

CONCEPTUAL ENGINEERING STUDIES

3.18.1. At-Grade Plan

The In-Progress Design Snapshot submitted November 6, 2002, did not contain an At-Grade Plan. The objective of this task is to identify and illustrate the conceptual configuration of an At-Grade replacement of the Alaskan Way Viaduct in sufficient detail to support the preparation of an EIS. The design work will also include the preparation of opinions of cost and will support both a parallel public involvement program and the WSDOT/City decision-making process. Three potential At-Grade options will be studied to determine the feasibility of each. One will be selected for possible inclusion in the EIS and developed to the same level as those in the November 6 In-Progress Design Snapshot. A technical memorandum documenting the rationale for selection will be provided.

The CONSULTANT shall perform Conceptual Engineering Studies for a new Design Plan that includes an SR99 at-grade roadway from approximately South Holgate Street to Pike Street, the proposed BNSF underpass near the intersection of Alaskan Way and Broad Street, the connection from the Alaskan Way to the Battery Street Tunnel, an assessment of the crossings and intersections from the north end of the Battery Street Tunnel to the vicinity of Ward Street, and the fire/life safety upgrades to the Battery Street Tunnel. This design plan will hereafter be referred to as the At-Grade Plan. The work will involve collection of data, evaluation of physical and stakeholder constraints, and the preparation of design drawings to illustrate potential street, transit, railroad and interchange options of the At-Grade Plan. It is assumed that three (3) At-Grade options will be developed to a level of detail to allow analysis and evaluation to determine the selection of a feasible At-Grade Plan to be potentially carried forward as part of the NEPA EIS.

Design elements expected to be considered for inclusion in the three At-Grade options include:

- Revisions to Western Avenue between Yesler Way and Seneca Street
- 1-lane service roadway along the dock-face of Alaskan Way
- 2-lane dedicated WSF Colman Dock access roadway
- Parking on both the east and west faces of the reconstructed Alaskan Way
- Connection of Armory Way from the waterfront to the Battery Street Tunnel
- ✓ The Broad Street/BNSF underpass
- Connections at SR 519 (Atlantic and Royal Brougham)
- Grade-separated pedestrian access bridges across Alaskan Way (2 to 3 or more)
- Access control, consistent with the characteristics of an urban major arterial
- A range of access options to allow analysis of all modes for achieving the best operations
- Fire and life/safety upgrades to the Battery Street Tunnel
- Waterfront Streetcar in either Alaskan Way or Western Avenue
- Improvements from approximately Railroad Avenue to Stewart Street and other street grid improvements in the downtown area
- ✓ Right of Way needs identified

Each of the three options will be evaluated in sufficient detail to determine its feasibility for, meeting operational and mobility requirements of the corridor, maintaining traffic during construction, and reducing construction cost, while at the same time addressing the existing engineering, environmental, and economic constraints. Of the At-Grade options considered

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feasible, one will be selected as the At-Grade Plan. Conceptual level engineering drawings will then be prepared for the At-Grade Plan selected that include project layout in plan and profile, roadway and connection configurations, structural elements, typical sections, pedestrian bridges, replacement/relocation of streetcar service and other related roadway facilities. Construction impacts will be identified including any required right-of-way acquisition, and conceptual level construction sequence drawings will be prepared. A conceptual level opinion of cost will also be prepared.

It is anticipated that the definition of the three options will be developed through a series of up-to three (3) team workshops. These workshops will be internal planning sessions involving the major discipline leads and a representative from the WSDOT and City. Development and refinement will be based on conceptual level analysis only, focused on travel market needs and an understanding of engineering and operational constraints.

ASSUMPTIONS:

- At-Grade Design Plan may provide only a portion of existing SR99 capacity and will be designed as an Urban Major Arterial
- Up to three (3) At-Grade options will be studied. One of these options will include a bypass tunnel.
- One (1) At-Grade Plan will be developed for possible inclusion in the EIS.

3.18.1.1. Design Criteria Update

The CONSULTANT shall update civil, structural, and traffic planning design criteria that is acceptable to both WSDOT and the City of Seattle. The resulting criteria will be an outgrowth of design criteria previously developed and modified to allow SR99 to more directly interface with, and make use of, surface streets. The resulting criteria will be used in developing the At-Grade options and producing the selected At-Grade Plan. The assumptions to be used in calculating an opinion of cost will be the same as those used for the In-Progress Design Snapshot issued November 6, 2002.

3.18.1.2. Data Collection / Survey

The CONSULTANT shall collect field surveys to locate key features that are not clearly shown in the City of Seattle GIS database.

ASSUMPTIONS:

- The study area shall remain as defined in all previous agreements.
- Right of Way shall be based on the City of Seattle GIS database "Parcel" layer and any additional survey data previously collected.

3.18.1.3. Transportation Analysis for At-Grade Plan

The CONSULTANT shall provide transportation planning and analysis of the At-Grade options. Influence of the Monorail, an expanded Waterfront Streetcar (circulator), bus transit modes, and redesign of the WSF intermodal terminal shall be considered in this analysis. The demand potential for the aforementioned transit services under At-Grade options will be assessed. The transportation analysis will also estimate impacts for travel on I-5 as a result of the anticipated reduced capacity of an At-Grade Plan. Use of existing analyses from

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previous work on other Design Plans will be prioritized in preference to the development of new data. The CONSULTANT shall provide transportation planning support at the conceptual level to assist in the definition of the three At-Grade options to be considered for identification of an At-Grade Plan.

Concurrent with development of the At-Grade options, the CONSULTANT will assess the potential for transit services to accommodate additional trips under an at-grade arterial concept. This assessment will involve analysis of modeled origin-destination information, assessment of baseline model assumptions, and planning-level identification of potential service enhancements to estimate the degree to which transit ridership could offset potential vehicle capacity reductions to the street system (arterial and freeway) under each At-Grade option.

The CONSULTANT shall refine the 2030 EMME/2 travel network to represent the selected At-Grade Plan. Using the findings developed to-date from simulations of the downtown grid along the waterfront, the CONSULTANT shall refine the speed and throughput assumptions for downtown streets and arterials. As with the modeling of the other design plans, the base conditions will be assumed in all other portions of the region. It is anticipated that up to four (4) primary model runs of the EMME/2 based model (three 2030 runs and one 2011 run) will be required to meet the needs of this analysis.

The CONSULTANT shall perform sufficient detailed traffic analysis using Highway Capacity Manual (HCM) methodology to assist in the refinement of the selected At-Grade Plan. Operational impacts to I-5, SR 519, and city surface streets will be described. Analysis will be consistent with that conducted for other design plans, beginning with a more general analysis approach (i.e., a feasibility analysis). Once the initial feasibility findings are evaluated and the implications of the concept understood, a more detailed analysis using simulation modeling techniques will be conducted (based on the outcome of the initial feasibility findings).

ASSUMPTIONS:

- Assumptions identified in the transportation analysis of the other design plans will be carried into the analysis of the At-Grade Plan.
- Use of the existing simulation networks will be limited to the refined analysis that follows the preliminary feasibility analysis.
- Analysis will be conducted for 2030 conditions. 2011 travel conditions for the selected At-Grade Plan will be measured in support of the EIS process only.
- Modeled transit service assumptions will be consistent with the baseline and other Design Plans, with modifications to incorporate the Monorail and expanded Waterfront Streetcar.

PRODUCTS:

- Refined 2030 model chain representing the At-Grade Plan
- Transportation analysis memorandum (data report), similar to those being developed for the remainder of the design plans. This memorandum will include a summary of transportation impacts and opportunities identified during the refinement of the plan and an over-all assessment of the ability of this plan to meet the mobility needs of the corridor. (Note: the mobility of persons, goods, vehicles, pedestrians, WSF, freight, etc. will be included in this memorandum. However the level of detail for each mode may vary, based on the information available.)

