

FIELD REPORT



Project: City of Stockton
Stockton Channel WQ Improvements
Job # 07018-060-141

Subject: TMDL Piggyback WQ Testing

Summary

Water quality data were collected from the Stockton Deep Water Channel near Weber Point, Stockton, CA. Isco 6700 Auto Samplers were used to collect two sets of samples at two depths within the channel. The samples were taken over a 25-hour period on July 27 and August 3, 2000. Samples were taken from the auto samplers, transferred into appropriate containers, packed in ice and transported to Sequoia Analytical for further analysis. An array of analyses was then performed in order to detect the concentration of the following constituents: nitrogen, ammonia; organic nitrogen; nitrite; ortho-phosphate (dissolved); total phosphorus; and chlorophyll a.

Location and Position

The Isco 6700 Auto Samplers were positioned on the edge of a public dock located approximately 900 ft west of Weber Point. The dock extended 150 ft towards the centerline of the channel. This position put the Samplers within 50 ft of the channel centerline.

Each Auto Sampler was then set to take samples at a specific depth. Sampler "A" was positioned to take samples at a depth equal to 3 ft below the water's surface. Sampler "B" was positioned to take samples at 3 ft above ground elevation. Each sampler was chained and locked to prevent any tampering while unattended.

Sample Collection

Each Sampler was programmed to collect an 1800-ml sample every 2.5 hours over a 25 hour period. Sample Set 1 began on July 27, 2000 at 10:10 am and Sample Set 2 began on August 3, 2000 at 8:30 am. Due to the extremely warm ambient temperatures, these samples were stored in a cooled compartment within the sampler for no more than five hours during the day and no more than 8 hours during the night. Each sample was periodically removed from the Sampler and transferred into four sample bottles that were provided by Sequoia Analytical. These bottles consisted of one 750 ml glass amber colored bottle with no preservative, one 250 ml clear poly bottle with no preservative, and two 250 ml poly bottles containing a small amount of H₂SO₄ as a preservative. Each sample was then placed into a cooler, packed with ice, and stored until the sample set was completed.

Sample Analysis

Upon completion of each 25-hour sample period, all 20 samples (80 bottles in all) were transported to Sequoia Analytical in Sacramento, CA for further analysis. Table 1 lists the constituent, estimated range, and the detection level for each analysis.

Table 1

Constituent	Estimated Range	Detection Level
Nitrogen, Ammonia	0.1 - 5.0 mg/L	0.1 mg/L
Organic Nitrogen	0.1 - 5.0 mg/L	0.1 mg/L
Nitrate	0.1 - 5.0 mg/L	0.1 mg/L
Ortho-Phosphate (dissolved)	0.05 - 1.0 mg/L	0.05 mg/L
Total Phosphorus	0.05 - 1.0 mg/L	0.05 mg/L
Chlorophyll a	5 - 200 µg/L	5 µg/L



Stockton Channel Water Quality Improvements
 Additional TMDL Studies Results
 Computed by: Mike Garelo
 August 21, 2000

DESCRIPTION: This worksheet presents the findings of the Additional water quality sampling conducted in the Stockton Channel near Weber Point. The samples were collected on 7/27/2000 and 7/28/2000.

Abbreviations and Detection Limits:

Abbreviation	Detection Limit
NH3 = Ammonia as N	0.10
Org N = Organic Nitrogen	0.50
TKN = Total Kjeldahl Nitrogen	0.50
TP = Phosphorus	0.02
Ortho P = Phosphorus (ortho) - Dissolved	0.01
NO3 = Nitrate as NO3	1.00
Chl a = Chlorophyll - a	0.0005

Results from samples taken at 3 feet below water surface (mg/l)

