

City of Portland Bureau of Environmental Services

Final Design Amendment to Exhibit A: Attachment A: Technical Scope of Services for Final Design

EAST SIDE CSO TUNNEL PROJECT

July 26, 2004





In Association with: CH2M Hill Tetra Tech/KCM

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BASIC DESIGN ASSUMPTIONS:

The engineering design of the East Side CSO (ESCSO) Tunnel Project consists of the design for a 22-foot inside diameter tunnel on the east side of the Willamette River that will provide relief to the existing east side interceptor system as well as providing storage during larger storm events. The tunnel is part of a system being built to meet the requirements for the Amended Stipulated Final Order (ASFO) entered into by the City of Portland with the Oregon Department of Environmental Quality in August 1994.

The proposed East Side CSO Tunnel will transport required flows from service areas on the east side of the river to the Columbia Boulevard Wastewater Treatment Plant. The tunnel will extend from the vicinity of SE Insley Street, proceeding north paralleling the river to a connection with the West Side CSO Tunnel on Swan Island, near N. Port Center Way. It will intercept overflows from sewer outfalls serving:

- Insley (OF-28) Basin
- Division (OF-31) Basin
- Taggart (OF-30) Basin
- Alder (OF-33, 34, 35, & 36) Basin
- Stark (OF-37) Basin
- Oak (OF-38) Basin
- Sullivan (OF-40) Basin
- Holladay (OF-41) Basin
- Wheeler (OF-43) Basin
- Beech-Essex (OF-44A & 46) Basins

These basins currently discharge overflows to the Willamette River. The tunnel will operate as part of the overall Willamette CSO System that includes the West Side CSO Tunnel, the Swan Island Pump Station, the Peninsular Forcemain, and the Portsmouth Forcemain.

It is assumed that as part of the CSO Flow Management Pre-Design Project (to be completed by June 2004), BES will have determined and provided PB with dry weather and wet weather inflows to the tunnel system and have recommended an appropriate tunnel size for a cost effective storage and transport system that meets the ASFO requirements. Based on this information, it is assumed that PB will have analyzed and refined tunnel sizing and new piping required to direct flows to the tunnel system in order to meet the stated operational performance objectives as part of the Preliminary Design and that BES will have approved the refined tunnel size needed for transients control and for cost considerations.

PB has assumed that the tunnel horizontal and vertical profile will be set at the 30% level. Following the selection of a preferred tunnel alignment and profile, and shaft locations in the preliminary design, the final design for the East Side CSO Tunnel Project will be carried out and contract packages for the construction of the project will be prepared.

Tunnel

A 22-foot diameter tunnel with a constant slope of 0.0012 is anticipated for the ESCSO tunnel. Current tunnel length is estimated at approximately 30,420 feet. The tunnel will be lined with precast concrete segmental lining sections.

Shafts

Ten shafts are anticipated for the East Side CSO project. Two of the shafts will be singleuse access shafts and the remaining shafts shall be either single-use or multi-use hydraulic shafts. Each hydraulic shaft shall also include one or more diversions as well as pipelines to deliver the CSO to the shaft. Outfalls to be diverted include OF 28, 30, 31, 33, 34, 35, 36, 37, 38, 40, 41, 43, 44A, and 46. Three additional storm water outfalls will also be diverted into the tunnel system. Five of the diversion structures will include overflow structures as well as provisions for floatable control structures based on the WSCSO concepts.

Structural design shall include design of excavation support, tunnel break-through, shaft lining, internal facilities and surface restoration and facilities. A summary of the anticipated approximate size of each shaft is shown below:

- Single-use access shafts-8.5 feet inside diameter
- Single-use drop shafts-10 feet and 22 feet inside diameter
- Multi-use shafts-45-48 feet diameter
- Main mining shaft-58 feet diameter

Shaft depth will depend on the tunnel grade and the surface elevation at the site.

Excavation support is anticipated to consist of drilled shaft with casing for smaller diameter shafts (<15 feet diameter), drilled secant pile or diaphragm wall for intermediate size shafts (15-25 feet diameter), and diaphragm wall for large shafts (>25 feet diameter).

Pipelines

Consolidation pipeline segments will be required to bring flow from the various diversion structures to the tunnel shafts. These consolidation pipelines will be constructed as either open cuts or microtunnels, depending on the required pipeline depths and sizes and the amount of existing utility infrastructure existing along the proposed pipeline routes. The following consolidation pipelines are anticipated:

- Insley Consolidation Pipeline OF 28 to Brooklyn Yard Shaft, 72" diameter.
- Ross Island Consolidation Pipeline OF 30 and 31 to Water Avenue Shaft, 96" diameter.
- SE Salmon Street Consolidation Pipeline OF 33, 34 and 35 to Salmon Street Shaft, 18" to 36" diameter.
- SE Washington Street Consolidation Pipeline OF 36, 37 and 38 to SE Washington Street Shaft, 54" to 84" diameter.
- OF 40 Consolidation Pipeline OF 40 to Steel Bridge Shaft, 96" diameter.
- OF 41 Consolidation Pipeline OF 41 to Steel Bridge Shaft, 72" diameter.
- River Street Consolidation Pipeline OF 43 and 44A to River Street Shaft, 72".

• Albina Consolidation Pipeline – OF 46 to Albina Yard Shaft, 72" diameter.

Diversion Structures

There will be three different types of diversion structures, those with overflows, those with RTC and overflows, and those without overflows. Structures without overflows will be smaller and less complex than the other two, and, depending on the size of the pipe may consist of just a precast manhole. Diversions that include overflows will also include an overflow weir, a backflow prevention gate, and provisions for floatable control for flows coming from the basin that will not enter the tunnel. Diversions with RTC and overflows will also contain a gate to shut off flow to the tunnel. The anticipated diversion arrangement is as follows, listed by outfall number.

- Diversion with no overflow-31, 33, 34, 35, 38, 41, 46
- Diversion with overflow-30, 36, 37, 40, 43,
- Diversion with overflow and RTC-28 (Note; no tunnel overflow from OF 28), 44A, and 3 storm only outfalls TBD

Instrumentation & Controls and Electrical

It is anticipated that Instrumentation & Controls (I & C) and electrical design will need to provide instrumentation and control as well as electrical service to power those facilities to 8 shaft sites, 5 overflow weirs, and 4 RTC overflow points (3 storm water only + OF 44A diversions) that contain gates to regulate inflow of storm water.

Instrumentation shall consist of tunnel water level measurements at each shaft site, gas measurements at one (1) shaft site, water level measurements at each weir, and gate levels at each gate. All instrumentation shall be terminated in a fiber patch panel such that BES can design a connection between the control panels and the City fiber optic (FO) network.

The diversion structure at Southern terminus (OF 28) shall also have 2 RTC gates and an odor control facility. Provide gate level measurement for one existing gate and one new gate at the southern terminus. Provide electrical service for an above-grade, structure that contains fans, control panels, lighting and heating, ventilation, and air conditioning (HVAC).

EAST SIDE CSO TUNNEL PROJECT FINAL DESIGN DETAILED SCOPE OF WORK:

Task 5 – Land/Easement Acquisition, Permitting, and Third Party Agreements

Objective: To identify property right needs for construction, protection and operation and maintenance of the ESCSO Tunnel Project improvements and assist BES with securing property rights.

05.01 Task Management

Objective: Prepare work plans and attend meetings related to the management of Task 5.

05.01.01 Task 5 Work Plan

PB will develop a work plan schedule for Task 5 which include a roll up of the Permitting and Property Acquisition Workplans (5.01.02 and 5.01.03) and all other property right needs (such intergovernmental agreements) and link key elements back to affected elements of the overall project schedule. PB will update the workplan schedule reflect design and construction requirements at the 60%, 90% and 100% design levels and at design changes that significantly affect the elements of work of Task 5.

05.01.02 Permitting Work Plan

PB will develop a work plan utilizing the Permitting Technical Memorandum (DCC#5516-01020A-12) dated December 19, 2003. The work plan will include the permit acquisition schedule linked to key elements of the project design and construction phasing and permitting agency.

PB will update the permitting workplan schedule, issues, and prioritization to reflect design and construction requirements at the 60%, 90% and 100% design levels and at design changes that significantly affect the required project permits.

05.01.03 Property Acquisition Work Plan

PB will develop a work plan for property acquisition including acquisition process, time requirements for process (early start – late finish if appropriate), and element of the project that is triggering the property acquisition for each affected property.

PB will update the property acquisition workplan schedule, issues, and prioritization to reflect design and construction requirements at the 60%, 90% and 100% design levels and at design changes that significantly affect the land acquisition requirements.

05.01.04 Task Coordination Meetings

PB will provide one staff member at Task Coordination Meetings (up to 12 meetings). The staff member is responsible for providing Task 5 updates, identification of issues

PB will prepare an updated status report and an issues and resolution list that will be submitted to BES at each coordination meeting.

Deliverables:

05.01.A	Draft Task 5 Work Plan and Schedule
05.01.B	Final Task 5 Work Plan and Schedule
05.01.C-X	Updates to Task 5 Work Plan Schedule at 60%, 90% and 100% Design
05.01.D	Draft Permitting Work Plan
05.01.E	Final Permitting Work Plan
05.01.F-X	Updates to Permitting Work Plan at 60%, 90% and 100% Design
05.01.G	Draft Property Acquisition Work Plan
05.01.H	Final Property Acquisition Work Plan
05.01.I-X	Updates to Property Acquisition Work Plan at 60%, 90% and 100%
	Design
05.01.J-X	Meeting notes and updates for Task Coordination Meetings

05.02 Third Party Coordination/Authorization

Objective: Identify coordination/authorization required from third parties to construct and operate the project facilities. This authorization may include permits; temporary and permanent easements; permits of entry; intergovernmental agreements (IGA); utility relocation permits; business relocations, leases and authorization for instrumentation and monitoring. Assist BES with the coordination of activities and securing of authorization from third parties.

05.02.01 Identification of Third Party Involvement

PB will develop a Summary of Third Party Involvement for the project including permits, right of way acquisition needs (easements, leases, and relocations), permits of entry, and intergovernmental agreements. Consideration should be given to various activities that will be required to construct the project as well as long-term needs to access and ability to operate and maintain the facility.

Elements of work that will be considered when identifying third party involvement include the following.

- Mining/Staging Site: Property rights needed to stage mining activities including area requirements, access, and work activities to take place on site.
- Tunnel: Property rights needed to construct the tunnel including permanent easement requirements, ground improvement activities, instrumentation and monitoring, and condition assessment videotaping of structures.

- Shafts: Property rights needed to construct, operate & maintain the shafts, odor control facilities, and provide long-term access for operation and maintenance of the tunnel infrastructure.
- Pipelines: Property rights required to construct, operate, and maintain the pipelines, ground improvement activities, instrumentation and monitoring, and condition assessment videotaping of structures and/or infrastructure.
- Utility Relocations: Property rights required to relocate utilities.

The Summary of Third Party Involvement will be developed in Excel and divided into major elements of work: Tunnel Reaches 1, 2, and 3 and Pipelines (each major pipeline). The Summary will include the following.

- Property State ID
- Property County ID Number
- Site Address
- Owner(s): Name and/or Permit Agency
- Type of Involvement of Third Party: Easement, lease, IGA, permit, etc
- Element(s) of the work that trigger third party involvement (such as odor control facility requiring a building permit) and correlating ESCSO plan sheet number/map number showing element of work
- Identify an early and late finish date for third party authorization/involvement to meet project schedule (link to element of work affecting/triggering Third Party Involvement)

Summary will be in the form of a spreadsheet. PB will verify and update the summary to reflect the progression of the design at the 60%, 90%, and 100% design levels. PB will provide BES with a written narrative summarizing changes at each revision.