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3.18.1.4. Civil

The CONSULTANT shall prepare conceptual design plans and profiles for the At-Grade options. Details to be shown include, but are not limited to, the proposed profile grade line with stationing; right-of-way limits; lanes; median and shoulders; ramps, major drainage facilities; retaining wall locations; bridge structures; and tunnel structures. The design will be used to analyze and evaluate the different options. Number of lanes and access points will be determined based on the latest traffic modeling analysis done to date. Conceptual plan and profile drawings will be developed for the selected At-Grade Plan.

PRODUCTS:

- Civil Plan and Profile drawings for the selected At-Grade Plan at 1" = 200' scale (based on 11" x 17" paper) including mainline and ramps.

3.18.1.5. Structural

The CONSULTANT shall determine the structural configurations of the various facilities of the At-Grade options. These facilities may include: cut-and-cover tunnels, retained cut sections, retained fill sections, and aerial structures. Structural configurations will be developed to accommodate known physical constraints and geological conditions. Conceptual typical section drawings will be developed for the selected At-Grade Plan. The need to reinforce existing areaways along Western Avenue, Jackson Street, and First Avenue will be evaluated, cost estimated, and a recommendation made.

ASSUMPTIONS:

- No additional Geotechnical information will be required.
- No design work for the areaways is anticipated in this task.

PRODUCTS:

- Typical Section drawings for the selected At-Grade Plan at approximately 1"=30' scale.

3.18.1.6. Construction Sequence

The CONSULTANT shall prepare a description of a feasible construction sequencing and staging plan for each of the At-Grade options. The description shall include a discussion in terms of construction sequencing, impacts on adjacent public facilities and businesses, storage of construction materials and equipment, site accessibility, working space, utility relocations and temporary utilities. A feasible construction schedule and overall construction duration will be estimated. Once an At-Grade Plan is selected, construction sequence plans will be developed. The CONSULTANT shall be allowed to consider the use of parallel facilities, city streets and limited construction of temporary structures in developing a work-around plan for construction. The plan shall not rely on the criteria that two lanes of main line SR-99 (i.e., the current Viaduct) be maintained throughout the construction process. However, the plan shall strive to offer a logical sequence that minimizes overall congestion impacts.

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PRODUCTS:

- Construction Sequencing Descriptions for up to three (3) At-Grade options.
- Construction Sequencing Plan working drawings for the selected At-Grade Plan at 1"=300' scale.

3.18.1.7. Urban Design

The CONSULTANT shall prepare urban design plans for each of the At-Grade options. Urban design plan and section drawings will be prepared and submitted for the selected At-Grade Plan. Focus shall be on the at-grade environment and how the selected plan integrates with the existing local streets, tunnel portals, aerial structures, other modes of travel, and adjacent properties and districts.

PRODUCTS:

- Urban Design Plan working drawings for the three At-Grade options
- Urban Design Plan and Section drawings for the selected At-Grade Plan (approximately 8 drawings).
- Graphic support for public presentations.

3.18.1.8. Utilities

The CONSULTANT shall coordinate the three At-Grade options with work previously performed to determine the impacts to existing utilities and anticipated utility relocations. Once an At-Grade Plan is selected, conceptual level plan and cross-section drawings of utility relocations will be prepared as necessary to support the EIS. An evaluation of utility constraints on Western Avenue and parts of First Avenue may be required in the definition of the At-Grade Plan.

ASSUMPTIONS:

- City GIS data will be used to locate sewer, water, storm drain, and electrical systems.
- Purveyor records will be used for gas and steam.
- Other utilities such as fiber optic, telephone, and cable are not included in this task.

PRODUCTS:

- Proposed Utility Plan and Profile in Alaskan Way for selected At-Grade Plan at 1"=200' H and 1"=20' V scale, approximately seven (7) drawings (draft and final).
- Up to four (4) Existing and Proposed Typical Cross sections for selected At-Grade Plan at 1"=30' scale (draft and final) in Alaskan Way.
- Existing and Proposed Utility Plan in Western Avenue between Seneca Street and Stewart Street for selected At-Grade Plan at 1"=200' H and 1"=20' V scale, approximately two (2) drawings (draft and final).
- Existing and Proposed Utility Plan in First Avenue between King Street and Stewart Street for selected At-Grade Plan at 1"=200' H and 1"=20' V scale, approximately 4 drawings (draft and final).

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3.18.1.9. Opinions of Cost

Conceptual opinions of cost will be developed for each of the At-Grade options. The opinions of cost shall include all other costs associated with the project construction. Once the At-Grade Plan is selected, conceptual opinions of cost will be created.

PRODUCTS:

- Comparative cost estimates for up to three (3) At-Grade options.
- Total project Opinion of Cost for the selected At-Grade Plan.

3.18.1.10. At-Grade Plan Feasibility Memorandum

Following the initial analysis of the At-Grade options, the CONSULTANT shall prepare a memorandum that summarizes the feasibility of each. From these options, an At-Grade Plan may be selected for further study and more detailed analysis if warranted. Associated transit investments expected to make the At-Grade Plan feasible will also be identified.

PRODUCTS:

- Draft At-Grade Plan Feasibility Memorandum (5 copies)
- Final At-Grade Plan Feasibility Memorandum (5 copies)

3.18.1.11. Interdisciplinary Coordination Review

After a feasible At-Grade option is selected, the CONSULTANT shall perform an internal Interdisciplinary Coordination Review (IDCR) on one (1) At-Grade Plan.

3.18.1.12. Other Agency Meetings

The CONSULTANT shall meet with the STATE, CITY and third party stakeholders to determine their requirements and opinions. Major stakeholders may include, but not be limited to, FHWA, Port of Seattle, WSF, U.S. Coast Guard, BNSF, UPRR, King County Metro, Elevated Transport Company, Sound Transit, FTA, Pioneer Square Historic District, Duwamish Planning Committee, Downtown Seattle Association and SODO Business Association. Up to twelve (12) meetings, three (3) hours long, for up to three (3) CONSULTANT staff persons and three (3) subconsultant staff persons (on average) shall be held. Each meeting will also require three (3) hours of preparation time.

PRODUCTS:

Twelve (12) Agency Meeting Notes

+ Concept Plans

CONTINUED CONCEPTUAL ENGINEERING STUDIES

3.18.2. Tunnel Plan – South Holgate to South King Street Section

The In-Progress Design Snapshot of the Tunnel Plan, submitted November 6, 2002, showed an at-grade roadway between South Holgate and South King Street with aerial ramps to allow Royal Brougham Way and Atlantic Street to pass over the mainline roadway. Further, it was assumed that the railroad tail track in this area would be relocated to accommodate the proposed roadway plan. The selected configuration was only one of several that were initially considered but not studied in detail to determine feasibility. In an effort to reduce construction cost and/or impacts, this task will continue conceptual engineering studies of several alternate configurations.

Previous conceptual engineering studies did not address specific locations or details associated with relocating the railroad tail track. One of the objectives of this task is to focus on the physical and operational requirements of the railroad and its current use of the tail track in order to replicate that same function at another location. This effort will involve conceptual track layout and alignment as well as a description of how the system would operate.

The CONSULTANT shall perform continued conceptual engineering studies and prepare design drawings to illustrate additional roadway and railroad configurations of the Tunnel Plan. The roadway configurations will be studied in the area bounded by Holgate Street in the south and King Street in the north. The railroad tail track location and configuration will be studied in this same vicinity as well as areas further south. The objective of this task is to illustrate each of the conceptual configurations of this Alaskan Way Viaduct (AWV) roadway segment in greater detail, sufficient to determine its feasibility, and support selection of a configuration for inclusion in an EIS. The design work will also include the preparation of a conceptual cost estimate and will support both a parallel public involvement program and the WSDOT/City decision-making process. The Conceptual Engineering work will involve investigation of up to four (4) configurations for the roadway segment and the preparation of design drawings for up to two (2) configurations.

Each of these four configurations will be evaluated in sufficient detail to determine its feasibility for reducing construction cost, maintaining traffic during construction, and meeting operational requirements of the roadway while meeting engineering, environmental, and economic constraints. Up to two of these configurations will be selected and developed to a level of detail to allow analysis in the EIS. Conceptual Level engineering drawings will be prepared for the roadway plan, profile, and typical sections and will be developed to a level of detail similar to that of the In-Progress Design Snapshot submitted November 6, 2002. A conceptual level cost estimate will be prepared for the selected configurations.

