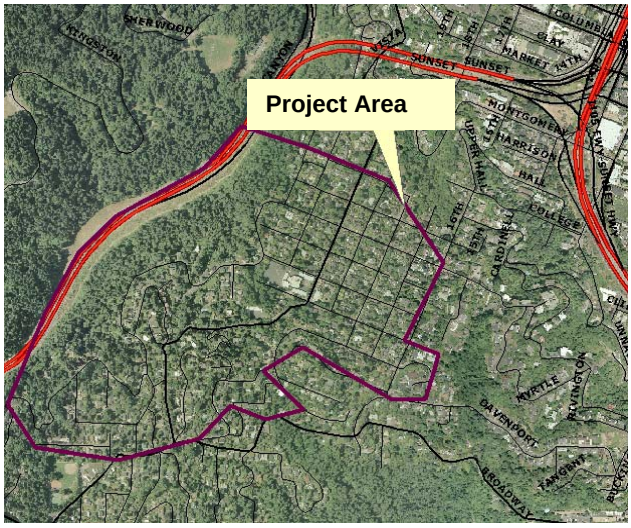
SW Montgomery Stormwater Flow Diversion Feasibility Study Portland, Oregon

PROJECT SUMMARY

Project Type:	Feasibility study to determine if stormwater flows could be directed out of the combined sewer system and into the storm sewer pipe constructed for the Tanner Creek Stream Diversion Project
Technologies:	Storm sewer separation and diversion
Major Benefits:	The feasibility study concluded that: • Runoff from 10 acres of impervious street and rooftop surfaces could be removed from the combined sewer system • The stormwater facilities built as part of Tanner Phase 3 could treat 2.6 million gallons of diverted stormwater runoff • Diversion could protect public health by minimizing the current level of basement flooding on SW Montgomery Drive
Cost:	$20,000 for feasibility study; up to $2.6 million for capital construction
Study Completed:	August 2004
Project Constructed:	Not yet constructed; not currently in the city's Capital Improvement Program (CIP)

Overview of the Stormwater System

Figure 1: SW Montgomery Feasibility Study Area



The study area is located between SW Montgomery Drive and SW 18th Avenue from Myrtle Avenue west to Patton Road. This 10-acre drainage area is within the larger 172-acre Market and 17th sub-basin. Most of the study area is zoned single-family residential, with 33% to 37% impervious cover. The Market and 17th sub-basin drains to the combined sewer.

The Market and 17th sub-basin has been studied as part of the West Side combined sewer overflow (CSO) and Basement Flooding Relief programs. The sub-basin has 31 potential pipe flooding locations, and 64 of the sub basin's 701 lots have a risk of basement flooding.

SW Montgomery Drive is a street of interest because it has limited or no public drainage facilities, a concentration of potential system surcharge points, and recorded basement flooding complaints. Of the five recorded complaints of basement flooding in the sub-basin as of 2001,

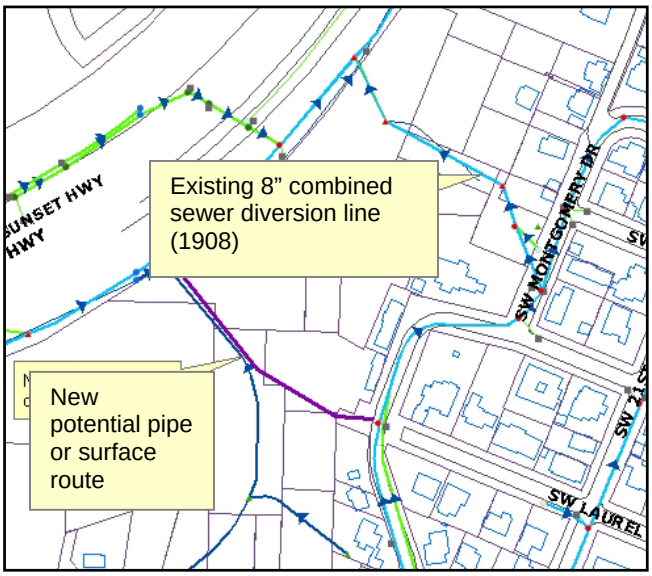
three are along SW Montgomery Drive, including a location where a house foundation repair of over $250,000 generated a reimbursement claim by the homeowner.

