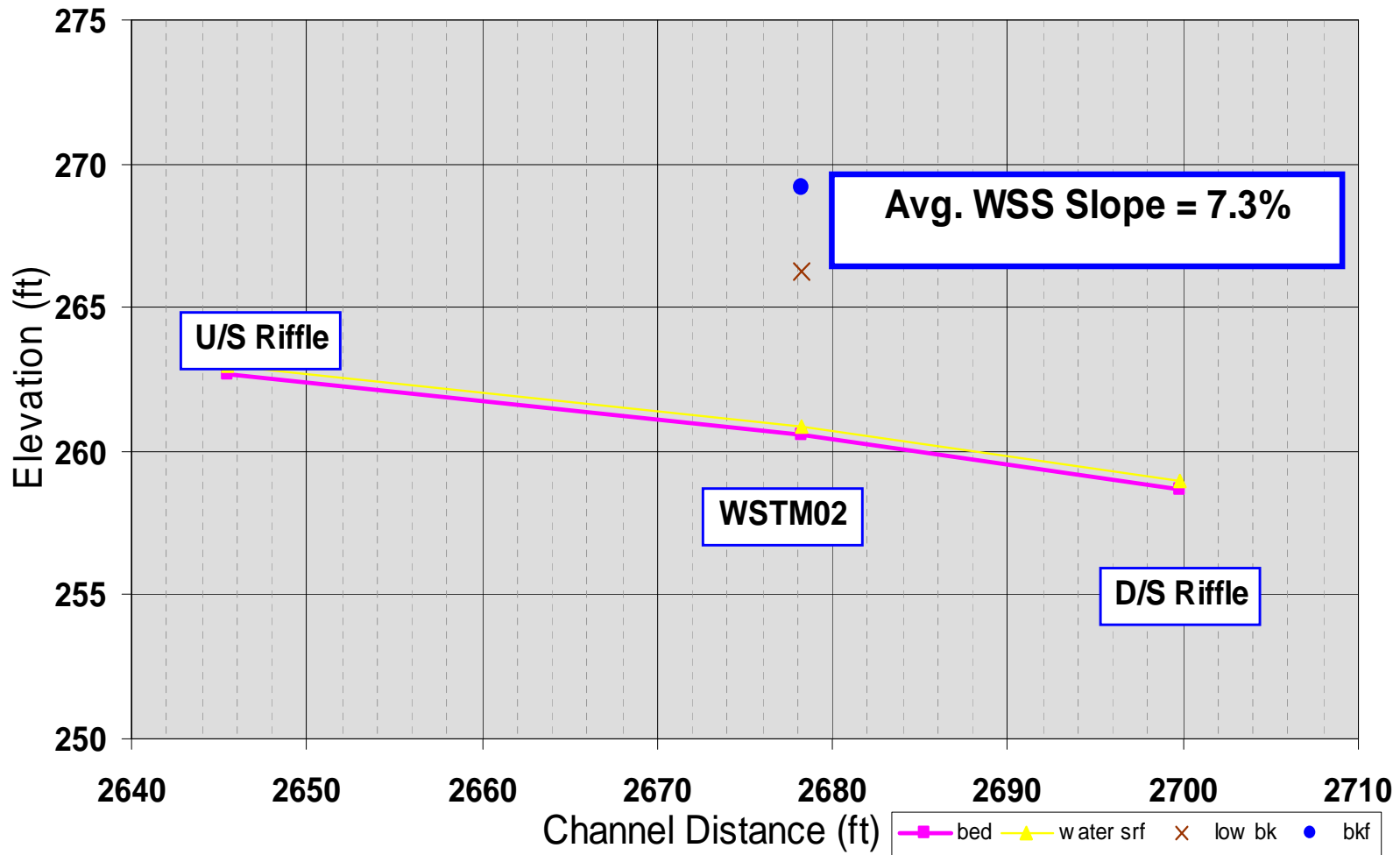


**APPENDIX A**  
FLUVIAL GEOMORPHOLOGY INFORMATION

# Thomas Mill Run



SECTION A.1: THOMAS MILL RUN

Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section  
WSTM-02**

