Appendix 1A

Design Checklist

# Introduction

This checklist shows the expected level of care and standard deliverables needed to produce a quality pipeline project. It may be useful for other types of SPU engineering design projects. The list is not exhaustive and is not intended to substitute for your engineering judgment. *Note: On many projects, deliverables listed during 30% design should have started earlier during preliminary engineering*.

The checklist is organized into six phases:

1. Scoping
2. 30% design
3. 60% design
4. 90% design
5. Bid documents
6. Construction

More detailed follow-up questions and lists are associated with most major checklist questions. Potentially useful contacts/links/documents are noted as Resource(s).

Minimum deliverables are shown in **red**.

Coordination points with physical security discipline are shown in **green**.

Coordination points with electrical design are shown in **brown**.

| **1 Scoping** | **Yes** | **N/A** | **Comments** |
| --- | --- | --- | --- |
| 1.1 Project History |  |  |  |
| Have you reviewed preliminary documents? |  |  |  |
| Service requests |  |  | Click or tap here to enter text. |
| PE Study |  |  | Click or tap here to enter text. |
| Design criteria sheet (criteria for physical security, electrical and I&C) |  |  | Click or tap here to enter text. |
| Business Case |  |  | Click or tap here to enter text. |
| Existing service agreements |  |  | Click or tap here to enter text. |
| Memorandums of Agreement |  |  | Click or tap here to enter text. |
| Budget |  |  | Click or tap here to enter text. |
| SEPA documentation |  |  | Click or tap here to enter text. |
| Easement documentation |  |  | Click or tap here to enter text. |
| Permit analysis and correspondence |  |  | Click or tap here to enter text. |
| 1.2 Objectives |  |  |  |
| Are project objectives clearly defined? |  |  | Click or tap here to enter text. |
| Have you discussed project with: |  |  | Click or tap here to enter text. |
| Your supervisor? |  |  | Click or tap here to enter text. |
| PM? |  |  | Click or tap here to enter text. |
| Project team? |  |  | Click or tap here to enter text. |
| Operations? |  |  | Click or tap here to enter text. |
| Security Program? |  |  | Click or tap here to enter text. |
| USM? |  |  | Click or tap here to enter text. |
| Other staff with historical knowledge of the project area? |  |  | Click or tap here to enter text. |
| Does the preferred alternative meet the objectives? |  |  | Click or tap here to enter text. |
| Would you recommend value engineering for this project? |  |  | Click or tap here to enter text. |
| 1.3 Schedule |  |  |  |
| Do you agree to the overall project schedule and staffing plan? |  |  | Click or tap here to enter text. |
| Is project team established? |  |  | Click or tap here to enter text. |
| Working days estimate for your time? |  |  | Click or tap here to enter text. |
| Working days estimate for your team? |  |  | Click or tap here to enter text. |
| Have you identified schedule conflicts for your supervisor? |  |  | Click or tap here to enter text. |
| Have you arranged access to secured sites? |  |  | Click or tap here to enter text. |
| 1.4 Site Visit |  | | |
| Have you made a site visit and photographic record checking for: |  |  |  |
| ROW Conditions: |  | | |
| What are street conditions? | Click or tap here to enter text. | | |
| Is it arterial or residential? Click or tap here to enter text. | | | |
| What is pavement type and condition? Click or tap here to enter text. | | | |
| What is the general pattern of concrete panels? Click or tap here to enter text. | | | |
| Is there reflective cracking in asphalt? Click or tap here to enter text. | | | |
| What is the pavement condition around castings? Click or tap here to enter text. | | | |
| Are there curbs and how high? |  |  | Click or tap here to enter text. |
| Are there sidewalks? |  |  | Click or tap here to enter text. |
| Are there curb ramps to current standard? | | | Click or tap here to enter text. |
| What is the channelization? | | | Click or tap here to enter text. |
