

HRSD Design and Construction Standards - January 2018

Table of Contents

Section No.	Subject	Page No.
Forward	Engineering Director's Viewpoint	
I.	Introduction	I-1
	A. Purpose	
	B. Expectations, Outcomes and Sustainability	
	C. Project Delivery Methods	
	D. Distribution	
	E. Preparation of Design Documents	
	1. Study and Preliminary Engineering Report (PER)	
	2. Project Manual (Contract Requirements, Technical Specifications and Construction Drawings)	
	F. Common Historical Issues in the Design and Construction Phase	
	1. Design Phase	
	2. Construction Phase	
	G. Use of Autonomus Vehicles (AV)	
II.	Front End Documents	II-1
	A. Introduction	
	B. Responsibilities of the FIRM	
	C. Standard Front End Documents	
	1. Project Specification Cover	
	2. Table of Contents	
	3. Advertisement for Bids	
	4. Instruction to Bidders	
	5. Questionnaire	
	6. Bid Bond	
	7. Agreement	
	8. Performance Bond	
	9. Payment Bond	
	10. Escrow Agreement	
	11. General Conditions of the Construction Contract	
	12. Supplementary Conditions	
	D. Specific Documents Requiring FIRM Input	
	1. Advertisement for Bid	
	2. Instructions to Bidders	
	3. Agreement	
	4. Supplementary Conditions	
III.	Construction Administration Forms/Format	III-1
	A. Introduction	
	B. Contract Administration Forms	
	1. Sample Bid Recommendation Letter	

Section No.	Subject	Page No.
	2. Notice of Award	
	3. Notice to Proceed	
	4. Emergency Contact List	
	5. Field Order	
	6. Request for Proposal	
	7. Work Change Directive	
	8. Change Order	
	9. Application for Payment	
	a. Summary Sheet	
	b. Schedule of Values – Lump Sum	
	c. Schedule of Values – Unit Price	
	d. Stored Materials Inventory	
	e. Diversity Procurement Statement	
	10. Certificate of Substantial Completion	
	11. Warranty Memorandum	
IV.	Suggested Division 1 Items	IV-1
	A. Introduction	
	B. Table of Division 1 Items for FIRM Consideration	
V.	Pipelines and Appurtenances	V-1
	A. Introduction	
	B. General	
	C. Force Mains	
	1. Design Specifics	
	2. Hydrostatic Pressure Test Procedures	
	D. Line Stops	
	1. Guidelines for Use	
	2. Design Considerations	
	E. Valves	
	1. Gate Valves and Plug Valves	
	2. Disposition of Existing Inline Valves to be Abandoned	
	3. Automatic Air Release Valves	
	F. Gravity Interceptors and Manholes	
	Attachment A – Report of Hydrostatic Pressure Test	
VI.	Trenchless Installations and Rehabilitation	VI-1
	A. Introduction	
	B. General Evaluation Criteria	
	C. New Trenchless Pipe Installation	
	1. Horizontal Directional Drilling (HDD)	
	2. Jack & Bore and Microtunneling	
	3. Ground Penetrating Radar (GPR) Use	

Section No.	Subject	Page No.
	D. Sanitary Sewer System Rehabilitation	
	1. Cleaning	
	2. Closed-Circuit Television Video (CCTV)	
	3. Diversion Pumping	
	4. Gravity Sewer Rehabilitation	
	a. Cured In Place Pipe (CIPP)	
	b. Folded and Reformed Liners	
	c. Formed In Place Pipe (FIPP)	
	d. Sliplining	
	e. Pipe Bursting	
	5. Lateral Reinstatement	
	6. Manhole Rehabilitation	
	7. Wet Well Rehabilitation	
	8. Post Construction Rehabilitation for Gravity Mains and Manholes	
	Manhole Protective Coating Post Installation Certification Form	
VII.	Pump Stations	VII-1
	A. Introduction	
	B. Description of Operations	
	1. Wet Well Pump Station	
	2. Pressure Reducing Station	
	C. General	
	D. Site Issues and Layout	
	E. Masonry	
	F. Equipment	
	G. Conveying Systems	
	H. Mechanical	
	I. Electrical & Instrumentation	
	J. Architectural Guidelines	
	Attachment A – HRSD Pump Station Architectural Guidelines	
VIII.	Treatment Plants	VIII-1
	A. Introduction	
	B. Abbreviations (Plant Processes)	
	C. Sewage Treatment Design and Operation	
	D. Solids Handling Design and Operation	
	E. Access to Unit Processes and Equipment	
	F. Sampling	
	G. Chemical Containment	
	H. Chemical Feed Systems	
	I. Drain Systems	

