2.

Preliminary Master Design Submittal

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2. PRELIMINARY MASTER DESIGN SUBMITTAL

Project Background and Setting

The Presidio Parkway Project (Project) will reconstruct approximately 1.6 miles of the existing U.S. 101 from the south approach to the Golden Gate Bridge to Richardson Avenue and Marina Boulevard in the vicinity of the Palace of Fine Arts in San Francisco. This parkway will provide a vital transportation link between the North Bay counties, San Francisco, and the Peninsula. Doyle Drive, originally built in 1936, contemporaneously with the construction of the Golden Gate Bridge, is structurally and seismically deficient and a high priority for replacement.

At the time of construction in the 1930s and during operation as a major link in the Bay Area roadway network, Doyle Drive traversed the Presidio of San Francisco (the Presidio). The Presidio had been an active military post for more than 200 years, serving under Spanish, Mexican, and U.S. military commands. In 1962, the Presidio became a designated National Historic Landmark District and Doyle Drive was identified as a contributing element to its historic nature.

In 1994, the Presidio was identified for closure as part of the national base closure program and was converted to a national park. During this time the Presidio Trust was formed and became the managing agency for the park and its facilities. The Presidio Trust owns the current Doyle Drive and future Project alignment right-of-way. To minimize impacts to the Presidio, the footprint of the new facility will include a large portion of Doyle Drive's existing footprint east of the Veterans Boulevard (Park Presidio Interchange).

The Presidio Trust's mission is to preserve and enhance the Presidio as an enduring resource for the American public and manage the park's resources. As such, the Project will follow defined guidelines and requirements for design, construction, and O&M activities and other aspects of the completion of the Project intended to minimize impacts on the existing natural environment and historic setting. Since the Project will be constructed within a National Historic Landmark District and the existing historic Presidio Viaduct will be removed, the goals of the Project have been expanded beyond addressing seismic, structural, and traffic safety concerns.

When constructed, the Project will improve structural, seismic, and traffic safety along this section of U.S. 101, while also creating a roadway that reduces impacts to biological, cultural, and natural resources; respects the project setting within a national park, National Historic Landmark District, and surrounding neighborhoods; and meets community needs. The Project will also address vehicular access by constructing a new interchange at Girard Road, thereby providing direct access to the commercial areas of the Presidio and eliminating the need to use residential streets to access numerous existing and future businesses located within the Presidio.

Innovative Approaches

1 1.2.A The following details how Golden Link Partners' (GLP) Preliminary Master Design Submittal will utilize innovative approaches to design, construction, and O&M that will minimize the overall cost of the Project during the Term.

Design

1 1.2.B.a GLP has developed the alignment geometry to address numerous goals of the Project and address environmental concerns including maintaining the integrity of the Final EIS/EIR and Record of Decision, as well as avoiding changes requiring additional environmental review and approvals. Since there are limited opportunities for design innovations and enhancements related to alignment geometry, GLP's Preliminary Master 1 1.2.B.a Design Plans contains geometric alignments, which largely follow the design outlined in the Indicative Drawings. However, we propose the following revisions and optimizations as part of the design submittal:

1 1.2.B.b • Revise the DOY4 Line horizontal alignment to optimize retaining wall design and reduce right-of-way needs and construction costs	1 1.2.B.c ▪ Revise the profile to tie-in with the revised northbound mainline profile and new connector alignment

Construction

1 1.2.A For this Project, GLP has selected proven construction methods for excavation, shoring systems, foundations, concrete work, and ITS implementation. We are very experienced with these methods in large-scale transportation projects in California, minimizing risk to the Department and ensuring quick mobilization and start-up of construction activities. Upon receipt of NTP 1, GLP will review each process developed for the proposed methods to verify that we are using the most appropriate method to build this Project.

Operations & Maintenance

Throughout the 30-year Operating Period, beginning at substantial completion, GLP will routinely review emerging technologies and new materials that may improve efficiencies or encourage increased sustainability for Project assets. We will also continue to stay aware of new procedures and processes for maintaining the assets. Areas in which we anticipate future 1 1.2.A opportunities for innovation include alternative fuels, pavement surfacing, materialism, and lighting options.

2. A) ROADWAY CONCEPT

GLP Preliminary Master Design Submittal Plans are included in Volume 2, Part 2. The Roadway Concept Plans are denoted on Sheets C, L, X, and P.

1 1.2.B.a Our Preliminary Master Design Submittal continues the innovative solutions contained in the Indicative Preliminary Design and constructed in Phase 1, Contracts 3 and 4.

Alignment and Profile

1 1.2.B.b The scope of the Project includes the replacement of the existing Doyle Drive with a new six-lane facility and a southbound auxiliary lane. The new facility will incorporate wide landscaped medians and continuous shoulders. The southbound and northbound Parkway will traverse separate viaduct structures, pass through separate tunnels and, when at-grade, be divided by a landscaped median.

Starting from the north end of the Project, an at-grade section of highway will continue southward from the Golden Gate Bridge toll plaza lanes and converge to six lanes. The six-lane Parkway will be constructed on at-grade split alignments for approximately 0.25 miles to the interchange with Highway 1 and Veterans Boulevard (Park Presidio Interchange). The Park Presidio Interchange will be completely reconstructed as part of the Project and entail the following construction work:

• Replace the existing exit ramp from southbound Doyle Drive to Veterans Boulevard with standard exit ramp geometry and widen to accommodate two lanes • Improve the existing exit ramp from northbound Doyle Drive to provide standard exit ramp geometry	• Reconstruct the northbound Veterans Boulevard connection to northbound Doyle Drive similar to the existing direct connector ramp configuration with improved exit and entrance geometry

1 1.2.B.c South of the Park Presidio Interchange, the Parkway will traverse parallel viaducts that span the valley between Veterans Boulevard and the San Francisco National Cemetery in the vicinity of Crissy Field Avenue. These two signature structures are called the Presidio Viaducts and are approximately 1,280 ft. long. The Parkway will traverse parallel tunnels between the north end of the San Francisco National Cemetery and the historic battery installations on the north side of Doyle Drive. These shallow cut-and-cover tunnels will extend approximately 850 ft. and the Parkway will continue toward the Main Post in an open depressed roadway with a landscaped median.

From Building 106 (Band Barracks) a second set of cut-and-cover tunnels approximately 1,020 ft. long will extend south below Halleck Street. Halleck Street will be reconstructed on a new alignment over the Presidio Viaducts. The Parkway profile will rise slightly across a low-level causeway over the site of the proposed Tennessee Hollow Watershed habitat restoration site

1 1.2.B.d and continues to the Girard Road Interchange, a new diamond interchange which will provide direct access to the Presidio and Marina Boulevard. East of Girard

Road, the facility will return to existing grade north of the Gorgas warehouses and connect to Richardson Avenue, where the northbound and southbound alignments rejoin.

Pavement Design Package

GLP's pavement design was developed for the mainline, ramp/connector, and local road pavement designs in accordance with the latest version of the Department's Highway Design Manual (July 2008) and AASHTO standards. The design was developed as continuously reinforced concrete pavement for the mainline, and hot-mix asphalt pavement for the ramps/connectors and local roads. Pavement designs were checked using the Mechanistic-Empirical Pavement Design Guide, which serves as an interim pavement design standard for AASHTO. A summary of the Department's traffic and subgrade inputs for the Project are as follows:

Section	Traffic Index*	Subgrade R-Value
Presidio Parkway Mainline NB	12.0	10-40 (Type II) / 30
Presidio Parkway Mainline SB	12.0	10-40 (Type II) / 30
Girard Road	11.0	10-40 (Type II) / 30
Gorgas Avenue	11.0	30
Halleck Street	11.0	30
Marina Blvd Ramps/Collectors	9.0	30
Park Presidio Ramps/Collectors	11.0	10-40 (Type II) / 30
Veterans Interchange Ramps	11.5**/11.0	10-40 (Type II) / 30
Girard Road Ramps	11.5***/11.0	10-40 (Type II) / 30

*The traffic index inputs represent a 40-year design period.
**Minimum TI for a CRCP design in the Caltrans HDM is 11.5. However, the AECOM report indicates TI = 11.0 ("Medium" Traffic Ramps Category) appropriate for Veterans Interchange Ramps.
***No data was presented for Girard Road Ramps, so TI = 11.5/11.0 used because TI=11.5 is necessary for CRCP design. TI = 11.0 for JPCP design is consistent with the TI used for Girard Road.

Results from Department-Based Pavement Design

Using the outputs outlined above, GLP derived the following pavement designs as shown in the following tables.