| Are there traffic signals and signal boxes? |  |  | Click or tap here to enter text. |
| What are major street uses? |  |  |  |
| Traffic? Click or tap here to enter text. | | | |
| Bicycles? Click or tap here to enter text. | | | |
| Bus routes, bus loading zones, trolley wires? Click or tap here to enter text. | | | |
| What other miscellaneous uses are present: | | | |
| Overhead utilities? | | | |
| Underground utility vaults and castings? | | | |
| Signs? | | | |
| Fire hydrants? |  |  | Click or tap here to enter text. |
| Survey monuments? | | | |
| Trees? |  |  | Click or tap here to enter text. |
| Planting strip improvements? | | | |
| Irrigation? | | | |
| Private structures or improvements within ROW? Click or tap here to enter text. | | | |
| Mailboxes? | | | |
| Other critical infrastructure? Click or tap here to enter text. | | | |
| Utilities: |  |  |  |
| Have you identified castings? |  |  |  |
| Condition? Click or tap here to enter text. |  |  | Click or tap here to enter text. |
| Sewer and drainage castings less than 24” diameter? |  |  |  |
| Type of drainage grates? | | | Click or tap here to enter text. |
| Do utility cuts in pavement match utility mapping? |  |  |  |
| Local Drainage Patterns: |  |  |  |
| Is street crowned or thrown? Click or tap here to enter text. | | | |
| What is general topography, including street profile? Click or tap here to enter text. | | | |
| Are there inlets, CBs or ditches? Click or tap here to enter text. | | | |
| Is there evidence of ponding? |  |  | Click or tap here to enter text. |
| Is there evidence of erosion? |  |  | Click or tap here to enter text. |
| Construction Issues: |  |  |  |
| Have you considered constructability issues, like: |  |  |  |
| Access for construction equipment? |  |  | Click or tap here to enter text. |
| Private property excavations and possible tie-backs? Click or tap here to enter text. | | | |
| Space for trailers, equipment and materials? |  |  | Click or tap here to enter text. |
| Overhead wire conflicts? |  |  | Click or tap here to enter text. |
| Poles that would need supporting? |  |  | Click or tap here to enter text. |
| Proximity to buildings/structures & type of foundations? | | Click or tap here to enter text. | |
| Tree and tree canopy conflicts? |  |  | Click or tap here to enter text. |
| Options for disposal of trench or pipe dewatering |  |  | Click or tap here to enter text. |
| Have you considered neighborhood needs, like: |  |  |  |
| Access to building entrances? |  |  | Click or tap here to enter text. |
| Driveways and access to parking lots? |  |  | Click or tap here to enter text. |
| Physical Security Issues? |  |  | Click or tap here to enter text. |
| Environmental Issues: |  |  |  |
| Are there steep slopes? |  |  | Click or tap here to enter text. |
| Are there vegetation issues? |  |  | Click or tap here to enter text. |
| Are wetlands present? |  |  | Click or tap here to enter text. |
| Is the project within 200 feet of a shoreline? |  |  | Click or tap here to enter text. |
| How far is the project from a water body? Click or tap here to enter text. |  |  | Click or tap here to enter text. |
| 1.5 Hydraulics |  |  |  |
| Have you gathered system and hydraulic information from resources? |  |  | Click or tap here to enter text. |
| **Water Infrastructure** |  |  |  |
| Have you talked to USM Hydraulic Modeler? |  |  | Click or tap here to enter text. |
| Have you talked to Water Operations and Control? |  |  |  |
| Checked Pressure Zone Mapping? |  |  | Click or tap here to enter text. |
| Checked Water Valve Mapping? |  |  | Click or tap here to enter text. |
| Drainage and Wastewater Infrastructure |  |  |  |
| Have you talked to USM Modeling Group? |  |  |  |
| Is there an existing hydraulic model? |  |  | Click or tap here to enter text. |
| Have you checked system mapping to understand: |  |  |  |
| Basic topography? |  |  | Click or tap here to enter text. |
| Surrounding system type? |  |  |  |
| Downstream surface waters and outfalls? |  |  | Click or tap here to enter text. |
| Backwater sources, such as: |  |  |  |