Section No.	Subject	Page No.
	J. Emergency Eyewash and Showers	
	K. Equipment Numbering Sequences	
	L. Equipment Spare Parts	
	M. Miscellaneous Items	
	N. Noise Abatement	
	O. Non-Potable Water Systems	
	P. Odor Control and Room Ventilation	
	Q. Pipe Insulation and Heat Tracing	
	R. Primary and Secondary Clarifiers	
	S. Process Air Piping	
	T. Process Flow Splitting	
	U. Scum Handling, Piping and Pumping	
	V. Grit, Septage and Grease, and Biosolids	
	W. Site Lighting	
	X. Slide and Sluice Gates	
	Y. Solids Piping	
	Z. Travel Path (Walkway) Alignment	
	AA. Water Reuse, Biosolids Recycling, and Nutrient Reclamation	
	BB. Yard Piping (Greater than 24 Inch in Diameter)	
	CC. Functional Descriptions	
	DD. Operational Technical Information System (OTIS)	
	EE. Equipment Startup, Training, and Turnover	
	FF. Flow Metering	
IX.	Electrical and Instrumentation	IX-1
	A. Introduction	
	B. General	
	C. Pump Station and Interceptor Systems Table	
	D. Treatment Plant Table	
	Attachment A “HRSD Arc Flash Mitigation Workshop”	
	Attachment B “Load Bank Connections”	
	Attachment C “Variable Frequency Drive”	
	Attachment D “HRSD Lighting Guidelines and Replacement Strategy”	
	Attachment E “HRSD Electric Motor Specifications”	
	Attachment F “HRSD Electrical Motor Specifications”	
	Attachment G “Stilling Well for Level Transducer Pumping Stations or Treatment Plants”	
	Attachment H “Temporary Portable Pump Alarms and Setup Schedule”	
	S&P Electrical Workshop 2016	
X.	Miscellaneous	X-1

Section No.	Subject	Page No.
	A. Introduction	
	B. Site	
	1. Site Drainage	
	2. Landscaping	
	3. Plant Material	
	4. Concrete Curb and Gutter	
	5. Sidewalks	
	C. Concrete	
	D. Masonry	
	E. Metals and Plastics	
	1. Hand / Guard Rails and Stair Systems	
	2. Hatches	
	3. Grating	
	F. Thermal and Moisture Protection	
	1. Roofing	
	G. Doors and Hardware	
	1. General	
	2. Pump Stations	
	3. Plants	
	H. Painting and Coatings	
	1. Painting and Coating Systems	
	2. Piping and Equipment Identification	
	3. Limits of Coatings in Covered Tanks	
	4. Pump Stations	
	I. Architectural / Structural	
XI.	Drawings, Record Drawings, and Valve Guides	XI-1
	A. Introduction	
	B. Drawings	
	C. Record Drawings	
	D. Bid Documents	
	E. Valve Guides	
	Attachment A: Valve Guide Format and Examples	
XII.	Public Participation Program	XII-1
	A. Introduction	
	1. Engage with Locality Staff	
	2. Identify Project Stakeholders	
	3. Participate in Public Open House / Community Meetings	
	4. Alert Public Officials	
	5. Distribute Project Introductory Notice to Neighbors	
	6. Post Project Signs	
	7. Establish Project Website	