STORMWATER CAPACITY AND SYSTEM COMPONENTS

Stormwater Management Goal

The goal is to divert residential runoff out of the existing Market and 17th combined sewer system and into the new Tanner Creek storm sewer pipe. The feasibility study explored three alternatives:

Figure 2: Alternative Stormwater Route



- 1 - Continue to route stormwater into the existing 8-inch combined sewer pipe going down the hill, and remove sanitary flows to make the pipe stormwater only. This alternative proposed adding a new SW Montgomery storm sewer line and disconnecting 50% of residential rooftops and driveways so runoff would go to the street, which would capture three acres of flow and divert it away from the combined sewer system. This alternative proved to have limited impact on abating combined sewer overflows and basement flooding. In addition, a few downslope sanitary connections were very problematic.

- 2 - Run a new 15-inch stormwater line or surface flow drainage down the slope to the Tanner Phase 3 system. In addition to the SW Montgomery line and disconnections of alternative 1, this alternative would add adjacent catchments to the enhanced storm conveyance capacity, and take 5.6 acres of impervious area would off the combined sewer pipe.

Figure 3: Montgomery Drive – Typical Street

- 3 - Route the entire drainage study area into a new storm-only line down the hill. Using the entire storm line capacity would direct drainage from 9.9 acres of impervious area away from the combined sewer system. A variety of tools would be added to capture flows, including additional pipe segments and flow slipping (see page 3).

The modeling analysis results are more fully explained in an August 3, 2004 technical memorandum.

Geotechnical Evaluation/Infiltration Test

No specific geotechnical investigations were made. However, each of the alternatives was extensively modeled, and geotechnical issues were identified as part of the engineering review.

System Components

New stormwater pipe: All three alternatives call for a new stormwater pipe in SW Montgomery Drive and elsewhere in the study area. That pipe would collect and route water into new collection system locations.

Flow slipping: Many of the existing streets are underserved or not served by standard inlet and pipe drainage systems. A number of areas were identified where runoff could be routed across the street or adjacent landscaped surface into desired inlet locations.

Downspout disconnection: To enhance the amount of flow a new system could accommodate, various residential, commercial, and two school properties were evaluated to determine if building downspouts could be disconnected and flow routed across paved or landscaped surfaces and into street collection systems. Because of tight soils, no infiltration into landscape areas would be expected or desired, which differs significantly from the city's Downspout Disconnection Program.

BUDGET

Feasibility Study Cost

The feasibility study cost $20,100. About $10,000 was used to develop the area model and run the three alternatives. The final predesign report – which included maps, model profiles, pre-design pipe layouts, and gross project cost estimates – cost an additional $10,000.

Item	Unit Cost	Alternative 2	Alternative 3
Design	20% of project total	$183,200	$370,900
Permitting	3% of project total	$27,500	$55,600
Materials Costs			
Direct pipe cost	$116 to $200 per linear foot, depending on diameter and depth	$732,780	$1,483,500
Construction			
Inspection, project management, testing	15% of project total	$137,400	$278,165
Startup and closeout	1% of project total	$9,160	$18,550
Contingency	25% of project total	$183,200	$370,890
TOTALS (rounded up)		$1,300,000	$2,600,000

Construction Costs

Alternative 1 was dropped from consideration because it had minimal impact on combined sewer overflows and basement flooding. Rough costs were developed for alternatives 2 and 3.

SUCCESSES AND LESSONS LEARNED

Field Evaluation: It was extremely helpful to have field evaluation work done to ground-truth various study area sub-catchments and to evaluate the likelihood of safe building disconnects and flow slipping opportunities. The fieldwork required four staff members for half a day to walk the entire study area.

Mapping System Use: The first alternative was eventually discarded because it would have limited benefits and because of issues discovered during catchment mapping. City plumbing and piping records were used to identify a subbasement sanitary connection in one household that would make this alternative substantially more complex.

Citizen Response: This project was initiated after a request by a school parents' group to disconnect some school buildings from one pipe system into another pipe system. This larger project concept resulted from the field and mapping work to approve or deny the parents' request. The initial request was denied because of significant combined sewer system capacity issues. If either Alternative 2 or 3 were implemented, the school disconnection would be a significant system benefit.