TRANSMITTAL MEMORANDUM 97-05

MEMO TO: Design Consultants
Division of Bridge Design Staff

FROM: Stephen E. Goodpaster, P.E.
Director
Division of Bridge Design

DATE: December 11, 1997

SUBJECT: Plan Submittal Policies

Several issues have arisen that call for either additional instruction, clarification, or change from Guidance Manual Policies.

The following policies shall be implemented effective January 1, 1998 and shall be incorporated into all plans submitted thereafter:

1) Mechanically galvanized bolts, nuts and washers shall be specified for all bolted connections for painted steel structures.

Direct Tension Indicators (DTIs) shall be specified for all field connections. For painted structures, the DTIs shall be mechanically galvanized. For weathering steel structures, the DTIs shall be mechanically galvanized and epoxy coated.

General Notes will be developed for this and placed in the General Note Library.

2) All bridges with pile foundations shall use the attached pile records and notes on the foundation layout sheet.

3) The attached Guidance for Drilled Shaft Design and Detailing shall be used on all bridges with drilled shaft foundations.

4) Aesthetics shall be implemented in accordance with the Guidance Manual. However, when aesthetics are included as part of the structure and are documented throughout the project, a note shall be required on the plans documenting the aesthetic items and noting that these items are not subject to value engineering proposals.

5) Reinforcing steel for spread box beams shall be detailed as plain instead of epoxy coated except the stirrup bar extending into the bridge slab which will be epoxy coated.. This matches the details for PCI beam reinforcement. Reinforcement in side by side boxes shall be epoxy coated.

6) Structure plans shall be furnished on 36" x 22" size plan sheets. Any plans begun on the A1 size metric sheets may be completed on that size. Any plans begun after January 1, 1998 shall be on the 36" x 22" size.

7) All preliminary plans and final plans for structures shall be submitted to this Division. The Division of Bridge Design will forward plans to the appropriate parties for comment.

8) The new Specifications are scheduled to be available in January, 1998. The designer is advised to review the new specifications and familiarize themselves with changes that will occur upon implementation. Of particular note is a change requiring a bid item for masonry coating. A bid item and quantities shall be added to any plans scheduled for letting after March, 1998. In the interim, a note will be added by this Division when required.

9) The AASHTO Standard Specifications will be sunset following the 1999 interims. While we will not be implementing the new LRFD code for some time, every effort shall be made by designers to familiarize themselves with the LRFD code. To facilitate this, we hope to offer the NHI courses this winter. After the courses, we intend to start LRFD designs on some of the out year structures (FY 2001 & 2002). These designs will be performed both in house and by consultant. By beginning design on these structures early, we should be able to ease into LRFD slowly, without compromising letting schedules.

10) Designers should be mindful that, when using spread box beams, the CRSI recommended 180 degree pin diameters for stirrup bends causes fabrication problems. To accommodate fabrication, the standard box beams use stirrup bend diameters for the 180 degree ends of bars. This can be done in spread boxes also, or the webs can be thickened to eliminate this problem. The prestress manufacturers indicate that they have no problem accommodating a thicker web.

11) Consultants are reminded to check the Internet for updated base sheets (armored edge, PCI Beam, etc.) general notes and additional information.

Attachments

Pile Record for Point Bearing Piles

Pile No.	Pile Cut-off Elevation (meter)	Tip of Pile Elevation as Driven (meter)	Length of Pile in Place (meter)	Design Axial Load (kN)	Estimated Driving Resistance (kN)	Calculated Field Bearing (kN)

DESIGN AXIAL LOAD: Actual service load carried by the pile as determined from design calculations.

ESTIMATED DRIVING RESISTANCE: Soil resistance that must be overcome to advance the pile to solid rock.

CALCULATED FIELD BEARING: Bearing value of the pile in place as determined by pile driving formula in Section 604.08(D) of the Standard Specifications.

PILE DATA: All piles shall be driven to solid rock. After all piles have been driven, the Project Engineer shall record for each pile, the "Tip of Pile Elevation as Driven", the "Length of Pile in Place", and the "Calculated Field Bearing". This data shall be recorded on this sheet and sent to:

Director, Division of Bridge Design
State Office Building, Room 725
Frankfort, KY 40622

The "Length of Pile in Place" shown is the actual length of pile in the finished structure, below the "Pile Cut-off Elevation". This pile record does not replace other records of piles required to be kept and submitted by the Project Engineer.