| Downstream water body? |  |  | Click or tap here to enter text. |
| Tidal outfall? |  |  | Click or tap here to enter text. |
| Regulated King County sewer? |  |  | Click or tap here to enter text. |
| Known downstream pipe, ditch, or stream constraints? |  |  | Click or tap here to enter text. |
| Known flooding? |  |  | Click or tap here to enter text. |
| Critical drainage area listing? |  |  | Click or tap here to enter text. |
| 1.6 Environmental Review |  |  |  |
| Geology and Soils |  |  |  |
| Have you done a preliminary check for geological and soils information:: | |  | Click or tap here to enter text. |
| Typical local soil conditions? |  |  | Click or tap here to enter text. |
| Corrosive soils? |  |  | Click or tap here to enter text. |
| Records of contaminated soils? |  |  | Click or tap here to enter text. |
| High groundwater? |  |  | Click or tap here to enter text. |
| Landfills? |  |  | Click or tap here to enter text. |
| Slopes and landslide prone areas? |  |  | Click or tap here to enter text. |
| Faults? |  |  | Click or tap here to enter text. |
| Resource: [Geomap](http://geomapnw.ess.washington.edu) |  |  |  |
| SPU Geotechnical Engineers |  |  | Click or tap here to enter text. |
| Stormwater |  |  |  |
| Have you checked [stormwater code compliance](http://www.seattle.gov/dpd/news/20080730a.asp?%7d)? |  |  | Click or tap here to enter text. |
| Where would project stormwater drain to? | Click or tap here to enter text. | | |
| What are the general requirements for this project? | Click or tap here to enter text. | | |
| Resource: SPU Engineering Plan Reviewers |  |  |  |
| Electrical: Established the need for power supply sources?  Checked Electrical Design Checklist (see DSG Chapter 9)? |  |  |  |
| 1.7 Records Review |  |  |  |
| Have you reviewed records? |  |  |  |
| Resource GIS |  |  |  |
| Resources at SPU: |  |  |  |
| PERC |  |  |  |
| Record drawings |  |  |  |
| Existing base mapping |  |  |  |
| Grading plans |  |  |  |
| Utility maps and books |  |  |  |
| Leak history |  |  |  |
| Comprehensive Plans and Studies |  |  |  |
| Science Library |  |  |  |
| Operations/MAXIMO database |  |  |  |
| Customer Service |  |  |  |
| Resources at DPD: |  |  |  |
| Sewer cards: Sewer plats |  |  |  |
| Building plans |  |  |  |
| Neighborhood Plans |  |  |  |
| Land Use |  |  |  |
| Private Construction |  |  |  |
| Resources at Other Records Vaults: |  |  |  |
| Seattle City Light |  |  |  |
| King County |  |  |  |
| WSDOT |  |  |  |
| Resources at SDOT: |  |  |  |
| Franchise Utility Agreements |  |  |  |
| Inspection Records on permits |  |  |  |
| Resources at Department of Neighborhoods: |  |  |  |
| Historic districts |  |  |  |
| Resources at City Clerk’s Office: Municipal Codes and Ordinances |  |  |  |
| Memorandums of Agreement |  |  |  |
| Archived photographic records |  |  |  |
| 1.8 Coordination |  |  |  |
| Have you checked for other infrastructure needs and opportunities, such as: |  |  |  |
| Has the condition of sewers and drains been assessed with CCTV? |  |  |  |
| Are there work orders or CIP listings for sewer and drainage work in the project area? |  |  |  |
| Are there spot drainage complaints in the project area? |  |  |  |
| Should SPU consider adding drainage & wastewater elements to project? |  |  |  |
| Has the condition of water mains been assessed? |  |  |  |
| Have or should water mains be potholed? |  |  |  |
| Are there work orders or CIP listings for water main work in project area? |  |  |  |
| Should SPU consider adding a water main element to the project? |  |  |  |
| Does this project overlap with SDOT’s transportation’s CIP list? |  |  |  |
| Is SDOT Utility Coordinator aware of private utility work planned for area? |  |  |  |
| Have electrical and I&C design issues been coordinated?  Does the project require coordination for electrical power utilities? |  |  |  |
| Has SPU Security Manager been consulted? |  |  |  |
| Is there potential for coordination of projects? |  |  |  |
| 1.9 Signature |  |  |  |
| Have you signed the scope of work? |  |  |  |