Sample	Date / Time	NH3	ON	TKN	P	Ortho	NO3	Chl a
A1010	7/27/00 10:10	ND	ND	ND	0.111	0.0558	2.63	0.0595
A1240	7/27/00 12:40	ND	ND	ND	0.0956	0.0315	2.19	0.0661
A1510	7/27/00 15:10	ND	ND	ND	0.0934	0.0426	2.52	0.0658
A1740	7/27/00 17:40	ND	ND	ND	0.0868	0.0382	2.82	0.0655
A2010	7/27/00 20:10	ND	ND	ND	0.104	0.0426	2.79	0.0687
A2240	7/27/00 22:40	ND	ND	ND	0.1	0.0426	2.71	0.0528
A2240-2	7/27/00 22:40	ND	1.08	1.08	0.133	0.0404	2.93	0.0543
A0110	7/28/00 1:10	ND	ND	ND	0.113	0.0382	2.72	0.0438
A0340	7/28/00 3:40	ND	ND	ND	0.0868	0.0271	2.43	0.0595
A0610	7/28/00 6:10	ND	0.509	0.509	0.116	0.0426	2.68	0.0534
A0840	7/28/00 8:40	ND	ND	ND	0.0934	0.0404	2.7	0.0571
A1110	7/28/00 11:10	0.212	ND	ND	0.138	0.0426	3	0.0567
Average		0	-	0.7945	0.105917	0.040383	2.676667	0.0586

Results from samples taken at 3 feet above ground surface (mg/l)

Sample	Date / Time	NH3	ON	TKN	P	Ortho	NO3	Chl a
B1010	7/27/00 10:10	0.103	ND	ND	0.118	0.0647	2.98	0.0275
B1240	7/27/00 12:40	0.206	ND	ND	0.129	0.0934	3.36	0.0407
B1510	7/27/00 15:10	0.187	ND	ND	0.129	0.0934	3.9	0.0025
B1740	7/27/00 17:40	0.194	ND	ND	0.116	0.0735	3.29	0.0261
B2010	7/27/00 20:10	0.247	ND	ND	0.127	0.089	3.39	0.0188
B2240	7/27/00 22:40	0.194	ND	ND	0.104	0.0558	2.62	0.0366
B0110	7/28/00 1:10	0.131	0.771	0.879	0.102	0.0669	3.72	0.0286
B0340	7/28/00 3:40	ND	ND	ND	0.118	0.0735	3.66	0.0457
B0610	7/28/00 6:10	0.174	ND	ND	0.12	0.089	3.61	0.0149
B0840	7/28/00 8:40	0.305	0.57	0.725	0.155	0.0934	3.68	0.0349
B1110	7/28/00 11:10	0.188	ND	0.721	0.166	0.1	3.67	0.0248
Average		0.175364	-	0.775	0.125818	0.081145	3.443636	0.027373



Stockton Channel Water Quality Improvements
 Additional TMDL Studies Results
 Computed by: Mike Garello
 September 10, 2000

DESCRIPTION: This worksheet presents the findings of the Additional water quality sampling conducted in the Stockton Channel near Weber Point. The samples were collected on 8/3/2000 and 8/4/2000.

Abbreviations and Detection Limits:

Abbreviation	Detection Limit
NH3 = Ammonia as N	0.10
Org N = Organic Nitrogen	0.50
TKN = Total Kjeldahl Nitrogen	0.50
TP = Phosphorus	0.02
Ortho P = Phosphorus (ortho) - Dissolved	0.01
NO3 = Nitrate as NO3	1.00
Chl a = Chlorophyll - a	0.0005

Results from samples taken at 3 feet below water surface (mg/l)

Sample	Date / Time	NH3	ON	TKN	TP	Ortho P	NO3	Chl a
A0830	8/3/00 8:30	ND	0.812	0.812	0.182	0.02093	2.51	0.116
A1100	8/3/00 11:00	ND	0.397	0.397	0.148	0.0161	1.88	0.102
A1330	8/3/00 13:30	ND	0.331	0.331	0.12	0.0139	1.48	0.0804
A1600	8/3/00 16:00	ND	0.322	0.322	0.116	ND	1.43	0.129
A1830	8/3/00 18:30	ND	0.351	0.351	ND	ND	1.54	0.0933
A2100	8/3/00 21:00	ND	0.348	0.348	0.09	0.0116	1.66	0.122
A2330	8/3/00 23:30	ND	0.593	0.593	0.112	ND	1.4	0.0811
A0200	8/4/00 2:00	ND	0.461	0.461	0.08	ND	1.35	0.0796
A0430	8/4/00 4:30	ND	0.284	0.284	0.94	ND	1.89	0.0644
A0700	8/4/00 7:00	ND	0.456	0.456	ND	0.0205	2.21	0.0715
Average		0	-	0.4355	0.2235	0.016606	1.735	0.09393