05.02.02 Coordination with Third Parties

PB will assist BES with coordination with third parties. Coordination includes setting up and attending coordination meetings, preparing supporting documentation for meetings and agency coordination, and completing meeting minutes. These agencies include Metro, ODOT, DEQ (contacts through BES), Multnomah County, PDOT, Bureau of Water Works, BES, Bureau of Parks and Recreation, Bureau of Development Services, Union Pacific Railroad Company, Oregon Pacific Railroad, TriMet, and other agencies as needed. Pre-application conferences and interagency meetings will be arranged where appropriate. Up to twenty-four (24) 2-hour agency meetings and two (2) public hearings are anticipated.

PB will prepare meeting minutes summarizing coordination meetings, communicate any required changes in design to the team, and update permit work plan/schedule under Subtask 05.02.01.

05.02.03 Third Parties Field Reconnaissance

PB will carry out field reconnaissance of all surface disturbance areas associated with the final alignment and shaft sites, to ensure that design and construction impacts remain below permit thresholds for identified permits including those listed below. The following fieldwork and associated third party coordination is anticipated.

- Corps of Engineers, NOAA Fisheries, US Fish and Wildlife Service, City of Portland ESA Program including the attendance of two meetings with the Streamlining Team (a group comprised of representatives from these agencies that meets monthly to review City projects).
- Oregon Division of State Lands (coordination with agency representatives and field checks to confirm that no fill and removal permits will be needed).
- Oregon State Historic Preservation Office (coordination with agency representatives to review final alignment details and confirm that Archaeological Permits are not needed).
- Portland Bureau of Development Services (coordination with BDS staff on permit requirements; field check alignment and shaft site work areas to confirm Conditional Use, Historic, and Design Review permits requirements).

05.02.04 Third Party Authorization Requirements

PB, using the Summary of Third Party Involvement, will define requirements for the various types of Third Party authorization, including the following.

- **Tunnel Easement**: Limits required for protection of the tunnel including easement width, constraints that will be placed on future use of the easement area such as limits on building construction excavation, depth of fill, proximity of underground improvements such as stone columns, load bearing non-driven & driven piles.
- **Shaft Easement**: Limits of permanent and temporary construction easements for construction, short and long term access, and operation and maintenance of the facility. Identify duration temporary of construction and future facility site constraints. (Unique to each shaft site.)
- **Pipeline Easement:** Limits for permanent and temporary construction easements for the construction, access, and operation and maintenance of the facility. Identify duration temporary of construction and future development site constraints. (Unique to each pipeline project.)
- **Construction Easements/Permits of Entry:** Limits of individual construction easements including extent of area/access needed, type of activity, duration and approximate date of activity. Activities which would fall into this category include, mining/construction staging, ground improvement, instrumentation and monitoring and video taping during construction. (Unique to each construction site/location or activity.)

• Utility Relocations: Identify requirements for easements, permits of entry, or permits for utility relocations.

PB will provide maps, details and exhibits as necessary to illustrate the requirements for the various types of Third Party Authorization. Such material related to utility relocations will be provided as part of Task 16.

Deliverables:

05.02.A	Draft TM of Summary of Third Party Involvement (5 copies)
05.02.B	Final TM of Third Party Involvement (5 copies)
05.02.C-X	Updates to Summary of Third Party Involvement at 30%, 60%, 90% and
	100% design (5 copies)
05.02.D-X	Meeting Notes for Third Party Coordination Meetings
05.02.E	Summary of Third Party Involvement Field Reconnaissance to include any meeting notes, permit requirements, field checks, field inspection reports.
	etc. resulting from the reconnaissance
05.02.F	Draft TM summarizing Third Party Authorization Requirements at 30% (5 copies)
05.02.G	Final TM summarizing Third Party Authorization Requirements at 60% design (5 copies each)

05.03 Permitting

Objective: Identify and coordinate required permits for project construction and operation and maintenance of the permanent facilities.

05.03.01 Permit Requirements

PB will prepare Technical Memorandums (TM) for each permitting agency identified in Task 05.01.02 Permitting Work Plan. Each TM will include detailed information related to all permits required by the permitting agency for the project. The TM's will include the following.

- Permit name, contact information
- Element/activity/scope of work triggering permit
- Map showing element of work covered by permit
- Copy of permit
- Permit applicant (contractor, consultant, city)
- Permit timeline and key elements of design/construction that relate to said timeline
- Summary of issues
- Permit costs
- List of plan sheet numbers/specifications of permitted element of work
- Copies of any meeting minutes with the permitting agency included in the appendix

TMs are anticipated for the following permitting agencies:

- Oregon Department of Transportation (ODOT)
- Oregon Department of Environmental Quality (DEQ)
- METRO
- City of Portland Department of Transportation (PDOT)
- City of Portland Parks and Recreation Department
- City of Portland, Bureau of Development Services (BDS)
- City of Portland, Bureau of Environmental Services (BES)
- Union Pacific Railroad Company (UPRR)
- Oregon Pacific Railroad Company (OPRR)
- Multnomah County

05.03.02 Permit Management/Oversight

PB will maintain a Permit Tracking Matrix and Summary of Unresolved Issues which will track the progress of each permit. PB will flag any delays in the permit process that may affect the project schedule and develop solutions to mitigate impact. PB will identify any potential permitting issues during key phases of the project (30%, 60%, 90% and 100% design) and update tracking sheet correspondingly.

05.03.03 Permit Applications

PB will prepare permit applications for all permits to be issued to the City of Portland. PB will complete applications to meet permitting agency and BES requirements, including permit related plans and studies (described in 05.03.04), fieldwork, maps, and/or reports. PB will prepare and provide key information to the permitting agency as the design progresses to work toward securing the permit. Permit application/information will be reviewed and approved by BES prior to submittal to any permitting agency.

PB will complete field checks as necessary for completion of permit applications. PB will:

- Complete permit related studies (identified below).
- Coordinate with team members responsible for tasks related to specific permits, including mapping and CADD support.
- Prepare draft permit applications and submit them to internal PB review and to BES for review and comment.
- Integrate comments into permit application documents and submit to BES for submission to the appropriate agencies. Permit application fees will be the responsibility of BES.
- Monitor permit review progress throughout the process. Review with the project team and address any questions and information needs identified by permitting agencies.

The following permits are anticipated, but not considered a final or complete list.

- Oregon Department of Transportation (ODOT)
 - Permit to Occupy or Perform Operations upon or under a State Highway or State property
 - o Bridge Permit
- Oregon Department of Environmental Quality (DEQ)
 - Air Quality
 - o 1200 C Permit
 - o Disposal Permit
- METRO
 - o Non-Park Use Permit
- Multnomah County
 - o Bridge Permit
- City of Portland Department of Transportation (PDOT)
 Street Opening Permit
- City of Portland Parks and Recreation Department
 - Non-Park Use Permit
 - Urban Forestry Permit
- City of Portland, Bureau of Development Services (BDS)
 - Land Use Permit Greenway Review
 - o Building Permit
 - Noise Variance
 - o Conditional Use
 - o Design Review
- City of Portland, Bureau of Environmental Services (BES)
 - Discharge Permit
- Union Pacific Railroad Company (UPRR)
 - Encroachment Permit
 - Crossing Permit
- Oregon Pacific Railroad Company (OPRR)
 - Encroachment Permit
 - Crossing Permit

05.03.04 Permit-Related Plans and Studies

PB will prepare all plans and studies required by or for permit applications in Subtask 05.03.01 Permit Requirements and 05.03.03 Permit Applications including any research and fieldwork required. Plans and studies will be reviewed and approved by BES prior to submittal to any permitting agency.

- Mitigation Plan anticipated in Springwater Corridor and Albina Yard areas
- Landscape Plan in coordination with the team Landscape Architects anticipated for Albina Yard riverfront area, Steel Bridge shaft site, Station L mining site, and southern terminus shaft site.
- Greenway Related Plans and Studies anticipated in Springwater Corridor, Station L, Steel Bridge, and Albina Yard areas
- Greenway Trail Plan

- Construction Management Plan for the Greenway
- Impact Evaluation Study focusing on natural resource and water quality impacts in the Greenway Zone, as required for the City's Greenway Permit

05.03.A	Notebook of Permits
05.03.B-X	Permit Tracking Matrix in Excel format and Summary of Unresolved
	Issues and updates at 60%, 90%, and 100% design

05.04 Property Acquisition

Objective: PB will identify properties acquisition requirements for construction and long-term operation and maintenance of the project facilities. This task is limited in scope to assisting BES with property acquisitions and completing property relocation.

05.04.01 Appraisals

PB will assist BES with appraisals by securing qualified firms to complete up to 54 appraisals, as requested by BES for properties impacted by the project (including 2 appraisals for tunnel shaft sites acquired in fee, including one specialty appraisal report for improvement valuation). PB will be responsible for passing on requests; including legal descriptions, property descriptions and property maps to the appraisal specialist. PB will return completed appraisals to BES for their review and use. Copies of the completed appraisals shall be maintained in the project files for inclusion in the Appraisal Notebook. PB will not be responsible for review of the material provided by BES or the appraisal specialist, but will only act to "pass-thru" information and maintain the appraisal notebook.

05.04.02 Relocation Services

Objective: This task includes the effort necessary to conduct relocation of businesses for the East Side CSO Tunnel Project, in accordance with accepted Federal and State Requirements. PB will provide a qualified and experienced Relocation Specialist and/or Acquisition Agent, approved by the City prior to commencing work on this task. A maximum of three (3) relocations are anticipated.

City will:

- Review and approval all forms and documents
- Review completed appraisals and appraisal reviews and give written authorization to make offers
- Provide title reports
- Provide payment or payment into escrow for closing on all parcels acquired and on relocation claims
- Manage condemnation proceedings with assistance from PB. PB will be available to discuss negotiations and issues on files that are in condemnation with the City.

Relocation Requirements

Prior to commencing with relocation services, PB will provide a Technical Memorandum summarizing Federal and State Requirements for Relocations. In addition, the TM will include a summary of factors that impact relocations and identify anticipated relocations at 30% design.

Relocation Plan

PB will develop a Relocation Plan for each relocation. The plan will include:

- Business Name
- Property State and county ID Number
- Property Owner
- Business Owner
- Type of Business
- Project Element requiring Relocation
- Relocation requirements
- Relocation Appraisal
- Estimated schedule and cost for relocation
- Map showing affected property and project element
- Narrative of relocation plan which corresponds to schedule outlining roles and responsibilities for each relocation task, as required by state and federal requirements

PB will submit the Relocation Plans for review and approval by the City. Relocation negotiations shall not commence until the City has provided written authorization to proceed for the specified business/property.

Relocation Negotiations and Package

PB will maintain complete logs of all property contacts in conformance with commonly accepted industry practices, with copies of phone logs to the City monthly for project files.

PB will prepare files and documents, including appraisals, fair offer letters, deeds, permits, easements, and other documents as necessary for negotiations. The City will then review and finalize documents on City Letterhead.