Philadelphia  
Drainage Area = 0.07 mi<sup>2</sup>  
04/19/2005



**XS – DSR to DSL**



**XS – DSL to DSR**

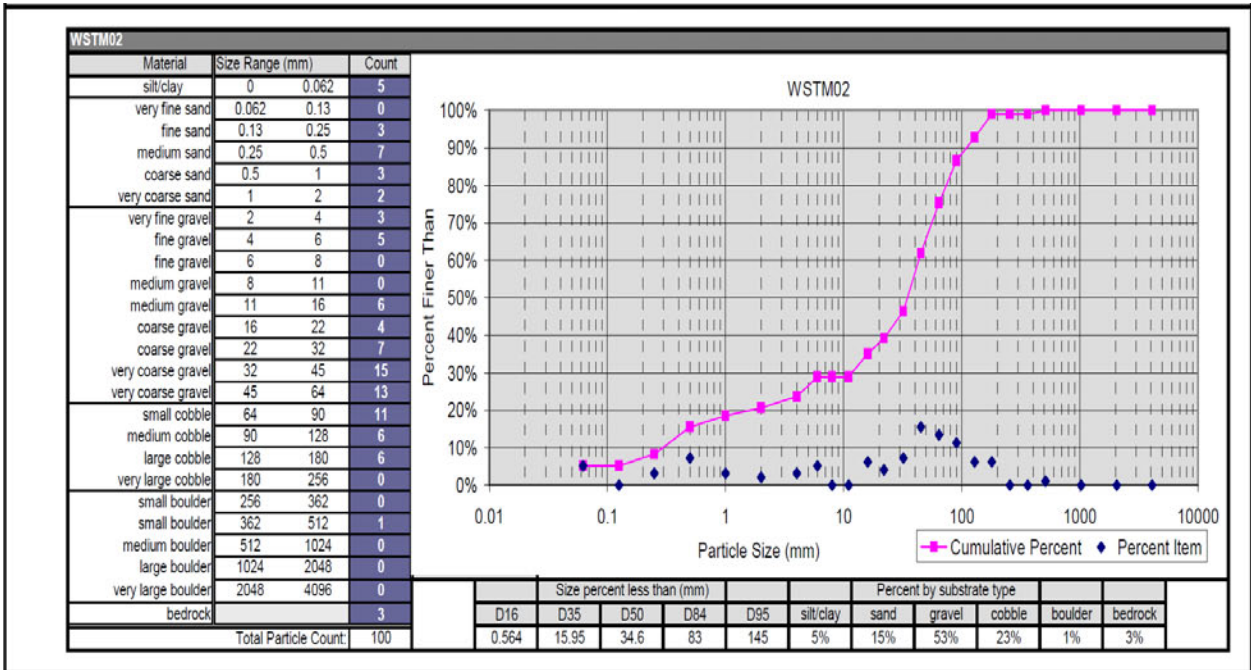
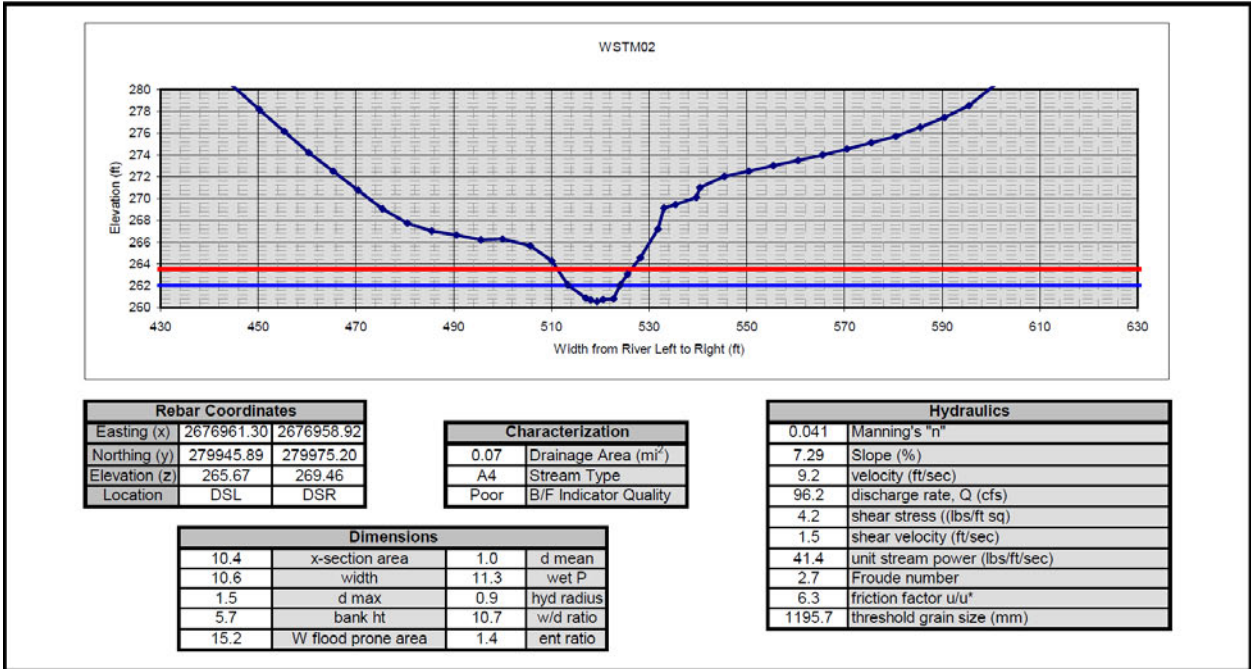
**Upstream View**