Presidio Parkway Northbound and Southbound Mainline (per Department's Highway Design Manual Table 623.1C and Pavement Policy Bulletin 09-01)
• 0.75 ft. Continuously Reinforced Concrete Pavement
• 0.25 ft. hot-mix asphalt or 0.35 ft. lean concrete base
• 0.60 ft. aggregate subbase
• Prepared subgrade

Presidio Parkway Mainline NB & SB - HMA Pavements [Caltrans HDM Table 633.1 using 1) the 20-year Caltrans flexible pavement design method but with a 40-year TI and 2) using the > 20 design life design method]
20-year Design Life Method with 40-year TI (Conventional HMA Pavement)
• 0.80' HMA, e.g.: ▪ 0.20' PG 64-28 PM Special Dense Graded HMA ▪ 0.25' PG 64-10 Dense Graded HMA ▪ 0.35' PG 64-10 Dense Graded HMA (with higher % AC)
• 1.25 ft. aggregate base
• Prepared subgrade

Girard Road, Gorgas Avenue, and Halleck Street – HMA Pavement Sections (Caltrans HDM Table 633.1 using the 20-year Caltrans flexible pavement design method but with a 40-year TI)
• 0.70' HMA, e.g.: ▪ 0.20' PG 64-28 PM Special Dense Graded HMA ▪ 0.25' PG 64-10 Dense Graded HMA ▪ 0.25' PG 64-10 Dense Graded HMA (with higher % AC)
• 1.25 ft. aggregate base
• Prepared subgrade

Ramps/Collectors – HMA Pavement Sections (Table 633.1 using the Caltrans 20-year flexible pavement design method but with a 40-year TI)
• 0.70' HMA, e.g.: ▪ 0.20' PG 64-28PM Special Dense Graded HMA ▪ 0.25' PG 64-10 Dense Graded HMA ▪ 0.25 ft. PG 64-10 dense graded hot-mix asphalt (higher percentage AC for rich bottom layer, to be approved by Department District Materials Engineer)
• 1.25 ft. aggregate base
• Prepared subgrade

Ramps (other than Marina Boulevard) – HMA Pavement Sections (Table 633.1 using the Caltrans 20-year flexible pavement design method but with a 40-year TI)
• 0.70' HMA, e.g.: ▪ 0.20' PG 64-28 PM Special Dense Graded HMA ▪ 0.25' PG 64-10 Dense Graded HMA ▪ 0.25' PG 64-10 Dense Graded HMA (with higher %AC)
• 1.25 ft. aggregate base
• Prepared subgrade

Ramps/Collectors – PCC Pavement Sections (Caltrans Highway Design Manual – Table 623.1C and Caltrans Pavement Policy Bulletin 09-01)
• 0.75 ft. Continuously Reinforced Concrete Pavement
• 0.25 ft. hot-mix asphalt or 0.35 ft. lean concrete base
• 0.60 ft. aggregate subbase
• Prepared subgrade

Transportation Management Plan (TMP)

1 1.2.C.a GLP has developed a Transportation Management Plan (TMP) for the Project focused on Contract 5 through Contract 8. The TMP identifies the methods for minimizing Project-related traffic impacts and delays associated with the construction work. We will accomplish this through the effective application of traditional traffic handling practices and an innovative combination of public and motorist information, traffic demand management, incident management, system management, construction strategies, and alternate routes. We present our Preliminary TMP in Volume 2, Appendix 3.

1 1.2.C.b Our TMP proactively identifies potential traffic impacts associated with construction activities and minimizes Project-related traffic impacts as summarized in the following table:

TMP Identified Potential Traffic Impacts	TMP Efforts to Minimize Project-Related Traffic Impacts
• Additional volume of traffic attributable to construction vehicles • Changes in traffic patterns and roadway configuration causing driver confusion • Planned weekend closures necessary to complete construction of the new roadway and shifting traffic onto the permanent alignment	• Managing construction traffic • Managing lane configurations on the detour to address changes in traffic patterns during peak periods • Strong public information outreach program and ITS strategies to guide motorists ▪ Active corridor management strategies including emergency response, service patrols, Construction Zone Enhanced Enforcement Program, and ITS

GLP has developed a preliminary Construction Phasing/Sequencing Plan (attached in the Preliminary TMP document, Volume 2, Appendix 3) to efficiently coordinate construction

1 1.2.D.a

sequencing of the Project while minimizing the impacts to the traveling public. We have integrated our TMP and Construction Phasing/Sequencing Plan. Traffic using Doyle Drive (U.S. 101) will operate on the detour while the Project is being constructed. For the most part, the Project will be constructed outside of active travel lanes and roadway capacity in place at the conclusion of Phase 1. Given the scale of the Project, however, some modifications are unavoidable, including some temporary ramp and roadway closures. As currently envisioned, a 3-day closure of U.S. 101 near the end of the Project limits will shift traffic from the detour alignment to the ultimate alignment. The closure will be between the Highway 1 Interchange and the first Marina Boulevard and Richardson Avenue intersections. The connection between Highway 1 and the Golden Gate Bridge will remain open.

1 1.2.D.b

Several roadways will remain closed under work performed by Phase 1. The long-term closure of the ramp from northbound U.S. 101 to southbound Highway 1 will be reopened at the conclusion of the Project as will the long-term closure of Halleck Street between Gorgas Avenue and Mason Street. The Marshall Street closure will be permanent between Gorgas Avenue and Mason Street. For additional details related to traffic management, please refer to the Preliminary TMP (Volume 2, Appendix 3).

The only falsework openings required to maintain traffic flow are for the construction of the Northbound High Viaduct from the Veterans Boulevard Off-Ramp bridges. Falsework openings will conform to the Department's standard criteria.

Drainage

GLP Preliminary Master Design Submittal Plans are included in Volume 2, Part 2. The Drainage Plans are denoted on Sheets D, DD, and DQ.

Innovative Design

1 1.2.B.f

GLP's Preliminary Master Design Submittal improves upon the Indicative Preliminary Design by proposing an enhanced detention system that will minimize increases in peak downstream discharges. The drainage system design improves collection and conveyance systems by routing stormwater runoff to stormwater treatment facilities before runoff is conveyed to a receiving body of water. Drainage system and water quality treatment design focuses on addressing design constraints and meeting environmental requirements. The proposed design will minimize impacts of on-site runoff to the San Francisco Bay.

Detention Systems

1 1.2.B.f

The Project will use two existing outfalls located on the beach areas north of the alignment. Temporary detention of the on-site runoff will allow the off-site runoff to discharge to the San Francisco Bay, while reducing the volume of peak discharge. This temporary detention proposal eliminates the need to increase the size of the existing outfalls by mitigating increases in peak runoff. GLP will coordinate our design with the Department's redesign of the outfall structures.

The on-site runoff from the western portion of the Project will be attenuated using two detention basins located under the viaduct prior to discharging into the San Francisco Bay.

The majority of the on-site runoff from the eastern portion of the Project will be detained in other storage facilities constructed as part of the Project. These underground storage facilities will utilize pipe or box culverts to detain and temporarily store runoff. A smaller downstream culvert will reduce flows to the proposed pump station and allow for the use of a smaller pump facility. The runoff will be pumped to a biofiltration swale prior to discharge to the San Francisco Bay via the existing outfall.

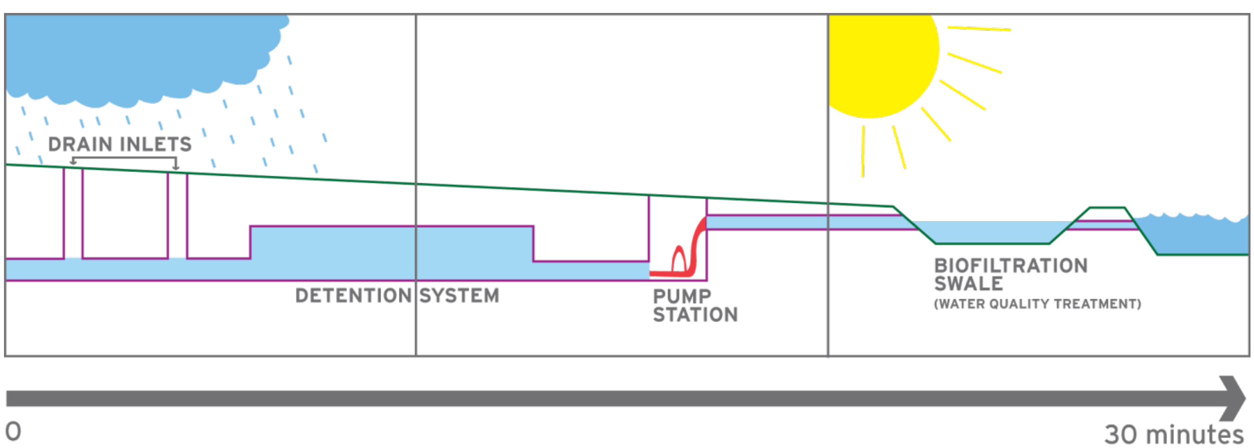
We provide the following summary of the detention systems and corresponding existing outfalls:

Detention System	Existing Outfall
10 ft. x 6 ft. Reinforced Concrete Box Culvert	A
Three 72 in. Reinforced Concert Pipe	A
Detention Basin	At Crissy Marsh

Biofiltration Swales

GLP will implement biofiltration swales and strips to achieve water quality treatment of the on-site runoff prior to discharging into the San Francisco Bay. As shown in Figure 9, biofiltration swales and strips are permanent Best Management Practices that promote pollutant removal by filtration through the use of properly selected vegetation and infiltration through the soil.