PB will make at least three bona fide attempts to negotiate with each owner(s) to secure the required right of or property for the project. Bona fide attempts to negotiate will be considered as the direct contact with the property owners to discuss acquisition, including in-person meetings whenever possible. Out of area owners will be contacted by telephone and by mail. Administrative settlements will be reviewed and approved by the City prior to agent making settlement offer to owner. Negotiations shall not be deemed complete until PB has returned, to the City, the file for acceptance, closing and payment, or the file with a written recommendation for further disposition.

The City must approve, in advance, any increases to purchase offer, special agreements, additional relocation assistance, etc.

Relocation Package for each relocation shall include (as applicable):

- Business Name
- Property State and county ID Number
- Property Owner
- Business Owner
- Type of Business
- Project Element requiring Relocation
- Relocation requirements
- Relocation Appraisal
- Logs of property contacts (letters, phone logs and meeting minutes)
- Fair Offer Letters
- Copies of Deeds, Permits and Easements
- Settlement Offers
- Recommendations for Further Disposition (if required)
- Mortgage releases
- Relocation documents (including notification letters, claim forms, move monitoring information, record of reestablishment assistance)

Relocation

PB in accordance with accepted Federal and State Requirements shall complete relocations. Relocation will include, but not be limited to, proper notification, advisory assistance, moving, move monitoring, reestablishment assistance and assistance with completing claim forms. Relocations shall not be deemed complete until the businesses have been relocated in accordance with Federal and State requirements.

PB shall secure mortgage releases when directed to do so by the City. When signatures cannot be secured, return file to the City with a written recommendation for further disposition.

PB will submit the Relocation Packages for review and approval by the City. Relocation of the business shall not commence until the City has provided written authorization to proceed for the specified business/property.

05.04.03 Property Identification and Descriptions

PB will provide up to 40 property maps indicating the property acquisition or easement needs. From this, BES will provide property maps with existing property monuments, legal descriptions, and exhibit maps (to accompany legal descriptions) for properties identified by PB along the tunnel alignment. PB will provide property maps and computations for the writing of easements and/or property purchases or leases. PB will provide assistance with legal descriptions at the request of BES.

05.04.A-X	Appraisal Notebook (5 copies)
05.04.B-X	Provide property maps, descriptions and computations for the writing of
	easements and/or property purchases or leases (maximum of 40)
05.04.C	Draft Technical Memorandum Summarizing Relocation Requirements and
	Identified Relocations at 30% Design
05.04.D	Final Technical Memorandum Summarizing Relocation Requirements and
	Identified Relocations at 30% Design.
05.04.E-X	Draft Relocation Plan for each Relocation Required
05.04.F-X	Final Relocation Plan for each Relocation Required
05.04.G-X	Draft Relocation Packages for Each Business/Property (5 copies)
05.04.H-X	Final Relocation Packages for Each Business/Property (5 copies)

Task 6 – Final Design Subsurface Investigation

Objective: PB will complete subsurface investigations along the tunnel and pipeline alignment and shaft locations and document the results of the investigations in a final Geotechnical Data Report (GDR).

06.01 Task Management

PB will prepare a work plan for the Final Design Subsurface Investigation. The work plan will be reviewed and approved by BES prior to proceeding.

Deliverables:

06.01.A	Draft Final Design Subsurface Investigation Work Plan
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06.01.B Final Design Subsurface Investigation Work Plan

06.02 Final Geotechnical Exploration Plan

PB will develop a detailed geotechnical exploration program to obtain data for final design. Based on subsurface information obtained during preliminary design, exploration locations will be optimized to determine subsurface conditions along the tunnel alignment, at shaft locations, and along pipeline alignments. Exploration methods will consist of rotosonic and mud rotary borings, cone penetrometer test (CPT) probes; geoprobes; and test pits. The exploration program will be conducted in accordance with the geotechnical field manual and health and safety plan developed during preliminary design.

Deliverables:

06.02.A	Draft Final Geotechnical Exploration Program (5 copies)
06.02.B	Final Geotechnical Exploration Program (5 copies)

06.03 Final Field Exploration Program

PB will conduct field investigations to obtain data for final design in accordance with the approved Final Geotechnical Exploration Program. This investigation will include subsurface exploration and field and laboratory testing.

06.03.01 Obtain Drilling Permits

Prior to initiating the field investigation, PB will review as-built utility maps and select appropriate boring locations. PB and its subcontractors will then develop drilling permit applications, traffic control plans, and right-of-entry requests to conduct explorations on private and railroad property prior to subsurface investigations as required. PB will contact the Oregon Utility Notification Center to mark underground utilities in right-of-way near boring locations. PB will locate and mark underground utilities on private property (if any) using a private locate service.

PB will acquire drilling permits. PB will acquire rights of entry for properties outside of the public right-of-way.

06.03.02 Final Design Drilling Program

The proposed final design drilling program consists of the following (based on BES approval):

<u>Rotosonic Drilling Along Tunnel Alignment</u>. Rotosonic borings will be advanced to 25 feet below tunnel invert along the tunnel alignment to obtain representative samples of coarse-grained soils. Twenty-four (24) borings are planned for 3,670 feet of total drilling footage.

<u>Rotosonic Drilling at Tunnel Shaft Locations</u>. Rotosonic borings are planned at tunnel shaft locations. These borings will extend 50 feet below tunnel invert to obtain representative soil data for shaft design. Seven (7) borings are planned for 1,225 feet of total drilling footage.

<u>Rotosonic Drilling for Pipeline Investigations</u>. Rotosonic borings are planned along microtunnel pipelines and at pipeline shaft locations where shallow gravel is anticipated. Boreholes will extend 15 feet below invert along pipeline alignments and 25 feet below invert at pipeline jacking or retrieval shafts. Four (4) borings are planned for 280 feet of total drilling footage.

<u>Mud Rotary Drilling at Tunnel Shaft Locations</u>. Mud rotary borings will be advanced 10 feet into gravel at tunnel shaft locations to obtain soil consistency data and relatively undisturbed samples for soil strength testing and consolidation testing. Six (6) borings are planned for 335 feet of total drilling footage.

<u>Mud Rotary Drilling for Pipeline Investigations</u>. Mud rotary borings are planned along microtunnel pipelines and at pipeline shaft locations where shallow gravel is not

anticipated and in open-cut pipelines. Boreholes will extend 15 feet below invert along pipeline alignments and 25 feet below invert at pipeline jacking or retrieval shafts. Twenty-two (22) borings are planned for 1,560 feet of total drilling footage.

<u>Cone Penetrometer (CPT) Test Probes at Tunnel Shaft Locations</u>. CPT probes are planned at tunnel shaft locations where deep soft soils are anticipated. Shear wave velocity measurements will be conducted within the CPT probes to obtain data for seismic design. CPT probes will be advanced to refusal in gravel. Predrilling may be required in paved areas or to advance through obstructions in artificial fill materials. Three (3) probes are planned for 300 feet of total drilling footage.

<u>Cone Penetrometer (CPT) Test Probes along the Tunnel and Pipeline Alignments</u>. CPT probes are planned along the tunnel alignment where Sand/Silt Alluvium is present within the tunnel zone and along shoreline pipeline alignments. Shear wave velocity measurements will be conducted within the CPT probes to obtain data for seismic design. CPT probes will be advanced to refusal in gravel. Predrilling may be required in paved areas or to advance through obstructions in artificial fill materials. Three (3) probes are planned for 300 feet of total drilling footage.

<u>Geoprobes</u>. Will be advanced to define mixed face conditions (locate soil contacts) in tunnels and for pipelines. Nine (9) Geoprobes are estimated to an average depth of 80 feet each.

<u>Test pits along pipeline alignments.</u> Test pits will be conducted to a maximum depth of 14 feet along selected pipeline alignments to locate and identify timber piles and other obstructions located in artificial fill material. Ten (10) test pits are planned.

PB will drill borings and excavate test pits using appropriate traffic control and railroad flagging (if required); install monitoring wells; conduct *in-situ* permeability testing; and monitor methane levels in samples, air space volatiles, and obvious contamination during drilling and test pit excavation. All borings and test pits will be continuously logged to identify soil properties, drilling conditions and difficulties, and geologic contacts. Core samples from rotosonic borings will be photographed. Soil sampling and testing will be conducted as established during preliminary design investigations. If suspicious stains, films, and odors are observed during drilling, an approved protocol (established during Preliminary Design) will be followed.

Pressuremeter testing will be conducted in two (2) selected borings to evaluate Young's Modulus in areas where the tunnel is located in Sand/Silt Alluvium. Young's Modulus is a geotechnical parameter used to evaluate tunnel squat and will also be used in the numerical modeling for bridge/tunnel interaction studies. PB will evaluate appropriate methods for conducting the pressuremeter testing and make an assessment of the likelihood of success in conducting this testing prior to conducting the tests. Approval from BES will be obtained prior to start of the testing.

Monitoring wells will be installed in selected borings to monitor groundwater levels. PB will provide monitoring well identification information to BES for their use. Monitoring wells are to be assumed to be used to monitor groundwater during construction.

Laboratory Testing

Laboratory testing will be conducted on selected borehole and test pit samples. Testing will include index testing (moisture content, Atterberg limits, organic content, and grain size analysis), strength testing (unconfined and triaxial testing), settlement (consolidation) testing, and corrosivity testing. Grain size analyses and rock property testing (used for TBM design) will be conducted on selected large diameter borehole samples. Interpretive (gINT) borehole and test pit logs will be prepared for all borings and test pits based on a comparison of field observations and laboratory testing results.

Drummed borehole cuttings will be the responsibility of PB. Chemical analytical testing of the cuttings will be conducted by BES to provide data for disposal. Drums will be disposed of in an appropriate manner once test results are provided to PB. No hazardous waste is anticipated within drummed cuttings.

Soil and rock samples will be transported to and stored in a sample storage area for a period of 1.5 years. After this time, samples become the responsibility of BES and BES is responsible for relocation or disposal of all samples.

Deliverables:

06.03.A-X	Copies of permits and right-of-entry agreements
06.03.B-X	Weekly exploration information summaries with the following
	information (boring date, project ID, cross streets, status (complete,
	underway, cancelled, etc), property owner, surveyed coordinates, state
	well numbers, permit status)
06.03.C-X	Draft field exploration borehole and test pit logs
06.03.D-X	Monitoring well information sheets
06.03.E	Draft TM describing results of pressuremeter testing (5 copies)
06.03.F	Final TM describing results of pressuremeter testing (5 copies)

06.04 Final Design Groundwater Analysis

PB will conduct six bimonthly checks of groundwater monitoring wells installed during both preliminary and final design to determine seasonal variation in groundwater levels. Permeability values will be determined for geologic units encountered during rotosonic drilling based on falling head tests. Lag time and tracer testing will be conducted at major shaft locations to evaluate tidal influence and groundwater velocity. The results of all final design groundwater testing and monitoring will be combined with preliminary design results and summarized in a technical memorandum.

06.04.A	Draft Groundwater Evaluation TM (5 copies)
06.04.B	Final Groundwater Evaluation TM (5 copies)

06.05 Final Seismic Evaluation

PB will conduct SHAKE analyses (up to 16) at major tunnel shaft locations and along shoreline pipeline alignments to develop seismic site response for determining liquefaction potential and lateral spread parameters on a site-specific basis for final design. Data for these analyses will be obtained from geotechnical borings and CPT probes. The results of the final seismic evaluation will be summarized in a technical memorandum.