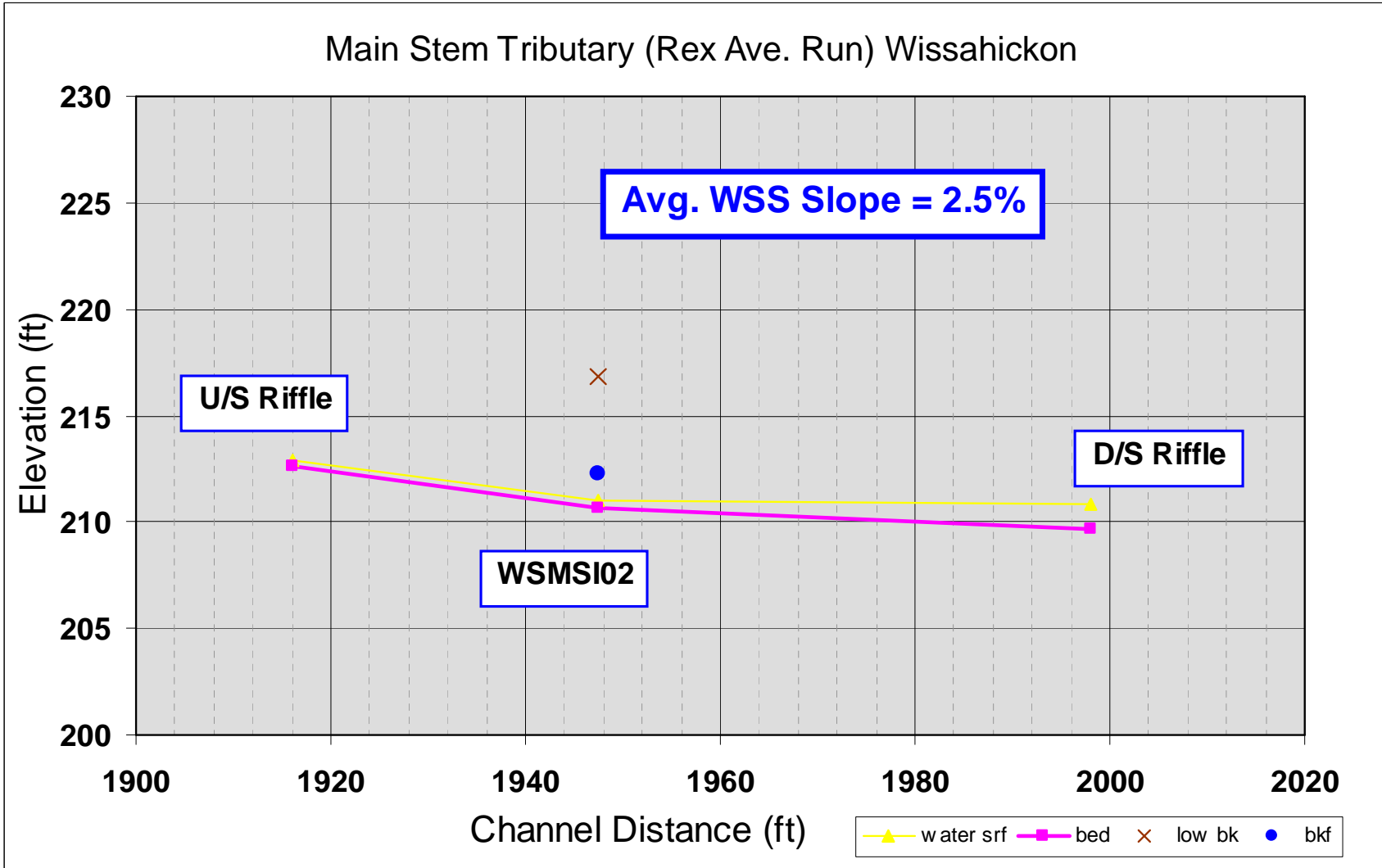


**Downstream View**



**XS = cross section / DSL = Downstream Left / DSR = Downstream Right**





Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section**  
**WSMSI-02**

Philadelphia  
Drainage Area = 0.16 mi<sup>2</sup>  
04/19/2005