Results from samples taken at 3 feet above ground surface (mg/l)

Sample	Date / Time	NH3	ON	TKN	P	Ortho	NO3	Chl a	
B0830	8/3/00 8:30	0.2	0.325	0.49	0.222	0.118	5.27	0.0278	
B1100	8/3/00 11:00	0.209	0.196	0.368	0.204	0.129	5.34	0.0466	
B1330	8/3/00 13:30	0.209	0.215	0.387	0.16	0.131	5.25	0.0632	
B1600	8/3/00 16:00	0.226	-	0.398	0.266	0.212		-	
B1830	8/3/00 18:30			Sampler Malfunction					
B2100	8/3/00 21:00	0.178	0.246	0.393	0.152	0.12	5.01	0.0617	
B2330	8/3/00 23:30	0.129	0.211	0.317	0.148	0.1	4.6	0.0926	
B0200	8/4/00 2:00	0.146	0.234	0.354	0.164	0.12	4.7	0.049	
B0430	8/4/00 4:30	0.158	0.295	0.425	0.182	0.138	4.28	0.0616	
B0700	8/4/00 7:00	ND	0.59	0.59	0.2	0.118	4.46	0.0543	
Average		0.181875	-	0.413556	0.188667	0.131778	4.86375	0.0571	

FIELD REPORT



Project: City of Stockton
Stockton Channel WQ Improvements
Job # 07018-060-141

Subject: Storm Drain Sampling

DATE: 9/29/2000	TIME: 9am to 4pm	BY: Mike Garello
WEATHER: Clear and Sunny		TEMP RANGE: Min 53° F, Max 72° F
PRESENT: Sharla Hardy Kevin Kennedy Mike Garello	PHOTOS TAKEN: None	
TIDE: Stockton, CA Low 2:18 am High 8:54 am Low 1:50 pm High 7:27 pm		

Summary

Water samples from five storm drains near the vicinity of Weber's point were taken on Thursday September 28, 2000. The discharge point of each of these five storm drains is located at various positions along McCleod Lake within the Stockton Channel. The five storm drains consisted of a 72-inch RCP on the south, a 30-inch RCP on the south, a 12-inch RCP on the west, a 30-inch RCP on the northeast, and a 42-inch RCP on the north end of McCleod Lake. All of these storm drains appeared to have dry-weather flow from unknown sources.

Methodology

Four composite water samples and two grab samples were taken and analyzed for various constituents. Each composite sample was the product of three 1.33-liter grab-samples taken at each sample point throughout the day. Each grab sample was the product of one single 4-liter sample. After each sample was extracted from the storm drain, it was placed within an ice-chest and packed with ice. At the end of the day, each sample was split into separate poly-vinal containers, packed into the ice chests and transported to the laboratory for analysis. Each sample was analyzed for ammonia as NH₃, nitrate as NO₃, total Kjeldahl nitrogen, phosphorus, and Ortho-Dissolved phosphorus.

Depth measurements were taken at each sample site three times throughout the day. A string and weight was lowered to the bottom. The string and weight was taken out and measured from the end of the weight to edge of the wet mark on the string. The wet

section of string was discarded and a new dry section was used for each of the measurements.

Velocity approximations were also taken at each sample site three times throughout the day. A semi-buoyant object was dropped onto the water's surface and was observed. Both the distant traveled and the elapsed time for the object to cover that distance was noted. The velocity was calculated by dividing the distance by the time. When possible, an extended distance between two manholes was used to estimate the velocity. Otherwise, a short distance of 3 to 6 feet was used within a single manhole or just outside of a storm drain outlet.