Deliverables:

06.05.A	Draft Seismic Evaluation TM (5 copies)
06.05.B	Final Seismic Evaluation TM (5 copies)

06.06 Final Geotechnical Data Report

Upon completion of the subsurface exploration, laboratory testing, and borehole log preparation, PB will prepare a Geotechnical Data Report (GDR) that presents the geotechnical investigation data obtained during preliminary and final design. Data obtained during previous investigations in the vicinity of the tunnel and pipeline alignments will also be included in the appendix of the GDR. The report will include a description of project area geology and geologic units as well as detailed descriptions of the field exploration and laboratory testing methods, and figures identifying boring locations. Boring logs, core photos, and field and laboratory testing results, will be presented in the appendices.

Following the completion of the GDR, electronic versions of the (gINT) borehole logs will be submitted to the City of Portland Materials Testing Laboratory for inclusion in their database.

Deliverables:

06.06.A	Draft Geotechnical Data Report (5 copies)
06.06.B	Final Geotechnical Data Report (5 copies)
06.06.C	Electronic Version of gINT borehole logs

06.07 Contingency Drilling

Once the Contractor has reviewed the geotechnical related documents prepared by PB; the Contractor, PB or BES may request additional subsurface investigations. As directed by the BES Project Manager or BES Task Manager, PB will develop an investigation plan and conduct additional investigations to address the request(s). A brief investigation plan with objectives will be written and submitted to BES for approval. Subsurface data collected will be included in a supplemental report referencing previous project reports.

Boring logs, core photos, and field and laboratory testing results, will be presented in the appendices. Contingency drilling is estimated to be:

- Eight (8) additional Rotosonic borings.
- Four (4) of these borings would be at the discretion of PB or BES and four (4) at the discretion of the Contractor. Depth of the borings will be to the anticipated tunnel invert, about 120 ft. average depth.
- Two Geoprobes (80 ft deep)
- Six (6) cone penetrometer (CPT) test probes (480 total feet)

Large Diameter Boreholes. Large diameter boreholes will be advanced to a maximum depth of 80 feet along the tunnel alignment or at tunnel shaft locations in areas of shallow Gravel Alluvium and Troutdale Formation. The purpose of these boreholes is to obtain representative samples of coarse grain soils for gradation and physical property testing, to characterize boulder size and frequency, and identify material subject to borehole caving. Two (2) boreholes are planned for 160 feet of total drilling footage.

Deliverables:

06.07.A	Exploration Plan for Additional Investigations (5 copies)
06.07.B	Draft Supplemental Geotechnical Data Report (5 copies) (If data provided
	after final GDR has been submitted)
06.07.C	Final Supplemental Geotechnical Data Report (5 copies)

Task 7 – Final Engineering Environmental Investigations

Objective: To develop project design documents that provide for a cost-effective management of contaminated media while properly reducing the City's long-term environmental liability consistent with the City's overall CSO environmental management program.

07.01 Task Management

Prepare work plans and attend meetings related to the management of Task 7.

07.01.01 Environmental Investigations Work Plan

PB will prepare a work plan for the Environmental Investigations. The work plan will be reviewed and approved by BES prior to proceeding.

07.01.02 Status and Coordination Meetings

Environmental task lead or their designated representative will meet monthly with BES Special Waste Group staff during the final engineering phase of the project to facilitate efficient coordination and completion of the preliminary engineering environmental investigation tasks. A total of 18 meetings are assumed. In addition, Environmental task lead will attend up to 18 project team meetings.

07.01.A	Draft Environmental Investigations Work Plan
07.01.B	Final Environmental Investigations Work Plan
07.01.C-X	Meeting Notes with "issues" list e-mailed to BES Task Manager.

07.02 Level II Environmental Assessment

Once the final alignment is selected PB will perform a Level II Environmental Investigation (EI). An updated Health and Safety Plan and Final Design Sampling and Analysis plan will be prepared prior to performing the push probe investigations. If necessary, street use permits or rights of entry will be obtained and traffic management plans prepared. PB will also coordinate necessary and proper management of Investigation Derived Wastes (IDW). PB will provide a temporary storage area for the IDW during the field explorations.

The scope of the EI will consider the DEQ-approved presumption that in the absences of an identified feature of concern, soil at depths greater than 30 feet, or beneath the depth of any historical fill, whichever is greater, is not contaminated. Given that the tunnel is greater than 30 feet below the ground surface and below the depth of any fill, soil sampling for chemical analysis will be limited to push probe explorations at shaft locations, shallow pipelines, and utility relocates.

Shaft Locations. For the purposes of the cost estimate, it is assumed that one push probe will be performed at each of nine (9) shaft locations. Based on previous CSO projects, PB anticipates that alignment revisions will require an additional four probes at revised shaft locations.

Push probe explorations at shaft locations will be advanced 30 feet (or depth of fill, whichever is deeper). Based on anticipated fill depths of greater than 30 feet at some shaft locations, the average depth of the shaft push probes is assumed to be 50 feet. Features of Concern, other than fill, suggesting contamination to depths greater than 30 feet are not anticipated at the shaft locations.

Soil samples will be collected at depths of 1, 5, and 10 feet and every 10 feet thereafter to the bottom of the push probe. Soil samples will be analyzed for petroleum hydrocarbons, PCBs, and metals or other contaminants as indicated by the Preliminary Environmental Assessment. Headspace measurements will be performed on the soil samples at the time of collection. Groundwater samples will be collected in push probes that encounter groundwater. The groundwater samples will be analyzed for volatile organic compounds. Laboratory analysis will be performed by the City of Portland, Bureau of Environmental Services, Water Pollution Control Laboratory. Costs for the laboratory analysis are not included in the cost estimate.

Shallow Pipelines and Utility Relocates. In order to reduce the potential for unanticipated conditions in areas designated as uncontaminated from the initial round of sampling, PB

will perform two rounds of investigations along shallow pipeline alignments and utility relocates.

- The first phase of this work assumes that one push probe will be performed every 100 feet of shallow pipeline and utility relocation. PB has assumed that there will be about 3500 feet of shallow pipeline (35 probes) and utility relocates in the overall project. Push probes along shallow pipelines will be advanced to a depth of 10 feet below the bottom of the pipeline trench.
- This second phase of this work will consist of collecting soil samples along shallow pipeline alignments from the upper 30 feet (or depth of fill, whichever is deeper) at 50-foot spacings in project areas where the initial sampling did not detect contamination or where initial sampling was not performed. These samples will be observed in the field for evidence of contamination (sheen, odor, discoloration), similar to what will occur during construction. In this manner, contamination that would otherwise be discovered during construction will be noted prior to construction and accounted for in the design documents. PB has assumed that an additional 15 probes will be performed as part of this phase two work. Laboratory analysis will not be performed on the second round soil samples, unless evidence of contamination is observed in the field. Lab analysis will be conducted by the City of Portland, Bureau of Environmental Services Water Pollution Control Lab.
- PB will evaluate geoprobes in Phase I and look for opportunities to reduce the amount of contamination soil that has to be managed during construction.
- PB will perform geoprobes with visual observations in areas to limit unanticipated contaminated soil conditions during construction.

Environmental Observations During Geotechnical Investigation. PB will also coordinate observation for field evidence of contamination during the geotechnical investigations. PB has assumed that 2 follow-up borings to the tunnel invert will be necessary at locations where the geotechnical investigations noted field evidence of contamination.

PB will collect groundwater samples from monitoring wells installed at the shaft locations as part of the geotechnical investigations.

All IDW will be stored at the locations designated and secured by PB while laboratory analysis is performed. PB will coordinate the disposal or placement of IDW based on results of the laboratory analysis and applicable federal and state disposal regulations.

Should contaminants be found during the environmental or geotechnical investigations, PB will test and dispose of contaminated materials. The cost of testing and disposal is a reimbursable expense.

07.02.A	Updated Health and Safety Plan (5 copies)
07.02.B	Design Sampling and Analysis Plan (5 copies)

07.03 CMMP, Specifications, and Supporting Documents

An Environmental Data Report (EDR) will be prepared at the conclusion of the EI. PB will also evaluate the potential for construction de-watering and sewer line construction to impact local hydrology and the potential for migration of liquid or vapor phase contaminants and prepare a technical memorandum presenting our findings. The EDR will include an Introduction, Environmental sampling Protocol, Summary of Findings and References.

Based on the results of the EI, PB will denote areas of subsurface contamination for the construction specifications and plans and prepare a Contaminated Media Management Plan (CMMP) for DEQ review and approval¹. The CMMP will ensure prudent field monitoring, identification, and management of anticipated contaminated media and describe appropriate responses to unanticipated contaminated media. Lastly, PB will detail the environmental construction inspection activities necessary to document to DEQ that the CMMP requirements were achieved during construction. The CMMP will include a Project Introduction and Description, a Summary of Environmental Investigations, Contaminated Media Designations and Other Environmental Issues.

The content of the DEQ approved CMMP will be the basis of the environmental specifications section prepared PB. This scope assumes that 40 labor hours have been allocated for the development of the environmental specification section 1565 by the environmental task lead.

Deliverables:

07.03.A	Final Environmental Data Report
07.03.B	Contaminated Media Management Plan.

07.04 Assist BES in Obtaining DEQ Concurrence

PB will assist BES staff, as necessary, in obtaining DEQ concurrence on the overall East Side CSO environmental management program. Submitting and obtaining DEQ approval of the Final Design Sampling and Analysis Plan and CMMP will be the primary task. However, other environmental issues are anticipated to arise also requiring DEQ discussions and, possibly, concurrence. One task to note is discussion regarding combining the CMMP and former Environmental Construction Oversight Plan (ECOP). This task will consist of an anticipated 12 meetings (if needed) with DEQ and BES staff.

¹ Previously CH2M HILL and the City EOC process developed a CMMP and an ECOP. We are proposing to combine the documents into on deliverable called the CMMP. There has been too much confusion over two documents. The information can be easily presented in one.

07.04.A-X E-mailed meeting notes and summary of Issues for each DEQ Meeting

Task 8 - Final Design – Hydraulic Modeling and System Optimization **Objective:** Following the hydraulic analysis performed to support the 30% design, there are expected to be refinements in the design that impact hydraulic performance as the final design documents are produced. PB will model the revisions to the preferred alignment for the eastside which will include the entire tunnel system (east and west side) for the dry weather and wet weather design storm conditions. The focus of the analysis will be the performance and function of the east side tunnel as final design is performed. The results will be presented in technical memoranda and at appropriate technical review meetings.

08.01 Task Management

08.01.01 Hydraulic Modeling and System Optimization Work Plan

PB will prepare a work plan for the Hydraulic Modeling and System Optimization task. The work plan will be reviewed and approved by BES prior to proceeding.

08.01.02 Status and Coordination Meetings

Hydraulic modeling and system optimization team staff will meet monthly with BES modeling staff during the final engineering phase of the project to facilitate efficient coordination and completion of the hydraulic modeling and system optimization tasks. A total of 18 meetings are assumed.

Deliverables:

08.01.A	Draft Hydraulic Modeling and System Optimization Work Plan
08.01.B	Final Hydraulic Modeling and System Optimization Work Plan
08.01.C-X	Meeting Notes with "issues" list e-mailed to BES Task Manager

08.02 Hydraulics

PB will model the revisions to the preferred alignment for the dry weather and wet weather design conditions identified during the preliminary design and used for the 30% design. The results will be presented at appropriate technical review meetings (3 meetings). PB will provide information to the design team produced through the finalization of the BES Flow Management Predesign Project (FMPP). The PB team will assess these results and determine the impacts to the design.

