DESIGN STANDARDS FOR: SANITARY SEWER SYSTEMS

NOTES TO THE CONSULTANT:

The attached Design Standards represent the minimum acceptable practices for the design and construction of Sanitary Sewer Systems on Seattle Parks and Recreation (SPR) properties. The consultant shall not add, delete, or alter these Standards unless approved by the Engineer prior to its inclusion in the contract documents. These are practices only and not specifications. The Consultant shall expand these standards into the design and technical specifications, using the appropriate SPR Standard Details (listed below) and Section 33 30 00 of the SPR Standard Specifications. The Consultant also has the added responsibility to not only comply with these standards, but to also use sound professional judgment in exceeding them as may be dictated or warranted by the following:

A. Special conditions for each project and site
B. Environmental considerations and constraints
C. The integrity of the proposed design
D. The health, safety, and welfare of the general public, etc.

All standard details that are part of these Standards shall be used as shown (without any alterations) and shall be included in the Contract Documents and can be copied and included into the specification book if desired or as directed by the Engineer.

The Consultant shall show to the Engineer that relevant (to the particular project) Design Standards have been included into the Contract Documents.

1. GENERAL:

A. All sanitary sewer plans and related specifications shall be prepared by a registered Professional Civil Engineer (PE) and shall be stamped and sign by such.

B. All construction shall be in accordance with the SPR Standard Specifications and Standard Details (as listed below) and the City of Seattle (COS) Standard Plans and Specifications for Road, Bridge, and Municipal Construction (most recent edition).

C. All sanitary sewers shall be installed by a side sewer contractor registered with the City of Seattle's Department of Planning & Development (DPD).

D. For all sanitary sewers, all applicable permits shall be required by SPR and processed through DPD.

E. Park site plans shall be updated by the Consultant so as to accurately reflect the final "As Built" conditions of completed sewer projects, with dimensions, prior to acceptance of said plans by SPR.

F. SPR Standard Details and COS Standard Plans for Municipal Public Works Construction, (most recent edition) shall be used. Use SPR Standard Details from 33 44 16 thru 33 49 33 or the COS Standard Specifications for Road, Bridge, and Municipal Construction at (www.cityofseattle.gov/util/engineering/), if the SPR details do not cover the needed subject or the work is being done outside Park properties in the Street Rights of Way.

H. All structures and pipes shall be cleaned and free of all foreign materials prior to final acceptance of the project by SPR.

I. Cross section details of all sanitary sewer structures and profiles showing existing grades, any proposed grade changes, existing underground utilities, and proposed sewer lines shall be required when submitting design development phase drawings for review, and be part of all final drawings and documents.

J. These written Design Guidelines shall take precedence over all drawings.

2. LOCATION: Locate pipe a minimum of 30 inches from the existing or proposed building face to centerline of sewer.

3. COVERAGE - Provide the following:

A. The sanitary sewer shall be laid with a minimum of 18 inches of cover.

B. Exceptions include - 30 inches minimum coverage at property line and 5 feet minimum coverage at the curb.

4. PIPE SPECIFICATION:

A. Gravity Flow - Gravity flow sanitary sewers on SPR property shall be a minimum of 6 inches diameter pipe with a minimum 2 percent grade and a maximum 100 percent grade (45degrees).

B. Gravity Flow:

1. General - PVC Schedule 3034 or better (rubber gasketed).
2. Paved areas -- Use Schedule 40 or Class 900 PVC.
3. Concrete Pipe - All pipes 12 inches diameter and greater shall be reinforced concrete pipes.

C. Forced Main - Pipe and installation shall conform to pump manufacturer's recommended specifications (4-inch diameter minimum). HDPE pipe or better shall be used.

D. Exception - If less than 18 inches of cover is required, use Ductile Iron Pipe (DIP), or Class 900 PVC as directed by the Engineer.

E. All pipes shall have rubber gasket type joints, or glued joints.

F. Pipe Diameter Changes: Adaptors - Provide 4 inch to 6 inch eccentric adapter at soil pipe to side sewer.

5. EXCAVATIONS AND PREPARATION OF TRENCH: All excavations over 4 feet deep shall be in conformance with WISHA shoring regulations and COS Standard Specifications (most recent edition).

6. DE-WATERING:

A. The control of ground water shall be such that softening of the bottom of excavations or formations of “quick” conditions or “boils during excavation shall be prevented. Dewatering systems shall be designed and operated so as to prevent removal of the natural soils.

B. During excavation and installation of pipelines, and placement of trench backfill, excavations shall be kept free of water. The Contractor shall control surface run-off so as to prevent entry or collection of water in the excavations. The static water level shall be drawn down a minimum of 1 foot below the bottom of the excavation so as to maintain the undisturbed state of the foundation soils and allow the placement of any fill or backfill to the required density. The de-watering system shall be installed and operated so that the ground water level outside the excavation is not reduced to the extent that would damage or endanger adjacent structures or property. All costs associated with dewatering the trench excavation and controlling groundwater shall be included in the lump sum bid and no separate additional payment will be made therefore, unless the Contract specifies otherwise. The Contractor is responsible for controlling groundwater.