**XS – DSR to DSL**

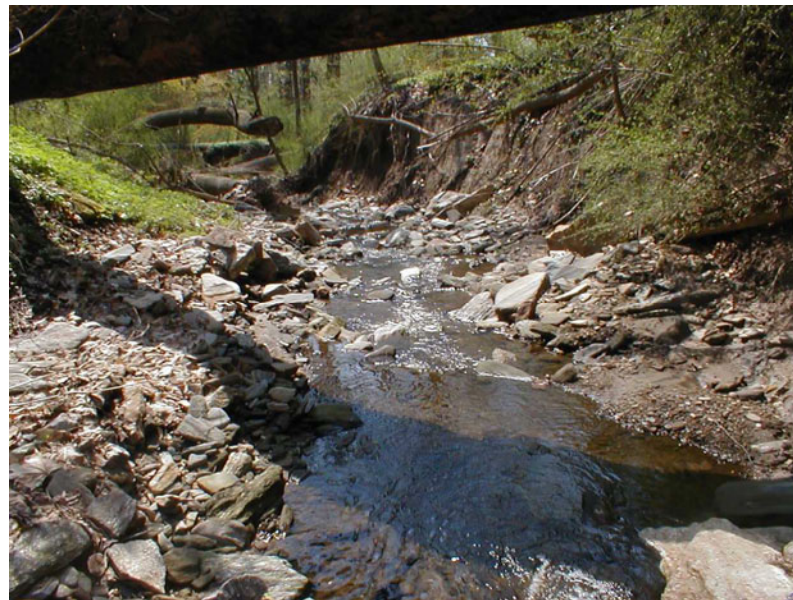


**XS – DSL to DSR**

**Upstream View**



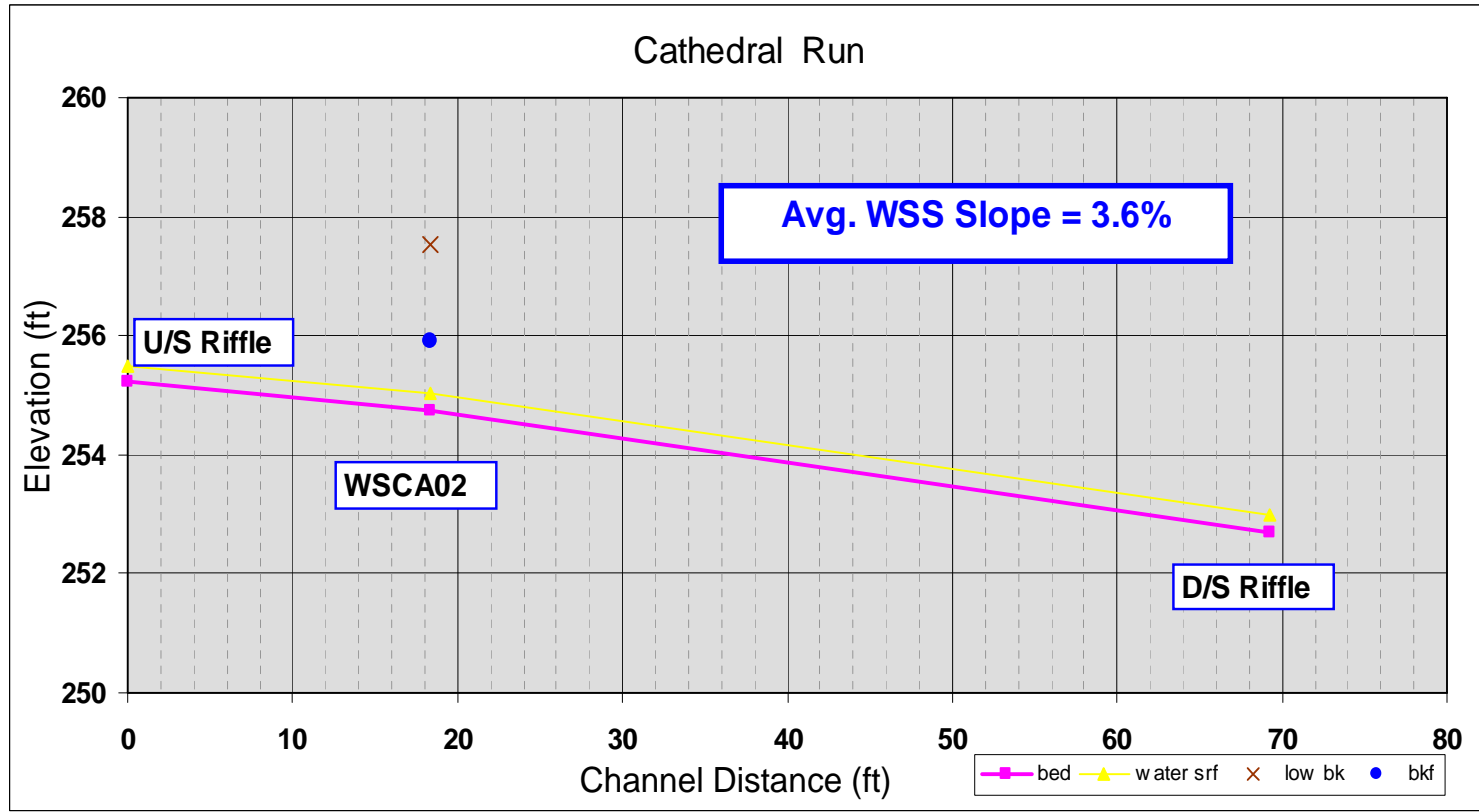
**Downstream View**



**XS = cross section / DSL = Downstream Left / DSR = Downstream Right**



SECTION A.3: CATHEDRAL RUN





Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section  
WSCA-02**

Philadelphia  
Drainage Area = 0.16 mi<sup>2</sup>  
04/21/02



**XS – DSR to DSL**



**XS – DSL to DSR**

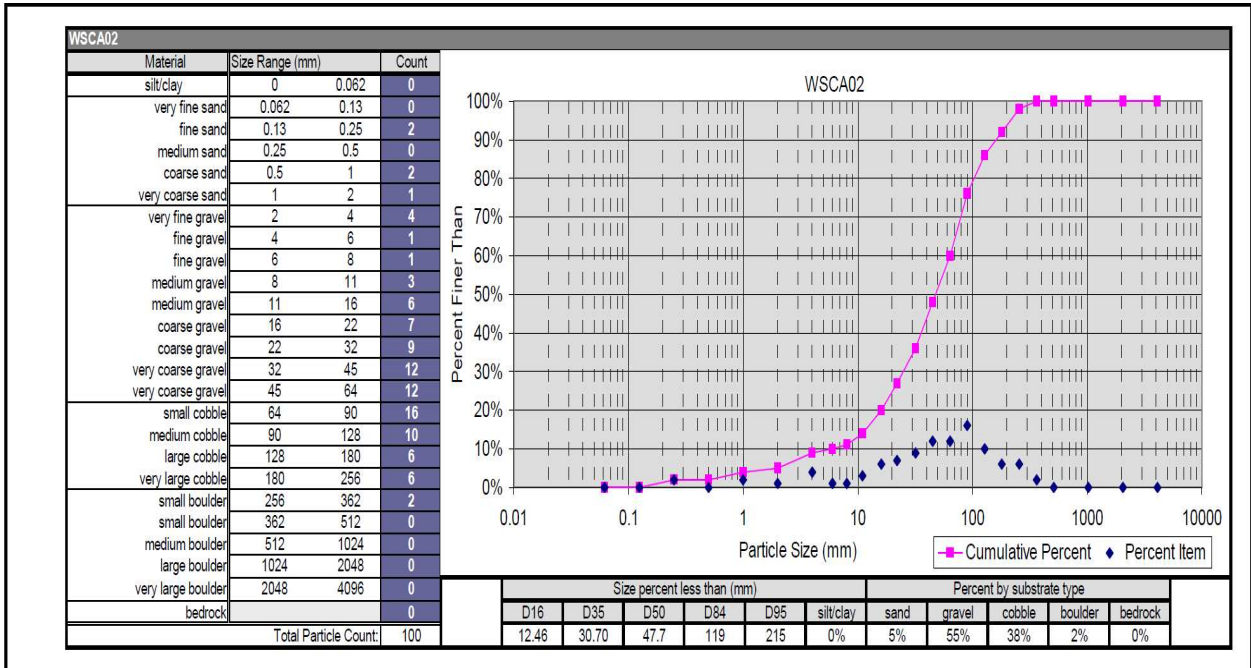
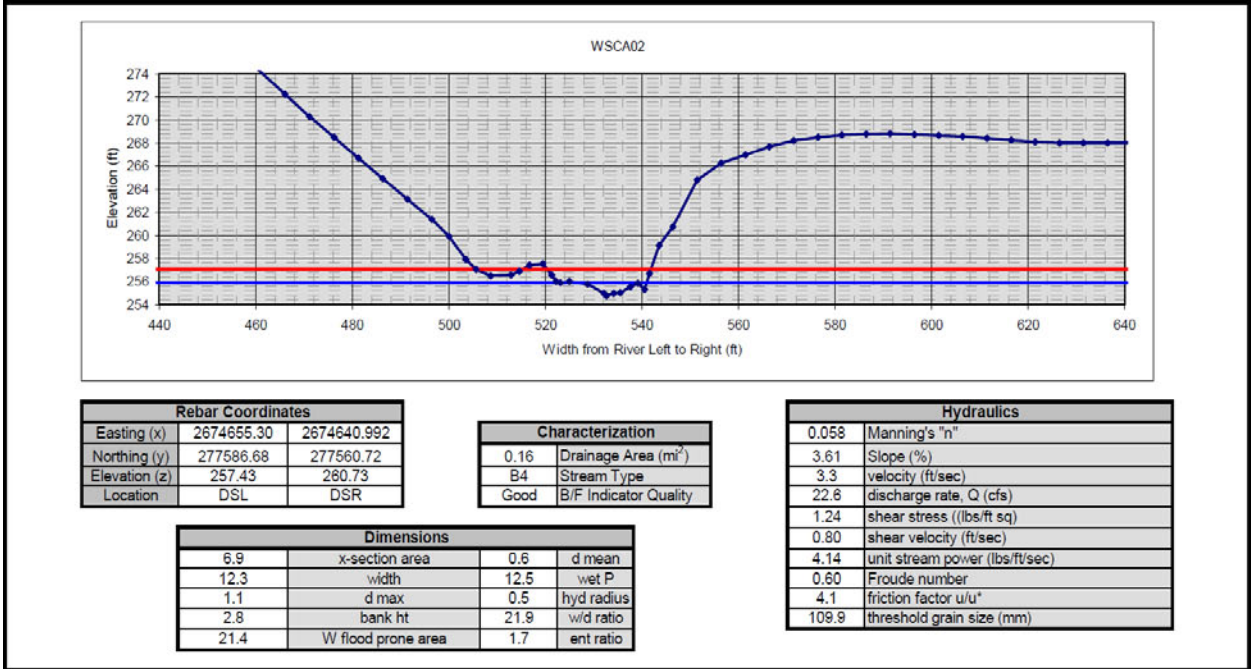
**Upstream View**