Flow approximations were calculated using a simple volumetric flow equation. The volumetric flow equation is written as:

$$Q = v \bullet A \quad \text{[EQN 1]}$$

where, $Q =$ flow, ft³/s
 $v =$ velocity, ft/s
 $A =$ cross sectional area, ft²

The cross sectional area of water flowing through a circular pipe can be calculated using the equation:

$$A = \frac{D^2}{4} (\beta - \cos \beta \sin \beta) \quad \text{[EQN 2]}$$

where, $D =$ diameter of pipe, ft

and

$$\beta = \cos^{-1} \left(1 - \frac{2Y}{D} \right) \quad \text{[EQN 3]}$$

where, $Y =$ depth of water within pipe, ft
 $\beta =$ angle, radians

The following sections provide general notes, sampling times, water depth, velocity estimations, and flow estimations for each of the sampling points.

Results

42-INCH STORM DRAIN WITH OUTLET ON NORTH SIDE OF MCCLOUD LAKE

The 42-inch storm drain was fully submerged at high tide. The water level within the drain was approximately half full during low tide. A plume of clear water was apparent

at the outlet. Large numbers of shad were positioned within the clearer water. Two manholes accessing this storm drain are located within the Weber Point parking lot. The first manhole is located approximately 38-ft 7-in from the outlet. The second manhole is approximately 50 to 75 ft from the first and is located close to the street.

Samples marked #42 designate samples taken from first manhole. Sample #42B will designate a grab sample taken immediately in front of the outlet. This grab sample was taken prior to sample time 1.

Velocity measurements were taken by using two methods. The first method was allowing an object to float the viewable distance within the manhole (approx. 4 to 5 ft.). The second method allowed an object to float from the first manhole to the outlet. Method 1 was conducted during sample 1 and Method 2 was conducted during sample 2. No method was used during sample 3 due to the fact that the tidal influence was producing negative velocities (upstream).

Table 1 shows the results from the 42-inch storm drain.

TABLE 1. 42-INCH STORM DRAIN SAMPLE TIMES, VELOCITIES, DEPTHS, AND Q RATES

	Sample 1	Sample 2	Sample 3
Time	9:23 am	11:36 am	2:19 am
Depth	40 in	30 in	23.5 in
Velocity	0.04 ft/s	0.03 ft/s	--
Approximate Q	0.38 ft ³ /s	0.22 ft ³ /s	--

Table 2 shows the results of the water quality analysis.

TABLE 2. RESULTS FOR 42-INCH STORM DRAIN WATER QUALITY ANALYSIS, MG/L

	42	42B
Ammonia as NH₃	0.185	ND
Nitrate as NO₃	3.59	2.93
Total Kjeldahl, nitrogen	0.724	ND
Phosphorus	0.166	0.111
Ortho. Dissolved phosphorus	0.0912	0.0536

30-INCH STORM DRAIN WITH OUTLET ON NORTHWEST SIDE OF MC CLOUD LAKE

The 30-inch storm drain was fully submerged at high tide. The water level within the drain was approximately half full during low tide. A plume of clear water was apparent at the outlet. Large numbers of shad were positioned within the clearer water. No manholes were accessible.

Velocity measurements were approximated at the outlet of the drain by floating an object a distance of 4 to 6 feet. One grab sample of sufficient volume was taken at the outlet of the drain. Table 3 and Table 4 show the field and water quality analysis results.

TABLE 3. 30-INCH STORM DRAIN SAMPLE TIMES, VELOCITIES, DEPTHS, AND Q RATES

	Sample 1	Sample 2	Sample 3
Time	9:40 am	--	--
Depth	na	--	--
Velocity	0.05 ft/s	--	--
Approximate Q	0.25 ft ³ /s	--	--

TABLE 4. RESULTS FOR 30-INCH STORM DRAIN WATER QUALITY ANALYSIS, MG/L

	30
Ammonia as NH₃	0.158
Nitrate as NO₃	3.77
Total Kjeldahl, nitrogen	0.874
Phosphorus	0.124
Ortho. Dissolved phosphorus	0.0581

12-INCH STORM DRAIN WITH OUTLET ON WEST SIDE OF MCCLOUD LAKE

The manhole for the 12-inch storm drain is located in the grass area due east of its outlet into McCloud Lake. This sample point was not tidally influenced throughout the day. All samples appeared to be very clear and could have consisted of city water. Velocity measurements were taken by floating an object within the viewable range of the manhole (approx. 4 to 6 feet). The results of the fieldwork are shown in Table 5. Results from the water quality analysis are shown in Table 6.

