

Project Approach and Understanding for EMWD Sewer Pipeline Protection at Manzanita St., Murrieta, CA

Hydrologic, Hydraulic, and Erosion Protection Study - Mod 1

HDR Engineering, Inc. (HDR) will provide professional engineering services to perform additional hydrologic, hydraulic, and scour evaluations for the EMWD sewer line crossing Warm Springs Creek near Manzanita St. in Murrieta, California. Mod 1 includes an interim scour/erosion protection design for the 5-year (or lower) flow event in Warm Springs Creek and final design for the 100-year flow event. Major tasks are described below.

Task 1: Project Coordination, Meetings and Data Collection – HDR will attend one virtual meeting with EMWD to discuss the interim design and will coordinate with agencies and others as required to complete the tasks listed below.

Task 2: Hydrologic Analysis for Interim Design – HDR will review the Warm Springs Creek USGS gage data to determine the appropriate seasonal flow for interim design (approximately 5-year flood event). No hydrologic modeling is anticipated for this task.

Task 3: Hydraulic Analysis for Interim Design – HDR will develop a HEC-RAS 2-D hydraulic model of the creek based on the digital channel topography obtained from the RCFCD and the new surveyed 1-ft contour digital terrain in the vicinity of the sewer crossing. The hydraulic model will be used to perform hydraulic analyses of the creek and provide maximum 5-year flow velocities, shear stresses, and stream power. The model will incorporate the Arroyo Vista development storm drain (from Tract 36629) and will be utilized in scour evaluations, as well as for the interim design of scour/erosion protection.

Task 4: Scour Analysis for Interim Design – HDR will perform a scour analysis at the sewer crossing for the 5-year flow event. The total depth of scour will be estimated from the sum of the various scour components including general scour, contraction scour, bedform scour, and bend scour. This task also includes scour impacts from the Arroyo Vista lateral storm drain discharging downstream of the sewer crossing.

Task 5: Design of Scour/Erosion Protection – HDR will prepare an interim design of scour/erosion protection for the 5-year flow event and final design for the 100-year flow event. One alternative is anticipated for each design that may include hard bed armoring with rock riprap or partially grouted rock and adequate bank erosion protection (e.g. rock slope protection or high performance turf reinforcement mats). HDR will develop an opinion of probable construction costs for each design.

Task 6: Reporting – HDR will provide a draft report in electronic (PDF) format detailing the engineering analyses performed for the interim and final design of scour/erosion protection. HDR will respond to one round of comments by EMWD and prepare the final report in electronic (PDF) format.

Assumptions and Limitations:

1. Digital terrain data (1-ft contour) for Warm Springs Creek in the vicinity of sewer crossing on NAVD 88 vertical datum will be provided by EMWD.
2. Floodplain mapping or preparation of FEMA related products (e.g., CLOMR, LOMR) is not part of this scope.
3. Four (4) design sheets will be prepared for interim design in AutoCAD: (1) Title Sheet, (1) Notes Sheet, (1) Plan and Profile Sheet, and (1) Detail Sheet.
4. Six (6) design sheets will be prepared for final design in AutoCAD: (1) Title Sheet, (1) Notes Sheet, (2) Plan and Profile Sheets, and (2) Detail Sheets.
5. One round of consolidated EMWD comments will be addressed following initial submittal of design, opinion of probable construction costs, and technical specifications; revisions to address the EMWD's one round of comments will be considered final.
6. EMWD will carry out biological constraints assessment and environmental permitting.
7. No temporary/permanent easement acquisitions are included.
8. No geotechnical or survey services are included.
9. Construction support services are not included.
10. Technical specifications will be prepared following Greenbook format to reflect design requirements.
11. EMWD will prepare front end specifications.
12. Scour/erosion protection revetments will be designed according to standard industry practice, following recommendations from USACE, FHWA, and Caltrans. The revetments should be properly installed and maintained for a successful performance. Due to inherent risks in hydrology, hydraulics, and fluvial geomorphology, it is always the best option to relocate sewer away from the creek.

Eastern Municipal Water District
 Warm Springs Sewer Pipeline Protection Mod 1
 Estimated Level of Effort and Fee