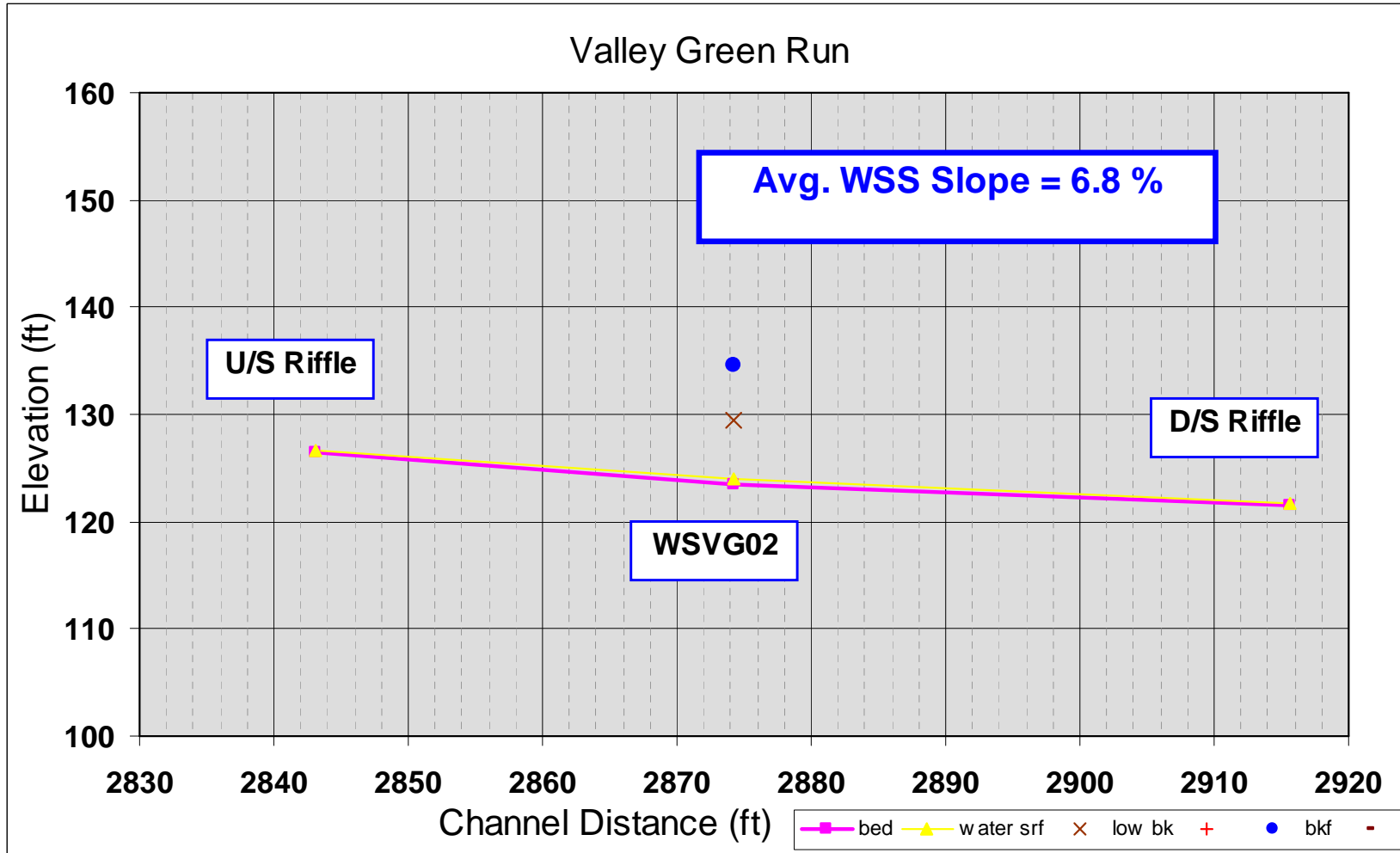
**Downstream View**



**XS = cross section / DSL = Downstream Left / DSR = Downstream Right**



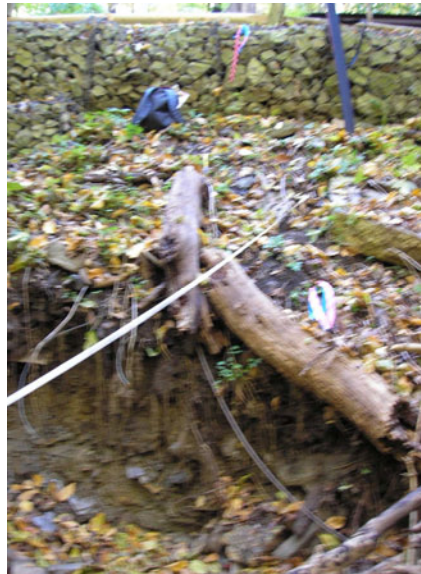
SECTION A.4: VALLEY GREEN RUN



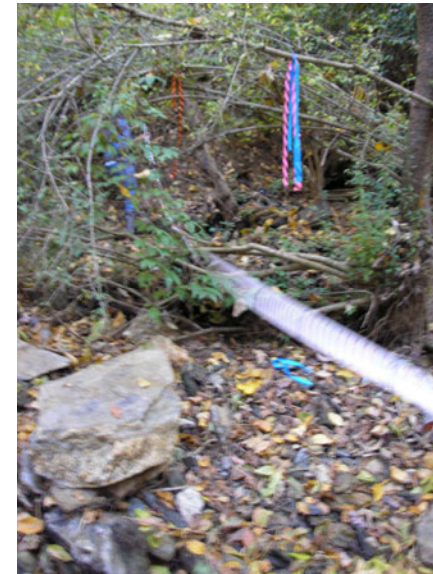
Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section  
WSVG-02**

