



# 1-35 FOUNDATION RECOMMENDATION AND REPORTS

## 1. Overview

This memo defines the roles of the Structure Project Engineer (PE) and Geotechnical Services' design staff during the project development process.

Determination of the foundation configuration as early as possible in the project development process is one of the keys to keeping a project within budget and on schedule. Obtaining the necessary foundation design and construction recommendations in a timely manner is the result of good communication between Structure Design (SD) staff and Geotechnical Services (GS) staff throughout the life of the project.

The key to successful and timely development of foundation recommendations is frequent communication. Since the design process is iterative, periodic communication is required. Discussions between SD and GS personnel are required at, or prior to, the beginning of detailed design. An agreement between SD and GS is needed at this time as to the content and timing of the foundation recommendation deliverables.

The foundation design process begins with SD and GS staff collaborating as soon as possible to determine the design performance requirements (factored load demands and tolerable displacements), the limitations on the configuration or type of foundation system imposed by the site conditions, and a mutual understanding of the foundation alternatives being considered. As the design proceeds, the preliminary factored load demands and foundation configuration will be superseded by data developed by more accurate design analyses. It is essential that the revised parameters be communicated by SD to GS as the information is developed. Likewise, as the knowledge of the foundation conditions is developed and design analysis findings are determined, this information must be shared with SD as soon as possible.

The foundation design process, whether it is for shallow or deep foundations, is an iterative process. Foundation recommendations are dependent upon the factored load demands and the foundation configuration. The Foundation Report cannot be completed without a collaborative effort among SD, GS and all other involved functional units to develop and refine the foundation details.



## 2. Requests for Foundation Recommendations and Reports

The timely development of foundation recommendations requires frequent communication between SD and GS personnel. Section 3 of this memo outlines the formal and informal communication that needs to take place during the project development process.

Upon request from SD, Geotechnical Services will provide a series of three geotechnical and foundation reports that contain the foundation type and associated technical recommendations for bridges and earth retaining structures. The reports are titled: Structure Preliminary Geotechnical Report (SPGR), Preliminary Foundation Report (PFR), and Foundation Report (FR). The SD request for each of these reports shall be a formal memorandum sent from the Structure Design Branch Chief to the GS Office Chief, listed in Table 1, who is responsible for the District where the project resides. GS will transmit the geotechnical and foundation reports back to SD Branch Chief who requested the report.

Less formal communication between the SD Project Engineer and GS design staff needs to occur as frequently as necessary to ensure efficient and timely delivery of all the bridge and earth retaining system foundation components. Informal communication may be in the form of a memo, email, or telephone call. Both SD and GS staff must keep detailed records of the date and content of all correspondence to ensure everyone is informed of critical project information.

Table 1 – GS Office Chief Geographical Boundaries

(NAME), Chief Office of Geotechnical Design - North Geotechnical Services, MS-5	Districts 1, 2, 3, 5, 6, 9 and 10
(NAME), Chief Office of Geotechnical Design - West Geotechnical Services, MS-5	District 4
(NAME), Chief Office of Geotechnical Design - South 1 Geotechnical Services, MS-5	Districts 7 and 12
(NAME), Chief Office of Geotechnical Design - South 2 Geotechnical Services, MS-5	Districts 8 and 11

(Names of all Office Chiefs can be found at <http://www.dot.ca.gov/hq/esc/geotech/design.htm>)



### 3. Project Tasks and Communications

Table 2 indicates the WBS elements, tasks, and associated responsibilities of the SD Project Engineer and GS design staff throughout the development of the Structures Plans, Specifications, & Estimate (SPS&E) package and construction contract support. Following the table is a list of each task and a detailed description of the data that needs to be exchanged between SD and GS. The interaction outlined herein is considered as a minimum. Additional communication may be necessary between SD and GS to maintain the project scope, cost, and schedule.