TABLE 5. 12-INCH STORM DRAIN SAMPLE TIMES, VELOCITIES, DEPTHS, AND Q RATES

	Sample 1	Sample 2	Sample 3
Time	10:19 am	12:12 p.m.	2:40 p.m.
Depth	3.0 in	3.25 in	3.0 in
Velocity	0.35	0.35	0.34
Approximate Q	0.05 ft ³ /s	0.06 ft ³ /s	0.06 ft ³ /s

TABLE 6. RESULTS FOR 12-INCH STORM DRAIN WATER QUALITY ANALYSIS, MG/L

	12
Ammonia as NH₃	0.236
Nitrate as NO₃	1.59
Total Kjeldahl, nitrogen	ND
Phosphorus	0.0227
Ortho. Dissolved phosphorus	0.0227

72-INCH STORM DRAIN WITH OUTLET ON SOUTH SIDE OF MCCLLOUD LAKE

The 72-inch storm drain was fully submerged at high tide. The water level within the drain was approximately half full during low tide. A plume of clear water was apparent at the outlet. Large numbers of shad were positioned within the clearer water.

Two manholes accessing this storm drain are located in the grassy area due south of its outlet on the south side of McCloud Lake. The first manhole is located approximately 24-ft 3-in from the outlet. The second manhole is located approximately 68-ft 6-in from its outlet in McCloud Lake.

All samples were taken from the manhole closest to McCloud Lake. Sample #72 represents a composite sample from grab samples taken during outgoing tide. Sample #72B represents a sample taken during incoming tide.

TABLE 7. 72-INCH STORM DRAIN SAMPLE TIMES, VELOCITIES, DEPTHS, AND Q RATES

	Sample 1	Sample 2	Sample 3
Time	10:43 am	12:26 p.m.	2:55 p.m.
Depth	56 in	51 in	56 in
Velocity	0.1	0.06	-0.31
Approximate Q	2.36 ft ³ /s	1.28 ft ³ /s	-7.31 ft ³ /s

TABLE 8. RESULTS FOR 72-INCH STORM DRAIN WATER QUALITY ANALYSIS, MG/L

	72	72B
Ammonia as NH₃	0.236	ND
Nitrate as NO₃	2.97	2.87
Total Kjeldahl, nitrogen	1.01	0.625
Phosphorus	0.175	0.129
Ortho. Dissolved phosphorus	0.0912	0.0492

Velocity approximations during outgoing tide were taken by floating an object from the first manhole to the outlet of the drain. Velocity approximations during incoming tide were taken by floating an object from the first manhole to the second manhole (approx. 44-ft 3-in). Negative velocities indicate upstream movement. Table 7 and Table 8 show the results for the 72-inch storm drain.

30-INCH STORM DRAIN WITH OUTLET SOUTH OF MCCLLOUD LAKE

The manhole to the 30-in storm drain consisted of a 48-in cylinder that extended approximately 10 feet deep. Upon initial inspection warm air exited the manhole and

smelled like decomposing matter. It was apparent that various articles of trash, woody debris, and styrofoam had accumulated at the bottom. A small amount of water made its way through the debris from the entrance at the south to the exit at the northwest. An attempt was made to clear a small area of debris for sampling. After a considerable effort a sample of approximately .5 to .75 L was obtained. The water within the sample was noticeably clear however, suspended material such as scum, woody debris, styrofoam, and a hyperdermic needle degraded the quality of the sample.

It was decided by sampling personnel that this 30-inch storm drain was not to be included in any further sampling throughout the day.