Figure 9: Eco-Friendly Drainage System Schematic



Utilities

GLP Preliminary Master Design Submittal Plans are included in Volume 2, Part 2. The Utility Relocation Plans are denoted on sheets SB and U.

Utility Coordination

Utility coordination will be a process to identify existing facilities and construction impacts on them. GLP will develop solutions to phase both the abandonment of the existing utilities and relocation of utilities to prevent uninterrupted services and resolve any conflicts.

Utility Relocation Schedule

1 1.2.F GLP has a proactive conceptual utilities relocation plan to efficiently tie to the phasing of the construction work. We will develop and maintain a schedule throughout the duration of construction to denote timelines for identifying existing utility locations, verifying work permit applications, negotiations of legal agreements, and construction start and completion milestones including abandonment and relocation of mains and services.

Utility Conflict Matrix and Tracking Log

GLP will use a utility conflict matrix to identify all utilities impacted by the Project. The utility type, size, length of conflict, and owner will be shown in the matrix. This matrix will become the basis for the utility tracking log, which will provide contact information for the utility owner, location, and limits of the impacted utility, right of occupancy for the utility owner, scheduled start and completion dates for utility relocation work, and status of work. GLP will submit a monthly utility tracking report to the Department, the Presidio Trust, and utility owners with impacted facilities.

Utility Work Plan

1 1.2.F The key components of the utility work plan are shown on the GLP Preliminary Master Design Submittal Plans and included in Volume 2, Part 2 and the utility conflict matrix. The work plan will include identification and location of existing utilities, coordination protocols with the utility owners, and communication procedures regarding scheduling of relocation work.

2. B) STRUCTURES CONCEPT

GLP Preliminary Master Design Submittal Plans are included in Volume 2, Part 2. The Structure Concept Plans are denoted on sheet ST.

Structural Engineering

The Project includes construction of 11 bridge and tunnel structures as well as an electrical substation. At the west end of the Project are two cast-in-place prestressed concrete box girder bridges, the Northbound High Viaduct and Veterans Boulevard Off-Ramp. The bridges will extend over U.S. 101 over the DOY4 Line as well as two existing roadways. Located to the east are the three cast-in-place concrete tunnels, the Northbound Battery Tunnel and two Main Post Tunnels. At the east end are six cast-in-place prestressed concrete voided slab bridges, the two Tennessee Hollow structures, Girard Road Northbound Ramp comprising two undercrossings that grade separate U.S. 101 over the depressed portion of the road; and the Gorgas Avenue Ramp that spans the future wetland habitat and trail system being developed by the Presidio Trust.

Geotechnical Engineering

GLP brings significant engineering expertise to address the Project's complex site subsurface conditions and develop innovative solutions to manage risk.

This Project is located in a complex geologic environment and has several geotechnical challenges that must be addressed in both the design and construction phases. The subsurface conditions range from shallow competent Franciscan bedrock in the west, to soft and weak marsh deposits in the east. These conditions, and the challenges they present, must be addressed uniquely for each of the various structures. GLP brings the right technical skills, extensive knowledge of Department requirements, and significant resources to provide creative and cost effective solutions to address these challenges. The following sections discuss the structural and geotechnical details for each major structure.

Northbound High Viaduct (Bridge No. 34-0157R) and Veterans Off-Ramp (Bridge No. 34-0159)

GLP presents our Structure Concept Plans in the GLP Preliminary Master Design Submittal Plans included in Volume 2, Part 2. Refer to sheet numbers ST-1 and ST-2 for Northbound High Viaduct and ST-3 for Veterans Off-Ramp. The proposed structure layout, superstructure type, substructure type, railing types, and architectural features are compatible with the Indicative Preliminary Design.

The following key features of the bridges will generally conform to the Indicative Preliminary Design:

• The abutment, bent and hinge locations • Superstructure type consisting of a cast-in-place prestressed concrete box girder with transverse deck post-tensioning and painted steel fins supporting the deck cantilever • Superstructure depth and cross section including locations of transitions in dimensions • Column size and shape	• The number of columns per bent, except at the Veterans Off-Ramp where the longitudinal dimension of the column has been reduced to comply with the guidelines in SDC 7.6.1 "Column Dimensions" • Bent foundation types consisting of Cast-In-Drilled-Hole (CIDH) piles (Type II) and CIDH (rock socket) with the type, size, and depth as shown on the GLP Structure Concept Plans	• Seismic isolation casings as shown on the GLP Structure Concept Plans • Seat abutments supported by 24-in.-diameter CIDH piles • Painted California ST-10 bridge rails

Subsurface Conditions

Topography and subsurface conditions vary at both the Northbound High Viaduct and the Veterans Boulevard Off-Ramp locations. To the west, the site is underlain by thin surficial soil (less than 10 ft. to less than 15 ft.) over Franciscan bedrock. The surficial soils are typically medium dense to dense sands and medium stiff clays. The rock consists of highly-sheared and folded serpentinite, sandstone, shale, and graywacke sandstone. To the east, the topography dips down as the Northbound High Viaduct crosses a valley and the site is underlain by thick deposits of loose sands and soft clays, indicative of its location north of the historic San Francisco Bay shoreline. The site is followed by dense sands and stiff silts/clays overlying bedrock as deep as approximately 160 ft. Further to the east, the topography rises, and the site is underlain by dense, shallow surficial soils overlying bedrock.

Key Geotechnical Challenges and Solutions

1 1.2.B.f These structures will be underlain by soil over competent bedrock. The foundations must provide vertical and lateral support for the structures, particularly during the Extreme Event Limit State of seismic loading. GLP's approach to designing the foundations is consistent with the approach utilized for the Presidio Viaduct – Left (Bridge No. 34-0157L), however, we propose to optimize the foundation during final design by using soil-structure-interaction (SSI) analyses. This type of analysis will account for the large rock-socketed pier columns required to reduce seismic ground motions as compared to free-field motions previously developed. By reducing the motions, we decrease the seismic demand on the

superstructure. GLP has performed these state-of-the-art SSI analyses for several projects, such as the Dumbarton Rail Bridge Rehabilitation Project, resulting in significant cost savings.

Northbound Battery Tunnel (Bridge No. 34-0161R)

GLP presents our Structure Concept Plans in the GLP Preliminary Master Design Submittal Plans included in Volume 2, Part 2. Refer to sheet numbers ST-4, ST-5, and ST-6 for the Northbound Battery Tunnel. The proposed structure layout, structure type, foundation, railing types, and architectural features are compatible with the Indicative Preliminary Design.

The following key features of the tunnel will generally conform to the Indicative Preliminary Design:

• Tunnel horizontal and vertical alignment • Structure type consisting of a cast-in-place concrete • Vertical cross section dimensions, with 16.5 ft. vertical height at the wall and 22.5 ft. vertical height at the crown • Horizontal cross section dimensions to accommodate two 11-ft.-wide lanes; one 12-ft.-wide lane; one 4-ft.-wide shoulder; one 10-ft.-wide shoulder and wall-mounted barriers at both walls • Tunnel founded on two layers of lean concrete base and aggregate base on native soil	• Waterproofing system consisting of a combination of protection board, HDPE sheet, applied mastic and geocomposite mesh (refer to GLP Structure Concept Plans sheet number ST-10W) • Interior drainage system and exterior subdrain system tied to southbound tunnel subdrain system • Multiple utility duct banks • Painted California ST-10 bridge rails • Portals consistent and compatible with the Southbound Battery Tunnel in for both architectural appearance and structural configuration • Raised sections to accommodate and support jet fans

Subsurface Conditions

The subsurface conditions at the Northbound Battery Tunnel location, in order of increasing depth, consist of medium dense sandy fill, a thin buried soil horizon, medium stiff sandy silts and clays, dense to very dense Colma sands, residual soil/colluvium, and Franciscan bedrock. The bedrock includes graywacke sandstone, siltstone, chert, serpentinite, mélange matrix, and greenstone. These rocks are highly sheared and folded and can change from being very soft to hard over short distances. Groundwater is shallower in the west and deepens to the east. The shallow groundwater is seasonally perched on the surface of the bedrock and flows north. The excavations for the tunnel will expose competent bedrock in the west and dense Colma sands in the east. The groundwater has seasonally risen above the proposed tunnel invert.

Key Geotechnical Challenges and Solutions

1 1.2.A

This structure will be underlain by competent rock and dense Colma sand. The geotechnical challenges present in this area are relatively straightforward. While

GLP has adopted the design approach identified in the Indicative Preliminary Design, it may be possible to optimize the tunnel design by performing SSI analyses to assess the racking demands on the tunnel during seismic events. Key challenges include maintaining groundwater flow from south to north to avoid impacting the wetlands at the base of the bluff located north of the tunnel. With regards to the groundwater flow, we believe that the groundwater drainage system shown in the Indicative Preliminary Design may result in groundwater traveling east rather than north as intended. Therefore, we propose enhancing the drainage system to facilitate greater flow in the northerly direction by limiting the continuity of flow in the east-west direction.

