

# WOOD RODGERS

April 15, 2004

APR 19 2004

Mr. Mark Collier  
City of West Sacramento  
1110 West Capitol Avenue  
West Sacramento, California 95691

Dear Mark:

Subject: City of West Sacramento, Southport Drainage Subbasin MC11 (8146.016), Analysis for Combining Drainage With Subbasin MC10 (Revised, April 2004)

This letter reflects revisions to the letter submitted to you dated May 30, 2003, from Wood Rodgers, Inc. Included as part of the revisions is a figure of subbasin MC11, as well as pertinent information related to grading within the detention pond for subbasin MC10 and adjacent to channels within MC10 and MC11.

The developers within MC10 are proposing to construct the detention pond larger than defined in the MC10 Drainage Master Plan. In view of the proposed enlargement, Wood Rodgers, Inc. was requested by the City of West Sacramento to determine if the MC10 detention pond, as proposed, could accommodate storm drainage from MC11, thereby eliminating the need for a detention pond within MC11. Wood Rodgers used information provided by Morton & Pitalo to define the proposed MC10 detention pond in the hydraulic model(s).

For the subject analysis, Wood Rodgers assumed the land use previously dedicated to the MC11 detention pond would be changed to "River Mixed Use" similar to land use for the adjacent land. The storm runoff developed for MC11 (Revised) was combined with the storm runoff from MC10, and routed through the MC10 detention pond and associated pumping facilities.

In the Drainage Master Plan 2001 Update (DMP 2001 Update), flood control pumping for the MC10 detention pond was determined to be 130 cfs, and flood control pumping for the MC11 detention pond was 16 cfs. Desired flood control performance was not achieved by combining the flood control pumping (146 cfs) with the current MC10 detention pond configuration, while maintaining the current flood control/water quality treatment volume separation. The maximum 100-year water surface elevation in the MC10 pond under this scenario is higher than the DMP 2001 Update. This increase in water surface elevation is not acceptable, as grading and drainage facilities for MC10 rely on the DMP 2001 Update water surface elevations to work, according to Morton & Pitalo.

The combined outflow from the MC10/MC11 pump system was further evaluated (routed) using UNET under the ultimate condition, and there were increases in the maximum water surface immediately downstream of the pump outfall and upstream of Jefferson Boulevard. These water surfaces are contained by the predevelopment grading. The grading adjacent to the channel should be at least maintained, and increased if possible to strengthen the containment of the flow within this reach. This was communicated to the City in 2003. It is important to note that downstream of the Jefferson Boulevard crossing, the ultimate water surfaces are contained in the Main Drain channel and flowing below the toe of adjacent embankments. While there has been some discussion regarding the boundary of the future contributing area to the MC10/MC11 system, no direction has been officially provided by the City to consider contributing land uses substantially different from those used as the basis for the DMP Update 2001.

Though the subbasins cannot be combined as stated in the previous paragraph, Wood Rodgers determined the subbasins could be combined within the current MC10 detention pond layout if the water quality treatment volume is also utilized as flood control storage. The methodology in the DMP 2001 Update was based upon keeping water quality treatment volume and flood control volume separate. More recent water quality treatment criteria, in the BMP Handbook (released by the California Stormwater Quality Association), indicates "wet pond" treatment (with a "permanent" water quality pool) can operate with a portion of the volume being "drawn down" over a period of time. Accordingly, there is some flexibility in the selection of drawdown times, varying from 12 to 40 hours, but it is clear that evacuation of treated water volumes should not occur in less than 12 hours. Dry extended ponds have been a water quality treatment option for some time, as the State published in the last edition of the Best Management Practices Handbooks. Dry extended treatment is associated with a drawdown time as well. The treatment volume calculations called out in the DMP 2001 Update were based upon the *Sato Method*, also utilized by Sacramento County in Volume 2 of its Hydrology Manual. The *Sato Method* has been used by many municipalities to size wet pond treatment but was initially developed primarily as a means of sizing dry extended detention ponds for water quality treatment. In fact, the full report developed by J. F. Sato includes the selection of a drawdown time as part of the method for sizing the water quality treatment volume, and is more consistent with the current water quality treatment methods for extended detention ponds proposed in the BMP Handbook.