FIELD REPORT



Project: City of Stockton
Stockton Channel WQ Improvements
Job # 07018-060-141

Subject: Storm Drain Sampling II

DATE: 11/10/00	TIME: 1pm to 7pm	BY: Mike Garello
WEATHER: Clear and Sunny		TEMP RANGE: Min 48° F, Max 75° F
PRESENT: Sharla Hardy Cedric Tadakoro Mike Garello	PHOTOS TAKEN: None	
TIDE: Stockton, CA Low 6:08 am High 12:45 am Low 6:21 pm High 11:16 pm		

Summary

Water samples from three storm drains near the vicinity of Weber's Point were taken on Thursday, October 19, 2000. Two of the three storm drains discharged to McCloud Lake while one discharged to the south end of Weber Plaza. The three storm drains consisted of a 72-inch RCP on the south of McCleod Lake, 42-inch RCP on the north of McCleod Lake, and a 30-inch RCP south of Weber's Plaza. Sampling at a 12-in storm drain was abandoned due to absence of flow.

Methodology

Three composite water samples and two grab samples were taken and analyzed for various constituents. Each composite sample was the product of three 1.33-liter grab-samples taken at each sample point throughout the day. Each grab sample was the product of one single 4-liter sample. After each sample was extracted from the storm drain, it was placed within an ice-chest and packed with ice. At the end of the day, each sample was split into separate poly-vinyl containers, packed into the ice chests and transported to the laboratory for analysis. Each sample was analyzed for ammonia as NH₃, nitrate as NO₃, total Kjeldahl nitrogen, phosphorus, and Ortho. Dissolved phosphorus.

Depth measurements were taken at each sample site three times throughout the day. A string and weight was lowered to the bottom. The string and weight was taken out and measured from the end of the weight to edge of the wet mark on the string. The wet

section of string was discarded and a new dry section was used for each of the measurements.

Velocity approximations were also taken at each sample site each time samples were taken. A semi-buoyant object was dropped onto the water's surface and was observed. Both the distance traveled and the elapsed time for the object to cover that distance was noted. The velocity was calculated by dividing the distance by the time. A short distance of 3 to 6 feet was used within a single manhole.

Flow approximations were calculated using the following volumetric flow equation:

$$Q = v \cdot A \quad \text{[EQN 1]}$$

where, $Q =$ flow, ft^3/s
 $v =$ velocity, ft/s
 $A =$ cross sectional area, ft^2

The cross sectional area of water flowing through a circular pipe was calculated with the following equation:

$$A = \frac{D^2}{4} (\beta - \cos \beta \sin \beta) \quad \text{[EQN 2]}$$

where, $D =$ diameter of pipe, ft

and

$$\beta = \cos^{-1} \left(1 - \frac{2Y}{D} \right) \quad \text{[EQN 3]}$$

where, $Y =$ depth of water within pipe, ft
 $\beta =$ angle, radians

The following sections provide general notes, sampling times, water depth, velocity estimations, and flow estimations for each of the sampling points.

Results

42-INCH STORM DRAIN WITH OUTLET ON NORTH SIDE OF MCCLOUD LAKE

The 42-inch storm drain was fully submerged at high tide. The water level within the drain was approximately half full during low tide. The water appeared to be well mixed with observable green particulate matter, assumed algae, suspended throughout the

sample. The manhole was located within a parking lot, approximately 38-feet 7-inches north from McCloud Lake.

Samples taken from this location are marked as #42 with a letter identifier. Sample #42C is a grab sample taken just after the peak of high tide. Flow was not observed at that time. Sample #42D a composite sample taken during ebb tide. Depth and velocities varied with the recession of the tide.

Velocity was taken by allowing an object to float the viewable distance within the manhole (approx. 4 ft. to 5 ft.).

Table 1 shows the results from the 42-inch storm drain.

TABLE 1. 42-INCH STORM DRAIN SAMPLE TIMES, VELOCITIES, DEPTHS, AND Q RATES

	Sample 1	Sample 2	Sample 3
Time	3:51 p.m.	4:50 p.m.	5:55 p.m.
Depth	36.5 in.	27.5 in.	32.5 in.
Velocity	0.11 ft/s	0.00 ft/s	-0.13 ft/s
Approximate Q	0.97 ft ³ /s	0.00 ft ³ /s	-1.04 ft ³ /s

Table 2 shows the results of the water quality analysis from the 42-inch storm drain.

