

Data Collection and Review

2.1 Literature Search/Review

One of the first steps involved a comprehensive compilation and review of readily available reports and publications from public and private files regarding the surface and subsurface conditions in the five zones and the immediate vicinity. The objective of this task was to gather and assess existing information to develop an initial understanding of the geologic, faulting, hydrogeological, environmental, and geotechnical considerations of each zone.

Data were compiled by acquiring readily available reports and publications from public agencies including:

- United States Geological Survey (USGS)
- California Department of Transportation (Caltrans)
- California Geological Survey (CGS)
- California Division of Oil and Geothermal Resources (CDOGR)
- Southern California Earthquake Center (SCEC)
- City of Los Angeles and the Los Angeles Department of Public Works (LADPW) - Geotechnical and Materials Engineering Division
- Los Angeles County Department of Public Works (LACDPW)
- California Department of Water Resources (CDWR)
- Main San Gabriel Watermaster (MSGW)
- Raymond Basin Management Board (RBMB)
- Dibblee Foundation

In addition, unpublished reports available in company and personal files, and available technical reports issued by other consultants were compiled and reviewed. A complete list of the geologic references compiled and reviewed is presented in the reference section of this report (Section 16). Table 16-1 provides information on the applicability of the compiled references to each of the individual zones under consideration.

Although the review of all the references included in Table 16-1 contributed to the understanding of the geologic, groundwater, and environmental conditions within the five zones, the following sources of data provided some of the most relevant information.

One of the best sources of information on the geological and fault conditions within Zones 1 through 3 is the "Geology of the Elysian Park-Repetto Hills Area," a report published by the

CGS (Lamar,1970). The geologic maps published by the Dibblee Foundation for the Los Angeles, Hollywood, Mount Wilson, El Monte, and Baldwin Park Quadrangles (Dibblee, 1989a, 1989b, 1998, and 1999) complemented the understanding of those three zones, as well as Zones 4 and 5.

Key geologic data along portions of Zones 1 through 3 were obtained from the geotechnical investigations for the Metro Pasadena Line (e.g., Law/Crandall, 1993). In addition, the geotechnical investigations and construction of the upper reach of the Northeast Interceptor Sewer (NEIS) Line Tunnel and the Avenue 45 - Arroyo Drive Relief Sewer (Avenue 45 Sewer) contributed significantly to the understanding of the geologic conditions along the portion of the Los Angeles River and Arroyo Seco that is located within Zones 1 and 2, respectively (City of Los Angeles, 2000, 2001, 2006a, and 2006b; and URS 2006). Caltrans as-built logs of test borings (LOTBs) for different freeways in all zones also contributed some key geotechnical data (Caltrans, 1974a and 1974b).

The most relevant information on groundwater, alluvium fill thickness, and depth to bedrock for the portions of the San Gabriel and Raymond groundwater basins in Zone 3 through 5 was obtained from the CDWR (1966) and from Geoscience Support Services, Inc. (Geoscience, 2004), respectively. Annual groundwater contour maps for the first basin were available from the MSGW (2006) and for the second basin from the RBMB (2006 and 2007). Finally, historically highest groundwater information for the entire area studied was obtained from the California Division of Mines and Geology (CDMG) (1998a, 1998b, 1998c, 1998d, and 1998e).

Several environmental reports prepared by various consultants for the United States Environmental Protection Agency (USEPA) allowed understanding of the lateral and vertical extent and type of groundwater contamination at the San Fernando, Alhambra, and the El Monte Superfund sites (JMMI, 1992; CDM, 1998, 2006, 2008a, and 2008b; GeoSyntec, 2006a and 2006b; and CH2M HILL, 2003, 2006, 2007, and 2009c) located in Zone 1, Zone 4, and Zone 5, respectively.

Information on the location of oil and/or natural gas fields was obtained from the CDOGR (2001).

2.2 Previous Metro Feasibility Assessment Study

The geotechnical portion of the Metro study, (Parsons Brinckerhoff, Inc. [PBI], 2006) summarized the geologic and geotechnical conditions along three proposed tunnel alignments extending from the north end of the existing I-710 Freeway in south Alhambra to the existing I-210 Freeway in Pasadena, a distance of about 4.5 miles (7.2 kilometers [km]). The geotechnical portion of the 2006 Metro study was based on a site reconnaissance and review of existing published data, geologic information, soil boring logs, rock core logs, foundation reports, groundwater data, seismicity data, and pertinent documents from other projects in the area of the Metro study. As part of the Metro study, three borings were drilled to a depth of 200 feet. The report was regarded as a generalized, preliminary description of the geological and geotechnical conditions likely to be encountered by the then-proposed tunnel, with the understanding that additional site-specific studies would be required for tunnel design and construction specifications. Significant sources of geologic

and geotechnical information used in preparation of the Metro report were also reviewed in preparation of this study (see Section 16). The Metro report concluded that construction of the then-proposed tunnel was feasible.

2.3 Fault Lineament Study

Historical and recent aerial photographs of the project area were examined to identify lineaments (linear alignments) of topographic highs and lows, color changes, or linear alignments of vegetation, any of which might represent the surface expression of geologic faults. The Fairchild aerial-photograph collection at Whittier College was the primary source of aerial photographs. The reviewed photographs are summarized in Table 16-2. Additional photographs were color images from the Google® Web site.

The oldest photographs in the Fairchild collection were from 1927; these are among the earliest aerial photographs taken by flying in a systematic overlapping grid with surveyed locations. These photographs are black and white stereographic images that allow three-dimensional viewing. These old photographs are generally more useful for geological analysis than modern photographs because they reveal geological conditions prior to much of the urban development of the region. However, much of the study region was densely populated since the late eighteenth and early nineteenth centuries, prior to the time the aerial photographs were taken, and this has obscured much of the natural topography.

The photographs listed in Table 16-2 cover most of the project area, including Zones 1 through 5. Due to the high degree of urban development, even in the late 1920s and early 1930s, one cannot be sure that some natural lineaments were not removed by grading or construction; therefore, some natural lineaments could have gone undocumented. However, grading practices prior to the 1950s generally utilized natural topography rather than completely removing it, enabling most of the known active faults in the project area such as the Alhambra Wash, Raymond, and Hollywood faults to be clearly identified on the aerial photographs.

The observed lineaments/faults were plotted on mylar overlays on the photographs and/or on maps. Although the analysis did not reveal any new faults, details on the location, width, and length of known faults were documented much more completely than anything available in the existing scientific literature. Some of the identified lineaments were later verified in the field by geological reconnaissance and seismic reflection surveys. These relationships are discussed in this report, where appropriate for the zones.

2.4 Summary of Data Review

The data collected during the review of available information along with the fault lineament study provided a good understanding of the subsurface conditions within the study area. The data review task provided information related to the geologic, groundwater, and seismic conditions, and soil and groundwater contamination. The information collected through data review, along with data collected from the current exploration, is summarized in Sections 4 through 11.