| **2 30% Design** | **Yes** | **No** | **Comments** |
| --- | --- | --- | --- |
| 2.1 Base map |  |  |  |
| Was the base map completed in preliminary engineering? |  |  |  |
| Have you determined the project’s standard and special base map needs, such as: | |  |  |
| Surface features and measure downs? |  |  |  |
| CB outfall inverts? |  |  |  |
| Topographic lines and additional topography for grade matching? |  |  |  |
| Private property information? |  |  |  |
| Easement delineation? |  |  |  |
| Lot lines? |  |  |  |
| Local conversions to other vertical datums? |  |  |  |
| Tie ins to other mapping? |  |  |  |
| Search of vaults beyond SPU’s? |  |  |  |
| Search of DPD’s private property records? |  |  |  |
| Addresses? |  |  |  |
| Meter numbers? |  |  |  |
| Foundations of bridges and walls? |  |  |  |
| Street channelization with paint records? |  |  |  |
| Have you requested the base map? |  |  |  |
| Are there inconsistent or missing records? |  |  |  |
| Have corrections been sent to GIS when records don’t match? |  |  |  |
| 2.2 Flow Analysis |  |  |  |
| Is flow analysis complete and hydraulic grade line set? |  |  |  |
| Are calculations documented, stamped and archived? |  |  |  |
| Who prepared the calculations? |  |  |  |
| Was a model developed? |  |  |  |
| 2.3 Pipe Layout |  |  |  |
| Are pipe layout and preliminary profile shown? |  |  |  |
| Is pipe in [standard location](http://www.seattle.gov/util/Engineering/Standard_Plans_&_Specs/index.asp)? See Standard Plan #030 |  |  |  |
| Are [standard clearances](http://www.seattle.gov/util/Engineering/Standard_Plans_&_Specs/index.asp) maintained? |  |  |  |
| Are critical cross sections identified and drawn? |  |  |  |
| Other utility infrastructure improvements identified and design started? |  |  |  |
| Resource: Drafting and plan presentation standards |  |  |  |
| 2.4 Geotechnical Report |  |  |  |
| Have you requested a geotechnical report? Report done during preliminary engineering? |  |  |  |
| Did the request identify: |  |  |  |
| Pipeline location and depth? |  |  |  |
| Location of any major structures? |  |  |  |
| Geotechnical information needed by other designers? |  |  |  |
| Does the project need additional information, such as: |  |  |  |
| Slope stability calculations and project seismic standards? |  |  |  |
| Seismic risk evaluation? To what standard? |  |  | Click or tap here to enter text. |
| Soil or groundwater contamination testing? |  |  |  |
| Have you requested soil resistivity testing? |  |  |  |
| Resource: SPU Geotechnical Engineers |  |  |  |
| 2.5 Regulations and Permits |  |  |  |
| Have you reviewed project -related regulations? Have you reviewed list of required permits from preliminary engineering? |  |  |  |
| Have you updated any permit requirements? |  |  |  |
| Are the permit applications started? |  |  |  |
| Resource: [City codes, rules and guidelines](http://www.seattle.gov/leg/clerk/clerk.htm) |  |  |  |
| Resource: WA [State Health Department codes and rules](http://www.doh.wa.gov/a-z_topics/w.htm) |  |  |  |
| Resource: WA State [Department of Ecology codes and rules](http://www.ecy.wa.gov/laws-rules/ecyrcw.html) |  |  |  |
| 2.6 Reviews |  |  |  |
| Electrical: Has 30% Electrical Design been developed?  Basis of Electrical Design document done? (see DSG Ch 9).  Preliminary service load determined?  One-line diagram developed? |  |  |  |
| Real property issues and needs identified? |  |  |  |
| Customer impacts identified? |  |  |  |
| Operations review? |  |  |  |
| Constructability review? |  |  |  |
| Physical Security review? |  |  |  |
| Electrical and I&C review? |  |  |  |
| Are other agency impacts identified? |  |  |  |
| 2.7 Are we on the right track? |  |  |  |
| Re-examine the alternative choice and 30% design and consider: |  |  |  |
| Are there alternatives with fewer environmental impacts? |  |  | Click or tap here to enter text. |
| Are there alternatives with fewer security limits? |  |  | Click or tap here to enter text. |
| Are there lower cost alternatives? |  |  | Click or tap here to enter text. |
| Are there easier to maintain alternatives? |  |  | Click or tap here to enter text. |
| Is value engineering or further brainstorming warranted? |  |  | Click or tap here to enter text. |
| Have you verified that Asset Management Committee (AMC) approved objectives are met? |  |  | Click or tap here to enter text. |
| 2.8 Completed 30% Design |  |  |  |
| Completed Base map |  |  |  |
| Updated cost estimate |  |  |  |
| Updated schedule |  |  |  |
| 30% Review Comments Log |  |  |  |