TABLE 2. RESULTS FOR 42-INCH STORM DRAIN WATER QUALITY ANALYSIS, MG/L

	42C	42D
Ammonia as NH₃	0.109	0.118
Nitrate as NO₃	5.58	4.68
Total Kjeldahl, nitrogen	0.574	ND
Phosphorus	0.155	0.089
Ortho. Dissolved phosphorus	0.0404	0.0271

72-INCH STORM DRAIN WITH OUTLET ON SOUTH SIDE OF MC CLOUD LAKE

The 72-inch storm drain was fully submerged at high tide. The water level within the drain was approximately half full during low tide. The water appeared to be well mixed with observable green particulate matter, assumed algae, suspended throughout the sample. The manhole was located at the grassy area approximately 24-ft 3-in due south of its.

Samples taken from this location are marked as #72 with a letter identifier. Sample #42C is a grab sample taken near the peak of high tide. Flow was not observed at that time.

Sample #42D is a composite sample taken during ebb tide. Depth and velocities varied with the recession of the tide.

Velocity was taken by allowing an object to float the viewable distance within the manhole (approx. 4 ft. to 5 ft.). During sampling 2, flow velocity was negative. Negative velocities indicate upstream movement despite continued recession of the tide. Table 3 and Table 4 show the results for the 72-inch storm drain.

TABLE 3. 72-INCH STORM DRAIN SAMPLE TIMES, VELOCITIES, DEPTHS, AND Q RATES

	Sample 1	Sample 2	Sample 3
Time	3:36 p.m.	5:07 p.m.	5:44 p.m.
Depth	58 in.	57.25 in.	56 in.
Velocity	0.0 ft/s	-0.0831 ft/s	0.0 ft/s
Approximate Q	0.00 ft ³ /s	2.00 ft ³ /s	0.00 ft ³ /s

TABLE 4. RESULTS FOR 72-INCH STORM DRAIN WATER QUALITY ANALYSIS, MG/L

	72C	72D
Ammonia as NH₃	ND	0.170
Nitrate as NO₃	4.44	4.33
Total Kjeldahl, nitrogen	0.500	0.500
Phosphorus	0.0824	0.0802
Ortho. Dissolved phosphorus	0.0161	0.0271

12-INCH STORM DRAIN WITH OUTLET ON WEST SIDE OF MCCLOUD LAKE

The manhole for the 12-inch storm drain is located in the grass area due east of its outlet into McCloud Lake. This sample point was not tidally influenced throughout the day. The drainpipe was completely dry with no apparent wetness.

30-INCH STORM DRAIN WITH OUTLET ON SOUTH SIDE OF WEBER POINT PLAZA

The 30-inch storm drain was fully submerged at high tide. A return observation was not made during low tide. The water appeared to be clear with observable green and dark brown/black suspended particulate matter. The manhole was located on a sidewalk, a few feet south of the previous Weber Point Plaza. Construction activity was high as the foundation pier was actively being removed. Debris from the activity was abundant in the water and more debris was constantly falling into the water.

It was decided by sampling personnel that this 30-inch storm drain was not to be included in any further sampling throughout the day.

Velocity was negligible. A single grab sample of 3 liters was taken.

Table 5 shows the results from the 30-inch storm drain.

TABLE 5. 30-INCH STORM DRAIN SAMPLE TIMES, VELOCITIES, DEPTHS, AND Q RATES

	Sample 1	Sample 2	Sample 3
Time	2:12 p.m.	--	--
Depth	8 in.	--	--
Velocity	0.00 ft/s	--	--
Approximate Q	0.00 ft ³ /s	--	--

Table 6 shows the water quality results from the 42-inch storm drain.

TABLE 6. RESULTS FOR 30-INCH STORM DRAIN WATER QUALITY ANALYSIS, MG/L

	30
Ammonia as NH₃	0.100
Nitrate as NO₃	1.60
Total Kjeldahl, nitrogen	1.03
Phosphorus	0.354
Ortho. Dissolved phosphorus	0.0118