The range of flows to be considered for the tunnel system design is to be established with BES. These flows will include the "design" flow as well as the upper range of storm flows to allow for cost-effective capture of the greatest storm possible. The performance of the system will be checked for the following storms:

- Main design storm: The tunnel's design is based on the limiting ASFO condition of no overflows more frequently than an average of once in three summers. To simulate this condition, the tunnel size was determined using a series of the worst six summer storms from the 1982-1987 representative period. The tunnel design can be confirmed by ensuring that the combined system does not overflow for more than two of these storms.
- Check 25-yr storm: Determine that the tunnel's interaction with connecting facilities, such as the SWPI, does not cause additional flooding (basement or street) upstream, using Tunnel model
- Check BES Water Quality Storm: Assess the interaction of the tunnel with storm only outfalls along the alignment and determine whether the tunnel has adequate capacity for collecting their flows. Also, this storm is used to set gate controls for stormwater flows controlled via RTC. The tunnel is filled with basin contributions from this storm (assuming the Swan Island Pump Station is operating normally), assessing the peak water level at the Confluent Structure, and setting the gates to close when the Confluent Structure water level reaches that elevation. BES will provide locations and quantities for storm flow inputs.

For the tunnel system simulation, PB is to determine and develop the following:

- Appropriate tunnel size and gradient
- Optimal tunnel inflow process
- Test hydraulic relief scheme
- Proper sediment management (flushing)
- Proper air and odor management
- Hydraulic compatibility with drop shaft locations
- Investigate and recommend pump out scheme for various flow situations
- Operational issues for dry weather conditions (based on dry weather flow scenarios provided by BES)

PB is to update the BES Tunnel model for the tunnel by reviewing existing information and simulation criteria and refining the existing model database. PB will provide BES with updated files of tunnel design and provide coordination and input on long-term simulation modeling.

Deliverables:

- 08.02.A Draft Design TM on hydraulic modeling (5 copies)
- 08.02.B Final Design TM on hydraulic modeling (5 copies)
- 08.02.C-x Electronic version of Final tunnel models corresponding to final design configuration. (Modeling files and a listing of changes provided at 60%, and 90% complete. Modeling files and model documentation provided at 100% along with responses to BES reviews.)

08.03 Conduct Transient Analysis of Flows

At a time to be determined in the finalization of the design, PB will perform a surge and transient analysis that includes a final tunnel filling analysis with respect to hydraulic transients. The analysis will incorporate the conclusions of the RTC system configuration as provided in the FMPP by BES.

PB is to evaluate transients using a model to identify critical situations needing advanced analysis. The transient analysis will evaluate tunnel "mounding" (air entrapment) and pump failure.

The approach will use a baseline run without surge protection in order to compare with conditions when surge control devices are introduced. PB will prepare a technical memorandum to report findings and recommendations, incorporating tables, charts, and graphs to illustrate results and including catalog cuts of control devices, if recommended.

If necessary, the transient analysis will be checked with the MXTRANS program.

The technical memorandum for this task will address the following:

- Pump shutdown and resulting pressure waves
- Tunnel filling and associated filling wave or surge
- Air flow and release to address air pocket formation and ventilation requirements
- Undesirable system performance (high pressures or flows rapidly released from the system--"geysering") will be identified and required mitigation measures, including size and location of venting facilities will be recommended for incorporation into the final design.

Deliverables:

08.03.A	Draft TM on transient and surge analysis
08.03.B	Final TM on transient and surge analysis

08.04 Systems Operations/Hydraulic Analysis

Following the analysis performed to support the 30% preliminary design there are expected to be refinements in the design that impact hydraulic performance as the final design documents are produced.

PB will identify changes in the design that would impact system operations and model their impacts. These additional operational issues that could include sedimentation, flow control, hydraulic relief (tunnel system, outfalls, interceptors), access, odor, and other issues that will be incorporated into the analysis and documented in the final System Configuration Plan. The final System Configuration Plan will include the location and function of all tunnel hydraulic facilities including:

• Inflows - quantity, location, for identified storm events

- Drop shafts type, function, contributing basins
- Odor control type, location
- Surge control facilities type, location, operation during varying flow conditions
- Hydraulic relief (outfalls) active outfalls, weir elevations, contributing basins
- Pump out time required for storms analyzed
- RTC location, function, related monitoring
- Other hydraulic controls required to meet tunnel operation and performance requirements (e.g., floatable controls)

The system analyzed will include the system elements incorporated into the final "tunnel" model provided by BES. This includes portions of the interceptor system, all CSO outfalls, and the east and west side tunnel system, consolidation piping and diversions. The Water Quality, ASFO compliance, Summer-six and 25-year storms will be reviewed as part of modeling the impacts of the design decisions. A draft and final system configuration plan will be available for BES review.

BES will provide design criteria to PB regarding floatable control devices. PB will include these design criteria in the design of the project facilities and in the Hydraulics Analysis and System Optimization. PB will include design criteria and future floatable control provisions in Operations and Maintenance TM.

PB will prepare draft and final TMs that provide operations and maintenance guidelines for the East Side CSO Tunnel and will describe how it will be incorporated into the existing system, including the WSCSO tunnel and the SIPS. BES will re-analyze longterm performance using the 25-year historical rainfall record. PB will review the results of these runs to assist in recommending routine dry and wet weather tunnel maintenance for BES operations staff. The TM will address:

- System start-up phasing of hydraulic controls and major system elements
- Venting identify required inspections
- Gate opening and closing operation description of performance requirements
- Drop shaft operation and maintenance
- Flushing structure operation and maintenance (if required) or flushing recommendations
- Location of confined space entry points
- Maintenance and inspection guidelines (frequency, location)
- Flow metering and monitoring location and connection to RTC facilities
- Operational modes and procedures dry and wet weather (gate settings, weir adjustments)
- Access location and general procedures
- Coordination with WSCSO facilities

The Operations and Maintenance TM will not provide detailed O&M procedures typically found in O&M manuals for many mechanical facilities.

08.04.A	Draft System Configuration Plan
08.04.B	Final System Configuration Plan
08.04.C	Draft TM on Operations and Maintenance
08.04.D	Final TM on Operations and Maintenance

Task 9 – Geotechnical Baseline Report

PB will prepare a Geotechnical Baseline Report to include information in general conformance to the guidelines contained in the publication entitled, "Geotechnical Reports for Underground Construction, Guidelines and Practices", published by ASCE, 1997.

09.01 Task Management

09.01.01 Status and Coordination Meetings

PB will conduct status and coordination meetings between staff responsible for preparation of the Geotechnical Baseline Report. It is assumed that 20 meetings will be held over the course of final design.

Preparation of the task Work Plan will be included in the Work Plan for the Subsurface Site Investigations – Task 06.01.01

Deliverables:

09.01.A-X Meeting Notes with "issues" list e-mailed to BES Task Manager.

09.02 60% Draft Geotechnical Baseline Report

PB will prepare a 60% Draft Geotechnical Baseline Report (GBR). The GBR will include: project description, sources of geologic information, project geologic setting, construction experience in the project area and ground characterization.

Deliverables:

09.02.A 60% Draft GBR (5 copies)

09.03 90% Draft Geotechnical Baseline Report

PB will update the draft GBR project description, sources of geologic information, project geologic setting, previous construction experience in the project area, and ground characterization based on comments from the review of the 60% draft. PB will prepare sections on baseline geotechnical parameters, and design and construction considerations.

09.03.A 90% Draft GBR (5 copies)

09.04 Final Geotechnical Baseline Report

PB will update the draft GBR based on comments from the review of the 90% draft report.

Deliverables:

09.04.A Final GBR (10 copies; electronic version on CD)

Task 10 – Tunnel, Shafts, Pipelines and Appurtenant Structures Design

Objective: To develop the design for tunnel, shafts, pipelines and appurtenant structures; and produce drawings to be used as part of the project Contract Documents.

10.01 Task Management

10.01.01 Tunnel, Shafts, Pipelines and Appurtenant Structures Design Work Plan

PB will prepare a work plan for the Tunnel, Shafts, Pipelines and Appurtenant Structures Design. The work plan will be reviewed and approved by BES prior to proceeding.

Deliverables:

10.01.A	Draft Tunnel, Shafts, Pipelines and Appurtenant Structures
	Design Work Plan
10.01.B	Final Tunnel, Shafts, Pipelines and Appurtenant Structures
	Design Work Plan

10.02 60% Design Drawings

PB will prepare 60% level design drawings. The drawings will contain detailed information on all elements of the work, including plan views, sections, details, elevations, and call-outs. All drawings to be included in the final package are to be identified in the drawing list. Ten paper copies and an electronic copy using AutoCAD Release 2002 and using the BES CADD Standard for the design drawings (11" x 17" format) are to be submitted to BES. Provide five (5) copies of full size 24" x 36" drawings. Cost of reproduction of the drawings is a reimbursable expense charged to BES. The drawing package will include:

• General Drawings

- Tunnel Plan and Profile Drawings
- Shaft Site Layout Drawings at up to 11 locations
- Shaft Excavation and Initial Ground Support Drawings
- Drop Structure and Access Shaft Drawings
- Utility Relocation Drawings at shaft locations and for near surface pipelines
- Traffic Control Drawings for utility relocation and shaft construction
- Geotechnical Instrumentation Drawings
- Erosion Control Drawings
- Pipeline Plan and Profile Drawings
- Microtunnel Shaft Location Drawings
- Appurtenant Structure Layout Drawings
- Initial Ground improvement plans

10.02.A	60% Design Drawings Submittal
10.02.B	Response to 60% plan review, using BES comment response form
10.02.C	TM on Geotechnical Instrumentation Criteria and Implementation Plan

10.03 90% Design Drawings

PB will develop the design, including addressing of comments not satisfactorily dispositioned at the 30% design review, and prepare 90% level design drawings. The drawings will contain detailed information on all elements of the work, including plan views, sections, details, elevations, and call-outs. All drawings to be included in the final package are to be identified in the drawing list.

Ten paper copies and an electronic copy using AutoCAD Release 2002 and using the BES CADD Standard for the design drawings (11" x 17" format) are to be submitted to BES. Provide five (5) copies of full size 24" x 36" drawings. Cost of reproduction of the drawings is a reimbursable expense to BES. The drawing package will include:

- General Drawings
- Tunnel Plan and Profile Drawings
- Drawings showing Ground Improvement Measures for Tunnel Break-outs
- Structural Drawings for the tunnel lining and lining connections to the shafts
- Shaft Site Layout Drawings at up to 11 locations
- Shaft Excavation and Initial Ground Support Drawings showing structural details for the initial ground support systems
- Drop Structure and Access Shaft Drawings
- Shaft Structural Drawings
- Utility Relocation Drawings at shaft locations and for near surface pipelines
- Traffic Control Drawings for utility relocation and shaft construction
- Geotechnical Instrumentation Drawings
- Geotechnical Instrumentation Layouts along tunnel and pipeline alignments, and at shaft sites

- Erosion Control Drawings
- Pipeline Plan and Profile Drawings
- Microtunnel Shaft Location Drawings
- Pipeline Structural Drawings
- Appurtenant Structure Layout Drawings
- Appurtenant Structures Structural Drawings
- Standard Drawings
- Ground Remediation and Structure Protection Drawings
- Instrumentation and Controls Drawings
- Electrical and Mechanical Drawings

10.03.A	90% Design Drawings Submittal
10.03 B	Response to 90% plan review, using BES comment response form
10.03.C	90% Update to TM on Geotechnical Instrumentation Criteria and
	Implementation Plan

10.04 Final Design Drawings

PB will develop final design drawings that will include the disposition of comments received as a result of BES, TRC and interdisciplinary reviews of the 90% level design package. The drawings will contain detailed information on all elements of the work, including plan views, sections, details, elevations, and call-outs.