| **3 60% Design** | **Yes** | **No** | **Comments** |
| --- | --- | --- | --- |
| 3.1 30% comments |  |  |  |
| Have the 30% review comments all been addressed? |  |  |  |
| 3.2 60% plans with final sizes, layout, profile, structures & major details |  |  |  |
| On the plans, are: |  |  |  |
| Major conflicts resolved? |  |  |  |
| Is potholing and survey of critical conflicts needed? |  |  |  |
| Conflicts discussed with other utility owners? |  |  |  |
| Minor conflicts identified? |  |  | Click or tap here to enter text. |
| All regulatory requirements incorporated? |  |  |  |
| Materials called out? |  |  |  |
| Shoring needs identified? |  |  |  |
| Paving/restoration? |  |  |  |
| Access points secured w/ Integrated Security System (ISS)? |  |  |  |
| Electrical and I&C? |  |  |  |
| Has the design considered: |  |  |  |
| Is trench or pipe [dewatering required](http://www.seattle.gov/dpd/publications/cam/cam506.pdf)? |  |  |  |
| Is a dechlorination plan required? |  |  |  |
| Construction pollution control? |  |  |  |
| Need a [permit from Ecology](http://www.ecy.wa.gov/programs/wq/stormwater/construction?) (storm drain discharge) ? |  |  | Click or tap here to enter text. |
| Need a [permit King Co. Industrial Waste](http://www.kingcounty.gov/environment/wastewater/IndustrialWaste/Forms/ApprovalForms.aspx) (sewer discharge)? |  |  | Click or tap here to enter text. |
| Resource: SPU Plan Reviewers |  |  | Click or tap here to enter text. |
| Sewer or Drainage Bypassing required? |  |  |  |
| 3.3 Is the geotechnical report complete? |  |  |  |
| 3.4 Is SEPA DNS complete? |  |  |  |
| 3.5 Are other permit applications submitted? |  |  |  |
| Resource (See DSG Ch 2 Design for Permitting) |  |  |  |
| 3.6 Are easement acquisitions started? |  |  |  |
| Resource Real Property Services |  |  |  |
| 3.7 Is there a draft customer service plan, considering: |  |  |  |
| Critical water services? |  |  |  |
| Water main construction/ shutdown sequence? |  |  |  |
| Fire protection analysis? |  |  |  |
| Security Plan? |  |  |  |
| Electrical? |  |  |  |
| 3.8 Reviews |  |  |  |
| Real property issues and needs identified? |  |  |  |
| Operations review and crew resources/scheduling identified? |  |  |  |
| Preliminary order of work plan |  |  |  |
| Constructability review? |  |  |  |
| Internal and external plan circulation? |  |  |  |
| Security elements? |  |  |  |
| Electrical and I&C elements? |  |  |  |
| 3.9 Have preliminary technical specifications been prepared? |  |  |  |
| 3.10 On track? Have you verified that AMC approved objectives are met? |  |  |  |
| 3.11 Completed 60% Design |  |  |  |
| Construction cost estimate |  |  |  |
| Updated schedule |  |  |  |
| 60% Review Comments Log |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **4 90% Design** | **Yes** | **No** | **Comments** |
| 4.1 60% Comments |  |  |  |
| Have all the 60% review comments been addressed? |  |  |  |
| 4.2 90% Plans substantially ready for bid |  |  |  |
| Has drafting been checked, for: |  |  |  |
| Standard layer control? |  |  |  |
| Seattle standards? |  |  |  |
| Spelling? |  |  |  |
| Stationing? |  |  |  |