C. Before de-watering is started, the Contractor shall submit to the Engineer a statement of the method, installation and details of the de-watering system he/she proposes to use. Open and cased sumps shall not be used as primary de-watering for excavations deeper than 3 feet below the static water table.

D. The Contractor shall comply with State of Washington Department of Ecology (DOE) requirements for dewatering using Decant Tank or meet or exceed the discharge criteria for turbidity.

7. PIPE BEDDING: Class "B" bedding shall be required for pipe bedding per following instructions:

A. Bedding shall comply with COS Standard Specifications (most recent edition).

B. For bedding of PVC pipe, see COS Standard Specifications (most recent edition).

C. Refer to City of Seattle Standard Specifications (most recent edition), or SPR Standard Specifications Section 32 11 23 - Mineral Aggregates for aggregate sizing.

8. SURVEY LINE AND GRADE:

A. This section shall comply with COS Standard Specifications (most recent edition).

B. Grade shall be accomplished by utilizing equipment with slope and depth control, such as a "Laser Plane Control System," or other methods as approved by the Engineer, so as to insure accuracy in the laying of the pipe.

9. PIPE LAYING:

A. Pipe laying shall comply with COS Standard Specifications (most recent edition).

B. All sewer lines shall be designed and installed with a minimum of bends.

C. No 90 degree bends or tees shall be allowed in any sewer.

D. Lay pipes in a straight line between bends. Make all changes in grade or line with an 11-1/4 degree bend, a 22-1/2 degree bend, or a 45-degree bend or wye (or combination thereof as directed by the Engineer). When laying pipe around a 90-degree corner, a maintenance hole shall be required as a clean out.

10. CLEAN OUTS: All clean outs (C/O) shall be stubbed to any finish grade with a poured in place concrete enclosure and the appropriate grate per COS Standard Plan No. 280 with hex head stainless steel bolts. Provide a locking cover.

11. MAINTENANCE HOLES. FRAMES, COVERS AND ADAPTORS:

A. Maintenance Holes:

1. All sanitary sewers shall have a maintenance hole for access, set on angle point or in line, minimum 30 feet from the building as a maintenance requirement. Note: The run from the building to the first maintenance hole shall be a straight line.

2. Maintenance holes shall be pre-cast maintenance holes with rubber gaskets (or saddle maintenance holes where pre-cast cannot be used). Maintenance holes should be no further apart than 200 lineal feet.

3. Maintenance Hole Installation:

(a) Place the base section on the prepared bedding so as to be fully and uniformly supported in true alignment, making sure that all entering pipes can be inserted on proper grade and alignment.

(b) All lift holes and all joints between pre-cast elements shall be thoroughly wetted and then be completely filled with mortar, smoothed and pointed both inside and outside; to ensure water-tightness with brushed finish.

(c) Pre-cast sections shall be placed and aligned to provide vertical sides and vertical alignment of the ladder runs.

(d) The Contractor shall construct structures of the type specified on the project drawings so as to provide adjustment space for setting frames and covers to a finished grade. Frame and cover shall be installed and adjusted in accordance with City of Seattle Standard Specifications (most recent edition).

4. Drop Maintenance Holes: Where a grade change exists, drop connections will be required where difference in incoming and outgoing invert elevations exceed 48 inches (see COS Standard Plan No. 233.1).

B. Maintenance Hole Channels: All maintenance holes shall have full and complete channels. Maintenance hole channels shall be made to conform accurately to the sewer grade and shall be brought together smoothly with well-rounded junctions, satisfactory to the Engineer. Channel sides shall be carried up vertically to the crown elevation of the various pipes, and the concrete shelf between channels shall be smoothly finished and warped evenly with slopes to drain.

C. Frame and Cover: All maintenance holes will have the round frame and round cover with cam lock as shown on COS Standard Plan No. 230.1 and the cover shall be lettered "SEWER."

D. Maintenance Hole Adapters: Maintenance Hole Adapters shall be used when grouting PVC lines into any maintenance hole.

12. JOINTING OF DISSIMILAR PIPE: The appropriate adjustable rubber coupling shall be used when connecting dissimilar pipe, see City of Seattle Standard Specifications (most recent edition).

A. Jointing of rigid dissimilar pipe shall require Romac, Caulder, or approved equal coupling.

B. Jointing of flexible pipe shall be accomplished with a sleeve.

13. JACKING AUGERING OR TUNNELING: Comply with City if Seattle Standard Specifications (most recent edition).

14. BACKFILLING: No sewer shall be back-filled until inspected by SPR (please contact SPR's Construction Manager at **(206-684-7034**) and DPD's Inspectors where applicable. Final acceptance shall be conditional upon approval by SPR's Facilities Maintenance Plumbing Shop, Sewer Crew staff **(206-684-7070**) and in conjunction with DPD's Inspectors. A signed copy of the witnessing inspector (Street Use Division) shall be supplied to SPR stating the results of the test. Back-filling shall be in accordance with City of Seattle Standard Specifications (most recent edition).

15. COMPACTION: Mechanical compaction shall be required to a density of 95 percent in both paved and unpaved areas. Comply with City of Seattle Standard Specifications (most recent edition).

16. CLEANING AND TESTING: Cleaning and testing shall comply with City of Seattle Standard Specifications (most recent edition).

END OF SECTION