1 1.2.A

Main Post Tunnel (Bridge No. 34-0163L/R)

GLP presents our Structure Concept Plans in the GLP Preliminary Master Design Submittal Plans included in Volume 2, Part 2. Refer to sheet numbers ST-7, ST-8, ST-9, and ST-10 for the Northbound Main Post Tunnel and Southbound Main Post Tunnel. The proposed structure layout, structure type, foundation, railing types, and architectural features are compatible with the Indicative Preliminary Design. The following key features of the bridges will generally conform to the Indicative Preliminary Design:

• Tunnel horizontal and vertical alignment • Superstructure type consisting of a cast-in-place concrete box with two cell and single cell sections • Vertical cross section dimensions, with 16.5 ft. vertical height at the wall and 22.5 ft. vertical height at the crown • Horizontal cross section dimensions to accommodate two 11-ft.-wide lanes; one 12-ft.-wide lane; one 4-ft.-wide shoulder; one 10-ft.-wide shoulder; and wall-mounted barriers at both walls for northbound direction • For the southbound direction, the horizontal dimensions vary. The minimum width section accommodates a roadway with three 11-ft.-wide lanes; one 12-ft.-wide lane; one 4-ft.-wide shoulder; one 10-ft.-wide shoulder; and bridge rails ▪ The maximum width section accommodates an additional 12-ft.-wide lane (total 5 lanes) and a varying center section	• Tunnel founded on two layers of lean concrete base and aggregate base underlain by a subdrain resting on ground improved by deep soil mixing • Waterproofing system consisting of a combination of protection board, HDPE sheet, applied mastic and geocomposite mesh (refer to GLP Structure Concept Plans sheet number ST-10W) • Interior drainage system and exterior subdrain system • Multiple utility duct banks • Painted California ST-10 bridge rails • Special sections to carry Halleck Street along the tunnel roof • Portals consistent and compatible with the Southbound Battery Tunnel in both architectural appearance and structural configuration • Raise sections to accommodate and support jet fans • Electrical substation adjacent to the northbound tunnel

GOLDEN LINK PARTNERS

Subsurface Conditions

East of the Battery Tunnel, the topography dips down to the lowlands area, which is currently at elevations ranging from approximately 10 ft. to 15 ft. NAVD88. This area extends from about 250 ft. east of the Battery Tunnel to east of the Main Post Tunnel. The subsurface conditions, in order of increasing depth, consist primarily of very loose sandy hydraulic fill, soft Bay Mud clays and loose sands (marsh deposits and marine sands), dense to very dense Colma sands, very stiff marine clays (Old Bay Clay) with interbedded marine sands, very stiff to hard clays (colluvium), and Franciscan bedrock. Groundwater in the fill is 2 ft. to 5 ft. in depth. The deeper sand layers are confined aquifers under artesian conditions. Geotechnical issues in this area include consolidation of the marsh deposits, liquefaction of marine sands and hydraulic fills, settlement associated with liquefaction, and lateral deformations (spreading) associated with liquefaction.

Key Geotechnical Challenges and Solutions

In the area between the Battery and Main Post tunnels, new fills as thick as 40 ft. and a retaining wall will be constructed to support the roadway. The presence of liquefiable hydraulic fill, Marine Sand, and compressible Bay Mud under large portions of the fill and wall will present significant geotechnical challenges. These materials have low strength, particularly if earthquake shaking were to induce liquefaction. The stability of the fill and wall would be severely reduced under such conditions. In addition, loads from the fill could result in large consolidation settlements of the Bay Mud. A combination of well-established ground improvement techniques will be used to address these issues. Using cement deep soil mixing (CDSM) techniques, a cellular patterned buttress will be installed beneath the wall. The buttress will increase the strength of the foundation soils and improve lateral and vertical stability.

1 1.2.B.f

The Main Post Tunnel site is underlain by liquefiable hydraulic fill, Marine Sands, and compressible Bay Mud and faces similar geotechnical challenges to those described above for the at-grade roadway. These soils are not suitable for support of the structure. Liquefaction-induced lateral spreading could result in excessive tunnel deformation and displacement. Additionally, groundwater flowing north must be maintained similar to the Battery Tunnel. To address the foundation issues, the Main Post Tunnel will be supported on soils improved by CDSM extending into dense Colma sands. The CDSM will provide increased strength and stiffness beneath the structure. By extending ground improvement beyond the tunnel footprint, in some cases the CDSM can be utilized as temporary shoring system needed for tunnel excavation.

1 1.2.A

GLP proposes to optimize the foundation design by performing a coupled finite difference SSI analysis of the tunnel and foundation elements. To facilitate groundwater flow, a drainage system will be installed beneath the tunnel. Further, the cellular CDSM pattern will feature open cells at regular intervals to allow flow.

1 1.2.A

Girard Road Undercrossing Northbound (Bridge No. 34-0165R), Girard Road Undercrossing Southbound (Bridge No. 34-0165L), Tennessee Hollow Northbound (Bridge No. 34-0164R), Tennessee Hollow Southbound (Bridge No. 34-0164L), Gorgas Ramp (Bridge No. 34-0168), and Girard Northbound Ramp (Bridge No. 34-0167)

GLP presents our Structure Concept Plans in the GLP Preliminary Master Design Submittal Plans included in Volume 2, Part 2. Refer to sheet numbers ST-14 for Girard Road Undercrossing Northbound; ST-13 for Girard Road Undercrossing Southbound; ST-12 for Tennessee Hollow Northbound; ST-11 for Tennessee Hollow Southbound; ST-18 for Gorgas Ramp, and ST-16 and ST-17 for Girard Northbound Ramp. The proposed structure layout, superstructure type, substructure type, railing types, and architectural features are compatible with the Indicative Preliminary Design.

The following key features of the bridges will generally conform to the Indicative Preliminary Design.

• The abutment, bent/pier and hinge locations • Superstructure type consisting of a haunched cast-in-place prestressed concrete voided slab • Superstructure depth and cross section • Column size, shape and quantity per bent	• Seat abutments • Abutment and bent/pier foundations will be CIDH piling with cellular CDSM ground improvement • Painted California ST-10 bridge rails

Subsurface Conditions

East of the Main Post Tunnel, the topography is currently at elevations ranging from approximately 10 ft. to 15 ft. NAVD88. This area extends from west of Tennessee Hollow to the Girard Road area. The subsurface conditions, in order of increasing depth, consist primarily of very loose sandy hydraulic fill; soft Bay Mud clays and loose sands (marsh deposits and marine sands); dense to very dense Colma sands; very stiff marine Old Bay Clay with interbedded marine sands; very stiff to hard clays (colluvium), and Franciscan bedrock. Groundwater in the fill is 2 ft. to 5 ft. deep. The deeper sand layers are confined aquifers under artesian conditions. Geotechnical challenges in this area include consolidation of the marsh deposits, liquefaction of marine sands and hydraulic fills, settlement associated with liquefaction, and lateral deformations (spreading) associated with liquefaction.

Key Geotechnical Challenges and Solutions

1 1.2.B.f The bridges spanning the Tennessee Hollow wetland habitat will face several geotechnical challenges. Liquefiable soils are present beneath the site to substantial depths. Unless mitigated, these materials will induce significant lateral spread forces on bridge foundations during significant seismic events. Additionally, artesian groundwater conditions can complicate construction. To address these challenges, GLP has made a significant modification to the approach presented in the Indicative Preliminary Design. As an

1 1.2.A

alternative to the large-diameter CIDH foundations shown, the bridges will be supported on pile caps with smaller diameter CIDH piles and a cellular pattern of CDSM will be used to improve the soils prior to installation of CIDH shafts. The design intent is to mitigate the lateral spreading using CDSM ground improvement, so that the CIDH piles will not need to be designed to resist the very large lateral spread loads. The CIDH piles will extend into, but not through the dense Colma sands to avoid the very high artesian pressures in the underlying deep marine sands. The structural vertical loads will be transmitted into the Colma sands by the CIDH piles. The structural horizontal loads imposed on the CIDH piles will be resisted by the CDSM improved ground and the underlying Colma sands. The use of CDSM ground improvement will afford a higher degree of confidence in the seismic performance of the structures. In addition, pile cap excavations will be below groundwater and dewatering will be required; however, the CDSM will help to reduce groundwater inflows and dewatering costs. CDSM will also help avoid problems with the CIDH construction through the shallow marsh deposits and marine sands.

Major geotechnical challenges at the Girard undercrossing bridges and Girard depressed roadway include consolidation settlement associated with Bay Mud, liquefaction of the hydraulic fill and Marine Sands, and artesian groundwater conditions. Unless mitigated, the Bay Mud will experience consolidation settlement under new loads resulting from new fill or shallow foundations. Liquefaction can result in seismically-induced settlement, lateral spreading, and reduced bearing capacity. Artesian groundwater conditions may complicate construction.