Ten paper copies and an electronic copy using AutoCAD Release 2002 and using the BES CADD Standard for the design drawings (11" x 17" format) are to be submitted to BES. Provide five (5) copies of full size 24" x 36" drawings. Cost of reproduction of the drawings is a reimbursable expense to BES. The drawing package will include:

- General Drawings
- Tunnel Plan and Profile Drawings
- Drawings showing Ground Improvement Measures for Tunnel Break-outs
- Structural Drawings for the tunnel lining and lining connections to the shafts
- Shaft Site Layout Drawings at up to 11 locations
- Shaft Excavation and Initial Ground Support Drawings showing structural details for the initial ground support systems
- Drop Structure and Access Shaft Drawings
- Shaft Structural Drawings
- Utility Relocation Drawings at shaft locations and for near surface pipelines
- Traffic Control Drawings for utility relocation and shaft construction
- Geotechnical Instrumentation Drawings
- Geotechnical Instrumentation Layouts along tunnel and pipeline alignments, and at shaft sites
- Erosion Control Drawings
- Pipeline Plan and Profile Drawings

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- Microtunnel Shaft Location Drawings
- Pipeline Structural Drawings
- Appurtenant Structure Layout Drawings
- Appurtenant Structures Structural Drawings
- Standard Drawings
- Ground Remediation and Structure Protection Drawings
- Instrumentation and Controls Drawings
- Electrical and Mechanical Drawings

10.04.A	Final Design Drawings Submittal
10.04.B	Response to 100% plan review, using BES comment response form
10.04.C	Final Update to TM on Geotechnical Instrumentation Criteria and Implementation Plan

10.05 Final Design Report

PB will prepare a Final Design Report describing:

- Design Criteria
- Design Assumptions
- Design Procedures

A draft of the Final Design Report will be submitted to BES as part of the 90% Design Drawings submittal. Following receipt of comments from BES the Final Design Report will be prepared and submitted to BES with the 100% Design Drawing submittal.

Ten paper copies and an electronic copy of the draft Final Design Report will be prepared and provided to BES. Ten paper copies and an electronic copy of the Final Design Report will also be prepared and provided to BES. Cost of reproduction of the drawings is a reimbursable expense to BES.

Deliverables:

- 10.05.A Draft Final Design Report
- 10.05 B Final Design Report and Response to draft review, using BES comment response form

Task 11 - Structure/Tunnel Interaction Studies

11.01 Task Management

11.01.01 Structure/Tunnel Interaction Studies Work Plan

PB will prepare a work plan for the Structure/Tunnel Interaction Studies. The work plan will be reviewed and approved by BES prior to proceeding.

11.01.02 Status and Coordination Meetings

PB will conduct status and coordination meetings between staff responsible for the Structure/Tunnel Interaction Studies. It is assumed that 10 meetings will be held over the course of final design.

Deliverables:

11.01.A	Draft Structure/Tunnel	Interaction	Studies	Work Plan
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- 11.01.B Final Structure/Tunnel Interaction Studies Work Plan
- 11.01.C-X Meeting Notes with "issues" list e-mailed to BES Task Manager.

11.02 Structure/Tunnel Interaction Studies

PB will identify structures along the alignment sensitive to settlement from tunnel and shaft construction. PB will screen the structures assess susceptibility to damage. It is anticipated that susceptibility to damage for the Hawthorne, Morrison, Steel Bridge, Broadway Bridge and Fremont Bridge can be assessed without carrying out detailed structural analyses as a result of the anticipated distance of the bridges from the tunnel or the structural nature of the bridges.

During final design, for the Ross Island and Burnside Bridges, and up to 3 ramp crossings for the Banfield Interchange, PB will perform pre-construction surveys of the bridge structures potentially within the zone of influence of tunneling to establish the as-built conditions for input into model studies. Using this information, PB will carry out analyses using codes such as GT STRUDL for structural analysis and FLAC for soil/structure interaction analyses of the bridge structures. The results of the analyses will be documented in TMs together with recommendations for mitigation of settlements, if needed.

Prior to beginning any bridge surveys or structural studies/assessments, PB will obtain approval from BES as to the approach to be used in the bridge assessments.

PB will perform pre-construction surveys for up to 6 buildings determined to be sensitive to project tunneling. PB will carry out analyses using codes such as GT STRUDL for structural analysis and FLAC for soil/structure interaction analyses of the buildings. The results of the analyses will be documented in a TM together with recommendations for mitigation of settlements, if needed.

In addition to the analyses specified above, up to twelve (12) additional GT STRUDL and FLAC analyses will be prepared for bridges, buildings, and utilities identified during final design.

Deliverables:

- 11.02.A Draft TM for Structural Analysis of Ross Island Bridge
- 11.02.B Final TM for Structural Analysis of Ross Island Bridge
- 11.02.C Draft TM for Structural Analysis of Burnside Bridge

11.02.D	Final TM for Structural Analysis of Burnside Bridge
11.02.E	Draft TM for Structural Analysis of Banfield Interchange Ramps
11.02.F	Final TM for Structural Analysis of Banfield Interchange Ramps
11.02.G	Draft TM for Structural Analysis of Simple Bridge Structures
11.02.H	Final TM for Structural Analysis of Simple Bridge Structures
11.02.I	Draft TM for Structural Analyses of Buildings
11.02.J	Final TM for Structural Analyses of Buildings

Task 12 - Technical Specifications

Objective: To prepare technical specifications for all construction packages planned for the East Side CSO Tunnel Project.

It is intended that PB will be responsible for Divisions 1 through 17 of the Project Specifications, as described below.

PB will prepare technical specifications using the CSI-format for the CM/GC design submittal package that are consistent with the design level for the ESCSO project facilities. BES will provide the General Conditions and Special Conditions (Div 0 and 1 of the CSI-formatted specs) previously used on the CSO Program, with any modifications desired. PB will review the General Conditions and Special Conditions (Div 0 and 1), updating these Sections to reflect the ESCSO Project, and identifying areas where conflicts between the Technical Specifications (Div 2 through 17) and the general specifications may exist. PB will include the recommended modifications to Div 0 and Div 1 Sections for BES consideration with the Draft Technical Specifications as part of the overall review of the Technical Specifications submittals.

12.01 Task Management

PB will prepare a work plan for managing and tracking specification changes. Following approval of the work plan by BES, PB will implement the plan. The plan will be presented at a workshop to explain process, discuss, and inform of roles and responsibilities (estimated at 1 hr).

PB will provide technical specifications in electronic and hard copy forms to BES at the 60%, 90% and 100% design completion levels. At the 90% and 100% design completion levels, electronic versions will be provided that indicate marked changes from the previous version.

On a monthly basis, PB will provide documentation of specification meetings and of change tracking. PB will track specification changes for consolidating piping and utility relocations separately from those for the tunnel and shafts in order that separate Contract Packages could be developed for construction of the pipelines and/or utility relocations.

Deliverables:

12.01.A	Work plan for managing and tracking specification changes & workshop
	notes (5 copies)
12.01.B	Electronic Version of 90% Specifications identifying changes from 60%
	suomittai
12.01.C	Electronic Version of final (100%) Specifications identifying changes
	from 90% submittal
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12.01.D-X Meeting Notes documenting specification meetings and change tracking

12.02 60% Technical Specifications

PB will develop 60% level technical specifications.

Deliverables:

12.02.A Draft 60% Specifications (5 copies)

12.03 90% Technical Specifications

Following the submittal of the 60% Specifications, PB will develop 90% level technical specifications to include responses to comments from BES, the TRC and interdisciplinary reviews.

Deliverables:

12.03.A Draft 90% Specifications (5 copies)

12.04 Final Technical Specifications

Following the submittal of the 90% Specifications, PB will develop final technical specifications that will incorporate all responses to comments from BES, the TRC and interdisciplinary reviews. A copy of all Standard Reference Specifications (ASTM, AWWA, etc.) used in the preparation of the Technical Specifications shall be provided to BES.

Deliverables:

12.04.A	Draft 100% Technical Specifications (5 copies)
12.04.B	Final 100% Technical Specifications (5 copies)

12.04.C Standard Reference Specifications (5 copies)

Task 13 – Construction Cost Estimate and Schedule

13.01 Task Management

13.01.01 Construction Cost Estimate and Schedule Work Plan

PB will prepare a work plan for the Construction Cost Estimate and Schedule. The work plan will be reviewed and approved by BES prior to proceeding.

13.01.02 Status and Coordination Meetings

PB will conduct status and coordination meetings between staff responsible for the Construction Cost Estimate and Schedule. It is assumed that 10 meetings will be held over the course of final design.

13.01.03 Project Controls

PB will track and provide written notification of deviation from current/existing schedule or budget based on BES or PB decisions, design or otherwise. A log of such design changes, their cost and schedule implications, and reason for implementation shall be maintained and submitted to BES at 60%, 90%, and 100% design completion.

Deliverables:

13.01.A	Draft Construction Cost Estimate and Schedule Work Plan
13.01.B	Final Construction Cost Estimate and Schedule Work Plan
13.01.C-X	Meeting Notes with "issues" list e-mailed to BES Task Manager.
13.01.D	Design Change Log at 60%
13.01.E	Design Change Log at 90%
13.01.F	Design Change Log at 100%

13.02 60% Construction Cost Estimate

PB will prepare a detailed cost estimate of the tunnel shafts and appurtenant structures using the 60% design drawings and specifications, and incorporating comments from the 30% design drawings. The 60% design Complete Estimate will be estimated to a level of accuracy of +10%, -5% and will address the following in terms of 2004 costs (escalation will not be included):

- Breakdown of labor, equipment and material costs
- Criteria for assumptions
- List of all assumptions, clarifications, items included and excluded
- Allowances
- Area cost factors and cost data sources
- Contingencies

Deliverables:

13.02.A 60% Construction Cost Estimate (5 copies)

13.03 90% Construction Cost Estimate

PB will prepare a detailed cost estimate of the tunnel shafts and appurtenant structures using the 90% design drawings and specifications, and incorporating comments from the 60% design drawings. The 90% design Complete Estimate will be estimated to a level of accuracy of +10%, -5% and will address the following in terms of 2004 costs (escalation will not be included):

- Breakdown of labor, equipment and material costs
- Criteria for assumptions
- List of all assumptions, clarifications, items included and excluded
- Allowances
- Area cost factors and cost data sources
- Contingencies

Deliverables:

13.03.A 90% Construction Cost Estimate.

13.04 Final Construction Cost Estimate

PB will prepare a detailed cost estimate of the tunnel shafts and appurtenant structures using the Final design drawings and specifications, and incorporating comments from the 90% design drawings. The Final design Complete Estimate will be estimated to a level of accuracy of +10%, -5% and will address the following in terms of 2004 costs (escalation will not be included):

- Breakdown of labor, equipment and material costs
- Criteria for assumptions
- List of all assumptions, clarifications, items included and excluded
- Allowances
- Area cost factors and cost data sources
- Contingencies

Deliverables:

13.04.A Final Construction Cost Estimate.