The four configurations to be studied are: (a) SR 99 at-grade and SR 519 on aerial structure with the SIG/Whatcom railroad yard tail track relocated out of the study area; (b) SR 99 at-grade and SR 519 on aerial structure with the SIG/Whatcom railroad yard tail track as proposed in the Phase I SR 519 plan; (c) SR 99 at-grade and SR 519 on aerial structure with the SIG/Whatcom railroad yard tail track relocated in the study area; and (d) SR 99 on an aerial structure and SR 519 at-grade with the SIG/Whatcom railroad yard tail track as proposed in the Phase I SR 519 plan. A summary of the alternate configurations to be investigated is shown in Table 1.

CONTINUED CONCEPTUAL ENGINEERING STUDIES

The selected configurations will be described in sufficient detail to allow identification of the specific characteristics to be evaluated in the EIS. These characteristics include project layout in plan and profile, roadway and connection configurations, structural measures, typical section and a construction cost estimate.

TABLE 1 Alternate Configurations

Configuration	SR99	SR 519	Tail Track Location
2a	At-Grade	Aerial	Outside Study Area
2b	At-Grade	Partial Aerial	Phase 1 SR519 Plan
2c	At-Grade	Aerial	Inside Study Area
2d	Aerial	At-Grade	Phase 1 SR519 Plan

The CONSULTANT shall use the same basis for design, design criteria and cost estimating assumptions as used for the In-Progress Design Snapshot of the Tunnel Plan issued November 6, 2002.

ASSUMPTIONS:

- Four (4) roadway and railroad configurations (shown in Table 1) shall be analyzed.
- No more than two (2) configurations will be carried forward into the EIS.

3.18.2.1. Civil

The CONSULTANT shall prepare conceptual plans and profiles for each of the alternate configurations shown in Table 1. It is assumed that the alternate configurations will include a combination of at-grade, and aerial components. Each alternate configuration will also address modification to adjacent surface streets and properties. Details to be shown include, but are not limited to, the proposed profile grade line with stationing; right-of-way limits; lanes, median and shoulders; major drainage facilities; potential retaining wall locations; bridge structures; and at-grade roadways.

Typical sections will be developed for AWV at key locations (generally up to three (3) each for the selected configuration(s)) to an appropriate scale to show the lane configuration, shoulder widths, pavement details, bike lanes, sidewalk widths, retaining walls, and proposed right-of-way widths. The design will be used to analyze and evaluate the different configurations. Number of lanes and access points will be determined based on the latest traffic modeling analysis done to date. Once the preferred configuration(s) is selected, formal plan and profile drawings will be updated and incorporated into the existing Tunnel Plan.

CONTINUED CONCEPTUAL ENGINEERING STUDIES

ASSUMPTIONS:

- No more than four (4) alternate configurations shall be analyzed.
- Plan and Profile drawings will be prepared for up to two selected configurations.
- No additional traffic simulation or studies required.

PRODUCTS:

- Plan and Profile at 1" = 200' scale – approximately 2 sheets
- Connection Layouts for up to two selected configurations.

3.18.2.2. Structural

The CONSULTANT shall determine the conceptual structural layout of the various facilities of the configurations shown in Table 1. These facilities may include: cut-and-cover tunnels, retained cut sections, retained fill sections, and aerial structures. Structural configurations will be developed to accommodate known physical constraints and geological conditions. Once the preferred configuration(s) is selected, formal typical sections drawings will be updated and incorporated into the existing Tunnel Plan.

ASSUMPTIONS:

- No additional Geotechnical information will be required.

PRODUCTS:

- Connection Profiles for two (2) preferred options at 1" = 200' scale.
- Typical Sections for two (2) preferred options at 1"=30' scale.

3.18.2.3. Construction Sequence

The CONSULTANT shall prepare a description of a feasible construction sequencing and staging plan for the selected configuration(s). The description shall include a discussion in terms of construction sequencing, impacts on adjacent public facilities and businesses, storage of construction materials and equipment, site accessibility, working space, utility relocations and temporary utilities. A feasible construction schedule and overall construction duration will be estimated. Construction sequencing plans for the selected configuration(s) will be prepared and incorporated into the Tunnel Plan.

PRODUCTS:

- Construction Sequencing Plans for up to two (2) configurations at 1"=300' scale.

3.18.2.4. Urban Design

The CONSULTANT shall continue to refine urban design alternatives for each of the configurations shown in Table 1. They shall focus on the surface manifestations and how they integrate with the local streets, tunnel portals, aerial structures, other modes of travel and adjacent properties and districts. Once a configuration(s) is selected, surface plans and sections will be updated and incorporated into the Tunnel Plan.

CONTINUED CONCEPTUAL ENGINEERING STUDIES

PRODUCTS:

- Urban Design Plans for up to two (2) configurations at 1"=200' scale.
- Urban Design Sections for up to two (2) configurations at 1"=20 or 30' scale.

3.18.2.5. Utility Relocation

The CONSULTANT shall coordinate up to two (2) configurations with work previously performed to determine the location of existing utilities and anticipated utility relocations. Conceptual level plan, profile and cross-sections of utility relocations will be updated and incorporated into the Tunnel Plan.

PRODUCTS:

- Utility Plan and Profile update for up to two (2) preferred options at 1"=200' scale (approximately two (2) drawings).
- Electrical Plan update for up to two (2) preferred options at 1"=100' scale.

3.18.2.6. Relocation of SIG/Whatcom Yards Tail Track

The CONSULTANT shall investigate possible locations to relocate the existing SIG/Whatcom Yards Tail track outside the limits of this SR 99/SR 519 Study area. The CONSULTANT shall develop concept level design criteria for the track relocation. Schematic track layout for up to three (3) locations will be developed and presented to WSDOT and the City. If one of the three (3) locations is part of a preferred option to be carried forward, conceptual level track design will be performed and incorporated into the Tunnel Plan.

PRODUCTS:

- Conceptual Track Relocation Design Criteria
- Schematic track layouts for up to three (3) locations at 1"=200' scale
- Conceptual track design for preferred option at 1" = 200' scale

3.18.2.7. Opinions of Cost

A conceptual opinion of cost will be developed for the selected configuration(s). The opinion of cost shall include estimates of base construction costs, Agency, Design, Right of Way, Construction Management, Risk, and escalation to mid-point of construction. Preliminary quantities for major elements of the selected configuration shall be determined and an opinion of cost shall be developed, based on the Standard Item Table, Bid Tabulations, R.S. Means cost and productions rate standards, WSDOT bridge square-foot costs, and other representative data as appropriate. The level of effort presented for evaluation shall be considered conceptual and sufficient to support the EIS.

ASSUMPTIONS:

- Support for a Cost Estimate Validation Process will be required.

PRODUCTS:

- Conceptual opinion of cost for the selected configuration.

CONTINUED CONCEPTUAL ENGINEERING STUDIES

3.18.2.8. Other Agency Meetings

The CONSULTANT shall meet with the WSDOT, CITY and third party stakeholders to determine their requirements and opinions on the configurations shown in Table 1. Major stakeholders may include, but are not limited to, FHWA, Port of Seattle, WSF, U.S. Coast Guard, BNSF, UPRR, Pioneer Square Historic District, Duwamish Planning Committee and SODO Business Association. Up to six (6) meetings, two (2) hours long, for up to four (4) CONSULTANT staff persons and two (2) subconsultant staff persons may be held. Each meeting will also require three (3) hours of preparation time.

PRODUCTS:

Up to six (6) Agency Meeting Notes.

+ Concept Drawings set

CONTINUED CONCEPTUAL ENGINEERING STUDIES

3.18.3. Tunnel Plan - South King Street to Battery Street Tunnel Section

The In-Progress Design Snapshot of the Tunnel Plan, submitted November 6, 2002, showed a stacked cut and cover tunnel along the waterfront and up to the south portal of the Battery Street Tunnel with ramps to the surface in Alaskan Way between Pike Street and Lenora Street. The selected configuration was only one of several that were initially considered but not studied in detail to determine feasibility. In an effort to reduce construction cost and/or impacts, this task will continue conceptual engineering studies of several alternate configurations.