HP 310x79 piles shall be in accordance with BPS-003, c.e.
HP 360x108 piles shall be in accordance with BPS-009, c.e.
HP 360x132 piles shall be in accordance with BPS-011, c.e.

Use the Pile(s) that apply

Pile Record for Friction Piles

Pile No.	Pile Cut-off Elevation (meter)	Tip of Pile Elevation as Driven (meter)	Length of Pile in Place (meter)	Design Axial Load (kN)	Minimum Pile Tip Elevation (meter)	Estimated Driving Resistance (kN)	Calculated Field Bearing (kN)

DESIGN AXIAL LOAD: Actual service load carried by the pile as determined from design calculations.

ESTIMATED DRIVING RESISTANCE: Soil resistance that must be overcome to advance the pile to the "Minimum Pile Tip Elevation".

CALCULATED FIELD BEARING: Bearing value of the pile in place as determined by pile driving formula in Section 604.08(D) of the Standard Specifications.

PILE DATA: Two criteria must be met when driving friction piles. The piles must be driven to the "Minimum Pile Tip Elevation", and the "Calculated Field Bearing" must equal or exceed the "Design Axial Load". If the "Calculated Field Bearing" equals or exceeds the "Design Axial Load" at a higher elevation than the "Minimum Pile Tip Elevation", driving shall continue until the "Minimum Pile Tip Elevation" is reached. If the "Calculated Field Bearing" is less than the "Design Axial Load" when the "Minimum Pile Tip Elevation" is reached, driving of the pile shall cease for a minimum of twelve hours. The pile shall then be struck ten blows with a warm hammer. If the "Calculated Field Bearing" is still less than the "Design Axial Load", the Central Office Division of Construction shall be consulted for further action. After all piles have been driven, the Project Engineer shall record for each pile, the "Tip of Pile Elevation as Driven", the "Length of Pile in Place", and the "Calculated Field Bearing". This Data shall be recorded on this sheet and sent to:

Director, Division of Bridge Design
State Office Building, Room 725
Frankfort, KY 40622

The "Length of Pile in Place" shown is the actual length of pile in the finished structure, below the "Pile Cut-off Elevation". This pile record does not replace other records of piles required to be kept and submitted by the Project Engineer.

HP 310x79 piles shall be in accordance with BPS-003, c.e.
HP 360x108 piles shall be in accordance with BPS-009, c.e.
HP 360x132 piles shall be in accordance with BPS-011, c.e.
355 mm piles shall be in accordance with BPC-002 or or BPC-011, c.e.

DRILLED SHAFT GUIDANCE

Note: The information provided is not to be considered policy. The information is provided to assist in designing and detailing drilled shaft in conformance with the Special Note and AASHTO requirements. The drilled shaft sheets are not base sheets. They are provided as guidance for developing the drilled shaft details necessary for the structure.

Drilled Shaft Record

Select the record appropriate for the type(s) of shafts required. One or both Drilled Shaft Records may be required. The designer has the option of combining the records by selecting the appropriate columns to insure all necessary information is provided.

The minimums (*) for rock socket length and shaft length are often controlled by the design for lateral stability. However, sometimes the bottom of a rock socket may be a specified depth below a certain point such as a coal seam. For this case, the column is left blank and an appropriate note is required.

Notes

Select the note(s) appropriate for the type(s) of shafts required. Designers may need to develop notes of their own or revise the wording of the notes shown.

Shaft Details

The top and bottom shaft details may be used in any combination necessary.

When footings are placed on drilled shafts, structure excavation is measured and paid in accordance with the Standard Specifications. Otherwise, the excavation is incidental to Drilled Shaft, Common.

Shafts are to be detailed straight sided top to bottom including the rock socket. An exception occurs when the Geotechnecial Report recommends a larger shaft size above the rock socket. The contractor always has the option of increasing the size of the shaft above the rock socket for ease of construction.

Shaft diameter is measured to the outside diameter of any temporary or permanent casing, to the rock face, or to the earth face.

The minimum reinforcement clearance from the perimeter of the shaft is 6", (150 mm) even in the rock socket.

Spirals shall be used for lateral reinforcement but the strength reduction factor for ties shall be used.

The minimum spiral pitch is 6", (150 mm). The maximum bar size for spiral reinforcement is a #5 (#16) bar.

The minimum spacing for vertical reinforcement is 6" (150 mm).

Splices shall be staggered a minimum of one splice length when splicing is required for vertical reinforcement. Zones where splicing is not permitted shall be shown. Bar length should not be shown.

Bundling vertical reinforcement should be avoided.