| Cross referencing? |  |  |  |
| Views adequate for construction? |  |  |  |
| Complete details? |  |  |  |
| Have all fittings and connections called out? |  |  |  |
| Are design criteria notes on the plans? |  |  |  |
| Is the hydraulic grade line on the profiles? |  |  |  |
| Are notes clear and complete? |  |  |  |
| Are all materials specified? |  |  |  |
| Have easements been identified? |  |  |  |
| Are boring log locations shown? |  |  |  |
| Has surface restoration been identified for all disturbed areas? |  |  |  |
| Are construction pollution control plans clear? |  |  |  |
| Has all grading information to be supplied by SPU survey or design identified? |  |  |  |
| Have easements been acquired and referenced? |  |  |  |
| 4.3 Design Calculations |  |  |  |
| Are all structural calcs including pipe loading and blocking complete and stamped? |  |  |  |
| Are all hydraulic calculations complete and stamped? |  |  |  |
| 4.4 Draft Project Manual |  |  |  |
| Do special provisions include: |  |  |  |
| Non-standard submittals required? |  |  |  |
| Permit conditions? |  |  |  |
| Traffic Control Plan? |  |  |  |
| Community commitments? |  |  |  |
| Access control policies/procedures to secured site? |  |  |  |
| Other Agency commitments? |  |  |  |
| Construction Management requirements? |  |  |  |
| Temporary erosion and sediment control plan? |  |  |  |
| Pre-bid meeting required? |  |  |  |
| Have permits been acquired and incorporated into plans and specifications? |  |  |  |
| Site Security Plan for Construction complete? |  |  |  |
| Electrical Design complete? |  |  |  |
| 4.5 Customer service plan? |  |  |  |
| 4.6 Reviews |  |  |  |
| Has operations reviewed and crew resources been scheduled? |  |  |  |
| Constructability review comments been incorporated into plans & specs? |  |  |  |
| Security review comments? |  |  |  |
| Electrical and I&C review comments? |  |  |  |
| Has the plan been circulated both internally and externally? |  |  |  |
| 4.7 On track? Have you verified that AMC approved objectives are met? |  |  |  |
| 4.8 Completed 90% Design |  |  |  |
| Engineer’s Estimate |  |  |  |
| Construction Schedule |  |  |  |
| 90% Review Comments Log |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **5 Bid Documents** | **Yes** | **No** | **Comments** |
| Finalize Plans |  |  |  |
| Have all review comments been addressed? |  |  |  |
| Has the Advertised Plan Set been Signed and Stamped? |  |  |  |
| Project Manual Support |  |  |  |
| Addendum Support |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **6 Construction** | **Yes** | **No** | **Comments** |
| Review submittals  Have all required Permits been issued?  Schedule any required Preconstruction Conferences with Permit Authority, contractors and city staff. |  |  |  |
| Response to RFIs and field design change proposals |  |  |  |
| Support Construction Management in review change of condition claims |  |  |  |
| Support construction manager and resident engineer at progress meetings |  |  |  |
| Final inspection and comments |  |  |  |
| Are as-built drawings complete? |  |  |  |
| Have GIS records been updated? |  |  |  |