The CONSULTANT shall perform Conceptual Engineering Studies and prepare design drawings to illustrate roadway configurations of the Tunnel Plan. The roadway configuration will be studied in the area bounded by King Street in the south and entrance to the Battery Street Tunnel in the north. The objective of this task is to illustrate the conceptual configuration of this Alaskan Way Viaduct (AWV) roadway segment in sufficient detail to support the preparation of an EIS. The design work will also include the preparation of cost estimates and will support both a parallel public involvement program and the WSDOT/City decision-making process. The Conceptual Engineering work will involve investigation of up to four (4) configurations for the roadway segment and the preparation of design drawings for a single (1) selected configuration.

Each of the four configurations will be evaluated in sufficient detail to determine its feasibility for reducing construction cost, maintaining traffic during construction, and meeting operational requirements of the roadway while meeting engineering, environmental, and economic constraints. One of these configurations will be selected and developed to a level of detail to allow analysis in the EIS. Conceptual level engineering drawings will be prepared for the roadway plan, profile, and typical sections and will be developed to a level of detail similar to that of the In-Progress Design Snapshot submitted November 6, 2002. A conceptual level opinion of cost will be prepared for the selected configuration.

The four configurations for the roadway segment will include: three (3) stacked tunnel configurations and one (1) side-by-side tunnel configuration. The stacked tunnel configurations will be variants of the segment shown in the First Operable Phase, In-Progress Design Snapshot drawings of the Tunnel Plan issued November 6, 2002.

The three configurations of the stacked tunnel configuration will investigate use of an aerial connection that maintains AWV traffic during construction (a) through use of a temporary aerial roadway along Alaskan Way that passes over the Art Institute building; (b) by remodeling the existing aerial structure under traffic to provide temporary lanes for traffic while simultaneously building a new aerial structure; (c) by diverting AWV traffic to the Alaskan Way surface street immediately north of Pike Street via ramps that will permanently serve traffic headed to Ballard/Interbay.

The side-by-side tunnel configuration will also maintain AWV traffic during construction by diverting it to the surface immediately north of Pike Street via similar ramps that will serve traffic headed to Ballard /Interbay. The expectation for these last two configurations is that during construction the traffic headed north on SR99 will return to Aurora Avenue North via surface streets. A summary of the alternate configurations to be investigated is shown in Table 2.

CONTINUED CONCEPTUAL ENGINEERING STUDIES

TABLE 2 Alternate Configurations

Configuration	Waterfront Tunnel Arrangement	Pike Street to BST	AWV Traffic Route during Construction
3a	Stacked NB over SB	Aerial	Temporary aerial ramp over Art Institute
3b	Stacked NB over SB	Aerial	Rebuild AWV structure under traffic
3c	Stacked NB over SB	Aerial	Divert AWV traffic to surface N. of Pike St
3d	Side by Side	Aerial	Divert AWV traffic to surface N. of Pike St

The selected configurations will be described in sufficient detail to allow identification of the specific characteristics to be evaluated in the EIS. These characteristics include project layout in plan and profile, roadway and connection configurations, structural measures, typical section and a construction cost estimate. A drawing submittal will be prepared that incorporates all of the details of the preferred options into the previously developed Tunnel Plan.

The CONSULTANT shall use the same basis for design, design criteria and cost estimating assumptions as used for the In-Progress Design Snapshot of the Tunnel Plan issued November 6, 2002.

ASSUMPTIONS:

- Four (4) roadway configurations (shown in Table 2) shall be analyzed.
- One (1) configuration will be carried forward into the EIS.

3.18.3.1. Civil

The CONSULTANT shall prepare conceptual plans and profiles for each of the alternate configurations shown in Table 2. It is assumed that the alternate configurations will include a combination of at-grade, tunnel, and aerial components. Each alternate configuration will also address the potential replacement of the adjacent seawall and modification to the Alaskan Way and adjacent surface streets. Details to be shown include, but are not limited to, the proposed profile grade line with stationing; right-of-way limits; lanes, median and shoulders; major drainage facilities; potential retaining wall locations; bridge structures; and tunnel structures.

Typical sections will be developed for AWV at key locations (generally up to three (3) for the selected configuration) to an appropriate scale to show the lane configuration, shoulder widths, pavement details, bike lanes, sidewalk widths, retaining walls, and proposed right-of-way widths.

ASSUMPTIONS:

- No more than four (4) alternate configurations shall be analyzed.
- Plan and Profile drawings will be prepared for selected configuration only.

CONTINUED CONCEPTUAL ENGINEERING STUDIES

PRODUCTS:

- Plan and Profile at 1" = 200' scale – approximately 2 sheets
- Connection Layouts for selected configuration.

3.18.3.2. Structural

The CONSULTANT shall determine the conceptual structural layout of the various facilities of the configurations shown in Table 2. These facilities may include: cut-and-cover tunnels, retained cut sections, retained fill sections, and aerial structures. Structural configurations will be developed for the selected configuration to accommodate known physical constraints and geological conditions. Connection layouts will also be developed.

Structural analysis will be performed to determine the approximate size of major components of the aerial and underground structures. These analyses will incorporate initial soil design parameters based on geotechnical borings and existing site-specific soils data.

ASSUMPTIONS:

- No more than four (4) alternate configurations shall be analyzed.
- Typical Section drawings will be prepared for selected configuration only.

PRODUCTS:

- Structural Cross-sections at 1" = 30' scale – approximately 3 sheets for the selected configuration.

3.18.3.3. Construction Sequence

The CONSULTANT shall prepare a description of a feasible construction sequencing and staging plan for the selected configuration(s). The description shall include a discussion in terms of construction sequencing, impacts on adjacent public facilities and businesses, storage of construction materials and equipment, site accessibility, working space, utility relocations and temporary utilities. A feasible construction schedule and overall construction duration will be estimated. Construction sequencing plans for the selected configuration(s) will be prepared and incorporated into the Tunnel Plan.

PRODUCTS:

- Construction Sequencing Plans for up to two (2) configurations at 1"=300' scale.

3.18.3.4. Urban Design

The CONSULTANT shall continue to refine urban design alternatives for each of the configurations shown in Table 2. They shall focus on the surface components and how they integrate with the local streets, tunnel portals, aerial structures, other modes of travel and adjacent properties and districts. Once a configuration is selected, surface plans and sections will be updated and incorporated into the Tunnel Plan.

CONTINUED CONCEPTUAL ENGINEERING STUDIES

PRODUCTS:

- Urban Design Plans for up to two (2) configurations at 1"=200' scale.
- Urban Design Sections for up to two (2) configurations at 1"=20 or 30' scale.

3.18.3.5. Utility Relocation

The CONSULTANT shall propose utility relocations to accommodate the selected roadway configuration and will coordinate proposed relocations with utility purveyors. The CONSULTANT shall schedule one (1) meeting with utility purveyors as follows: water, sewer/drainage (combined SPU and King County), gas, steam, and telephone purveyors, plus up to two (2) major fiber optic to discuss any site specific constraints and review proposed relocations to address any fatal flaws in concept. Construction considerations will be addressed. Temporary construction utility requirements will be reviewed. It is assumed that up to seven (7) 4-hour meetings shall be held with the purveyors, with one (1) drainage/utilities lead engineer and one (1) administrative staff person in attendance. Meeting notes shall be compiled and submitted.

ASSUMPTIONS:

- Design criteria for all utilities shall be based on the purveyor standards and the requirements of the CITY.

PRODUCTS:

- One (1) Relocated utility plan and profile drawing at 1"=200'
- One (1) Relocated utility cross section drawing at 1"=30'
- Up to seven (7) purveyor meeting notes.