Permanent casing may be considered for vertical and confinement reinforcement. Deduct $^{1}/_{8}$", (3 mm), of the exterior thickness for section reduction due to corrosion. The net area may be included in determining the percentage of reinforcement, ρ.

Drilled Shaft Detailing

Detailing of Drilled Shafts shall satisfy the requirements of the Special Note for Drilled Shafts.

Longitudinal Reinforcement. The following note shall be placed on all sheets showing drilled shaft reinforcement details. '**Splicing of Longitudinal Reinforcement:** The first splice for longitudinal reinforcement shall be 12 m, minimum, from the top of shaft. No more than 50% of the longitudinal reinforcement shall be spliced within 1 splice lengths of any location or within three feet (one meter) of the splice location if mechanical connectors are used. Mechanical connectors shall develop a minimum of 125% of the yield strength of the longitudinal reinforcement. When a drilled shaft is lengthened in the field, 100% of the longitudinal reinforcement may be spliced at the bottom of the reinforcement cage.

Drilled Shaft to Column Reinforcement. Drilled shafts shall be constructed to within 3" (75 mm) of plan position in a horizontal plane at the top of shaft plan elevation. Clearance requirements for longitudinal reinforcement in drilled shafts and columns preclude longitudinal reinforcement continuity. The plans shall provide a reinforcement detail that maintains

reinforcement continuity and satisfies the design requirements of the drilled shaft to column connection. The size of the longitudinal and spiral reinforcement and embedment depth in the drilled shaft and column shall be provided by the structure designer. The diameter of the splice reinforcement cage shall be sized so that the cage will be approximately 6" (150 mm) clear from both the drilled shaft and column reinforcement at the maximum allowed horizontal out-of-plan tolerance of 3" (75 mm). Longitudinal bars shall not have hooks.

Special Note

Anyone designing or detailing drilled shafts should familiarize themselves with the Special Note for Drilled Shafts provided by the Geotechnical Branch.

DRILLED SHAFT RECORD

Drilled Shaft No.	Drilled Shaft Capacity (Units)			Elevations (Meters)					Lengths (Meters)					
				Top of D.S.	Top of Rock	Bottom of D.S.		Top of Rock Socket	Common	Solid Rock		Rock Socket		
	Bearing	Uplift	Lateral			Plan	As Built		Plan	Plan	As Built	Plan	*Minimum	As Built

* For Lateral Stability

DRILLED SHAFT RECORD

Drilled Shaft No.	Drilled Shaft Capacity (Units)			Elevations (Meters)			Lengths (Meters)		
				Top of D.S.	Bottom of D.S.		Common		
	Bearing	Uplift	Lateral		Plan	As Built	Plan	*Minimum	As Built

