

HIGH POINT PHASE II – ABATEMENT, DEMOLITION, GRADING AND INFRASTRUCTURE
SEATTLE, WASHINGTON
SECTION 33 40 00
STORM DRAINAGE SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes, but is not limited to:
1. Furnishing and installing catch basins, maintenance holes, cleanouts, storm drain pipes, culverts, fittings, service drains, storm drain structures, and related work and appurtenances as shown on the Contract Documents.
 2. Coordinating work with Seattle Department of Transportation (SDOT) and Seattle Public Utilities (SPU)
 3. Provide connections to existing public and private systems.
 4. Provide temporary connections and bypasses for public and private systems.
 5. Coordinating with the components of the Natural Storm Drainage System including but not limited to NDS Soil, PSD and SSD pipes, storm collection structures, grading of swales, porous pavement, landscaping and soil amendments.

1.2 REFERENCES

- A. Reference the following standards:

COS 2005	City of Seattle 2005 Standard Specifications for Road, Bridge and Municipal Construction and City of Seattle 2005 Standard Plans
WSDOT 2004	Washington State Department of Transportation 2004 Standard Specifications and Plans for Road, Bridge, and Municipal Construction.
WISHA	Revised Code of Washington (RCW) Chapter 49.17
WAC 296-155	Washington Administrative Code (WAC) 296-155 Standards for Construction Work
RCW Chapter 39.04.180	RCW Chapter 39.04.180 Public Works/Trench Excavations – Safety Systems Required

1.3 RELATED SECTIONS

- A. Coordinate related work specified in other parts of the Contract Documents, including but not limited to the following:

Section 31 00 00 - Earthwork
Section 31 05 10 - Natural Drainage System Soil Mix
Section 31 10 00 - Site Clearing

1.4 REGULATORY REQUIREMENTS

- A. Comply with all applicable Federal, State and Local codes and safety requirements. If there are any conflicts among reference standards, the more stringent requirements shall govern.

1.5 PERMITS

- A. Obtain and pay for Side Sewer permit, Street Use permit, and other permits as required in accordance with Section 01 41 00 - Regulatory Requirements.

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1.6 QUALIFICATIONS

- A. Install all public storm drains and storm service drains by a Side Sewer Contractor registered with the City of Seattle per Paragraph 1.7.D.
- B. HDPE Pipe Installers Training Course(s):
 - 1. Contractor's personnel crews managing, supervising, and/or installing HDPE pipe for the project shall attend a HDPE Pipe Manufacturer's installation training course (such as by ADS/ Hancor) at the project site prior to installation of HDPE pipe.
 - 2. Notify SPU's Resident Engineer and Owner's Representative two weeks prior to training course(s).
 - 3. Coordinate schedule of training course with SPU's Resident Engineer and Pipe Manufacturer.
 - 4. Contractor shall schedule additional training courses at the job site for new personnel if there are changes in personnel for the HDPE pipe installation crews.
 - 5. SPU Resident Engineer shall be present at the first training course scheduled by the Contractor and notified of subsequent training course(s) for new Contractor personnel.

1.7 DIMENSIONS AND LAYOUTS

- A. Furnish, set, and mark all line location stakes as described in Section 01 71 23. Assign a licensed surveyor for this work who will be on site at all times when work requiring control is being performed, together with all necessary equipment, supplies and instruments related thereto. This equipment and personnel must be available, at no additional cost to the Owner, for the purpose of verifying layout and certifying the accuracy of work on the site.
- B. Complete a review of all COS and SHA records relative to the existing underground utilities. Avoid damage to these facilities. Restore all active, damaged utilities at own expense.
- C. Notify the Owner's Representative immediately of underground utilities encountered, which are not shown on the Drawings or Owner's survey or record drawings.
- D. All public storm and storm service drains, including structures, shall be installed by a COS approved and registered side sewer contractor. Submit documentation to Owner's Representative verifying registration.

1.8 SUBMITTALS

- A. Submit the following in accordance with Section 01 33 00.
 - 1. Product data sheets and shop drawings for materials, including but not limited to pipe, catch basins, maintenance holes, inlets, culverts, and cleanouts.
 - 2. Documentation verifying registration of side sewer contractor with City of Seattle per paragraph 1.7.D of this Section.
 - 3. Documentation from HDPE Pipe Manufacturer listing the crew personnel who attended the HDPE Pipe Manufacturer's installation training course at the job site prior to starting installation of the HDPE pipe. Submit documentation to SPU Resident Engineer on site and Owner's Representative. If crew personnel changes over the duration of the project, new crews shall attend installation training course and submit documentation as noted.
 - 4. Copies of permits obtained per Paragraph 1.5 of this Section.