3.18.3.6. Opinions of Cost

A conceptual level opinion of cost will be developed for the selected configuration. The opinion of cost shall include estimates of base construction costs, Agency, Design, Right of Way, Construction Management, Risk, and escalation to mid-point of construction. Preliminary quantities for major elements of the selected configuration shall be determined and an opinion of cost shall be developed, based on the Standard Item Table, Bid Tabulations, R.S. Means cost and productions rate standards, WSDOT bridge square-yard costs, and other representative data as appropriate. The level of effort presented for evaluation shall be considered conceptual and sufficient to support the EIS.

ASSUMPTIONS:

- Support for a Cost Estimate Validation Process will be required.

PRODUCTS:

- Conceptual opinion of cost for the selected configuration.

3.18.3.7. Other Agency Meetings

The CONSULTANT shall meet with WSDOT, CITY and third party stakeholders to determine their requirements and opinions on the configurations shown in Table 2. Major stakeholders may include, but are not limited to, FHWA, Port of Seattle, WSF, and the

CONTINUED CONCEPTUAL ENGINEERING STUDIES

Pioneer Square Historic District. Up to four (4) meetings, two (2) hours long, for up to four (4) CONSULTANT staff persons and two (2) subconsultant staff persons may be held. Each meeting will also require three (3) hours of preparation time.

PRODUCTS:

Up to four (4) Agency Meeting Notes.

*Conceptual
+ Drawing*

CONTINUED CONCEPTUAL ENGINEERING STUDIES

3.18.4. Rebuild Plan – Reduced Earthquake Design Criteria

The In-Progress Design Snapshot of the Rebuild Plan, submitted November 6, 2002, showed structural configurations of a rebuilt or retrofitted viaduct designed to withstand the earthquake loading of a seismic event with a return period of 2500 years. In an effort to reduce construction costs, this task will re-evaluate the structural design of the viaduct and seawall shown in the previously submitted Rebuild Plan based on a reduced earthquake loading resulting from a seismic event with a return period of 475 years (current WSDOT Standard).

The CONSULTANT shall perform a Conceptual Engineering Study to determine the effects of using a seismic design criteria different than the project Structural Design Criteria dated March, 2002, that results in reduced earthquake loading. The seismic design criteria to be used for the study will be the present WSDOT seismic design criteria in place of the project seismic criteria that is based upon the "Recommended LRFD Guidelines for the Seismic Design of Highway Bridges, Multidisciplinary Center for Earthquake Engineering Research (MCEER)", November 2001.

The work shall involve the structural analysis of a typical two-level viaduct structure and a typical single level viaduct structure. Two different configurations will be evaluated for the two-level viaduct structure. The first (4a) will be a rebuilt viaduct structure. The second (4b) will be a retrofitted viaduct structure that has external vertical seismic resisting elements. The typical single level viaduct structure (4c) will use a retrofit design concept, similar to what is proposed in the Rebuild Plan. The effect of the present WSDOT seismic design criteria on the soil improvement anticipated in the Rebuild Plan south of South King Street will be analyzed (4d). Ramifications of a reduced earthquake design criteria on the design of the Alaskan Way Seawall Rebuild will also be studied (4e). The viaduct, without a rebuilt seawall, will be evaluated (4f). It is anticipated that the reduced earthquake loading will lead to smaller new member sizes and possibly fewer new members. A summary of the configurations to be investigated is shown in Table 3.

TABLE 3 Configurations to be Studied

Configuration	Arrangement	Structural Approach
4a	Two Level Viaduct	Rebuild
4b	Two Level Viaduct	Retrofit
4c	Single Level Viaduct	Retrofit
4d	Soil Stabilization – South of S. King St.	Retrofit
4e	Type B Seawall	Rebuild
4f	Viaduct w/o a Rebuilt Seawall	Soil Stabilization

CONTINUED CONCEPTUAL ENGINEERING STUDIES

The configurations shown in Table 3 will be explored in sufficient detail to allow identification of potential cost savings related to size and arrangement of structural members, and a comparison of the construction sequencing and staging associated with each configuration. At the conclusion of the study, a Technical Memorandum will be submitted that will provide potential design, constructability, construction, utility, and cost estimate implications.

ASSUMPTIONS:

- Design Earthquake shall be in accordance with Division 1-A, Seismic Design of the 1996 AASHTO Standard Specifications for Seismic Design of Highway Bridges.
- Use the USGS Peak Ground Acceleration map to obtain an acceleration coefficient (10% probability of exceedance in 50 years or a 475 year return period)

The CONSULTANT shall use the same basis for design, design criteria and cost estimating assumptions as used for the In-Progress Design Snapshot of the Rebuild Plan issued November 6, 2002 with the exception that the seismic criteria will be based upon the current WSDOT seismic design criteria.

3.18.4.1. Viaduct Structural

The CONSULTANT shall determine conceptual structural layouts for the configurations shown in Table 3. The structural configurations will be developed to accommodate known physical constraints and geological conditions. Use of the present WSDOT seismic design criteria may have implications to the soil improvement currently anticipated in the Rebuild Design Plan south of S. King Street.

A brief assessment will be made to identify possible implications to the Viaduct foundation soil improvement area south of S. King Street as proposed in the Rebuild Plan. This will include reviewing the depth of liquefaction and resulting soil properties. Typical structural working drawings will be produced and incorporated into the Technical Memorandum. An extrapolation will be made to estimate the potential cost savings to an overall viaduct design concept based on a reduced earthquake. An evaluation will also be made to assess how the lateral spreading of the soil surrounding the viaduct foundations north of S. King St. may be addressed if the seawall is not rebuilt.

Typical structural working drawings will be produced and incorporated into the Technical Memorandum. An extrapolation will be made to estimate the potential cost savings to an overall viaduct design concept based on a reduced earthquake.

Viaduct rebuild / retrofit concepts that have been previously assessed by the Consultant will be documented in a technical memorandum. Both concepts that were considered and rejected as well as those concepts that could be considered at a future time will be listed. A brief explanation of the concepts will be included.

PRODUCTS:

- Technical Memorandum of Rebuild / Retrofit Viaduct Concepts Previously Considered



CONTINUED CONCEPTUAL ENGINEERING STUDIES

3.18.4.2. Seawall Structural

The CONSULTANT shall include in the study a comparison between the Rebuild Plan Seawall and a Seawall Design Concept for a single cross section that is based on a reduced earthquake. A typical Type B seawall section will be evaluated. The different impacts between the two earthquake design levels will be included. An extrapolation will be made to estimate the potential impact to an overall Seawall design concept based on a reduced earthquake.

3.18.4.3. Construction Sequence, Phasing and Implementation

The CONSULTANT shall include in the study a comparison of the construction sequencing and staging between the Rebuild Plan and a Rebuild Design Concept based on a reduced earthquake. A discussion of the different impacts between the two earthquake design levels will be included. An extrapolation will be made to estimate the potential impact of the reduced earthquake design concepts on the overall construction schedule and the construction duration.

A construction phasing and implementation strategy will be developed for a limited annual project funded scenario. Risk reduction will be considered in the development of this plan.

3.18.4.4. Utilities

The CONSULTANT will estimate the impacts of the configurations in Table 3 to existing utilities and anticipated utility relocations based upon the Rebuild Plan November 6, 2002 Snapshot design. Impact to utilities of the construction phasing and implementation strategy will also be assessed.

3.18.4.5. Opinions of Cost

Conceptual level opinions of cost will be developed for the Viaduct structure, Viaduct foundation soil improvement, and Seawall areas considered in the study. The impact of these costs will be extrapolated to estimate the potential cost impact of the reduced earthquake design criteria. Opinions of cost will also be developed for the construction phasing and implementation strategy under a limited project funded scenario.

ASSUMPTIONS:

- Support for a Cost Estimate Validation Process will be required.

PRODUCTS:

- Conceptual opinions of cost in the Technical Memorandum.

3.18.4.6. Technical Memorandum

A Draft Technical Memorandum covering the Conceptual Engineering Study of the Rebuild Plan based on a reduced earthquake design criteria will be submitted for review and comment to WSDOT and the City of Seattle. Comments on the Draft will be incorporated into the document before final issue.