1 1.2.B.f

GLP's approach to addressing these challenges is similar to the approach outlined in the Indicative Preliminary Design, with some modification: eliminating tension elements (tension piles or ground anchors) to resist uplift pressures below the depressed roadway, installing continuous CDSM ground improvement to resist hydrostatic uplift (artificial aquitard or "boat section"), continuing the CDSM in a cellular pattern below the "boat section" into the Colma sands to mitigate lateral spreading and seismically-induced settlement, mitigating lateral spreading using CDSM ground improvement around bridge CIDH foundations, and use of spread footings and CDSM ground improvement to support retaining walls.

1 1.2.A

1 1.2.B.f

At the depressed roadway site location, uplift pressures are of concern because the finished roadway will be below the groundwater level. The approach identified in the Indicative Preliminary Design suggests that in addition to constructing a CDSM artificial aquitard, tension elements (piles or permanent ground anchors) and a waterproofed structural pavement slab will be used to resist uplift pressures. GLP propose to design the CDSM "boat section" to resist uplift through its self weight without the need for tension elements. With this concept, a drainage system will be installed between the "boat section" and the pavement section to intercept any minor seepage that permeates through the CDSM. This system will eliminate costly tension elements, waterproofing, and the structurally reinforced pavement section. In addition, this system will afford better seismic performance of the depressed roadway.

GLP proposes to support the bridges on CIDH shafts surrounded by a cellular pattern of CDSM ground improvement to mitigate lateral spreading, as discussed above for the Tennessee Hollow bridges. The use of CDSM ground improvement will afford a higher degree of confidence in the seismic performance of the structures. The retaining walls adjacent to the bridges will be supported on shallow spread foundations bearing on a cellular grid of CDSM. This will mitigate lateral spreading, reduce seismically-induced settlements, and reduce static consolidation settlement of the walls.

1 1.2.A

Electrical Substation

The electrical substation is an underground cast-in-place concrete structure adjacent to the Northbound Main Post Tunnel. The substation will include rooms for the electrical switchgear and for the SCADA system. Permanent access for personnel, equipment, and maintenance will be provided. The appropriate ventilation for all equipment will also be provided. The inside footprint of this substation facility will be 76 ft. long and 41 ft. wide. The clear inside height of the rooms will be 15 ft. The cellular CDSM system below the Main Post Tunnel will be extended to the north to support the electrical substation mat foundation.

Typical Superstructure Cross Section at Each Crossing Road

Typical superstructure cross sections at each crossing road showing the existing condition, each construction phase, and the final condition are presented in GLP's Preliminary Master Design Submittal. Refer to sheets ST-20 for Girard Road Undercrossing Northbound and Girard Road Undercrossing Southbound; ST-21 for Northbound High Viaduct at Crissy Field Avenue; ST-22 for Northbound High Viaduct at Lincoln Boulevard; and ST-23 for Northbound High Viaduct and Veterans Off-Ramp at DOY4 Line.

Minimum Vertical Clearances

Figure 10 presents the minimum vertical clearances for each bridge that crosses a roadway. Bridges that do not cross a roadway are not included. The minimum vertical clearances are also shown in GLP's Structure Concept Plans.

Figure 10: Minimum Vertical Clearances

Bridge				Roadway			Minimum vertical clearance
Bridge Name	Bridge No.	Station	Offset	Name	Station	Offset	
Northbound Presidio Viaduct	34-0157R	92+50.97	19.33 ft. Rt.	Crissy Field Avenue	N/A	N/A	65 ft.
		98+59.07	14.29 ft. Rt.	Lincoln Boulevard	N/A	N/A	30 ft.

Bridge				Roadway			Minimum vertical clearance
Bridge Name	Bridge No.	Station	Offset	Name	Station	Offset	
		99+85.57	28.63 ft. Rt.	DOY4 Line	108+84.206	33.00 ft. Rt.	16 ft., 8 in.
Veterans Off-Ramp	34-0159	100+59.19	17.63 ft. Rt.	DOY4 Line	109+49.02	33.00 ft. Rt.	17 ft., 0 in.
Girard Road Undercrossing Northbound	34-0165R	45+96.83	0.17 ft. Lt.	Girard Road	66+30.83	38.00 ft. Rt.	15 ft., 7 in.
Girard Road Undercrossing Southbound	34-0165L	47+15.52	38.17 ft. Lt.	Girard Road	65+00.43	38.00 ft. Rt.	15 ft., 11 in.
Northbound Presidio Viaduct	34-0157R	92+50.97	19.33 ft. Rt.	Crissy Field Avenue	N/A	N/A	65 ft.
		98+59.07	14.29 ft. Rt.	Lincoln Boulevard	N/A	N/A	30 ft.
		99+97.21	44.00’ Rt.	DOY4 Line	109+02.12	33.00’ Rt.	18 ft., 1 in.
Veterans Off-Ramp	34-0159	100+65.56	22.00 ft. Rt.	DOY4 Line	109+56.04	33.00’ Rt.	18 ft., 11 in.
Girard Road Undercrossing Northbound	34-0165R	45+96.83	0.17 ft. Lt.	Girard Road	66+30.83	38.00’ Rt.	16 ft., 10 in.
Girard Road Undercrossing Southbound	34-0165L	46+30.31	38.17 ft. Lt.	Girard Road	65+51.52	38.00’ Rt.	17 ft., 9 in.

Minimum Horizontal Clearances

Figure 11 presents the minimum horizontal clearances for each bridge that crosses a roadway. Bridges that do not cross a roadway are not included. The method of shielding is presented when shielding of the object is required.

Figure 11: Minimum Horizontal Clearances

Bridge			Roadway name	Minimum horizontal clearance	Method of shielding object
Bridge Name	Bridge No.	Object			
Northbound Presidio Viaduct	34-0157R	Bent 3 column	Crissy Field Ave.	30 ft., 11 in.	N/A
		Bent 5 column	Lincoln Boulevard	98 ft., 2 in.	N/A
		Bent 6 column	Lincoln Boulevard	18 ft., 5 in.	N/A
		Bent 6 column	DOY4 Line	29 ft., 8 in.	N/A
		Abutment 7	DOY4 Line	47 ft., 1 in.	N/A
Veterans Off-Ramp	34-0159	Bent 1 column	DOY4 Line	15 ft., 11 in.	ST-10 barrier
		Bent 2 column	DOY4 Line	5 ft., 0 in.	ST-10 barrier
		Abutment 3	DOY4 Line	7 ft., 9 in.	ST-10 barrier

Bridge			Roadway name	Minimum horizontal clearance	Method of shielding object
Bridge Name	Bridge No.	Object			
Girard Road Undercrossing Northbound	34-0165R	Bent 2 column	Girard Road	5 ft., 1 in.	Concrete barrier
		Bent 3 column	Girard Road	4 ft., 9 in.	Concrete barrier
Girard Road Undercrossing Southbound	34-0165L	Bent 2 column	Girard Road	5 ft., 2 in.	Concrete barrier
		Bent 3 column	Girard Road	5 ft., 3 in.	Concrete barrier

Outline Bridge Removal Plan

Where structures require removal, the work will be completed in conformance with the Department's Standard Specifications and the Contract Documents. GLP will develop a Bridge Removal Plan focused on all aspects associated with bridge removal including, but not limited to, hazardous material investigation and handling, waste management, material salvage, and health and safety training for both workers and community members. The final plans will be stamped by a licensed professional engineer. The Design-Build-Joint Venture has extensive experience in bridge removal and the development of engineered demolition plans, as demonstrated by successfully completed projects throughout the State.

Before bridge removal activities take place, GLP will conduct further testing on the existing structures to better determine the potential risks and environmental hazards associated with each structure's removal. Two key concerns are the lead in the paint systems and the potential for asbestos in the bearings and expansion joints. This information will expand upon the data from the RFP's Reference Documents. After thorough investigation, our licensed professional engineer will produce a detailed plan for removal activities. With an awareness of local regulations and the sustainability goals for the project, special consideration will be given to waste minimization through material salvage and responsible disposal of materials unable to be reused on site. Since the Project will be constructed and operated with live traffic on or adjacent to the site, GLP also understands the importance in caring for the workforce, the traveling public, adjacent properties, occupants, and users. We will use Best Management Practices to ensure adequate maintenance of the Project site and adjacent properties is achieved.

Specifically, GLP's Bridge Removal Plan will cover the demolition of the existing High Viaduct, the removal of temporary elements on the Southbound Presidio Viaduct, the removal of all debris and the restoration of detour routes after traffic is in its final configuration, and the removal of all clashing foundation elements as defined in the Agreement, Appendix 5. ESA areas will be protected from intrusion by personnel, equipment, or debris. After the concrete deck is removed, the steel trusses will be lowered by crane for dismantling on the ground. Materials will be stockpiled and segregated based on the requirements of the Contract Documents, the Project's Waste Management Plan, Hazardous Materials Management Plan, and Sustainability Management Plan. GLP will maintain adequate property control records for materials or equipment specified in the Contract Documents to be salvaged for the Department or other designated parties. Materials to be hauled off-site or reused for permanent construction will also be segregated based on the above Project Plans, with special care taken to ensure proper recycling and disposal of hazardous waste.