Philadelphia Township  
Drainage Area = 0.19 mi<sup>2</sup>  
11/01/2005



**XS – DSR to DSL**

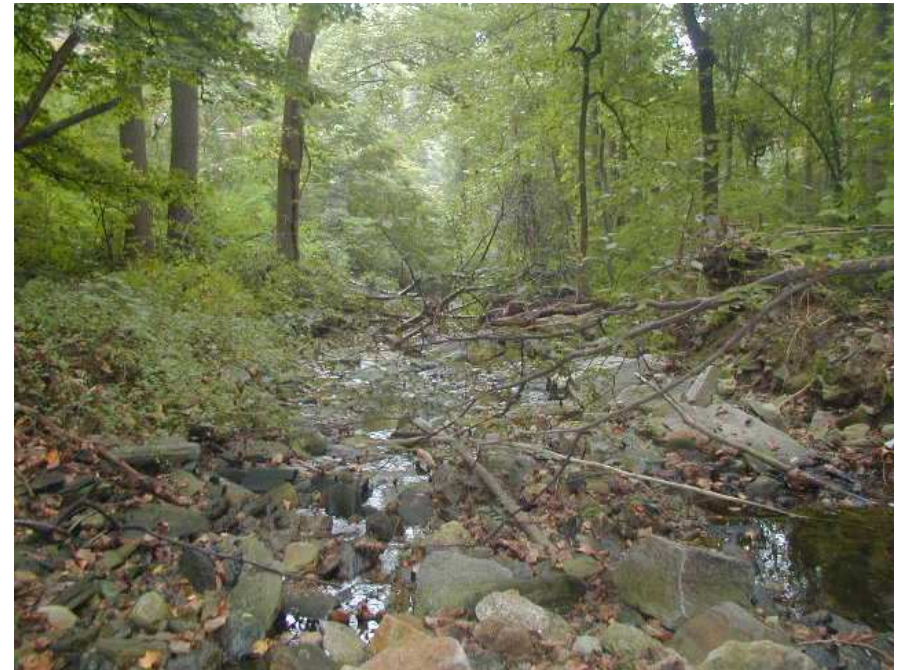


**XS – DSL to DSR**

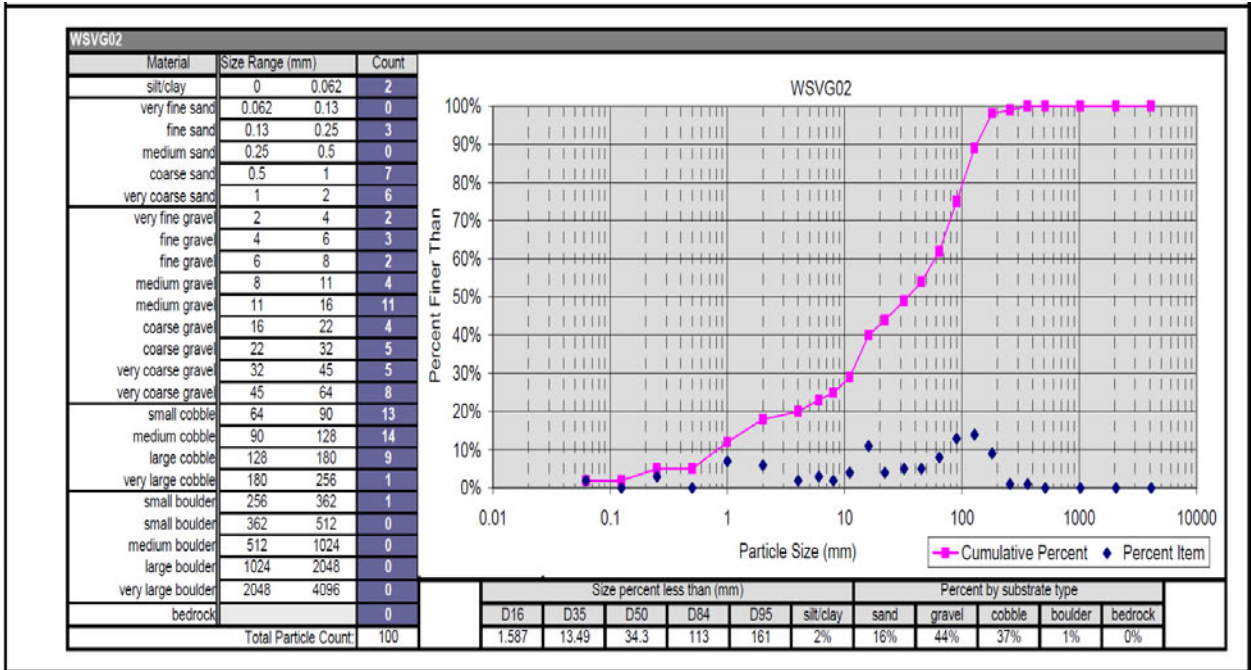
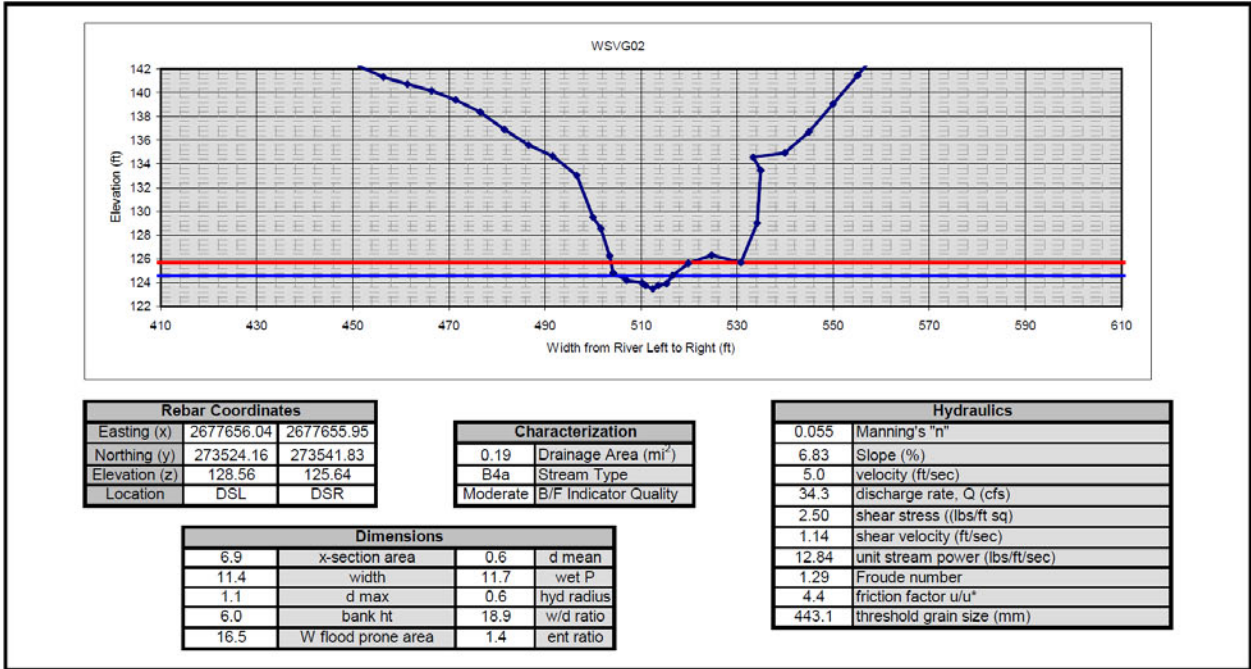
**Upstream View**