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PART 2 - PRODUCTS

2.1 MATERIALS

- A. Polyvinyl Chloride (PVC) Drain Pipe: conform to COS 2005 Section 9-05.3 with rubber gasket joints.
 - 1. Fittings shall be same material as pipe.
 - 2. Provide connections to catch basins and inlets with AC or GPK manhole adapter or an approved equivalent product. Portland cement joints on pipe are prohibited.
- B. Ductile Iron Pipe with restrained joints DIP (RJ): conform to COS 2005 Section 9-30.2(1).
 - 1. Conform restrained joints to COS 2005 Section 9-30.2(6).
 - 2. Use ductile or cast iron on fitting, meet the same requirements as the connecting pipe, and conform to COS 2005 Section 9-30.2(1). Saddles fastened to pipe with external bands shall not be acceptable on any new system.
- C. Ductile Iron Pipe without restrained joints (DI): conform to COS 2005 Section 9-05.2.
 - 1. Culverts: Culverts shall be Ductile Iron Pipe per ANSI Class 52 with push-on joints. Culvert inlet and outlet ends shall be beveled. Culvert outlet protection per plans
- D. Corrugated High Density Polyethylene (HDPE) Pipe: use dual walled with smooth interior pipe wall and corrugated exterior with watertight joints. Corrugated HDPE pipe 12" or greater in diameters shall conform to AASHTO M294 Type S and have minimum cell classification of 335400C, as defined in ASTM D3350. For HDPE Connections to MH use sand collar adapter.
- E. Slotted Storm Drain Pipe (SSD)
 - 1. Use PVC per ASTM D 1785, SCH 40 with solvent welded joints for all slotted subsurface drains and fittings.
 - 2. Slot the screen uniformly with slots placed perpendicular to the longitudinal axis of the pipe in straight rows. Make slots free from any sign of burning or abrasion. Use Farwest "Special Products Division" (1-800-438-3808) for pipe slotting or approved equal. Screen opening slot width shall be as shown on Drawings. Slot width tolerance shall be +0.005 to - 0.015 inches.
 - 3. Install pipe and screen true to line and grade and shall be free of cracks or defects. Clean the interior of the pipe of all dirt, excess water and other foreign material as the pipe laying progresses.
 - 4. Install slotted pipe so that the solid half faces down, unless noted otherwise. Locate slots in accordance with the Drawings.
 - 5. The storm drain pipe that connects SSD to maintenance holes and storm drain shall be the same as SSD except that the pipe shall have solid walls.
- F. Fittings Couplings and Joints
 - 1. Fittings shall be the same material as the pipe.
 - 2. Tees on existing pipe and new connections to maintenance holes shall be connected by core drilling and flexible connections. Use Inserta-Tee fittings for connections to existing pipes or an approved equivalent product.
 - 3. Pipe-to-pipe connections between pipes of differing material shall be made with a flexible, watertight gasketed coupling as manufactured by Romac, Caulder, or Fernco or approved equivalent product, unless noted otherwise.
 - 4. Tees on new pipe shall be prefabricated tees.
- G. Conductive warning tape: conform to Section 31 00 00 - Earthwork.
- H. Bedding: conform to Section 31 00 00 - Earthwork.
- I. Backfill: conform to Section 31 00 00 - Earthwork.

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- J. Cleanouts: conform to COS 2005 Section 7-19, except Paragraphs 7-19.4 and 7-19.5, and as shown on the Contract Documents.
- K. COS Concrete Maintenance Holes (MH) indicated on the Drawings shall conform to the COS 2005 Standard Plans and COS 2005 Section 7-05, except Paragraphs 7-05.4 and 7-05.5.
 - 1. Maintenance holes: use precast with rubber gaskets.
 - 2. Provide full and complete channels for MH w/o sumps.
 - 3. Provide sumps for MH per plans.
 - 4. Use Type 200 MH with Reinforced Base shown on Drawings for COS Type 200MH with cover greater than 20 feet and cover no more than 22 feet (from rim elevation to top of MH base section as noted on plans).
 - 5. Where designated on the Art plans, MH cover shall be per COS Standard Plan 230 and locking per COS Type 230L except imprint on lid shall be as shown on the Art Plans with “STORM” imprinted on cover.
- L. WSDOT Concrete Maintenance Holes (MH) indicated on the drawings shall conform to WSDOT 2004 Standard Plans and WSDOT 2004 Section 7-05.
 - 1. WSDOT Type 3 MH shown on Drawings shall conform to WSDOT Standard Plan B-23c.
 - 2. WSDOT Type 2 MH shown on Drawings shall conform to WSDOT Standard Plan B-23b.
 - 3. Maintenance holes: use precast with rubber gaskets.
 - 4. Provide full and complete channels for MH w/o sumps.
 - 5. Provide sumps for MH per plans.
 - 6. Where designated on the Art plans, MH cover shall be per COS Std Plan 230 and locking per COS Type 230L except imprint on lid shall be as shown on the Art Plans with “STORM” imprinted on cover.
- M. Catch basins: conform to the COS 2005 Standard Plans noted on the Drawings and COS 2005 Section 7-05, except Paragraphs 7-05.4 and 7-05.5.
 - 1. Install outlet traps per COS 2005 Section 9-12.12.
- N. Inlets: conform to COS 2005 Standard Plans as indicated on the Drawings and COS 2005 Section 7-05, except Paragraphs 7-05.4 and 7-05.5.
 - 1. Metal frame and grate: conform to COS and be as specified on the Drawings.
- O. Catch basin and maintenance hole ladders: conform to COS Standard Plans.
- P. See paragraph 2.1E.
- Q. Tightlined Storm Drain Pipe (TSD): same material as SSD pipe except pipe shall be solid wall without slots.
- R. Beehive Frame and Grates: as specified on Drawings.
- S. Coir Matting: as specified in Section 32 91 13 - Soil Preparation.
- T. Natural Drainage System Swales: as specified on Drawings.