Section No.	Subject	Page No.
	8. Issue Media Releases	
	9. Response to Public and Media Inquires	
	10. Provide Project Updates	
	11. Coordination with Locality Public Information Staff	
	Templates and Forms	
	• Sample – Willingness to Hold	
	• Sample - Public Meeting Advertisement	
	• Open House Notice to Public	
	• Public Meeting Requirements	
	• Project Sign-In sheet - Template	
	• Project Comment Sheet – Template	
	• Advertisement Submission Schedules	
	• Project Introductory Notice to Neighbors – Template	
	• Sample – Project Signs	
	• HRSD Sign Specifications	
	• Universal Rubber Base Systems	
	• New Project Webpage – Template	
	• New Project FAQs – Template	
	• New Project Map Landscape	
	• Wet Weather Locality Program Map	
	• Sample – Media Release – Traffic Advisory	
	• Sample – Media Release – Incident Statement	
	• Sample – Media Project Inquiry Cards	
	• Sample - Website Update	
	• Construction Update Notices	
	• CCTV Inspection Notice to Neighbors	
	• CCTV Cleaning and Inspection Notice to Neighbors	
	• Smoke Testing Notice	
	• Smoke Testing Door Card Hanger	
	• Survey Message to Neighbors	
	• Reminder Notice to Neighbors (one week/48 hours)	
	• Reminder Notice to Neighbors (day of work)	
	• Construction Project Closeout Notice	
	• Stakeholder Email Update	
XIII.	Use of Technical Memorandum for CIP Projects	XIII-1
	A. Introduction	
	B. Circumstances for Use	
	C. Approval for Use	
XIV.	Monthly Project Status Reporting	XIV-1

Section No.	Subject	Page No.
	A. Introduction	
	B. Content and Format for Project Status Report (Part 1)	
	C. Content and Format for Project Expenditure Tracking (Part 2)	
	Attachment A – FIRM Progress Report Template	
	Attachment B – Project Expenditure Tracking Template	
XV.	PER, Design, and Construction Submittal Information for Design & Construction Managed Projects	XV-1
	A. Introduction	
	B. Requirement for Submittals	
	1. Format for Digital Files	
	2. Seamless AutoCAD Files	
	3. Interim Record Drawings	
	4. Interim Valve Guides	
	5. Final Record Drawings	
	6. Final Valve Guides	
	7. Shop Drawings	
	8. Operation and Maintenance (O&M) Manuals	
	9. Conformed Documents	
	C. Attachment A – Summary of Major Submittals to HRSD	
	D. Attachment B – Equipment Record Template (Excel)	
XVI.	Capital Project Cost, Schedule and Risk Reporting at Milestones	XVI-1
	A. Introduction	
	B. FIRM Responsibilities	
	C. Example Report	
XVII.	Real Estate Acquisition and Plat Guidelines	XVII-1
	A. Introduction	
	B. Real Estate Schedule vs. Project Schedule	
	C. Easements	
XVIII.	Flood Elevation Requirements	XVIII-1
	A. Introduction	
	B. Locality Code Requirement	
	C. Steps for Determining Construction Elevation	
	D. Elevation Requirement Example	
XIX.	Coordination with Virginia DEQ for Certificate to Construction, Certificate to Operate and Tax Exemptions for Qualifying Sanitary Sewer Projects	XIX-1
	A. Introduction	

Section No.	Subject	Page No.
	B. Approval CTC Process for State Water Quality Improvement Fund (WQIF) Projects	
	C. Abbreviated Administrative Process for Non-WQIF Projects	
	D. Approval Process for Non-WQIF Projects that Involve Greater than 25% Capacity Increase or Decrease	
	E. Relocation, Replacement-In-Kind, Maintenance or Emergency Projects	
	F. Online Resources within DEQ for Approval Process Exhibits A thru D – Template Letters to DEQ	
XX.	Coordination of Preconstruction Phase Issues	XX-1
	A. Introduction	
	B. Coordination with Engineering Contract Specialist	
	C. Coordination with Engineering Director	
XXI.	Preparation of and Format for Construction Addenda	XXI-1
	A. Introduction	
	B. Guidelines and Specific Requirements	
	C. Addendum Template	
XXII.	Preparation of and Format for Conformed Documents	XXII-1
	A. Introduction	
	B. Specifications	
	C. Drawings	
	D. Format and Number of Conformed Documents	
XXIII.	HRSD Safety Programs	XXIII-1
	A. Introduction	
	B. Safety Programs	
	1. Hazard Communication Program	
	2. Hot Work Permit Program	
	3. Lock Out / Tag Out Program	
	4. Confined Space Entry Program	
	5. Plant Access Procedures for Contractors	
	6. NFPA 70E	
	7. Fall Protection	
	8. Correction of Safety Issues	
	9. Excavations and Trenching	
	10. Fire Protection Systems	
	11. Housekeeping	
	12. Outside Contractor Briefing	
	13. Asbestos Awareness Program	
	Asbestos Checklist	

