME SIGN STRUCTURE (TYPE 3F) (SD 9.20)	EA
6060079	FOUNDATION FOR TUBULAR FRAME SIGN STRUCTURE (TYPE 4F) (SD 9.20)	EA
6060131	TUBULAR CANTILEVER SIGN STRUCTURE (TYPE 1C) (SD 9.10)	EA
6060132	TUBULAR CANTILEVER SIGN STRUCTURE (TYPE 2C) (SD 9.10)	EA
6060133	TUBULAR CANTILEVER SIGN STRUCTURE (TYPE 3C) (SD 9.10)	EA
6060134	TUBULAR CANTILEVER SIGN STRUCTURE (TYPE 4C) (SD 9.10)	EA
6060161	SIGN STRUCTURE (MEDIAN, TWO SIDED) (SD 9.01)	EA
6060162	SIGN STRUCTURE (MEDIAN, ONE SIDED) (SD 9.02)	EA
6060247	FOUNDATION FOR SIGN STRUCTURE (MEDIAN) (SD 9.01 OR SD 9.02)	EA
6060254	FOUNDATION FOR TUBULAR CANTILEVER SIGN STRUCTURE (TYPE 1C) (SD 9.10)	EA
6060255	FOUNDATION FOR TUBULAR CANTILEVER SIGN STRUCTURE (TYPE 2C) (SD 9.10)	EA
6060256	FOUNDATION FOR TUBULAR CANTILEVER SIGN STRUCTURE (TYPE 3C) (SD 9.10)	EA
6060257	FOUNDATION FOR TUBULAR CANTILEVER SIGN STRUCTURE (TYPE 4C) (SD 9.10)	EA
6100001	PAINTING STRUCTURAL STEEL	LUMP SUM
6100011	PAINT BRIDGE	LUMP SUM
7320471	BRIDGE JUNCTION BOX	EA
7379111	VARIABLE MESSAGE SIGN ASSEMBLY INSTALLATION	EA
9050430	THRIE BEAM GUARD RAIL TRANSITION SYSTEM (SD 1.03)	EA
9100008	CONCRETE BARRIER (TEMPORARY BRIDGE)	LF
9120001	SHOTCRETE	SQ YD
9140136	SOUND BARRIER WALL (CONCRETE) (SD 8.01)	SF
9140137	SOUND BARRIER WALL (MASONARY) (SD 8.02)	SF
9210001	SLOPE PAVING (STD. B-19.20 AND B-19.21)	SQ YD