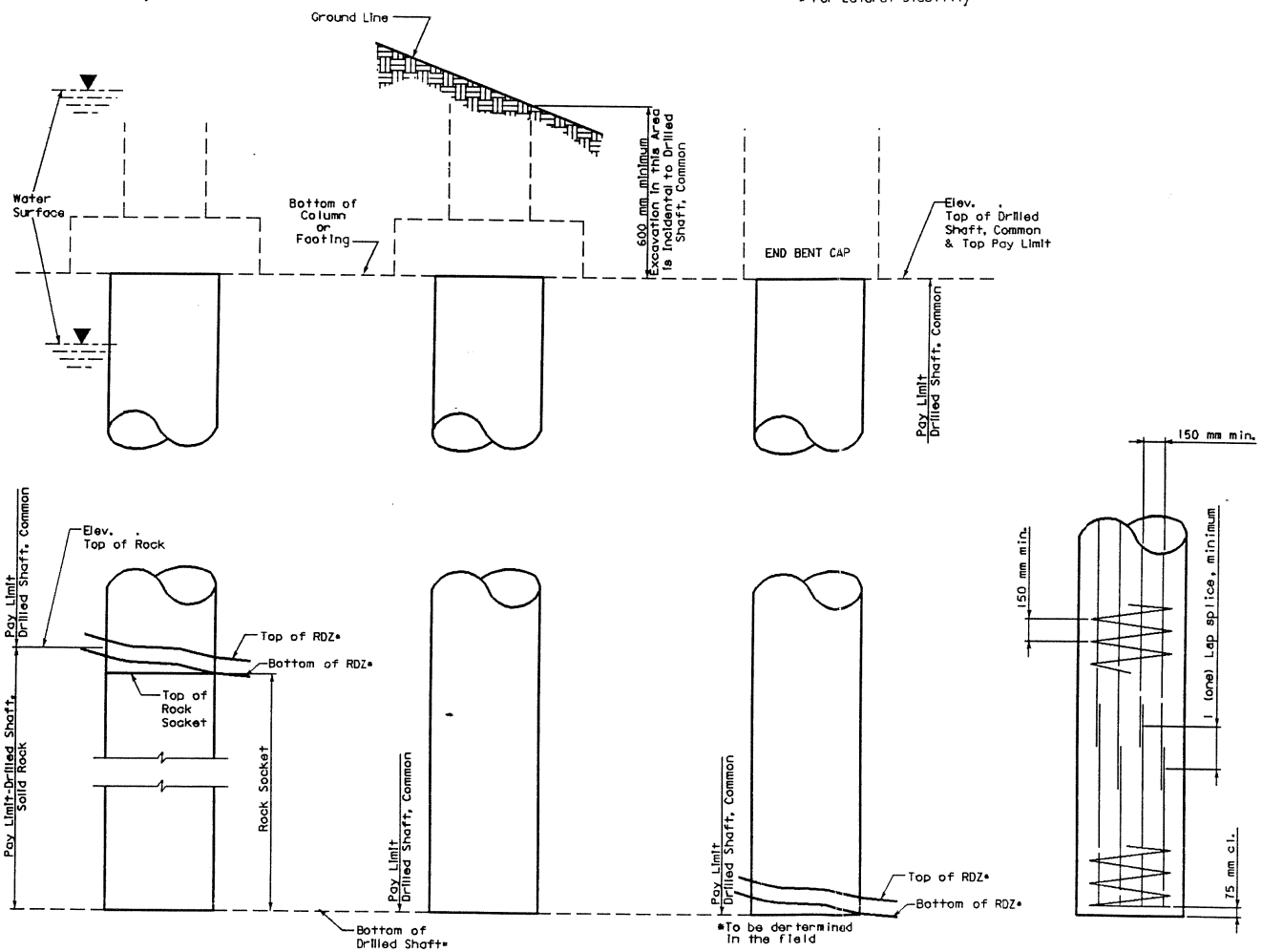
* For Lateral Stability

NOTE: After completing the drilling operations, the Resident Engineer shall complete the Drilled Shaft Record. One copy of the completed record shall be forwarded to the Director, Division of Bridge Design. This Drilled Shaft Record does not replace other records and documentation required. See the Special Note for Drilled Shafts for additional required drilled shaft records.

NOTE: Drilled shafts founded at the base of RDZ shall be at or below the bottom of RDZ as determined in the field by the Resident Engineer. Bottom of shaft elevations and lengths shown are design/plan values and shall be considered approximate. Elevations and pay lengths shall be determined in the field. There shall be no separate measurement and pay for Drilled Shaft, Solid Rock.

NOTE: Drilled shafts with rock sockets shall be paid plan quantity for Drilled Shaft, Common. The top of rock socket and bottom of shaft/rock socket shall be determined in the field by the Resident Engineer. The pay length of Drilled Shaft, Solid Rock shall be determined in the field by the Resident Engineer. The length of rock socket may change due to the results of load tests.

NOTE: The bottom of drilled shafts that are friction bearing shall be determined in the field by the Resident Engineer. The plan/design bottom elevations may change due to the results of load tests. The length of shaft required by the Resident Engineer shall be measured and paid as Drilled Shaft, Common.