Section No.	Subject	Page No.
XXIV.	Virginia Work Area Protection Requirements	XXIV-1
	A. Introduction	
	B. Training Requirements for Construction Inspectors	
	C. Personal Protective Equipment (PPE) Requirements	
XXV.	Preconstruction Assessments and Damage Mitigation Procedures	XXV-1
	A. Introduction	
	B. Organization of Section	
	1. Stage 1 – Construction Impact Research and Evaluation	
	a. Research and Investigations during Design Phase	
	b. Determinations during the Design Phase	
	c. Potential of Construction Related Impacts	
	i. Noise Generation and Impacts	
	ii. Vibration Impacts	
	iii. Dewatering Impacts on Ground and Structure Settlement	
	iv. Construction Impacts on Existing Topography, Hard Surfaces, Hydrology, and Construction Travel Routes	
	v. Dust, Odor, and Other Emissions Beyond Construction Zone	
	d. Determination of construction zone of influence for all potential construction related impacts	
	2. Stage 2 – Risk Mitigation Analysis and Bid Document Development for Contractor Actions	
	a. Construction Noise	
	b. Construction Vibration	
	c. Construction Dewatering	
	d. Construction Impacts to Existing Drainage, Trees / Vegetation, and Locality / Private Roads	
	e. Construction Dust, Odor, and Other Fugitive Emissions	
	3. Stage 3 – Specific Pre-Construction Field Surveys and Construction Activity Monitoring Programs	
	a. Responsibilities of the FIRM	
	b. Responsibilities of the Contractor	
	c. Identification of Other Party Responsibilities	
	Communications and Contract Tracking Log	
	Preconstruction Assessment Right to Access Property Form	
	Preconstruction Assessment Request Letter to Enter Private Property Template	
	Preconstruction Assessment Reporting Form	
XXVI.	Regulatory Reporting Requirements for Spills	XXVI-1

Section No.	Subject	Page No.
	A. Introduction	
	B. Procedures	
	C. Contact Information	
XXVII.	Tracking of Construction Phase Milestones and Performance Metrics	XXVII-1
	A. Introduction	
	B. Completion and Submittal of Construction Milestone Tracking Form	
	C. Performance Metrics	
XXVIII	Expectations for Construction Administration and Construction Inspection	XXVIII-1
	A. Introduction	
	B. Organization of Section	
	C. General Expectations	
	D. Preconstruction	
	E. General Procedures	
	F. Tie-In, Shutdown, and Diversion Procedures	
	G. Line Stop Procedures	
	H. Trenchless Crossing Procedures	
	I. Damage Assessment and Claims Procedures	
	J. Training	
	K. Record Keeping	
	L. Staffing	
	M. Verification	
XXIX.	Checklist for Trenchless Crossing Operations	XXIX-1
	A. Introduction	
	B. Completion and Submittal of Checklist for Trenchless Crossing Operations	
XXX.	Checklist for Line Stop Installations	XXX-1
	A. Introduction	
	B. Completion and Submittal of Checklist for Line Stop Installations	
XXXI.	Checklist for Tie-Ins to Existing Interceptor Force Mains	XXXI-1
	A. Introduction	
	B. Completion and Submittal of Checklist for Tie-Ins to Existing Interceptor Force Mains	
XXXII.	Use of Air Vent Proving Tool	XXXII-1
	A. Introduction	
	B. FIRM Responsibilities and Procedures	