2. C) ARCHITECTURAL CONCEPT PLANS

1 1.2.B.e Architectural treatments to structures, tunnels, bridges, walls, lighting, and other features will follow the Indicative Preliminary Design and the Doyle Drive South Access to the Golden Gate Bridge Architectural Criteria Report (August 2008). Architectural improvements will incorporate the design criteria developed by the Design Concepts Working Group and the Architectural Steering Panel. Parkway elements will, at a minimum, match existing roadway architectural treatment in Phase 1 work. GLP will architecturally treat the following elements:

• Girard Road Interchange bridge deck edge treatment and column detail • Main Post Tunnel portals, interior finish, safety railing, and fences • Northbound Battery Tunnel portals, interior finish, safety railing, and fences	• Northbound Parkway viaduct deck, cantilever support steel fins, and columns • Light poles, fences, and railing

The parkway roadway will apply Context Sensitive Solutions (CSS) and visually integrate into the existing Presidio environment and minimize visual impacts to drivers, pedestrians, and other users. The parkway design will provide the driver a pleasant visual experience and ensure that all roadway safety criteria are met. GLP will preserve and enhance views, which we understand are highly valued by the public. Further, GLP will provide visual continuity from Richardson Avenue to the east and extend to the Golden Gate Bridge. Architectural applications include shape, form, color, and texture and the design will incorporate historical and environmental influences of the Presidio lands.

Girard Road Interchange

1 1.2.B.e The parkway roadway components will be a simple and visually-consistent design including guardrails, abutments, bridge columns, and security/access fencing. The Girard Road bridge deck edge will receive architectural consideration and treatment. Security/access fencing will be compatible with the landscape design. Guardrails will be metal and not impede views while maintaining safety standards. Colors for the guardrail system will follow the Technical Requirements.

Tunnel Portals

1 1.2.B.e

All parkway tunnel portals will be similar in appearance and character. The interior finishes will be smooth concrete. Security fencing and railing will be compatible with the Technical Requirements. The tunnel portal treatment will be compatible with Phase 1 tunnel portals. Figure 12 depicts a rendering of the West Portal Battery Tunnel.

Parkway Viaduct

1 1.2.B.e

The viaduct roadway deck and cantilever support steel fins will be a simple and visually consistent design. Architectural applications will include guardrails, abutments, retaining walls, bridge columns, and security/access fencing which will be compatible with the landscape design. Guardrails will be metal and not impede views while maintaining safety standards. Colors will follow the Technical Requirements and consistently match other colors used in Phase 1.

Light Poles, Fences, and Railing

1 1.2.B.e

The light pole design will be consistent with the Technical Requirements and include historical era ambiance. All fencing and railings will be visually compatible with the landscape design. Guardrails will be metal, low, and not impede visual access while maintaining safety standards. Decorative fencing will be utilized where possible in lieu of chain link fence. Maintaining safety is always paramount while applying visual aesthetic criteria. Color selections and application of color treatments will follow the requirement of the RFP.

Figure 12: West Portal Battery Tunnel

2. D) LANDSCAPE CONCEPT

1 1.2.E

GLP's Preliminary Master Design Submittal addresses the environmental and landscape requirements of the Department, the Presidio Trust, and other Project stakeholders and is based on aesthetic and environmental guidelines in the Presidio Trust's Indicative Preliminary Design's landscape concepts. The final landscape plans will be compliant with the Doyle Drive South Access to the Golden Gate Bridge, Architectural Criteria Report (August 2008) and the Landscape Overall Design Intent Illustrative Concept Plan. The plans will be developed using a collaborative design process, providing agency stakeholders an opportunity for design input.

The Landscape Concept Plans illustrates the entire Project limits, from the Veterans Boulevard Interchange to Girard Road and Richardson Drive. The plan incorporates the design criteria developed by the Design Concepts Working Group. Planting design will conform with the Presidio Vegetative Management Plan and associated plant community zones.

Figure 13: Presidio Historic Wall, Context Sensitive Solution Example

The landscape design will apply context sensitive solutions and integrate the parkway into the existing Presidio environment, such as the historic wall depicted in Figure 13, while minimizing visual impact to drivers, pedestrians, and other users. The parkway will provide the driver a pleasant visual experience and ensure that all roadway safety criteria are met. GLP will preserve and enhance views which we understand are highly-valued by the public.

Project elements included in the landscaping plans include:

• Potential landscape improvements subject to Presidio Trust approval	• Arborist
• Parking lots	• Landscape architect
• Sidewalks	• Lighting for pedestrian pathways and landscaping
• Curbs	• Acoustical screening
• Fencing and cable railings	• Visual screening
• Permanent erosion control	• Elevated berms and barriers
• Irrigation	• Topsoil
• Irrigation electrical supply	• Additional building surrounds Building 201 relocation and improvement
• Plants	

GLP's Landscape Concept Plans are represented by geographic areas in relation to the overall site and each area has its own distinct visual character. Starting east at the Palace of the Fine Arts, local street improvements begin with Richardson Avenue and Girard Road and include a

Figure 14: Prototype Restorative Landscape Planting

new landscaped median. The parkway crosses the Crissy Marsh restoration land (not included in the scope of this Project), and enters the Main Post Tunnel's east portal. The Main Post Tunnel landscape area is arguably the most significant parkway segment due to its physical setting and connectivity to the Main Post and Crissy Field. GLP will apply landscape elements at this location including pedestrian walkways and trails, benches and view seating, and refined grading including retaining walls and steps.

The Main Post Tunnel's west portal begins the divided parkway setting including a landscaped median and large retaining wall. The parkway quickly enters the east tunnel portal of the Battery where Lincoln Boulevard is rebuilt adjacent to the cemetery. The parkway then leaves the Battery Tunnel's west portal and starts the new viaduct merging into the Veterans Boulevard Interchange and ultimately connecting to the Golden Gate Bridge. Set in the historic forest area, the restoration plantings will soften and visually blend the highway infrastructure with adjacent historic residences and buildings.

2. E) TUNNEL SYSTEMS PLANS

GLP's Preliminary Master Design Submittal Plans included in Volume 2, Part 2 present coherent and realistic strategies for the four critical elements of tunnel system:

• Fire and life safety • Tunnel ventilation	• Fire suppression • Tunnel lighting

Refer to sheets EP-01 through EP-03 for locations of tunnel fire and life safety system components such as communication pull boxes and niches; sheets M-01 through M-04 for tunnel ventilation and drainage systems; sheets FP-01, FP-02, and FP-03 for tunnel fire protection/suppression systems; and sheets EL-05 through EL-07 for schematics of the tunnel

1 1.2.G.d

lighting. Refer to sheets EL-08 for tunnel controls and SCADA system schematic; sheets EL-01 through EL-04 for tunnel electrical power supply; and EP-04 for the electrical duct bank layout in the Main Post Tunnel.

To demonstrate our ability to implement these strategies, GLP will design the tunnel systems using experience gained while working with the Department on the design and construction of the Devil's Slide Tunnels located along Highway 1 between the cities of Pacifica and Half Moon Bay. Our team is familiar with the Department's standards and criteria for tunnel design; integration of tunnel systems into the operations center at the Oakland Tunnel Systems

Management Center (TSMC); and methods used for monitoring critical systems in the tunnels. The working relationships formed with the Department during the Devil's Slide project will be beneficial to GLP's success on this Project by providing coherent and realistic strategies for fire and life safety.

Tunnel Fire and Life Safety

1 1.2.G.a GLP will install automatic fire detectors in each tunnel while manual pull stations will provide a secondary method of fire detection. Alarms will be connected to the digital control system through the fire alarm control panel, provide input for the tunnel ventilation and fire suppression systems and notification to the project control center and the TSMC.

GLP will install CCTV cameras at specified intervals to confirm alarms and to monitor the progress of incidents in the tunnel. The cameras will be programmed with presets to focus on fire telephone cabinets or fire extinguishers and on areas identified as experiencing congestion by incident detection systems.

Carbon monoxide and nitrous oxide sensors will be provided in the tunnel to monitor the levels of these gases. An alarm will trigger start of the ventilation system when carbon monoxide levels exceed operational performance requirements.

Emergency hands-free telephones with ring-down capability will be provided at egress points. A radio re-broadcast system will provide communication in the tunnel for GLP's O&M forces, Department personnel, and other emergency responders. The control center will have the ability to communicate with Department's traffic and maintenance group radios as well as monitor other frequencies.

1 1.2.G.a Fire and life safety systems in the tunnel will be connected with a digital control system similar to the system being installed for the Devil's Slide Tunnel project. All systems will be capable of control from the local control center or remotely from the TSMC. A layout of the local control center within the electrical substation building is presented in the GLP Preliminary Master Design Submittal Plans, which are included in Volume 2, Part 2, sheet EL-04.