13.05 Construction Schedule

PB will prepare a draft construction schedule (based on the 60% project drawings and specifications) using Primavera Project Planner (P3) with anticipated activities and interface points defined. The schedule will identify:

- Construction package integration
- Construction staging and sequencing
- Interfaces with other projects
- Major construction activities

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- TBM fabrication
- Tunnel lining system fabrication
- Major contractor submittals affecting project delivery
- Turnover milestones

The construction schedule will be cost loaded to provide a draft cash flow curve and histogram of monthly expenditures.

The final schedule submittal (based on the 90% project drawings and specifications) will include a milestone summary schedule that reflects turnover dates, constraints and interfaces with other projects. The final Construction Schedule will incorporate comments received on the draft Construction Schedule.

Deliverables:

13.05.A	Draft Construction Schedule
13.05.B	Final Construction Schedule

Task 14B – Design Reviews and Workshops

Objective: To provide support for value engineering workshop and technical QC reviews of the design. The technical review workshops (TRC) will be undertaken using independent, senior staff familiar with BES standards and CSO tunnel design.

A separate Work Plan will not be prepared for this task. However, procedures and schedule for design reviews and workshops will be included in the Work Plan for Task 10.

Deliverables:

14B.01.A-X Presentation Materials.

14B.01 Technical Review at 60% Completion Level

At the 60% Design Completion Level, PB will conduct a 3-day technical review workshop with its Technical Review Committee. The technical review will concentrate on issues related to constructability, biddability, maintainability, construction safety, mitigation of construction impacts, identification of major issues needing further study and issues that may help to reduce construction costs, risks, impacts, duration and/or minimize construction change orders and claims. The TRC discussions will be summarized and incorporated into the draft Final Design Report with a separate compilation of the identified risk and risk mitigation procedures included for final design action. The review workshop will be held two weeks before the 60% design is submitted to BES.

14B.01.A	Presentation Data Package and Presentation Material for TRC Review at
	60% Design Completion Level.

14B.01.B Minutes of 60% TRC Meeting and issue/resolution tracking sheet

14B.02 Technical Review at 90% Completion Level

At the 90% Design Completion Level, PB will conduct a 3-day technical review workshop with its Technical Review Committee. The technical review will concentrate on issues related to constructability, biddability, maintainability, construction safety, mitigation of construction impacts, identification of major issues needing further study and issues that may help to reduce construction costs, risks, impacts, duration and/or minimize construction change orders and claims. The TRC discussions will be summarized and incorporated into the Final Design Report with a separate compilation of the identified risk and risk mitigation procedures included for final design action. The review workshop will be held two weeks before the 90% design is submitted to BES.

Deliverables:

14B.02.A	Presentation Data Package and Presentation Material for TRC Reviews at
	90% Design Completion Level.
14B.02.B	Minutes of 90% TRC Meeting and issue/resolution tracking sheet

14B.03 Decision Committee Workshop Presentations

PB will prepare data packages, presentation materials and give presentations at up to 50 decision committee workshops.

Deliverables:

14B.03.A-X Data Package for Decision Committee Workshops.

14B.04 Attend BES Review Meetings

PB will attend up to 10 BES review meetings and respond to BES comments. PB will document the comments presented by BES.

Deliverables:

14B.04.A-X Documentation of BES Comments.

14B.05 Responses to BES 60% and 90% Comments

PB will prepare a log of comments from BES, and TRC workshops and prepare written responses.

14B.05.A-X Documentation of Comment Responses.

14B.06 Risk Assessment Workshops

PB will conduct two (2) risk management workshops with BES and the selected Contractor to identify construction risks and address mitigation measures. The risk analyses are carried out for the following purposes:

- To assess the relative risks of the different system components and construction schemes.
- To assess the risk of disruptive events during construction that could result in added cost or delay or destruction of the works using Monte Carlo simulation techniques.
- To develop design parameters that will result in mitigating or eliminating certain identified risks.
- To develop specifications and safety requirements to be embodied into the construction contracts.
- To provide information on operational risk parameters.

The risk assessment workshops will be carried out during the 90% design phase. One risk assessment workshop will be informal and include representatives from BES, the design team, and the Contractor. The other risk assessment workshop will be formal and also include representatives from BES, the design team and the Contractor.

Deliverables:

14B.06.A	TM documenting the initial Risk Management Workshop (5 copies)
14B.06.B	TM documenting the final Risk Management Workshop (5 copies)

14B.07 Meetings With Contractors

PB will conduct up to 20 meetings with the selected contractor and BES to progress the design and incorporate contractor's comments. PB will carry out a Constructability Workshop with the contractor to identify constructability issues.

Deliverables

14.B.07A-X Meeting Notes.

Task 15 - RFP Preparation and Assistance

15.01 Prepare Pre-Qualification Documents

PB will assist BES in preparing pre-qualification documents.

15.02 Evaluate Pre-Qualification

PB will assist BES to evaluate the pre-qualification documents submitted by interested contractors and prepare recommendations.

Deliverables:

15.02.A Pre-Qualification Summaries and Recommendations

15.03 RFP Preparation and Addendum

PB will assist BES in the preparation of addenda to the RFP documents based on questions from contractors. Efforts will be made to keep these to a minimum.

15.04 Prepare and Attend Pre-RFP Meeting

PB will attend the pre-RFP meeting and assist with preparing responses to questions. PB will also prepare minutes of the meeting.

Deliverables:

15.04.A Meeting Minutes

15.05 Response to Contractor Clarifications

PB will assist BES prepare written responses to contractor questions.

15.06 Assist with RFP Evaluation

When the proposals are received and opened, PB will assist BES in evaluating the proposals, produce proposal summaries and recommendations on selection and disqualification.

Deliverables:

15.06.A RFP Summaries and Recommendations

Task 16 - Coordination Activities

PB will not provide a separate work plan for this task. The work plan and staff meetings for Task 16 will be included within Task 10 as the primary emphasis of Task 16 is design of utility relocations and associated potholing requirements.

16.01 Third Party Coordination

16.01.01 Current Status Presentations

PB will coordinate up to three "current status" presentations to utility agencies, City bureaus, etc. PB will provide Powerpoint presentation, visual aids, and one to two people

to present at meetings ≈ 1.5 hours each. The three (3) meetings will correspond roughly to 60%, 90%, 100% design.

16.01.02 Utility Agency Meetings

PB will conduct specific meetings with the various utility agencies to coordinate relocation and protection requirements for the agencies utilities as needed to complete the project design. It is assumed that up to 30 meetings will be held to accomplish this task.

16.01.03 Utility Conflict Logs

PB will maintain a utility conflict log summarizing potential conflicts between existing utilities and the various project features. Log will include summary description of the affected utility, proposed mitigation measures, and disposition of measures. Formal submittal of log will occur at 60%, 90% and 100% project completion.

Deliverables:

ing Notes

16.02 Survey Coordination

16.02.01 Survey requests

The City will provide the actual survey services. BES will provide survey of shaft sites, existing utilities, pipeline routes, existing structures, etc. as needed by the tunnel design per requests submitted by PB.

- Maintain a set of horizontal and vertical control points to be used for field investigations and construction.
- Traversing a designated site and locating physical features such as curb lines, sidewalks, edges of asphalt, break lines, top and toes of banks, edges of water, buildings, underground utilities, surface features of vaults, and manholes, bridge piers, signs, miscellaneous structures, railroad tracks, trees, shrubs, landscaping, and sufficient ground shots to produce a 2-foot contour map.
- Providing a DXF or DWG file and ASCII file for all survey data.

Additional Survey services to be provided by the City consist of establishing property lines from located monuments for maps, and legal descriptions.

Additional survey requests, as they are determined, will be made to the BES Project Manager, as necessary.

16.02.A-X Written Requests for Surveys

16.03 Potholing

PB will develop a plan for potholing existing utilities. Included in the plan will be a prioritization of utilities to be potholed, schedule, and a determination of who will be responsible for conducting the potholing activities: BES, as part of a potholing contract; utility owners; or the ESCSO Contractor. Following preparation of the potholing plan, PB will provide input to BES in the preparation of a Potholing Request for Proposals (RFP) to be used for those potholes determined to be the responsibility of BES. Input will include a map showing the requested pothole location and a listing of information to be gathered for the specific utility during the potholing effort. BES will also be responsible for publishing the RFP, selection of a contractor, and administering the Potholing Contract.

PB will be responsible for distribution and incorporation of the final potholing information developed.

PB will also be responsible for coordinating and distributing potholing information gathered by responsible utility agencies.

It is anticipated that the potholing contract will be performed in three batches of 10-16 utility locates each.

Deliverables:

16.03.A	Draft Potholing Plan (5 copies)
16.03.B	Final Potholing Plan (5 copies)
16.03.E	Draft Report on Results of Potholing Activities (5 copies) Listing
	potholes, dates, results, summaries
16.03.F	Final Report on Results of Potholing Activities (5 copies) Listing
	potholes, dates, results, summaries

Task 17B - Public Involvement / Community Benefit Opportunities (CBOs)

Objective: To support BES in developing and implementing a public involvement program that encourages community interest, understanding, and support of this project.

17B.01 Community Support Activities

17B.01.01 Develop a Final Design Public Involvement Plan

PB will work with BES staff to develop and implement a final design public involvement (PI) plan. The plan will outline PI activities, task leads, work products,

time lines and budget. The plan elements will be developed such that public involvement efforts will continue into the construction phase of the project. This Public Involvement Plan will incorporate the elements of a Task Management Plan for Task 17B by including management elements in timelines and activities and recorded task management meeting notes. PB will attend twelve (12) bi-monthly or monthly PI team meetings and will present tracked progress of the team's PIP.

17B.01.02 Database

PB will prepare and provide the stakeholder database(s) to BES in Excel format.

17B.01.03 Prepare Public Update and Public Meeting Mailers

PB will prepare graphics for two (2) project information mailers within project area (expected to be at the 60% and 90% design points). Graphics will be submitted to BES for final layout, production, and distribution.

17B.01.04 Prepare Small Group Presentations

PB will develop presentation materials for and schedule up to thirty (30) small group community presentations. The presentations will be targeted to project area's neighborhood and business associations. PB will develop the schedule and provide a location (if needed), at least thirty (30) calendar days prior to each meeting. A minimum of one PB public involvement person will be present at each of the thirty (30) meetings. One additional PB technical person will attend the small group community presentations, as requested, up to fifteen (15).

PB will prepare presentation materials, develop and update speaker materials, provide technical support, and provide updates to project progress. Presentation materials for meetings will typically consist of PowerPoint presentations and display boards containing such items as subsurface geology, aerial views of alignments, shaft locations, etc. All presentation materials will be reviewed and approved by BES.

Out-of-office expenses, such as mounted display boards, meeting room rental, refreshments, meeting handouts, or other presentation materials, will be reimbursable expenses with pre-approval and receipts.

17B.01.05 Site Visits

PB will organize and develop draft and final materials for site visits that will be conducted by PB and BES to provide an opportunity to hear concerns and to develop project support. Site visits will be done with impacted and interested parties along the final construction route and within the project area that will have visible construction activities. A maximum of 100 site visits are anticipated along the tunnel alignment, PB will conduct up to 40 of those site visits. PB will develop site visit tracking forms and provide a summary report listing all concerns that will be entered into the project database. PB will provide one public involvement person to attend the PB conducted site visits (up to the 40 site visit limit).

17B.01.06 CAD Assistance

PB will provide supporting CAD assistance to develop aerial maps of alignment and shaft locations. This support will primarily compose of supplying design details/elements needed by BES to create PI maps including geologic profiles.