Section No.	Subject	Page No.
XXXIII.	Condition Assessment Protocol for Replaced or Abandoned Pipelines	XXXIII-1
	A. Introduction	
	B. Technical Specification	
	C. Checklist	
XXXIV.	Standard for Capital Improvement Projects that Involve Construction Dewatering Activities	XXXIV-1
	A. Introduction	
	B. Background	
	C. Requirements	
	D. Receiving Sewer System	
	E. Contacts	
	Attachment A – Anticipated Schedule from Initial Investigation to General Permit Acquisition	
	Attachment B – Contaminated Identification Table	
XXXV.	Standard Details	XXXV-1
	A. Introduction	
	B. Listing of Standard Details	
	1. Standard Cover Sheet	
	2. Standard Manhole Frame and Cover	
	3. Outside Drop Manhole	
	4. Sanitary Sewer Manhole Adjustment	
	5. Manhole Frame and Cover – Watertight	
	6. Air Vent	
	7. Air Vent and Cover	
	8. Roadside Ditch – Air Vent	
	9. Air Release Valve Box Adjustment	
	10. Roadside Ditch – Valve Box	
	11. Valve Box and Riser	
	a. For Mainline and/or Connection Valves	
	b. For Bypass Valves	
	12. Tapping Saddle for Cast Iron Pipe, Ductile Iron, RC & PVC Pipe	
	13. Tapping Saddle for Concrete Cylinder Pipe	
	14. Steel Casing Pipe Detail	
	15. Cathodic Protection Test Station	
	16. Easement Plat	
	17. Pressure Sensor Installation	
	18. Sanitary Sewer Straddle Manhole	
	19. Exterior Bollard Detail	
	20. Bollard Location Detail	

Section No.	Subject	Page No.
	21. Connection to Existing HRSD Valve	
	22. Connection into Existing Manholes	
	23. New Wet Taps	
	24. Valve Riser Adjustment	
	25. Precast Concrete Shallow Manhole with Extended Base	
	26. Manhole Invert Shaping	
	27. Precast Concrete Manhole with Extended Monolithic Base	
	28. Horizontal Gate Valve	
	29. Vertical Gate Valve	
	30. Ductile Iron MJ Spigot to Concrete Transition Adaptor (Male)	
	31. Ductile Iron MJ Spigot to Concrete Transition Adaptor (Female)	
	32. Cathodic Protection Isolation Detail	
	33. Load Test Hinged Bank Box	
	34. Flush-mount Groundwater Monitoring Well	
	35. Recovery Sheet Template	
	36. Sanitary Sewer Service Connection Alternate	
	37. House Lateral Cleanout Alternate	
	38. Sanitary Sewer Lateral Cleanout Frame and Cover	
	39. Sanitary Sewer Lateral Cleanout Frame and Cover for Heavy Loads	
	40. Sanitary Sewer Service Connection	
	41. Dual Sanitary Sewer Service Connection	
	42. Manhole Insert	
XXXVI.	Master Specification Sections	XXXVI-1
	A. Introduction	
	B. Listing of Master Specification Sections	
	01010 – Summary of Work	
	01040 - Coordination	
	01060 – Special Conditions	
	01270 – Measurement and Payment	
	01323 – Record Documents	
	01340 – Submittals	
	01520 – Maintenance of Pipeline and Pumping Operations	
	01560 – Environmental Protection and Special Controls	
	01650 – Facility and System Start-up	
	02510 – Ductile Iron Pipe	
	02520 – Polyvinyl Chloride Pipe	
	02531 – Line Stops on Sanitary Sewer Force Main Systems	
	02610 – Valves	
	02710 – Contaminated Groundwater Management	
	02761 – Television Inspection of Pipelines	

Section No.	Subject	Page No.
	02773 – Ultrasonic Pipeline Inspection	
	02774 – Condition Assessment Data Collection for Pipelines Being Repaired Or To Be Abandoned	