**Table 2 - Overview of Tasks and Responsibilities of the SD and GS Design Staff**

WBS Elements	Tasks	Structure Design Staff	GS Design Staff	
Advance Planning Study (APS) (WBS 150, 160)	Advance Planning Study	Request Structure Preliminary Geotechnical Report (SPGR) from GS.	Acknowledge receipt of request and provide name of GS design staff assigned.	
			Provide SPGR to SD.	
Draft Structure PS&E (WBS 240)	Preliminary Foundation Report	Request Preliminary Foundation Report (PFR) from GS.	Acknowledge receipt of request and provide name of GS design staff assigned. Provide PFR to SD.	
	Site Ready for Subsurface Exploration	Acknowledge status of site readiness for subsurface exploration.	Contact Structure PE regarding status of subsurface exploration. Report issues that potentially influence the project cost and/or schedule.	
	Draft Structure General Plan	Discuss feasible foundation types prior to Type Selection with GS staff. Invite GS design staff to the Type Selection Meeting.	Discuss appropriate foundation types and recommended foundation types. Attend the Type Selection Meeting.	
	Foundation Reports		Request Foundation Report (FR)	Acknowledge receipt of request and provide name of GS design staff assigned.
			Confirm or update the design loads and project schedule to GS design staff.	Prior to drilling, contact Structure PE to verify the foundation design data and schedule.
			Confirm or update foundation design data, including structure loads.	After drilling, contact Structure PE to discuss foundation design data.
			Verify/provide final foundation design data, including design structure loads to GS.	Acknowledge receipt of final foundation design data.
			Review FR. Contact GS design staff with comments.	Provide FR, including LOTBs to Structure PE.
	Draft Structure Plans	Request Draft Plans (Unchecked Details) review by GS design staff.	Send review comments to SD.	
	Draft SPS&E	Request Draft SPS&E package review by the GS design staff.	Review Draft SPS&E. Send comments to SD and Structures Office Engineer (SOE).	
Final Structure PS&E Package (WBS 250)	Project Review	Request review of final PS & E including constructability by GS. Review FR.	Update FR (if necessary). Issue foundation review/concurrence	
Awarded & Approved Const. Contract (WBS 265)	Advertised Contract	SD/SOE request GS to respond to bidder inquiries.	Provide bidder inquiry response to SD and/or SOE.	
Construction Engineering and General Contract (WBS 270)	Construction Engineering Work	SD/Structure Representative request technical support during construction (i.e., CRIP review, pile mitigation, foundation testing and CCO support).	Provide technical support to SD and Structure Representative.	



### 3.1 Advance Planning Study

SD requests, by transmittal memo, a Structure Preliminary Geotechnical Report (SPGR) to develop the Planning Study.

The SPGR request should include the following information:

- Location plan or strip map
- Aerial photos (if available)
- As-Builts (if available)
- Scope & possible structure type
- Proposed foundation locations (if known)
- Potential for scour (if known)
- Types of foundations being considered
- SPGR due date

The SPGR provided by GS should include the following information:

- Subsurface conditions, including groundwater
- Geologic hazards
- Seismic Information
  - Fault rupture potential
  - Design Peak Bedrock Acceleration (PBA)
  - Design earthquake magnitude (M)
  - Soil Profile Type
  - Potential for liquefaction, lateral spreading and other secondary seismic hazards
- Feasible foundation type(s) for site
- Potential construction issues
- Initial corrosion evaluation
- Identification of potential for Foundation Load Test(s)

### 3.2 Preliminary Foundation Report (PFR)

SD requests, by transmittal memo, the PFR to develop Draft Structure General Plan.



The PFR work request should include the following information:

- Location and site plans
- Scope of proposed work
- Preliminary layout of structure and foundations (APS, if available)
- Copy of previous SPGR (if available)
- Preliminary design loads on foundations (use the “Preliminary Foundation Design Data Sheet” included in MTD 3-1 or MTD 4-1)\*
- Scour data
- Foundation type(s) being considered (indicate if different from the SPGR recommendations)
- Project schedule
  - Draft Structure General Plan distribution target date
  - Name and phone number of Structures PE
- Information on retaining walls on the project (if known)
- PFR due date

The PFR provided by GS should include the following information:

- Subsurface conditions including groundwater
- Geologic hazards
- Seismic Information
  - Fault rupture potential
  - Design Peak Bedrock Acceleration (PBA)
  - Design earthquake magnitude (M)
  - Soil Profile Type
  - Recommended preliminary ARS curve
  - Potential for liquefaction, seismic settlement, lateral spreading, slope failures or landslides and other secondary seismic hazards
  - Additional work to develop final recommendations

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\* If all or part of the preliminary loads are not available at the time of the PFR work request, SD shall include a date in the request when the outstanding load data will be transmitted to the GS.



- Appropriate foundation type (s) for site
- Recommended foundation type(s)
- Foundation constructability
- Corrosion and/or hazardous waste evaluation
- Anticipated site investigation program
  - Permits needed for entry
  - Duration and schedule of the site investigation program
- Additional field work and laboratory tests

### 3.3 Site Ready for Subsurface Exploration

Prior to drilling, GS prepares a site exploration plan, procures site entry and drilling permits.