CONTINUED CONCEPTUAL ENGINEERING STUDIES

ASSUMPTIONS:

- Urban Design impacts are not included.
- The Battery Street Tunnel is not included.
- Soil properties used in structural analysis of the Viaduct will be based upon the MCEER 2500 year return period seismic design criteria.
- A formal Design Submittal for consideration in the EIS is not included.
- Only structural working drawings in support of the study will be created, (i.e. no new drawings).
- Assessment of risk reduction will be made jointly by the CONSULTANT, WSDOT and the City.

PRODUCTS:

- DRAFT Technical Memorandum with engineering working drawings and conceptual opinions of cost.
- FINAL Technical Memorandum with engineering working drawings and conceptual opinions of cost.



3.18.4.7. Coordination Meetings

The CONSULTANT may meet with WSDOT, CITY and third party stakeholders to determine their requirements and opinions on the configurations shown in Table 3. Major stakeholders include, but are not limited to, FHWA, Port of Seattle, WSF, and the Pioneer Square Historic District. Up to four (4) meetings, two (2) hours long, for up to four (4) CONSULTANT staff persons and two (2) subconsultant staff persons may be held. Each meeting will also require three (3) hours of preparation time.

Two Technical Design Review Meetings (TDRM) will be scheduled. The first TDRM will be held in Seattle in the first part of January 2003 to review the conceptual designs develop by the CONSULTANT for the reduced earthquake design criteria. This will be an all day meeting for up to four (4) consultant staff persons and two (2) subconsultant staff persons, and will require 24 hours of preparation time.

The second TDRM will be held in Seattle after the DRAFT Technical Memorandum has been issued. The purpose is to review the contents of the document. This will be an all day meeting for up to four (4) consultant staff persons and two (2) subconsultant staff persons, and will require 8 hours of preparation time.

PRODUCTS:

- Up to four (4) Agency Meeting Notes.
- Two (2) TDRM Meeting Notes.

3.18.4.8. WSDOT Load Rating Study

The technical work included in this work item will be coordinated with an on-going parallel work activity led by the STATE to evaluate the load rating for the existing Viaduct structure.

CONTINUED CONCEPTUAL ENGINEERING STUDIES

3.18.5. Depressed SR99 Roadway North of Battery Street Tunnel

The In-Progress Design Snapshot of the various Plans, submitted November 6, 2002, showed one of several possible configurations of the intersection of Roy Street and Mercer Street with SR99 (Aurora Avenue). In an effort to reduce construction cost and/or impacts, this task will continue conceptual engineering studies of several alternate configurations.

The CONSULTANT shall perform Conceptual Engineering Studies and prepare design drawings to illustrate roadway configurations of SR99 Roadway in the South Lake Union Area. The roadway configuration will be studied in the area bounded by the entrance to the Battery Street Tunnel in the south and Ward Street in the north. The objective of this task is to illustrate conceptual configurations of this Aurora roadway segment in sufficient detail to support both selection of a single configuration to go forward with into the preparation of an NEPA EIS. The design work will also include the preparation of a cost estimates and will support both a parallel public involvement program and the WSDOT/City decision-making process. The Conceptual Engineering work will involve investigation of up to three (3) configurations for the roadway segment and the preparation of design drawings for a single (1) selected configuration.

Each of the three configurations will be evaluated in sufficient detail to determine its feasibility for reducing construction cost, maintaining traffic during construction, and meeting operational requirements of the roadway while meeting engineering, environmental, and economic constraints. One of these configurations will be selected and developed to a level of detail to allow analysis in the EIS. Conceptual Level engineering drawings will be prepared for the roadway plan, profile, and typical sections. A conceptual level cost estimate will be prepared for the selected configuration. Following the selection of a configuration, conceptual design drawings will be developed to a level of detail similar to that of the In-Progress Design Snapshot submitted November 6, 2002.

The CONSULTANT shall use the same basis for design, design criteria and cost estimating assumptions as used for the In-Progress Design Snapshot of the Tunnel Plan issued November 6, 2002.

ASSUMPTIONS:

- No more than three (3) alternate configurations shall be analyzed.
- No more than two (2) selected configurations will be carried forward into the EIS.

3.18.5.1. Civil

The CONSULTANT shall prepare conceptual design plans and profiles for the configurations. Details to be shown include, but are not limited to, the proposed profile grade line with stationing; right-of-way limits; lanes; median and shoulders; ramps, major drainage facilities; retaining wall locations; bridge structures; and tunnel structures. The design will be used to analyze and evaluate the different options. Number of lanes and access points will be determined based on the latest traffic modeling analysis done to date. Once a configuration is selected, formal plan and profile drawings will be created.

CONTINUED CONCEPTUAL ENGINEERING STUDIES

PRODUCTS:

- Civil Plan and Profile working drawings for the alternate configurations studied.
- Civil Plan and Profile drawings for one (1) selected configuration at 1" = 200' scale (based on 11" x 17" paper) including mainline and ramps.

3.18.5.2. Structural

The CONSULTANT shall determine the structural arrangement of the various facilities of the selected configuration. These facilities may include: retained cut sections, retained fill sections, and aerial structures. Structural configurations will be developed to accommodate known physical constraints and geological conditions. Typical sections drawings will be created.

ASSUMPTIONS:

- No additional Geotechnical information will be required.

PRODUCTS:

- Typical Section working drawings for the alternate configurations studied.
- Typical Sections drawings for one (1) selected configuration at approximately 1"=30' scale.

3.18.5.3. Construction Sequence

The CONSULTANT shall prepare a feasible construction sequencing and staging plan for the selected configuration. The plan shall include a discussion in terms of construction sequencing, impacts on adjacent public facilities and businesses, storage of construction materials and equipment, site accessibility, working space, utility relocations and temporary utilities. A feasible construction schedule and overall construction duration will be estimated. Conceptual construction sequencing drawings will be created.

PRODUCTS:

- Construction Sequencing Plan for the selected configuration
- Construction Sequencing Drawings for one (1) selected configuration at 1"=300' scale.

3.18.5.4. Urban Design

The CONSULTANT shall continue to refine urban design alternatives in the South Lake Union area. They shall focus on the SR99 environment and how it integrates with the local streets, tunnel portals, other modes of travel and adjacent properties and districts. Once a configuration is selected, conceptual Urban Design Plans will be created.

PRODUCTS:

- Urban Design Plans of the selected configuration at 1"=200' scale.
- Urban Design Sections of the selected configuration at 1"=20 or 30' scale.

3.18.5.5. Utilities

The CONSULTANT shall coordinate the three (3) configurations with work previously performed to determine the location of existing utilities and anticipated utility relocations.

CONTINUED CONCEPTUAL ENGINEERING STUDIES

Once a configuration is selected, conceptual level plan, profile and cross-sections of utility relocations will be updated.

PRODUCTS:

- One (1) Existing and Proposed Utility Plan and Profile for one (1) preferred option at 1"=200' H, 1"=20' V scale.
- One (1) Existing and Proposed Utility Cross-section for one (1) preferred option at 1"=30' scale.

3.18.5.6. Transportation Analysis

The CONSULTANT shall provide transportation planning and analysis support to assist in selection of the roadway configuration to be carried into the EIS.

ASSUMPTIONS:

- Assumptions identified in the transportation analysis of the other design plans will be carried into the analysis of the configurations studied.

PRODUCTS:

- Refined 2030 model chain representing the selected configuration.

3.18.5.7. Opinions of Cost

Conceptual level estimates of cost will be developed for each of the three (3) configurations. An opinion of cost will be developed for the selected configuration that shall include construction, operation and maintenance and all other costs associated with the construction to the same level of detail that has been previously developed.

ASSUMPTIONS:

- Support for a Cost Estimate Validation Process will be required.
- Cost estimates for configurations that include bridges over up to three streets parallel to Mercer will be prepared for review.

PRODUCTS:

- Conceptual opinions of cost for the selected configuration.