PART 3 - EXECUTION

3.1 GENERAL

- A. Coordinate and schedule a HDPE Pipe Manufacturer’s installation training course at the job site with the Pipe Manufacturer, crews and SPU Resident Engineer prior to start of construction for storm drain pipe per Paragraph 1.6.B.
- B. Verify location of existing utilities in accordance with Section 31 10 00.

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- C. Make proper provisions to avoid interferences with installation of other work and/or other Contractors, prior to the construction. Make any changes caused by neglect to coordinate work as directed by the Owner's Representative and at no additional cost to the Owner.
- D. Compare storm drainage drawings and specifications with drawings and specifications of other trades and report any discrepancies between the documents to the Owner's Representative prior to beginning work.

3.2 TRENCHING AND PIPE INSTALLATION

- A. Excavation and preparation of the trench shall be in accordance with Sections 31 00 00 and 31 10 00. All trenching shall conform to the Washington Administrative Code (WAC) 296-155 and WISHA requirements for Excavation, Trenching and Shoring.
- B. Excavate trench and install pipe to alignments, elevations, grades and slopes indicated on the drawings.
- C. Excavate and prepare trench in accordance with Section 31 00 00. For work within the critical root zone, prepare trench in accordance with Paragraph 3.2.1.2 in Section 01 56 39.
- D. Install pipe in conformance with COS 2005 Section 7-17.3(2). True line and grade requirements will be enforced by Seattle Public Utilities (SPU) Inspection.
 - 1. City of Seattle requirements for HDPE Pipe:
 - a. HDPE pipe run (maintenance hole to maintenance hole) with sags between 0.4" to 0.5" occurring over more than 20% of the run will require correction and/or reinstallation. Multiple sags may occur within a run as long as the total length of all the sags does not exceed 20% of the run. Length of sag to be measured as shown in Detail 33 40 00 B at the end of this Section.
 - b. Sags exceeding 0.5" over any part of the HDPE pipe run (maintenance hole to maintenance hole) will require correction and/or reinstallation.
 - c. Depth and length of sag(s) to be determined by video inspection reviewed by SPU.
- E. Install conductive warning tape in accordance with Section 31 00 00.
- F. Install 2x4 studs at ends of service drains as shown on plans. Mark ends of wood stud with "STORM" in indelible markers as shown. Maintain and preserve marked studs. Record as-built invert elevation and location of all service drain stub ends on as-builts.

3.3 CATCH BASIN, MAINTENANCE HOLES AND STRUCTURE INSTALLATION

- A. Install catch basins, maintenance holes (MH) and structures in accordance with COS 2005 Section 7-05.3 and the Contract Documents.
- B. Adjust existing maintenance holes to remain in accordance with COS 2005 Section 7-05.3(1)P & 7-05.3(2).
- C. Rebuild existing maintenance holes in accordance with COS 2005 Section 7-05.3(1)U, including removal, rebuilding, and/or furnishing and installing maintenance hole sections to meet COS requirements.
- D. Adjust existing catch basins and inlets to remain in accordance with COS 2005 Section 7-05.3(2).

3.4 BEDDING AND BACKFILLING

- A. Place and compact bedding and backfill in conformance with Section 31 00 00.