These maps can include the associated geology of the alignment or shaft, as needed. PB will produce up to two (2) revised and iterative finished maps of alignment. PB will also produce one each of each shaft location (total of nine (9)).

17B.01.07 Public Meetings

PB will assist with compiling a mailing list and locating, planning, publicizing, and conducting a total of six (6) public meetings: three (3) meetings to correspond to the 60% design and three (3) meetings to correspond to the 90% design. The meetings will be held in central locations. PB will provide task representatives to attend and address technical questions and concerns, note public comments and meeting events, and summarize the meetings into a report. Meeting refreshments will be arranged by PB.

It is assumed that technical personnel will be provided jointly by BES and PB to address issues raised at the Public Meetings. It is assumed that three (3) technical personnel will be present at each of the six public meetings for a total of eighteen (18) meeting commitments. BES and PB will each provide for nine (9) of these technical personnel meeting commitments.

Out-of-office expenses, such as mounted display boards, meeting room rental, refreshments, meeting handouts, or other presentation materials, will be reimbursable expenses with pre-approval and receipts.

Deliverables:

- 17B.01.A Draft Final Design Public Involvement Plan
 17B.01.B Final Design Public Involvement Plan including section for on-going task management meeting notes
- 17B.01.C Stakeholder Database
- 17B.01.D Graphics for Project Information and Public Meeting Mailer #1
- 17B.01.E Graphics for Project Information and Public Meeting Mailer #2
- 17B.01.F-X Small Group Presentation Materials
- 17B.01.G-X Meeting Notes from Small Group Meeting as needed
- 17B.01.H-X Summary Report of Site Visits
- 17B.01.I-X Maps Four final iterations and two each of each shaft location
- 17B.01.J-X Public Meetings Summary Report

17B.02 CBO

PB will provide 2 representatives (from JLA and Greenworks) at all CBO workshops and Advisory Committee meetings.

17B.02.01 Preliminary CBO Initiation

The Community Benefit Opportunities (CBO) Program will be integrated into the project to collect, evaluate, and plan the implementation of project area improvements desired by the area residents and businesses. During final design, PB will assist to identify criteria for targeting, recruiting, reviewing, and screening of conceptual CBO to be refined and selected for implementation.

- PB will assist BES in determining and recruiting the membership of the CBO Advisory Committee.
- PB will assist to organize, attend and participate in CBO Criteria Development Workshop to develop the criteria for the targeting, recruiting, reviewing, and initial screening of CBO nominations. BES will provide location, committee members, and agenda.

17B.02.02 CBO Work During Design

During final design, PB will assist BES to identify, seek, and rate public nominations of conceptual CBO, develop threshold criteria filter chart, attend meetings, prepare cost estimates, displays, and visual information on CBO, as well as select and confirm the featured CBO.

17B.02.02.A CBO Nominations

- BES will obtain community plans for all affected neighborhoods; and PB will assist to review and identify ideas that may be a consideration for CBO nominations. A report will be provided to BES. The report will compile opportunities, constraints, and correlations between the community plans, zoning requirements and possible elements or areas within CBO nominations such as river access, tree plantings, parks and open space, community gardens, vegetation objectives, curb improvements, etc.
- PB will assist BES to develop CBO nomination forms; BES will distribute them. Members of PB and BES will discuss available opportunities as part of other work activities.
- PB will schedule up to 10 meetings with community organizations for discussion and distribution of nomination forms. PB may be required to provide one public involvement person to attend the community organization meetings, as directed by BES.

• PB will assist in compiling the initial CBO nominations, determining the "fatally flawed" nominations (i.e., duplicates, runs, etc.) during a work session with BES, and then they will prepare a memorandum with the nomination inventory. The inventory will list the categories of initial CBO with any particular opportunities that have been identified. This would include categorizing the nominations received by type of project, as well as identifying by location on a map. PB will produce a TM listing CBOs by categories, known opportunities, and providing location map(s).

17B.02.02B CSO Advisory Committee Assistance

- PB will attend a work session with BES to determine initial criteria for CBO selections.
- PB will assist BES with the kick-off CBO Advisory Committee meeting (CBOAC#1), in which BES will present the "fatally flawed" nominations, and seek concurrence with the Advisory Committee.
- PB will assist in the development of the threshold criteria filter chart that shows which criteria have been met per remaining nominated projects, etc. This will be accomplished during a 2 hour work session with BES.
- PB will attend 8-hour work session with BES to narrow the remaining list of CBO nominations down to a maximum of 40.
- PB will attend a CBO Advisory Committee Meeting (CBOAC#2) to seek concurrence.
- PB will provide a planning level cost estimate for each of the 40 nominations.
- PB will attend the CBO Advisory Committee Meeting (CBOAC #3), expected to be a 3-hour meeting, to narrow the projects from a maximum of 40 to a maximum of 15.
- PB will assist BES to develop a second round of questions for the final round of 15 CBO semi-finalists .
- PB will provide updated cost estimates for each of the maximum of 15 nominated projects.
- PB will assist BES to prepare for a public meeting with visual displays, etc. BES will schedule location, time, and staff for this public forum (such as open house or other type of gathering). PB will provide one public involvement staff person to attend the public meeting.
- PB will attend CBO Advisory Committee Meeting (CBOAC #4), expected to be a 3-hour meeting, to narrow the potential projects to a maximum of 10 final projects.

17B.02.02.C Development and Presentation of Final CBO Projects

• PB will review and comment on Final Report provided by BES.

Memorandum of summary of findings after reviewing neighborhood
community plans.
Guidelines for CBO nominations and forms.
Threshold Criteria Filter Chart, including meeting summary for threshold
criteria work session.
Planning-level cost estimates of up to 40 CBO site/projects.
Site-specific cost estimates for up to 15 semi-finalist CBO sites/projects,
plus the second round of questionnaires.
Update cost estimates for a maximum of 10 final CBO site/projects
Written Review Comments on Final Report prepared by BES

Task 18B - Project Management

Objective: To build a team with the client and subconsultants, to establish achievable goals for the project and for each Task Leader, and to provide them with the tools needed to accomplish – on schedule and within budget – the tasks outlined in the Scope of Work.

18B.01 Update Project Management Plan

PB will update the Project Management (PM) Plan at the beginning of final design to include final design. Thereafter, updates will be made as changes occur. The PM Plan outlines the procedures and controls that will be employed to complete the project. The Project Management Plan is to outline:

- Scope of Work
- Total project schedule, forecast, and updated monthly
- Total project budget, forecast, and updated monthly
- Project coordination procedures
- Invoicing and billing procedures
- File documentation procedures
- Quality Assurance and Control procedures
- Communication reporting
- Change management procedures
- Project monitoring procedures
- Decision making protocol
- Total project cost control procedures
- Constructware use

Copies of the Project Management Plan will be distributed to BES and members of PB design team.

Deliverables:

18B.01.A	Update to Project Management Plan (8 copies)	
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18B.01.B Update to Work Breakdown Structure (8 copies)

18B.01.C-X Periodic Revisions to Project Management Plan

18B.02 Project Coordination

The Project Manager will coordinate all project work. The PM will coordinate work with BES, maintain project records and files, review work for completeness, look at ways to start work elements early, develop recovery plans if work elements fall behind schedule, coordinate work between PB's subconsultants, and oversee the mentoring of M/W/ESB firms. PB will review management information; progress reports and project needs, and provide management actions needed to maintain budgets and schedules, as well as maintaining quality control of the deliverables. Under this task, PB is to prepare the scope of services to meet BES requirements, prepare and complete subconsultant agreements, coordinate, review, and administer all work by sub-consultants. PB will utilize Constructware (a web-based project management system) for tracking and storing all deliverables and significant documents generated as part of the project design. PB will maintain a hard copy record of the project documents according to the established File Indexing List.

18B.02.01 Team Meetings

PB is to hold weekly coordination meeting with the BES Project Manager, and the joint team leads to discuss and coordinate project activities, work progress, budget and schedule compliance, project issues, past tasks, and planning for future tasks and work issues. PB will keep and provide a weekly "Outstanding issues" list. PB will establish meeting agenda and prepare minutes of the meeting; summarizing issues discussed; actions items established and responsible parties for resolution of outstanding issues; and any deviation from anticipated budgets or schedule dates.

Large Team Meetings will be held quarterly to provide an update to all team personnel.

18B.02.02 Coordination with other CSO Projects

As requested by the BES Project Manager, PB's Project Manager (or designated representative) will attend and participate in BES coordination meetings with other CSO projects.

18B.02.03 QA/QC Reviews

Quality control of project deliverables is to be the responsibility of each task leader and overseen by the Project Manager. An internal QA audit will be held at the completion of the 90% and 100% Design Packages. All QA/QC will be in accordance with PB's procedures and the BES Quality Manual.

Deliverables:

18B.02.A	Final Scope of Services as in BES Contract
18B.02.B-X	Copies of Subconsultant Agreements.

- 18B.02.C-X Weekly "outstanding issues" list.
- 18B.02.D-X Minutes of Meetings with other CSO Projects.
- 18B.02.E Documentation on 90% QA/QC process
- 18B.02.F Documentation on 100% QA/QC process
- 18B.02.G-X QA/QC Signoff Sheet for each major deliverable. Major deliverables shall be determined by the BES and PB Project Managers and documented in the Updated Project Management Plan.

18B.03 Progress Reporting and Invoicing

18B.03.01 Prepare Monthly Progress Reports

PB will prepare a monthly progress report to be submitted by the 5th of each month. The report is to include an updated schedule reflecting hours spent-to-date, costs by task, earned value, estimates-to-completion, and breakdown of M/W/ESB participation. The monthly progress report will include: (1) an Executive Summary summarizing all work performed during the reporting period including work progress compared to scheduled progress as presented in the project schedule, budget plan and schedule performance, explanation of existing or anticipated budget or schedule and recommended corrective actions, and critical project issues needing resolution; (2) a Summary of Work by Sub-task describing work performed during the reporting period and the firm(s) that incurred associated costs; (3) an updated status of deliverables listing all deliverables of the contract with original target submittal dates and the actual or projected submittal dates of draft and final deliverables.

PB will update the project schedule using Primavera software. The project schedule with charts is to be included with the monthly progress reports.

18B.03.02 Prepare Monthly Invoices

PB will prepare monthly invoices to be submitted by the 5th of each month. The report will include hours spend-to-date by persons by task, direct expenses, and mark-up. *Deliverables:*

- 18B.03.A-X Monthly Progress Reports. (3 copies)18B.03.B-X Monthly Invoices. (3 copies)
- 18B.03.C-X Update on status of M/W/ESB firms

18B.04 M/W/ESB Coordination.

PB will use Mr. Rosholt (GSA) to meet with each of the M/W/ESB business owners to determine how they might increase capability and expand capacity through working with members of the PB team. This will include participation, where appropriate, in training programs conducted by the larger team members as part of their respective internal employee development programs. These could include marketing, safety, project management and human resource administration. There would be no charge to the M/W/ESB firms for this training. Mr. Rosholt will also work with BES's Harvey Lockett

to coordinate the East Side M/W/ESB program with the other City of Portland Development Programs.

Task 19Construction Support _NIC

Review of Contractor Submittals and Shop Drawings – PB will review the contractor submittals and shop drawings for compliance with the design documents and prepare written clarifications/responses to contractor submittals as needed.

On-site Support – PB will provide construction support and produce conforming documents. This can be modified to office support based on the stage of construction and problems being encountered.

Public Involvement Activities – PB will continue with Public Involvement activities during the construction phase of the project.