3.18.5.8. Other Agency Meetings

The CONSULTANT shall meet with WSDOT, CITY and third party stakeholders to determine their requirements and opinions on the configurations. Major stakeholders include, but are not limited to, FHWA, and the Queen Anne Neighborhood. Up to three (3) meetings, two (2) hours long, for up to four (4) CONSULTANT staff persons and two (2) subconsultant staff persons may be held. Each meeting will also require three (3) hours of preparation time.

PRODUCTS:

Up to three (3) Agency Meeting Notes.

x concept drawing

CONTINUED CONCEPTUAL ENGINEERING STUDIES

3.18.6. Groundwater Flow

The CONSULTANT shall perform a Conceptual Engineering Study to evaluate the effects of deep, low permeability walls associated with the Aerial and Rebuild Plan soil improvement areas, seawall and the cut-and-cover tunnel along the waterfront on groundwater flow conditions. The objective of this study will be to review changes in groundwater flow from pre-construction conditions. The work will include an evaluation of potential groundwater mounding behind the walls and groundwater flow underneath and around the walls. The feasibility of mitigating measures including allowing flow through the walls will be evaluated. At the conclusion of the study, a Technical Memorandum summarizing the findings will be submitted.



PRODUCTS:

- Technical Memorandum on potential changes in groundwater flow for each of up to four Design Plans, and the feasibility of potential mitigating measures for each.
- Evaluation of existing groundwater quality and potential impacts of project.

3.18.6.1. Groundwater Evaluation

The CONSULTANT shall use the previously completed groundwater modeling analyses and hydrogeologic testing as a framework for evaluation of changes in groundwater conditions associated with low-permeability, subsurface structures.

3.18.6.2. Seawall

The CONSULTANT shall evaluate changes in groundwater conditions associated with construction of a jet-grouted seawall and a frame. The previously completed groundwater modeling analyses will be modified to simulate the affects of a wall installed to the top of glacial soils.

3.18.6.3. Tunnel Plan

The CONSULTANT shall evaluate changes in groundwater conditions associated with construction of a cut-and-cover tunnel as shown in the latest Tunnel Plan. Analyses previously completed for groundwater mounding will be updated to include the most recent groundwater models completed for dewatering feasibility and the results of the pumping tests.

3.18.6.4. Aerial and Rebuild Plans

The CONSULTANT shall evaluate changes in groundwater conditions associated with construction of the seawall configurations, ground improvements, and viaduct foundations shown in the Rebuild Plan and the Aerial Plan submitted November 6, 2002 as part of the In-Progress Design Snapshot. Analyses previously completed for groundwater mounding will be updated to include the most recent groundwater models completed for dewatering feasibility and the results of the pumping tests.

CONTINUED CONCEPTUAL ENGINEERING STUDIES

3.18.6.5. Mitigating Measures

The CONSULTANT shall evaluate potential mitigating measures for the impact of the tunnel, ground improved areas, and two (2) different types of seawall structures.

CONTINUED CONCEPTUAL ENGINEERING STUDIES

3.18.7. Alternatives to Existing Stormwater Drainage Conveyance

The In-Progress Design Snapshot, submitted November 6, 2002, showed a conceptual design for a stormwater drainage system that has been referred to as “Best Management Practices” and included preparation of a Drainage Alternatives Technical Memorandum to investigate the technical feasibility of an alternative approach to stormwater management that has been referred to as the “ Big Conveyance Pipe ”. This concept also envisioned a new wet weather/CSO detention and/or treatment facility in the vicinity of Royal Brougham Way and 1st Avenue. Additional work is needed to further develop and refine the Big Conveyance Pipe alternative for inclusion in the EIS. The objective of this task is to continue conceptual engineering on this option and produce conceptual level design drawings and a conceptual level cost estimate for the alternate drainage system referred to as the Big Conveyance Pipe for the Tunnel Plan.

3.18.7.1. Big Conveyance Pipe and Utility Relocation

The work shall include preparation of conceptual drawings for the Tunnel Plan only that show the proposed final relocated utilities for the Big Conveyance Pipe drainage system as proposed in the Drainage Alternatives Technical Memorandum prepared in December 2002. A Technical Memorandum explaining the Big Conveyance Pipe concept as shown in the conceptual drawings and an opinion of cost will also be prepared.

The drawings shall be prepared to show both the Big Conveyance Pipe and required utilities relocations at a conceptual level. The drawings shall show relocated utilities such that further relocations are not required to implement the “Vision” phase as shown in the November 6, 2002 drawing set.

The maximum pipe elevations for the revisions to the system will be based on King County grade line information provided previously and in accordance with the calculations prepared for the Drainage Alternatives Technical Memorandum submitted in December 2002. The drawings will be based on concept-level profiles and alignments developed for the Drainage Alternatives Technical Memorandum.

The single Big Conveyance Pipe with gravity flow from Vine Street to Royal Brougham Way as discussed in the Drainage Alternatives Technical Memorandum shall not be further considered. Additional modeling by the CONSULTANT is not included in this scope of work. However, previous calculations shall be updated if needed to account for refinements to the layout of the Big Conveyance Pipe for the conceptual drawings. The drainage/utilities subconsultant shall coordinate with others conducting parallel studies as appropriate. The drainage/utilities subconsultant shall also coordinate, through the CONSULTANT, with King County and Seattle Public Utilities (SPU).

CONTINUED CONCEPTUAL ENGINEERING STUDIES

ASSUMPTIONS:

- New outfalls shall not be considered.
- Use of the King County hydraulic or other models shall not be required.
- The Big Conveyance Pipe will not include a pump station.
- Existing SPU owned outfalls will be maintained in service.
- The technical memorandum and concept drawings shall be based on a tunnel depth of fifteen (15) feet from the inside top of the tunnel to grade.
- The limits of the drawings shall be from approximately S. Atlantic Street to Blanchard Street.
- Groundwater flow studies as defined in Section 3.18.6 shall not propose increased flow to combined sewers.

PRODUCTS:

- Draft Conceptual level Big Conveyance Pipe plan and profile drawings for the Tunnel Plan at 1"=200' H and 1"=20' V. (approximately 12 drawings)
- Final Conceptual level Big Conveyance Pipe plan and profile drawings for the Tunnel Plan at 1"=200' H and 1"=20' V. (approximately 12 drawings)
- Draft Conceptual level relocated utility cross section drawings at 1"=30'. (approximately 5 sections)
- Final Conceptual level relocated utility cross section drawings at 1"=30'. (approximately 5 sections)
- Big Conveyance Pipe Cost Opinion (5 Copies)
- Draft Technical Memorandum (5 Copies)
- Final Technical Memorandum (5 Copies)



3.18.7.2. Detention and/or Treatment Facility at Royal Brougham

The Big Conveyance Pipe concept envisions that a new wet weather CSO detention and/or treatment facility would be located in the vicinity of Royal Brougham Way and 1st Avenue. It is assumed that this facility would be owned and operated by King County, but with significant input from SPU in its planning and design. Consequently, this task shall first include working with King County and SPU, in the context of their CSO planning process, to develop a concept level consensus on the required size, location, and technology for the proposed Royal Brougham Facility. It is recognized that this facility may ultimately become either a detention facility only (with associated controls and pump station for returning detained CSO's back to the EBI), or a treatment facility to treat and discharge CSO's to Elliott Bay, or a combination of both. The work will then involve the preparation of conceptual drawings for the Royal Brougham Facility showing location, size and other pertinent design features. This will include, as necessary, a preliminary analysis of the existing Royal Brougham outfall to Elliott Bay with respect to its continued and future use. If an upgrade to the outfall will be required to support a new Royal Brougham treatment facility, it will be included in the conceptual level design package. A Technical Memorandum explaining the Royal Brougham Facility will be prepared that details the inputs, operations, outputs, and opinion of cost for this facility at a conceptual level sufficient to support the preparation of the EIS.

CONTINUED CONCEPTUAL ENGINEERING STUDIES

ASSUMPTIONS:

- Any required flow/hydraulic modeling for the Royal Brougham Facility will be done by King County
- Utility relocations shall be based on the November 6, 2002 In-Progress Design Snapshot with no further roadway revisions.
- The subconsultant will have ready access to King County and SPU staff to gain concept levels agreements and conceptual design review.
- Opinion of Cost shall be provided in accordance with requirements for the November 6, 2002 In-Progress Design Snapshot opinion of cost format.
- Geotechnical data will be available to support conceptual level decisions regarding underground structures.