Tunnel Ventilation

1 1.2.G.b The Technical Requirements state that a mechanical ventilation system is required to be built by the Developer for all three tunnels and requires the Developer to furnish and install jet fans for the southbound Battery Tunnel (constructed in Phase 1, Contract 4). GLP's tunnel ventilation design meets the Technical Requirements by providing a longitudinal ventilation system with jet fans for the tunnels.

1 1.2.G.b GLP performed manual calculations to determine the preliminary jet fan selections as shown in the table below. For each of the three tunnels, we calculated the critical velocity using the specific geometry of the tunnel and the design fire. We then calculated the total thrust required to maintain the critical velocity by overcoming the losses in the specific tunnel, including the 12-mile-per-hour adverse wind conditions and adverse buoyancy where applicable. In addition, we will install a sprinkler system for safety and to avoid potential loss of fans. The jet fans arrangement and locations are also shown in GLP Preliminary Master Design Submittal Plans included in Volume 2, Part 2, sheets M1, M2, and M4.

Application	Number of Fans	Nominal Fan Size (mm)	Max Nameplate (HP)	Nominal Thrust at Standard Density Newtons	Maximum Weight of Fan (lbs)
Southbound Battery Tunnel	4	1,400	150	2,250	4,700
Northbound Battery Tunnel	2	1,400	150	2,492	4,700
Southbound Main Post Tunnel	4	1,400	125	2,109	4,700
Northbound Main Post Tunnel	4	1,400	125	2,213	4,700

In the case of the Northbound Main Post Tunnel, the row of fans will need to be installed 150 ft. to 200 ft. away from the entrance portal because of the Halleck Street construction above. GLP included a density correction for the thrust of the fans due to the increased likelihood of a fire occurring between the entrance portal and the fans.

During final design, we will reevaluate all assumptions and perform detailed computer calculations/simulations including use of the Subway Environmental System to complete the design and obtain permits from the relevant agencies.

Tunnel Fire Protection

1 1.2.G.c GLP's approach to providing tunnel fire protection includes a wet standpipe system that meets the current NFPA 502 and NFPA 14 requirements and a fixed fire protection deluge system that meets the NFPA 13 requirements. The standpipe system for each of the three tunnels will have a 6-in.-diameter buried main running the length of the tunnel. Fire hose valve stations will be located in niches along one of two walls at a spacing not to exceed 250 ft. Each fire hose valve station will be fed by a 4-in.-diameter branch line off the buried main. The standpipe system will have a water supply connection at both ends of each tunnel for added reliability. Two-way siamese freestanding fire department connections will be provided outside the portals for use by the fire departments. The design will add fire hydrants outside the portals where required to minimize fire department connection distance to a maximum of 100 ft. from the nearest fire hydrant. The buried piping will be Class 52 (or

pressure class) ductile iron pipe. The above ground piping will be A-53 Schedule 40 galvanized steel.

1 1.2.G.c The fixed fire protection deluge system will be designed for an Ordinary Hazard Group 2 environment in accordance with NFPA 13. The density for the deluge design will be 0.2 GAL per minute per SQFT using both pendant and sidewall open heads. In the final design, GLP will use hydraulic calculations to optimize the design, limit the overspray, and size the feed mains and the branch main. These design elements will also impact the size of the drainage system. The system water supply will be designed to function adequately when any two adjacent zones are activated. Zone lengths will be limited so that the maximum instantaneous demand of any two adjacent zones, plus a nominal hose stream demand of 250 GAL per minute will not exceed 3,000 GAL per minute. This maximum instantaneous demand will require the use of a 10-in.-diameter buried main running the length of each tunnel. The 6-in. deluge valves will be installed in pairs in niches along the same wall as the fire hose valve niches. The 10-in. buried main will be routed alongside the 6-in. standpipe main.

A four-way fire department connection is provided at each end of the Southbound Battery Tunnel and will be installed during Phase 1 construction under Contract 4. New connections to these existing fire department connections will be provided from the Northbound Battery Tunnel. A four-way freestanding fire department connection common to both tubes will be provided at each end of the Main Post tunnels.

1 1.2.G.c For each tunnel, the fixed fire protection and the standpipe system will be fed by the same redundant water supply. A utility-approved backflow preventer will be provided at each end of the tunnels to separate the tunnel fire systems from the general water supply. Downstream of each backflow preventer, a common 10-in. header will split into a 6-in. header for the standpipe main and a 10-in. header for the fire protection main. Check valves will be located in a common vault at each of the above two mains to provide the required separation of the two systems. See GLP Preliminary Master Design Submittal Plans included in Volume 2, Part 2, sheets FP-01, FP-02, and FP-03 for preliminary layouts of the fire protection systems for the three tunnels.

Tunnel Lighting

1 1.2.G.d GLP will bring current experience in design and construction of tunnel lighting from recent work with the Department on the Devil's Slide Tunnel project to ensure the process is smooth and successful for this Project.

Schematic diagrams of the lighting systems in both Main Post tunnels and the Northbound Battery Tunnel are presented in GLP Preliminary Master Design Submittal Plans included in Volume 2, Part 2. Lighting system components within the tunnels will be presented on the preliminary submittal drawings.

The design will incorporate a symmetrical lighting system employing linear-type luminaries and supplemented with point source luminaries in the locations described in the Technical Requirements. High pressure sodium High-Intensity Discharge type luminaries will be used. Lighting will be designed in compliance with Illuminating Engineering Society Standard RP-22 ensuring the safety of the traveling public by setting lighting levels to accommodate the needs of the human eye as it adjusts from light to dark areas. Lighting levels at the entrance are set to match external conditions; then as the vehicle moves through the tunnel, lighting levels are reduced to an internal lighting level. This gradual reduction in light levels allows for adjustment to the lower level of light, avoiding temporary blindness.

GLP will use AGI 32, the nationally-recognized software program used to prepare lighting calculations, to simulate lighting conditions in the tunnel and determine the success of the lighting system for this Project. GLP has extensive experience in using the AGI 32 program to prepare lighting calculations for numerous roadway tunnels.

Tunnel Control and SCADA Systems

1 1.2.G.a 1 1.2.G.b 1 1.2.G.c 1 1.2.G.d

GLP's experience with design and construction of the Devil's Slide Tunnels has provided in-depth familiarity with the Department's standards and criteria for tunnel controls and monitoring systems design including SCADA. We are familiar with the Department's Oakland TSMC operations and the methods used for both local and remote control and monitoring of critical systems in the tunnels. The experience gained and relationships formed will be beneficial to the success of this Project.

1 1.2.G.d

Tunnel controls will be provided to operate and monitor the tunnel ventilation systems, tunnel lighting, stormwater and sanitary sewage pump stations, and electrical distribution systems. Controls will be implemented using networked programmable controllers and will use fully-redundant, hot-standby processor modules and fully-redundant fault tolerant communications networks. All control and network communications will be implemented in redundant optical fiber networks using managed switching topologies to provide maximum bandwidth and minimized network traffic. Schematic block diagrams of the controls and communication network architecture are presented in the GLP Preliminary Master Design Submittal Plans included in Volume 2, Part 2.

Local operator controls, as well as the facility for interfacing the tunnel controls to a wide-area network and remote locations, will be provided via redundant database and application servers and desktop operator terminals located in the electrical substation building. A layout of the operator interface equipment and controls components within the Main Post Tunnel's electrical substation building is presented in the GLP Preliminary Master Design Submittal Plans included in Volume 2, Part 2, sheets EI-OA. The controls will be integrated with those provided under Phase 1 work for the Southbound Battery Tunnel.

Working closely with our O&M team, GLP will design all aspects of the tunnel controls and monitoring systems to provide extensive user/operator diagnostic capabilities and to ensure maximum up-time availability and fault tolerance. The locations of significant components are presented in GLP Preliminary Master Design Submittal Plans included in Volume 2, Part 2, sheets EL-08.

Tunnel Electrical Power Supply

NFPA 502 requires two sources of power for a roadway tunnel. GLP will install an electrical substation at the North Main Post Tunnel, which will be fully integrated with the Battery Tunnel Substation provided during Phase 1, Contract 4 construction. Each substation will contain two utility feeds to the main bus, connected by a tiebreaker. The system will be designed so that if one utility feed is lost the remaining utility feed can support the entire system. One-line diagrams representing the electrical distribution systems for each of the tunnels are presented in the GLP Preliminary Master Design submittal Plans included in Volume 2, Part 2, sheets EL-02 and EL-03.

One nominal 15 KV medium voltage utility feed will come in to the Project at the Battery Substation as indicated on the Phase 1 sheets and the Department will provide the second 15 KV utility feed to the Main Post Substation from an independent utility power source. Medium voltage feeders and spares will be installed between the substations routed through the tunnels and the connecting roadway. A layout of the electrical distribution components within the electrical substation building is presented in the GLP Preliminary Master Design submittal Plans included in Volume 2, Part 2, sheet EL-04.