NO.	TASK DESCRIPTION	LEVEL OF EFFORT, HOURS						FEE, DOLLARS										
		Snr Project Manager	Snr Hydraulic Engineer	Design Engineer	CADD/GIS Designer	Water Res EIT	Project Admin	TOTAL LABOR	LABOR	SUBS	DIRECT COSTS	TOTAL						
		<i>Client Billing Rates</i>						\$300	\$316	\$250	\$175	\$115	\$107	\$179				
1	Project Coordination, Meetings & Data Collection																	
1.1	One (1) project meeting for interim design	4	8					2				14	3,942	0	200		4,142	
1.2	Data collection		4							4		8	1,724	0	100		1,824	
1.3	Coordination	8	16					8				32	8,312	0	0		8,312	
	Subtotal 1 Project Coordination, Meetings & Data Collection	12	28	0	0	4	10	54	13,978	0	300	14,278						
2	Hydrologic Analysis for Interim Design																	
2.1	Review gage data and determine 5-yr design flow		4									12	2,184	0	0		2,184	
	Subtotal 2 Hydrologic Analysis for Interim Design	0	4	0	0	8	0	12	2,184	0	0	2,184						
3	Hydraulic Analysis for Interim Design																	
3.1	Develop and refine hydraulic model for existing conditions		4									20	3,104	0	200		3,304	
3.2	Perform hydraulic analysis for preferred alternative	2	4									22	3,704	0	0		3,704	
	Subtotal 3 Hydraulic Analysis for Interim Design	2	8	0	0	32	0	42	6,808	0	200	7,008						
4	Scour Analysis for Interim Design																	
4.1	Perform scour analysis for proposed conditions		4									12	2,184	0	0		2,184	
4.2	Perform geomorphic evaluation	1	4									9	2,024	0	200		2,224	
4.3	Perform lateral migration analysis	1	4									9	2,024	0	0		2,024	
	Subtotal 4 Scour Analysis for Interim Design	2	12	0	0	16	0	30	6,232	0	200	6,432						
5	Design of Erosion Protection																	
5.1	Design for interim erosion protection - 5-yr event	2	16	12	120	16						166	31,496	0	300		31,796	
5.2	Opinion of probable construction costs - 5-yr event	2		8		32						42	6,280	0	0		6,280	
5.3	Design for erosion protection -100-yr event	2	8	16	160	100						286	46,628	0	400		47,028	
5.4	Opinion of probable construction costs -100-yr event	2		8		40						50	7,200	0	0		7,200	
5.5	Prepare technical specifications -100-yr event			24		40		8				72	11,456	0	100		11,556	
	Subtotal 5 Design of Erosion Protection	8	24	68	280	228	8	616	103,060	0	800	103,860						
6	Reporting																	
6.1	Produce DRAFT report for review and comments	4	16	8	4	16	6					54	11,438	0	0		11,438	
6.2	Produce FINAL report that incorporates agreed comments	4	8	4	4	16	4					40	7,696	0	0		7,696	
	Subtotal 6 Reporting	8	24	12	8	32	10	94	19,134	0	0	19,134						
	TOTAL, hours	32	100	80	288	320	28	848										
	TOTAL, dollars								151,396	0	1,500	152,896						

Assumptions:

Mod 1 scope includes Interim Design of scour/erosion protection for 5-yr flow event and Final Design of scour/erosion protection for 100-year flow event

Task 1. Project Coordination, Meetings & Data Collection

- One virtual progress meeting for Interim Design with presentation

Task 2. Hydrologic Analysis for Interim Design

- Warm Springs Creek USGS data analysis will be performed to determine 5-yr flow event; no hydrologic modeling is anticipated

Task 3. Hydraulic Analysis for Interim Design

- District will provide new channel topography based on sufficient bare-earth cloud points to develop 1-ft contour terrain surface
- Warm Springs Creek 2-D hydraulic modeling will be performed for 5-yr flow event; includes lateral storm drain flow from Arroyo Vista site improvements (Tract 36629)



Task 4. Scour Analysis for Interim Design

- Warm Springs Creek scour analysis will be performed for 5-yr flow event; includes scour impacts from Arroyo Vista lateral storm drain flow

Task 5.1 Design for interim erosion protection – 5-yr flow event

- 4 design sheets will be prepared in AutoCAD: (1) Title Sheet, (1) Notes Sheet, (1) Plan and Profile Sheet, and (1) Detail Sheet
- One round of consolidated District comments will be addressed following Interim Design initial submittal; revisions to address the District's one round of comments will be considered final
- District will carry out environmental permitting
- No temporary/permanent easement acquisitions are included
- No geotechnical or survey services are included
- Construction support services are not included

Task 5.2 Opinion of probable construction costs – 5-yr flow event

- One round of consolidated District comments will be addressed following initial submittal

Task 5.3 Design for erosion protection – 100-yr flow event

- 6 design sheets will be prepared in AutoCAD: (1) Title Sheet, (1) Notes Sheet, (2) Plan and Profile Sheets, and (2) Detail Sheets
- One round of consolidated District comments will be addressed following initial submittal of 100-yr erosion protection; revisions to address the District's one round of comments will be considered final
- District will carry out environmental permitting
- No temporary/permanent easement acquisitions are included
- No geotechnical or survey services are included
- Construction support services are not included

Task 5.4 Opinion of probable construction costs – 100-yr event

- One round of consolidated District comments will be addressed following initial submittal

Task 5.5 Prepare technical specifications – 100-yr event

- Technical specifications will be prepared following Greenbook format to reflect design requirements
- One round of consolidated District comments will be addressed following initial submittal
- EMWD will prepare front end specifications

FEMA floodplain modeling and CLOMR/LOMR submittal is not included in Mod 1 scope