Applying extended detention pond methodology, Wood Rodgers determined that storm drainage from MC11 could be accommodated within the MC10 detention pond, with some modifications. These modifications include:

- Flood control pumping must be increased from the presently planned 130 cfs to 140 cfs. The additional 10 cfs pumping capacity should be provided as a separate unit. This 10 cfs pump would begin evacuating storm water within the previously designated water quality treatment zone and serve as a control for drawdown of the water quality treatment volume, simultaneously serving as a portion of the total flood control pumping capacity. The 10 cfs pump could also be used for the "summer" flow pump referenced in the DMP 2001 Update.

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April 15, 2004  
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- The MC10 detention pond does not need to be modified, however, the storm drainage pipe system for MC11 must be reconfigured (extended) to drain into the MC10 detention pond. To accomplish connection to the pond, two buried pipes (under the railroad and Chevron pressure gas main) with a grated drop inlet must be installed to accommodate overland flow, hydraulically connecting the subbasins. Two pipes, approximately 200 feet in length (one 66-inch-diameter and one 48-inch-diameter), would be required to drain the entire MC11 subbasin.
- The pipe layout for the south portion of MC11 was adjusted to accommodate the current proposed piping associated with the "Town Center" area provided by Psomas.

Wood Rodgers and others have performed subsequent evaluations of the detention pond volume since May 30, 2003. In July 2003, Wood Rodgers provided an estimate to potentially reduce the total available detention storage by approximately seven acre feet, based upon a grading plan provided by Morton & Pitalo at that time. No specific communication has been provided by the City or others to date, so Wood Rodgers contacted Mr. Roger Henry of Morton & Pitalo. Mr. Henry advised there is some reduction in the total volume in the final grading plan, to reflect the seven acre-foot reduction. Therefore, the equivalent of seven acre feet was removed from the cost estimate relative to the excavation referenced in the May 30, 2003 memorandum.

Wood Rodgers prepared an Opinion of Probable Cost (Table 1) for the drainage facilities for MC10 and MC11 combined, including the facilities necessary to connect MC11 with the MC10 detention pond. The cost assumes the modifications can be made to the pump station during the design (pre-construction) phase. The unit costs utilized are the same as those presented in the DMP 2001 Update.

Wood Rodgers made an allocation of costs as part of its work for this assignment. The results of this allocation are presented on Tables 2, 3, and 4.

Wood Rodgers appreciates the opportunity to work with the City on this assignment and looks forward to discussing the results with you and your staff.

In accordance with communications with you, Wood Rodgers has reflected a reduction in the unit fee for exempt land that results from the decrease in MC10/MC11 costs. This reduction would also apply to all non-exempt land from which fees are being allocated within the Southport area.

Sincerely,



Michael C. Nowlan, P.E.

Enclosures

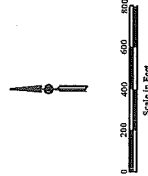
H:/worddocs/WestSac/MC11-Collier-Ltr-Revised-4-15-04.doc



**LEGEND**

---	EXISTING DRAIN
---	ROADWAY
---	STATE ROUTE
---	RAILROAD
---	SUBBASIN BOUNDARY
---	SUBBASIN NAME
⊙	PUMP STATION
⊙	PIPE SHED BOUNDARY
---	STORM DRAINAGE PIPE
•	PIPE NODE
⊙	PIPE NODE NAME
⊙	PIPE DIAMETER, INCHES
---	WATER

- NOTES:**
1. Topographic mapping is from USGS Quad Map (NGVD29).
  2. Trunk storm drainage pipes are defined as pipes with diameters equal to or greater than thirty-three inches.



CITY OF WEST SACRAMENTO  
 SOUTHWEST DRAINAGE MASTER PLAN UPDATE  
**MC11 SUBBASIN (REV. 2003)**  
**STORM DRAINAGE PIPE PLAN**  
 WOOD RODGERS, INC.  
 SACRAMENTO, CALIFORNIA