Power from the medium voltage switchgear is distributed to the low voltage switchgear through a single transformer in each substation and from the low voltage switchgear to distribution panel boards and motor control centers throughout the Project. Emergency loads are supported by a Uninterrupted Power Supply to ensure that loads are not dropped during the switchover from one service to the other. Emergency loads include egress and emergency lighting, fire alarm and suppression systems, communication systems, and SCADA systems. An arranged listing of the symbols used throughout the electrical and associated systems plans is presented in the GLP Preliminary Master Design submittal Plans included in Volume 2, Part 2, sheet EL-O1.

2. F) TCE OCCUPATION PLAN

GLP’s access to the site is staged by intermediate release dates. These are initiated by the Department by issuing NTP 1, NTP 2, and NTP 3. Upon NTP 1, GLP will begin the design, utility potholing, building inspection, survey, and geotechnical investigation. These processes will be coordinated with the Department, the Presidio Trust, and the Phase 1 Contractors. The NTP 1 work will take several months and will enter the entire future work site for the Project. As these entries are relatively short term at each specific location, they will be organized to allow the

Phase 1 Contractors to continue their work without impact. GLP will establish Project offices, but not occupy them until we receive NTP 3.

Upon the issuance of NTP 2, GLP will be responsible for performing operations and maintenance on Phase 1, while construction is being completed by the Phase 1 Contractor. During this time, GLP's operations manager will be responsible for ensuring that maintenance activities required for NTP 2 are performed per the Technical Requirements. Activities to be performed during NTP 2 will include incident and emergency response, debris and litter removal, routine pavement patching, small sign replacements, graffiti removal, and other activities that can be safely performed by a small crew. Major unexpected damage or repairs that require specialty equipment or additional resources will be provided by local Contractors or the DBJV.

The operator will coordinate with the Phase 1 Contractor for the twice-daily requirement of relocating the movable barrier. GLP staff will be trained in traffic control for incidents, maintenance activities, and to respond to traffic issues that may occur due to the ongoing construction.

An important function of our GLP's operations manager and technical staff will be to participate in the inspections of the Phase 1 construction to ensure that final acceptance of the assets meet the expectations of asset lifecycle and that the infrastructure conforms to the maintenance requirements at turnover. As part of our review of the system, we will provide punchlist items as necessary to support final acceptance.

Upon issuance of NTP 3 by the Department, construction operations will commence. GLP will proceed to erect the temporary fences, signs, and barriers to protect the public from entering an active Project work site. Refer to GLP Preliminary Master Design Submittal Plans included in Volume 2, Part 2 for TCE Occupation Plan sheets C11-C13. Due to the limited area within the TCE, we intend to use all of these areas for construction staging, material lay down, temporary offices, and stockpile locations while working in the sequence outlined in the Project schedule and TMP.

Many of the materials from excavations and removals are suitable for use in the Project and they will be stored on-site until they can be incorporated into the work. The Department's investigation has determined on-site hazardous and contaminated materials needed to be tested and evaluated before their use or disposal can be determined. This will require much of the available site. As part of our Sustainability Management Plan, we will use the site to minimize excess movement of equipment, materials, and earthwork. In addition, to limit the off haul and trucking of excess soil, we intend to stockpile as much as possible for later backfill and embankment. This will help support GLP's goal to minimize construction traffic, emissions, and traffic through the streets of San Francisco. By keeping objects contained within the appropriate Project zones, we will minimize disruptions to the public and perform in accordance to our Environmental Compliance Plan.

As the heavy construction operations are completed and the work transitions to landscaping and commissioning, some areas within the TCE, but outside of the O&M limits will become available. GLP will work with the Department and the Presidio Trust to vacate these parcels and return their control to the Presidio for its use.

2.2.

Form I/Design Submittal Overview

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FORM I

Preliminary Master Design Submittal Overview

Concept Component	Indicative Preliminary Design Item / Feature	Proposed Modification to Indicative Preliminary Design	Comments / Benefits
A) Roadway Concept			
Alignment and Profile			
Changes reflected in the proposal			
DOY4-LINE	HORIZONTAL ALIGNMENT	Revised alignment	Revised alignment to optimize / reduce R/W needs, retaining wall limits and construction cost.
	PROFILE	Revised profile	Designed to tie in with revised NB mainline profile and new connector profile. Profile provided in IPD set did not satisfy requirements for a vertical clearance between connector and mainline above. Implementation of this proposal requires coordination/revisions for work proposed in Contract #3.
Transportation Management Plan			
		No Changes Proposed	

Concept Component	Indicative Preliminary Design Item / Feature	Proposed Modification to Indicative Preliminary Design	Comments / Benefits
Drainage			
Drainage	Stormwater Pump Station	Relocated Stormwater Pump Station to the northwest corner of the Girard Rd/ SB Off-Ramp intersection.	Pump station is relocated for accessibility purposes. The location shown on the IPD plans are not feasible.
Drainage	Storage/Treatment of Storm Water	Proposed Storage boxes (2) to collect tunnel wash water.	Tunnel wash water will be collected and stored until it can be off-hauled for treatment.
Drainage	Storage/Treatment of Storm Water	Proposed 10' x 6' RCB for retention of on-site runoff.	A 30 minute detention of the on-site runoff will allow the off-site runoff to discharge to the San Francisco Bay and reduce the amount of peak discharge. This will minimize impacts to the existing outfalls to the bay.
Drainage	Storage/Treatment of Storm Water	Proposed - 72" Pipe for retention of on-site runoff.	A 30 minute detention of the on-site runoff will allow the off-site runoff to discharge to the San Francisco Bay and reduce the amount of peak discharge. This will minimize impacts to the existing outfalls to the bay.
Drainage	Subsurface Drainage	Proposed subsurface drainage system in Girard Road.	Subsurface underdrains are needed in Girard Road because of the high groundwater level.

Concept Component	Indicative Preliminary Design Item / Feature	Proposed Modification to Indicative Preliminary Design	Comments / Benefits
Utilities			
The sanitary sewer pump station located near Lincoln Blvd.	U-7	The sanitary sewer pump station located near Lincoln Blvd and associated pipes will be constructed by others and will not be part of this contract.	Based on information we received from two meetings with the Sponsors, the sanitary sewer pump station and pipes will be constructed as part of the Phase 1 contracts.
A new gas line was included from Halleck to Girard.	U-2 / U-5	The gas line extended to provide connection to the building 603.	The gas line extended further than shown in the IPD set to connect to building 603. Required to reconnect building service. No line size was given in IPD set, so assumed 2" .
B) Structures Concept			
Geotechnical			
Girard Road Depressed Roadway (34-0166)	Artificial Aquitard	Replace tension piles, reinforced concrete slab, and waterproofing with thickened artificial aquitard ("Boat Section") and pavement underdrain system.	-Reduces construction costs -Reduces constructability risks associated with pile installation in challenging subsurface conditions and difficulty of waterproofing around pile connections.

Concept Component	Indicative Preliminary Design Item / Feature	Proposed Modification to Indicative Preliminary Design	Comments / Benefits
C) Architectural Concept Plans		No Changes Proposed	
D) Landscaping Concept			
Electrical Substation at Main Post Tunnel	Location of Electrical Substation at Main Post Tunnel	Proposed alternate location for the Electrical substation to conform to the requirements of the landscape concept presented in the IPD set.	The location proposed in IPD set does not qualify as Context Sensitive Solutions (CSS), which is the basic design criteria for the entire project. It conflicts with pedestrian access and connectivity between presidio Main Post and Crissy Field. Alternate location will be proposed as part of final design since current location of the substation was approved by stakeholders.
E) Tunnel Systems Plans			
		No Changes Proposed	
F) ITS System Plans			
VMS Sign	Location of the VMS sign	Moved from location indicated in the Technical Specifications	Relocated VMS from "SB" 92+00 to "SB" 101+00
VMS Sign	Location of the VMS sign	Moved from location indicated in the Technical Specifications	Moved VMS off bridge to from "SB" 92+00 to "VT" 120+00

Concept Component	Indicative Preliminary Design Item / Feature	Proposed Modification to Indicative Preliminary Design	Comments / Benefits
VMS Sign	Location of the VMS sign	Moved from location indicated in the Technical Specifications	Relocated VMS from "SB" 85+20 to "SB" 87+20 to outside of the tunnel
VMS Sign	Location of the VMS sign	Moved from location indicated in the Technical Specifications	Relocated VMS from "NB" 76+50 to "NB" 75+00 to outside of the tunnel
VMS Sign	Location of the VMS sign	Moved from location indicated in the Technical Specifications	Relocated VMS from "SB" 69+60 to "SB" 70+60 to have an offset from a proposed overhead sign
VMS Sign	Location of the VMS sign	Moved from location indicated in the Technical Specifications	Relocated VMS from "SB" 64+60 to "SB" 66+60 to outside of the tunnel
VMS Sign	Location of the VMS sign	Moved from location indicated in the Technical Specifications	Relocated VMS from "NB" 54+30 to "NB" 53+00 to outside of the tunnel