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3.5 CLEANING AND TESTING

- A. Clean and test storm drain in conformance with COS 2005 Section 7-17.3(4).
1. Require the new storm drain system pass all tests required by the City of Seattle prior to final acceptance of the project. See paragraphs below for interim testing requirements and submittals as construction progresses.
 2. Replace service drains, public storm drain pipe, maintenance holes, and catch basin storm drains that do not pass all tests as directed by the Owner's Representative and at no additional cost to the Owner.
 3. Perform deflection test for flexible public storm drain pipe (PSD) (including but not limited to PVC, HDPE pipe) in accordance with COS Section 7-17.3(4)H.
 4. Perform television inspection and videotaping, and provide associated reports and video tapes
 - a. Videotaping:
 - 1) Submit an individual videotape cassette for each structure-to-structure pipe run.
 - 2) Sumps in MHs upstream and downstream of pipe run shall be filled with water to outlet pipe invert elevation prior to videotaping. During videotaping, no water shall be discharged into pipe run.
 - 3) City of Seattle requirements for HDPE pipe for PSD:
 - a) All videotapes shall be done with one-inch weighted ball suspended from a rod off the end of the camera.
 - b) The ball is to touch the bottom at the center of the pipe and will be used to measure the sag in the pipe based on the depth of ponding water in the pipe. Water with a ponding depth of half of an inch will be equivalent to 1/2" sag. The one-inch ball shall be marked at half of an inch around entire circumference of ball at midway point when the ball is suspended from the rod as shown in Detail 33 40 00 B at the end of this Section. Marks on the ball shall be visible during videotaping. If the ponding depth is over the 1/2" mark on the ball then it is determined to be equivalent to a sag greater than 1/2" .
 - c) Any pipe run (maintenance hole to maintenance hole) that is found to have a sag depth exceeding the half of an inch mark will be rejected by SPU and require correction at no additional cost to the Owner. See Detail 33 40 00 B at the end of this Section.
 - d) Any pipe run with sag(s) depth and length of sag(s) exceeding requirements noted in Paragraph 3.2 D of this Section will be rejected by SPU and require correction at no additional cost to the Owner. See Detail 33 40 00 B at the end of this Section.
 - b. First Submittal of Videotapes to SPU:
 - 1) SPU will require that all new storm drain pipe be videotaped and submitted directly to SPU Inspector for review within ten working days after placement of a pipe run and its service laterals between maintenance holes (MH) have been completed. If tapes are not received within thirty working days after placement of a pipe run and its service laterals between MHs Seattle Public Utilities reserves the right to shut down utility and paving construction within the right-of-way.
 - 2) Perform first complete videotape run upon installation of pipe but prior to abandoning bypass.
 - 3) Repair and/or replace pipe runs identified as nonconforming to the specifications and as directed by the Owner's Representative at no additional cost to the Owner. Once repairs are completed re-videotape pipe run and submit videotape to SPU for review and approval at no additional cost to the Owner.

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- 4) No paving shall occur over the new storm drain pipe until SPU has approved the testing and approved the first videotape inspection of the new storm drain pipe that is below the proposed paving.
- c. Pre-Project Closeout Videotape Inspection:
 - 1) Re-videotape storm drain pipes prior to project closeout to verify pipes are undamaged. Submit videotapes directly to SPU Inspector for review.
 - 2) Repair and/or replace pipe runs identified as nonconforming to the specifications and as directed by the Owner's Representative at no additional cost to the Owner. Once repairs are completed re-videotape pipe run and submit videotape to SPU for review and approval at no additional cost to the Owner. All restoration required for repairing or replacing pipe runs shall be at no additional cost to the Owner.

3.6 PERMANENT CONNECTIONS TO EXISTING MAINS

- A. Make permanent connections to existing storm drain systems where indicated on the Drawings.
- B. Replace existing pipe and/or add fittings and pipe as necessary here existing pipe is to be connected to a new structure to provide an approved connection per the Drawings.
- C. Rebuild structure where new pipe is to be connected to an existing structure as necessary to provide an approved connection per the Drawings. Rechannel the structure.

3.7 NATURAL DRAINAGE SYSTEM SWALES

- A. Install TESC and flow diversion measures prior to excavating NDS swales (conveyance and retention swales) and PSD, TSD, SSD utility trenches.
- B. Install Natural Drainage System swales in accordance with City Checklist noted in Section 01 41 50 and per details noted on plans. See Section 31 00 00 - Earthwork and Section 31 05 10 Natural Drainage System Soil Mix.
- C. If NDS Soil Mix for retention swales is not placed within 48 hours after installation of PSD, SSD and TSD, then construction stages for NDS retention swale sections (those swales with NDS Soil Mix #1 backfill) shall be per Detail 33 40 00 A at the end of this Section.

END OF SECTION 33 40 00