TABLE 1

## CITY OF WEST SACRAMENTO

DRAINAGE SUBBASINS - MC10 AND MC11 COMBINED  
OPINION OF PROBABLE COST

Description	Quantity	Unit	Unit Cost, \$ <sup>1</sup>	Cost, \$
<b>1. Detention Pond</b>				
a. Excavation				
(1) Cut in Dry Conditions				
· Excavate and Load into Trucks	67,000	CY	1.70	113,900
· Haul and Dump Excess Material	67,000	CY	1.10	73,700
· Spread, Compact, and Shape Excess Material	0	CY	1.40	0
(2) Cut in Wet Conditions				
· Excavate and Load Into Trucks	236,707	CY	3.40	804,800
· Haul and Dump Excess Material	236,707	CY	1.25	295,900
· Spread, Compact, and Shape Excess Material	0	CY	2.70	0
b. 48" Connector Pipe Under Lake Washington Blvd.	300	LF	172.00	51,600
c. Inlet/Outlet Structures at Connector Pipe	2	EA	5,000.00	10,000
d. Dewatering	1	LS	300,000.00	300,000
e. Access Road	5,600	LF	12.00	67,200
f. Hydroseed Pond Slopes	73,000	SF	0.04	2,900
g. Irrigation and Planting	60,000	SF	1.00	60,000
h. Inlet Structures (Overland and Pipe) Under Railroad	2	LS	25,000.00	50,000
i. Land Acquisition	17.0	AC	40,000.00	680,000
Subtotal - Detention Pond				2,510,000
<b>2. Pump Station</b>				
a. Pump Station	140	CFS	16,500.00	2,310,000
b. Discharge Pipe, (Open Cut) Under Railroad	200	LF	250.00	50,000
c. Gated Outlet Structure at Discharge at Main Drain	1	EA	5,000.00	5,000
Subtotal - Pump Station				2,365,000
<b>3. Storm Drainage Pipe System</b>				
a. 33" Diameter RCP	0	LF	104.00	0
b. 36" Diameter RCP	5,898	LF	116.00	684,200
c. 39" Diameter RCP	0	LF	129.00	0
d. 42" Diameter RCP	3,989	LF	143.00	570,400
e. 48" Diameter RCP	4,680	LF	172.00	805,000
f. 54" Diameter RCP	0	LF	204.00	0
g. 60" Diameter RCP	1,400	LF	238.00	333,200
h. 66" Diameter RCP	3,736	LF	275.00	1,027,400
i. 72" Diameter RCP	4,490	LF	315.00	1,414,400
j. 60" Diameter Manhole	24	EA	2,790.00	67,000
k. 72" Diameter Manhole	13	EA	3,580.00	46,500
l. Saddle Manhole	34	EA	5,590.00	190,100
m. Outlet Structure at Pond	6	EA	5,000.00	30,000
n. Plug or Remove Culvert Under Linden Road	1	EA	3,000.00	3,000
Subtotal - Storm Drainage Pipe System				5,171,200
Subtotal Construction and Land Acquisition				10,046,000
15% Contingency				1,506,900
20% Engineering, Surveying, and Contract Administration				2,009,200
Subbasin MC10 Drainage Master Plan				80,000
Subbasin MC10/MC11 Combination Technical Memorandum				6,000
<b>TOTAL</b>				<b>13,648,000</b>

<sup>1</sup>Costs are based upon 2000 price levels.

TABLE 2

CITY OF WEST SACRAMENTO

DRAINAGE SUBBASINS - MC10 AND MC11 COMBINED  
COST ALLOCATION BY LAND USE

Land Use	Allocation Factor <sup>1</sup>	Area ac	Total Allocation unit	Weighted Benefit <sup>2</sup> %	Allocated Cost <sup>3</sup> \$
<b>PROPOSED DEVELOPMENT</b>					
Rural Estates (RE)	0.00				
Rural Residential (RR)	0.00	90.8	0.00	0.00%	0
Low Density Residential (LR)	0.45	277.8	125.01	29.93%	4,085,343
Medium Density Residential (MR)	0.51	205.6	104.86	25.11%	3,426,708
High Density Residential (HR)	0.71	61.3	43.52	10.42%	1,422,337
High Rise Residential (HRR)	0.71				
Neighborhood Commercial (NC)	0.84	7	5.88	1.41%	192,159
Community Commercial (CC)	0.84				
Water Related Commercial (WRC)	0.84				
General Commercial (GC)	0.64	22.23	14.23	3.41%	464,947
Business Park (BP)	0.84				
Mixed Use (MU)	0.64	34.8	22.27	5.33%	727,852
Riverfront Mixed Use (RMU)	0.64	98.39	62.97	15.08%	2,057,855
Light Industrial (LI)	0.80				
Heavy Industrial (HI)	0.80				
Water Related Industrial (WRI)	0.80	14.9	11.92	2.85%	389,547
Public/Quasi-Public (PQP)	0.58	18.7	10.85	2.60%	354,449
Recreation and Park (RP)	0.28	41.6	11.65	2.79%	380,658
Open Space (OS)	0.26	17.2	4.47	1.07%	146,146
<b>EXISTING DEVELOPMENT</b>					
Rural Estates (RE)	0.00				
Rural Residential (RR)	0.00	42	0.00	0.00%	0
Low Density Residential (LR)	0.00	37	0.00	0.00%	0
Medium Density Residential (MR)	0.00				
Commercial (NC, CC, and GC)	0.00	6.9	0.00	0.00%	0
Public/Quasi-Public (PQP)	0.00	2	0.00	0.00%	0
Recreation/Park/Open Space (RP & OS)	0.00				
Agriculture (AG)	0.00				
<b>TOTAL</b>		978.22	417.6238	100.00%	13,648,000