Provided by GS:

- Site exploration plan
- Request to District to obtain permits for site exploration
- Site access arrangements and lane closure (if required)
- Status of site exploration to Project Engineer

Provided by SD:

- Updated information on foundation design data and/or schedule if available

### 3.4 Draft Structure General Plan

Provided by SD:

- Contact GS design staff prior to the Type Selection Meeting to discuss the information in the PFR
- Invite GS design staff to the Type Selection Meeting

Provided by GS:

- Discuss appropriate foundation type(s) with Project Engineer prior to the Type Selection Meeting
- GS design staff attend the Type Selection Meeting



### 3.5 Foundation Report (FR)

#### *3.5.1. Foundation Report Request*

SD requests, by transmittal memo, the FR to develop Draft Structure Plans, Specifications, and Estimates (SPS&E).

The FR work request should include the following information:

- Scope of proposed work
- Location and Site Plans (show support locations)
- Utility Plan (if not shown on Site Plan; send whatever information is available)
- Draft Structure General Plan (GP)
- Foundation Plan showing support locations and elevations
- Approximate design structure loads at each support (use the “Foundation Design Data Sheet” included in MTD 3-1 or MTD 4-1)
- Foundation type(s) being considered
- Special foundation data including soil-structure interaction analysis data (e.g., p-y, t-z and q-z curves, etc.)
- Preliminary Hydraulic Report or Final Hydraulic Report
- Project Schedule:
  - Date final design loads will be available
  - FR due date

GS acknowledges FR request memo and provides the following information:

- Name and Phone Number of GS design staff assigned
- Comments on FR data requested
- Potential for special testing or studies required

#### *3.5.2 Prior to Drilling*

Prior to the site exploration, GS design staff should contact the Project Engineer and confirm critical project information.

Provided by GS:



- Drilling schedule
- Request confirmation of the foundation design data
- Request confirmation of the project schedule

Provided by SD:

- Confirm or update project status
- Confirm or update draft GP
- Confirm or update foundation design data including design loads

### *3.5.3 After Drilling*

After the site exploration, GS design staff should contact the Project Engineer and communicate any critical project information that may affect the project.

Provided by GS:

- Contact SD and convey any information from the site exploration that may affect the SPS&E package.

Provided by SD:

- Confirm or provide updated foundation design data including design loads

### *3.5.4 Transmit Final Design Data*

The Project Engineer will transmit final design data including design loads to GS.

Provided by SD:

- Verify or provide final foundation design data/loads and project status

Provided by GS:

- Acknowledge receipt of final foundation design data/loads.

### *3.5.5 Receipt of Foundation Report*

Provided by GS:

- Foundation Report, including geotechnical seismic design recommendations, driveability analysis and corrosion report (if applicable)
- Log of Test Borings (LOTBs) sheets



Provided by SD:

- Comments on FR

### 3.6 Draft Structure Plans (Unchecked Details)<sup>1</sup>

Provided by SD:

- Draft Structure Plans (Unchecked Details) to GS design staff for review and comments
- Due date for review comments

Provided by GS:

- Comments on Structure Plans

### 3.7 Draft Structure Plans, Specifications and Estimates (SPS&E)<sup>1</sup>

SD requests GS design staff to participate in the Constructability Review (CR) and to review draft SPS&E for conformance with the FR recommendations.

Provided by SD:

- Draft SPS&E to GS design staff for review and comments
- Due date for review comments

Provided by GS:

- Attend CR Review Meeting and comments on Draft SPS&E package

### 3.8 Advertised Contract

Structure Office Engineer (SOE) requests support from SD and GS during contracting process.

Provided by SOE:

- Request for SD and GS to address bidders inquiries pertaining to foundations.  
Note: SD to include GS project design staff in addressing foundation issues

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<sup>1</sup> See Memo to Designer 1-31 “Constructability Reviews For Structures Projects” for additional information on Draft Plan and SPS&E reviews



Provided by GS to SD and/or SOE:

- Responses on foundation issues to SD if design concurrence is required or Office Engineer SOE, as necessary

### 3.9 Construction Engineering Work

Structure Construction (SC) requests technical support from SD and GS during construction.

#### *3.9.1 Pre-Construction Meeting*

If requested by GS, SD or SC, there should be a Caltrans-only “Pre-Construction” meeting with the Structure Representative, the Structure PE, and the GS design staff.

#### *3.9.2 Support During Construction*

When requested, SD and GS will provide to SC:

- Technical Support
- CRIP Review

( *original signed by Kevin Thompson* )

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