SHAFT with ROCK SOCKET | **FRICTION SHAFT** | **SHAFT with END BEARING on ROCK** | **SPLICE DETAIL**

DRILLED SHAFT RECORD

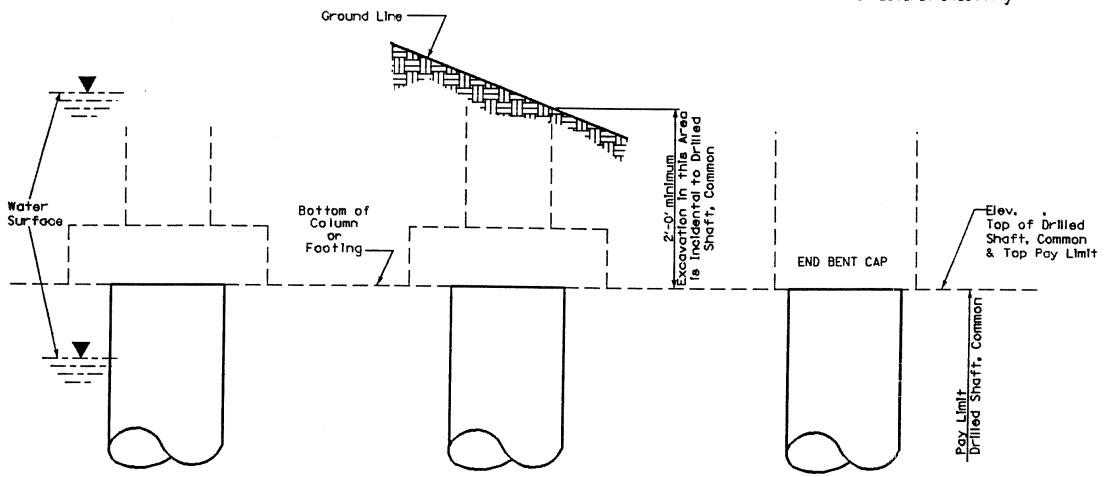
Drilled Shaft No.	Drilled Shaft Capacity (Units)			Elevations (Feet)					Lengths (Feet)					
				Top of D.S.	Top of Rock	Bottom of D.S.		Top of Rock Socket	Common	Solid Rock		Rock Socket		
	Bearing	Uplift	Lateral			Plan	As Built		Plan	Plan	As Built	Plan	*Minimum	As Built

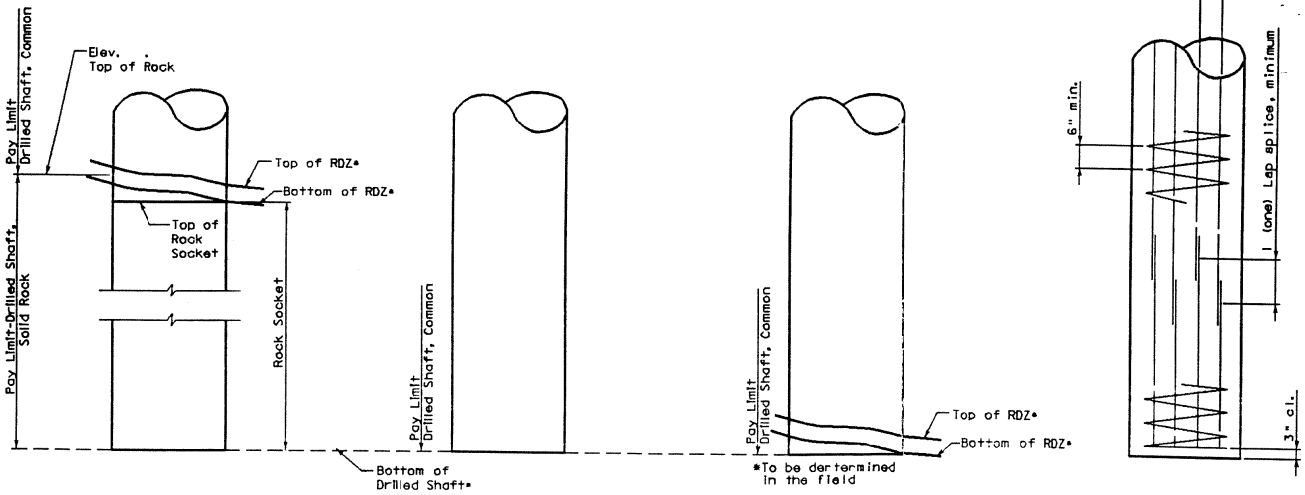
* For Lateral Stability

DRILLED SHAFT RECORD

Drilled Shaft No.	Drilled Shaft Capacity (Units)			Elevations (feet)			Lengths (feet)		
				Top of D.S.	Bottom of D.S.		Common		
	Bearing	Uplift	Lateral		Plan	As Built	Plan	*Minimum	As Built

* For Lateral Stability





SHAFT with ROCK SOCKET | **FRICTION SHAFT** | **SHAFT with END BEARING on ROCK** | **SPLICE DETAIL**

NOTE: After completing the drilling operations, the Resident Engineer shall complete the Drilled Shaft Record. One copy of the completed record shall be forwarded to the Director, Division of Bridge Design. This Drilled Shaft Record does not replace other records and documentation required. See the Special Note for Drilled Shafts for additional required drilled shaft records.

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NOTE: The bottom of drilled shafts that are friction bearing shall be determined in the field by the Resident Engineer. The plan/design bottom elevations may change due to the results of load tests. The length of shaft required by the Resident Engineer shall be measured and paid as Drilled Shaft, Common.

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