<sup>1</sup>Except for Rural Estates and Rural Residential land use types, the allocation factor is equal to the runoff coefficient for the Rational Method. The runoff coefficients reflect hydrologic soil group C and were obtained from the report entitled, "The City of West Sacramento, Storm Drainage Design Standards, Section 4.11, Draft," dated October 30, 1995. Rural Estates and Rural Residential land use types are exempt from subbasin specific drainage facilities cost allocations.

<sup>2</sup>Weighted benefit for each land use type is calculated as "Total Allocation Units" divided by the sum of "Total Allocation Units" and multiplied by 100.

<sup>3</sup>Allocated Cost for each land use is calculated by multiplying the subbasin drainage facilities cost by the weighted benefit percentage for nonexempt land use only.

Effective 4/1/2004

<b>USE CATEGORIES AND FACTORS</b>		
<b>CATEGORY</b>	<b>CSD-1</b>	<b>SRCSD</b>
Auto Dealer		0.2 ESD /1000 sf
Bakery		0.5 ESD /1000 sf
Bank		0.3 ESD /1000 sf
Barber and Beauty Shops		0.1 ESD /chair
Bar		0.7 ESD /1000 sf
Bowling Alley		0.4 ESD /lane
Car Wash-Automatic		1.0 ESD /9,300 gal/mo
Car Wash-Manual		0.7 ESD /stall
Dry Cleaner		1.7 ESD /1000 sf
Garage		0.1 ESD /1000 sf
Hall-Auditorium		0.3 ESD /1000 sf
Gyms,Health Clubs,Tanning Salons		0.3 ESD /1000 sf
Hospital		1.1 ESD /9,300 gal/mo
Hotel and Motel		0.4 ESD /sleep room
Laundry-Self Service		0.5 ESD /machine
Laundry-Industrial		1.0 ESD /9,300 gal/mo
Market-High Impact		0.6 ESD /1000 sf
Market-Low Impact		0.2 ESD /1000 sf
Medical, Dental, and Massage Therapy Offices		0.4 ESD /1000 sf
Mini-Storage Facilities – 1SFD w/ Public Restrooms		1.0 ESD/ SFD+.04/Public fixture
Mortuary		0.8 ESD /slumber room
Office		0.2 ESD /1000 sf
Place of Worship		0.2 ESD /1000 sf
Rest Home-Boarding House		0.4 ESD /bed
Restaurant-Dine In		2.0 ESD /1000 sf
Restaurant-Dine In(Patio Area)		1.0 ESD /1000 sf
Restaurant-Dine In & Take Out		1.9 ESD /1000 sf
Restaurant-Take Out		1.7 ESD /1000 sf
Retail		0.1 ESD /1000 sf
Service Station		0.1 ESD /pump
Theaters		0.3 ESD /100 seats
Warehouse		0.1 ESD /1000 sf
<b>FEES</b>	<u>RELIEF AREA</u> \$1,350/ESD 6.0ESDs/Acre \$8,100/Acre <u>EXPANSION AREA</u> \$1,853/ESD 6.0ESDs/Acre \$11,118/Acre	Calculation Based on Use Only <u>INFILL-DEVELOPMENT</u> \$2,314/ESD <u>NEW - DEVELOPMENT</u> \$6,000/ESD 1.0 ESD Minimum / Parcel