PRODUCTS:

- Conceptual level site, facility plan and section drawings for the Royal Brougham Facility (approximately six drawings).
- Draft Technical Memorandum
- Final Technical Memorandum
- Wet Weather CSO Detention/Treatment Facility Cost Opinion

3.18.7.3. Other Agency Meetings

The CONSULTANT shall meet with WSDOT, SPU, King County and third party stakeholders to determine their requirements and opinions on the configurations shown on the Big Conveyance Pipe Drawings. Major stakeholders include, but not limited to, FHWA and SDOT, SPU, and King County. Up to five (5) meetings, three (3) hours long, for up to one (1) CONSULTANT staff person and three (3) subconsultant staff person may be held. Each meeting will also require three (3) hours of preparation time.

PRODUCTS:

- Draft and Final Meeting Minutes

*Conceptual
+ drawings*

CONTINUED CONCEPTUAL ENGINEERING STUDIES

3.18.8. Cost Estimating Validation Process Activities

The Draft Conceptual Opinions of Cost technical memorandum submitted in December 2002, provided a conceptual level opinion of cost for the Aerial, Tunnel, and Rebuild Plans as defined in the In-Progress Snapshot of November 6, 2002. These opinions of cost were developed using a methodology designed to produce similar results as might have been obtained if time and resources had permitted the use of the WSDOT standard Cost Estimating Validation Process (CEVP). During this phase of work, the Consultant will update the cost estimates for the Aerial, Rebuild, and Tunnel Plans to reflect the latest conceptual design, develop a conceptual level cost estimate for the At Grade Plan, develop Risk Registers for each of the four build plans, and participate in a full WSDOT-facilitated CEVP for the four build plans.

CEVP is an intense workshop process, somewhat resembling value engineering. Engineers, risk managers and cost estimators who are not directly associated with the project are assembled to review the cost estimate. The CEVP process recognizes that every project cost estimate is a combination of the very likely, the probable and the maybe. The cost estimate is stripped of all escalation, contingencies, mark-ups and other "soft costs," which are then described and categorized in a Risk Register. During the CEVP workshop the quality of the information that makes up the cost estimate is given careful review, followed by application of systematic risk assessment methods including statistics and probability theory. The process examines how risks can be lowered and cost vulnerabilities managed or reduced.

The end product of this process is a CEVP Summary. The CEVP Summary has the following elements:

- Project cost estimates stated in dollar ranges, not as single numbers. This reflects the limits of estimating precision at the planning stage when crucial decisions are yet to be made and the specific risks cannot be exactly costed.
- Risk considerations specific to each project are identified and described so that specific risk issues can be foreseen, discussed, evaluated and selectively mitigated by the public as the project moves forward.
- Likelihood of project construction schedules have been taken into account and schedule-based adjustments made to the estimates to reflect the smaller purchasing power of dollars to be spent on construction several years in the future.

3.18.8.1 Opinions of Cost

The CONSULTANT shall prepare conceptual opinions of cost to support each of the four build plans (Tunnel, Aerial, Rebuild, At-Grade), as modified from the In-Progress Design Snapshot submitted November 6, 2002. The opinions of cost shall include all other costs associated with the construction. Preliminary quantities for major elements of the project shall be determined based on the Standard Item Table, Bid Tabulations from similar projects, R.S. Means cost and productions rate standards, WSDOT bridge square-yard costs and other representative data as appropriate. The opinions of cost shall be developed to the same level of detail as for the In-Progress Design Snapshot submittal.

CONTINUED CONCEPTUAL ENGINEERING STUDIES

PRODUCTS:

- Conceptual opinions of cost for each of the four plans (Tunnel, Aerial, Rebuild, At-Grade).

3.18.8.2 Risk Assessment and Risk Registry

The CONSULTANT shall develop a comprehensive list of risks (Risk Registry) identified during the evolution of the conceptual design for each of the four design plans. The Risk Registry shall be based on the risk registries previously prepared for each design plan. Types of risks to be tracked will include those associated with known and unknown existing conditions, design assumptions, anticipated construction sequences and techniques, and operation, maintenance and use of the facility once constructed. Each identified risk will be registered along with a description of potential problems or consequences that could result. Each risk will have a numeric value that is the product of the severity of the consequences should the risk item occur multiplied by the probability (likelihood) of occurrence.

The four Risk Registries will be prepared by an interdisciplinary team, composed of representatives from the CONSULTANT, the CITY and the STATE. Team members will meet in Seattle at one or more workshops to develop the Risk Registries. The following disciplines are expected to be represented at each workshop: urban design, civil, structures (aerial, tunnel, and seawall, as necessary), tunnel systems (as necessary), utilities, environmental, geotechnical, traffic and operations and maintenance. A Risk Registry manager will facilitate the workshops.

PRODUCTS:

- Risk Registries for each of the four build plans (Tunnel, Aerial, Rebuild, At-Grade).
- Project Model Flow Chart for each of the build plans (Tunnel, Aerial, Rebuild, At-Grade)

3.18.8.3 CEVP Project Model

The CONSULTANT shall develop a project model flow chart for each of the four design plans. The project model identifies major activities with associated costs, risks, and durations. These major activities are linked by predecessor/successor relationships.

3.18.8.4 CEVP Workshops

The CONSULTANT shall participate with the STATE in conducting WSDOT standard CEVP workshops in Seattle for each of the four design plans (Tunnel, Aerial, Rebuild, At-Grade). It is expected that the CITY will also participate in the workshops, with staff representation to be coordinated between the two client agencies. The objective of each CEVP workshop is to perform a peer-level review analysis on the scope, schedule and cost estimate for each design plan to evaluate the quality and completeness, including anticipated risk, of the plan's cost and schedule.

Each workshop will be conducted by a joint WSDOT/City/Consultant Team, consisting of key personnel who can represent the design plan in all areas essential to an understanding of the project plan. This will include, as a minimum:

- Management
- Engineering

CONTINUED CONCEPTUAL ENGINEERING STUDIES

- Cost Estimating
- Scheduling
- Environmental Process

Prior to each workshop the CONSULTANT will prepare the following:

- Civil plan and profile drawings
- Typical section drawings
- Construction sequencing descriptions and plans
- Urban design section drawings and plan working drawings
- Utility plans and profiles
- Opinion of cost
- Risk Registry
- Project model flow chart with high level schedule

These deliverables will be in accordance with the extent of this scope for each of the four plans.

The actual workshops will begin with a presentation by the CONSULTANT that outlines the scope, schedule and cost for the design plan. This will be followed by a series of interactive discussions with the CEVP team, a validation of the opinion of cost, preparation of the CEVP Summary, and, time permitting, an outbrief to the CLIENT. It is anticipated that each workshop will run 2-3 days in length. The workshops could run concurrently over a two-week period, or be held independently, depending on logistic requirements and availability of team members. It is expected that up to six (6) Consultants will participate in each workshop.

ASSUMPTIONS:

- WSDOT will facilitate the CEVP workshop and provide required peer review staff
- For each build plan, the CEVP workshop will be 2-3 days in duration.
- Following the completion of each workshop WSDOT will provide a summary of CEVP data and CEVP Report to the Project Team for each build plan.

PRODUCTS:

- Provide revised Opinions of Cost for each of the four plans following the CEVP workshops.

CONTINUED CONCEPTUAL ENGINEERING STUDIES

3.18.9 DEIS Support and Coordination

The CONSULTANT shall provide advice and assistance regarding technical questions related to up to four build Design Plans and the No Action Plan in support of the production of the DEIS or in response to comments received on the DEIS.

ASSUMPTIONS:

- Up to four build Design Plans will be evaluated in the DEIS.
- Significant new design work as a result of environmental issues is not included.

PRODUCTS:

- Technical clarification of the conceptual Design Plans to support DEIS preparation.
- Written responses to preliminary DEIS comments from outside agencies as required.