TABLE 3

**CITY OF WEST SACRAMENTO**  
**DRAINAGE SUBBASINS - MC10 AND MC11 COMBINED**  
**DRAINAGE FEES**

Land Use	Area	Subbasin-Specific Drainage Facilities		Common Drainage Facilities		Exempt Land Cost		Total	
		Total Fee	Fee Per Acre	Fee Per Acre	Total Fee	Fee Per Acre <sup>1</sup>	Total Fee	Total Fee	Fee Per Acre
		ac	\$	\$	\$	\$	\$	\$	\$
<b>PROPOSED DEVELOPMENT</b>									
Rural Estates (RE)				420		1,096			
Rural Residential (RR)	90.8	0	0	840	76,284	1,096	99,515	175,800	1,936
Low Density Residential (LR)	277.8	4,085,343	14,706	4,201	1,166,944	1,096	304,465	5,556,752	20,003
Medium Density Residential (MR)	205.6	3,426,708	16,667	7,351	1,511,399	1,096	225,335	5,163,441	25,114
High Density Residential (HR)	61.3	1,422,337	23,203	10,502	643,752	1,096	67,184	2,133,273	34,801
High Rise Residential (HRR)				0		1,096			
Neighborhood Commercial (NC)	7	192,159	27,451	10,502	73,512	1,096	7,672	273,343	39,049
Community Commercial (CC)				10,502		1,096			
Water Related Commercial (WRC)				0		1,096			
General Commercial (GC)	22.3	464,947	20,850	10,502	234,187	1,096	24,440	723,574	32,447
Business Park (BP)				10,502		1,096			
Mixed Use (MU)	34.8	727,852	20,915	10,502	365,458	1,096	38,140	1,131,450	32,513
Riverfront Mixed Use (RMU)	98.39	2,057,855	20,915	10,502	1,033,258	1,096	107,834	3,198,947	32,513
Light Industrial (LI)				10,502		1,096			
Heavy Industrial (HI)				0		1,096			
Water Related Industrial (WRI)	14.9	389,547	26,144	10,502	156,475	1,096	16,330	562,352	37,742
Public/Quasi-Public (PQP)	18.7	0	0	0	0	0	0	0	0
Recreation and Park (RP)	41.6	0	0	0	0	0	0	0	0
Open Space (OS)	17.2	0	0	0	0	0	0	0	0
<b>EXISTING DEVELOPMENT</b>									
Rural Estates (RE)				0		0			
Rural Residential (RR)	42	0	0	0	0	0	0	0	0
Low Density Residential (LR)	37	0	0	0	0	0	0	0	0
Medium Density Residential (MR)				0		0			
Commercial (NC, CC, and GC)	6.9	0	0	0	0	0	0	0	0
Public/Quasi-Public (PQP)	2	0	0	0	0	0	0	0	0
Recreation/Park/Open Space (RP & OS)			0	0		0			
Agriculture (AG)			0	0		0			
<b>TOTAL</b>	<b>978.29</b>	<b>12,766,748</b>			<b>5,261,267</b>		<b>890,916</b>	<b>18,918,930</b>	

<sup>1</sup>See Table 4.



TABLE 4

CITY OF WEST SACRAMENTO

DRAINAGE SUBBASINS - MC10 AND MC11 COMBINED  
EXEMPT LAND COST ALLOCATION AND DRAINAGE FEE

	Exempt Land Cost Allocation (\$)							Total
	Subbasin <sup>1,2</sup>							
	MC10/MC11	MC20	MC71	MC80	NC10	NC20	SC10	
<b>PROPOSED DEVELOPMENT</b>								
Public/Quasi-Public (PQP)	354,449			676,613	594,023		120,382	1,745,467
Recreation and Park (RP)	380,658	169,814		162,991	211,864		72,816	998,143
Open Space (OS)	146,146	318,913	26,655	116,975	159,819	27,095	235,591	1,031,194
<b>EXISTING DEVELOPMENT</b>								
Recreation/Park/Open Space (RP & OS)								0
Agriculture (AG)								0
<b>Totals</b>	<b>881,252</b>	<b>488,727</b>	<b>26,655</b>	<b>956,579</b>	<b>965,706</b>	<b>27,095</b>	<b>428,790</b>	<b>3,774,804</b>
Total Southport Area Excluding Existing Development							4,940 Acres	
Total Southport Non-Exempt Area Excluding Existing Development							4,461 Acres	
Total Southport Area (excluding Subbasin MC60) Excluding Existing Development							3,845 Acres	
Total Southport Non-Exempt Area (Excluding Subbasin MC60) Excluding Existing Development							3,444 Acres	
Exempt Land Cost Drainage Fee (for Non-Exempt Lands Only, Excluding Subbasin MC60 and Existing Development)							\$1,096 Per Acre	

<sup>1</sup>Subbasin MC60 is not participating in the spread of the costs for exempt land throughout Southport. Subbasin MC60 will fund all cost allocations for exempt land uses within Subbasin MC60 and will not fund any portion of cost allocations for exempt land uses outside of MC60.

<sup>2</sup>Subbasin MC30 has an existing pond and pump station. Subbasin MC30 will fund all cost allocations for exempt land uses within Subbasin MC30.