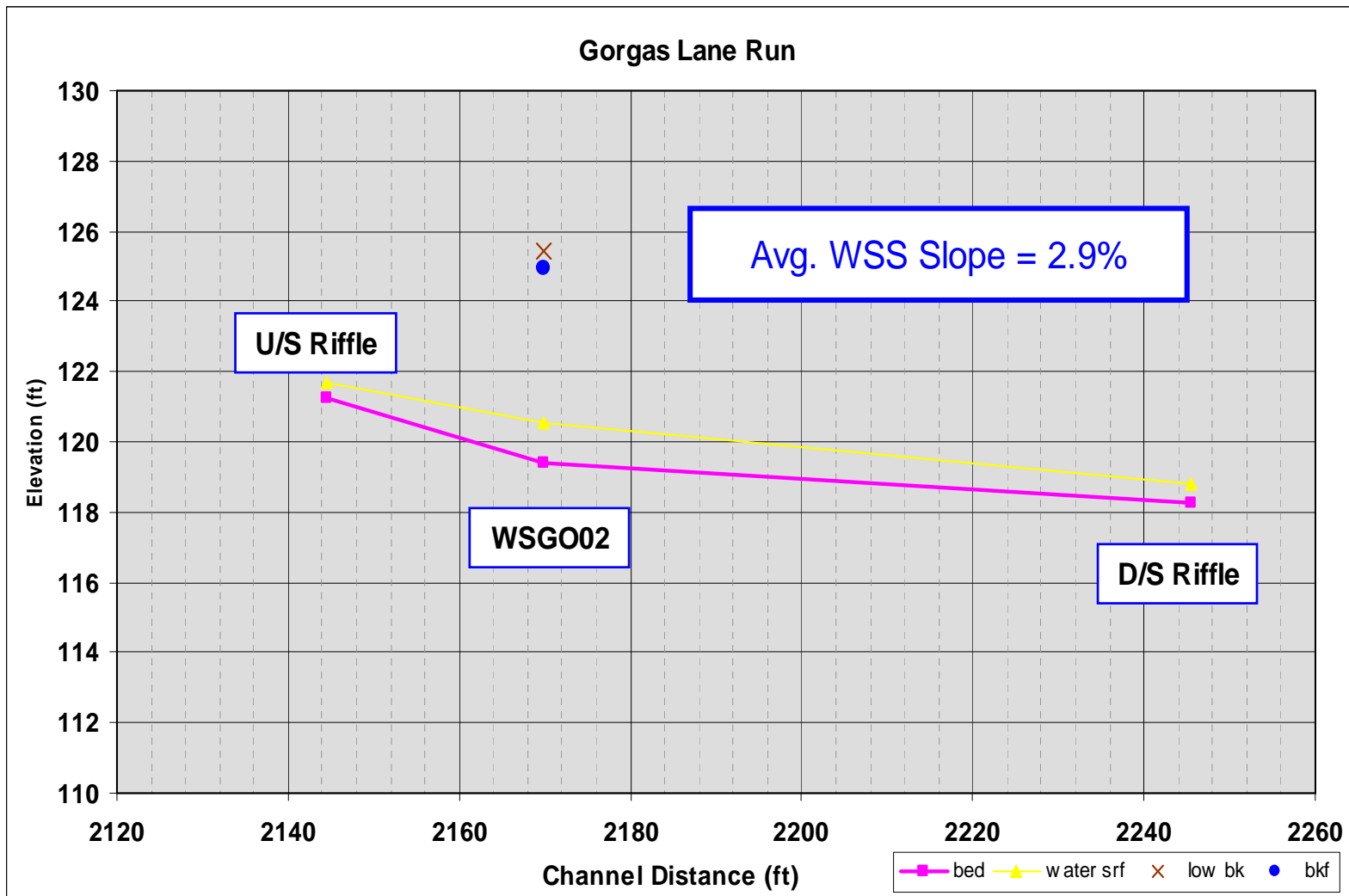
**Downstream View**



**XS = cross section / DSL = Downstream Left / DSR = Downstream Right**



SECTION A.5: GORGAS RUN



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section**  
**WSGO-02**

Philadelphia  
Drainage Area = 0.62 mi<sup>2</sup>  
04/28/2005



**XS – DSR to DSL**



**XS – DSL to DSR**

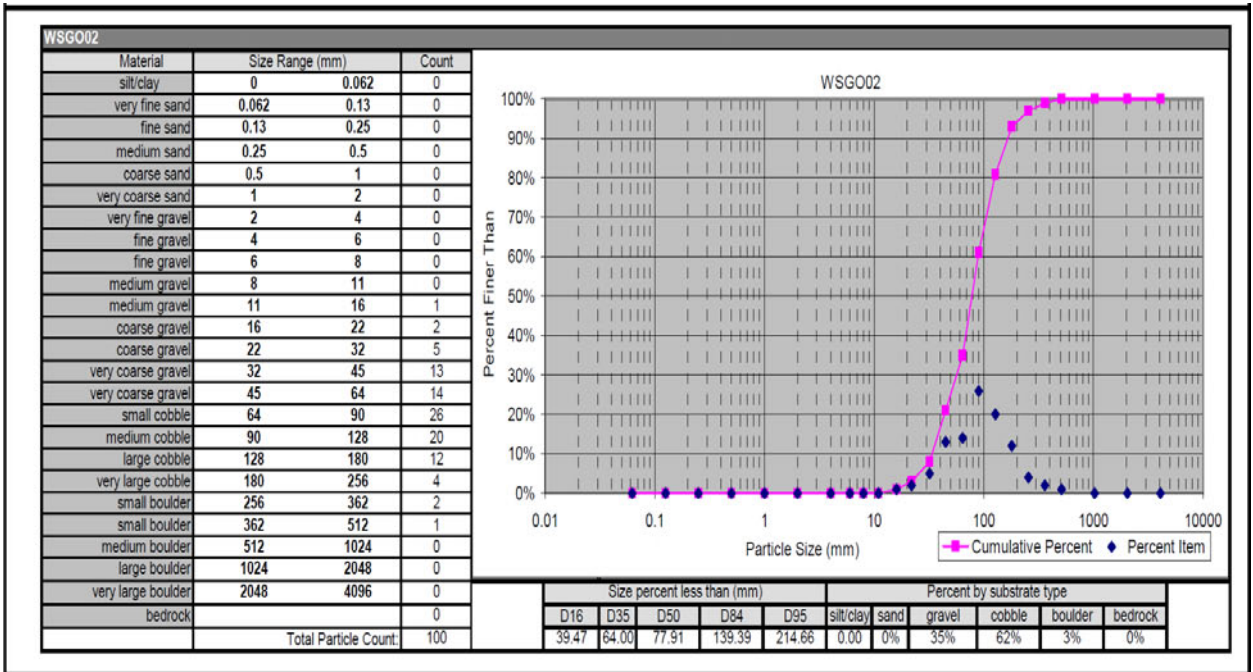
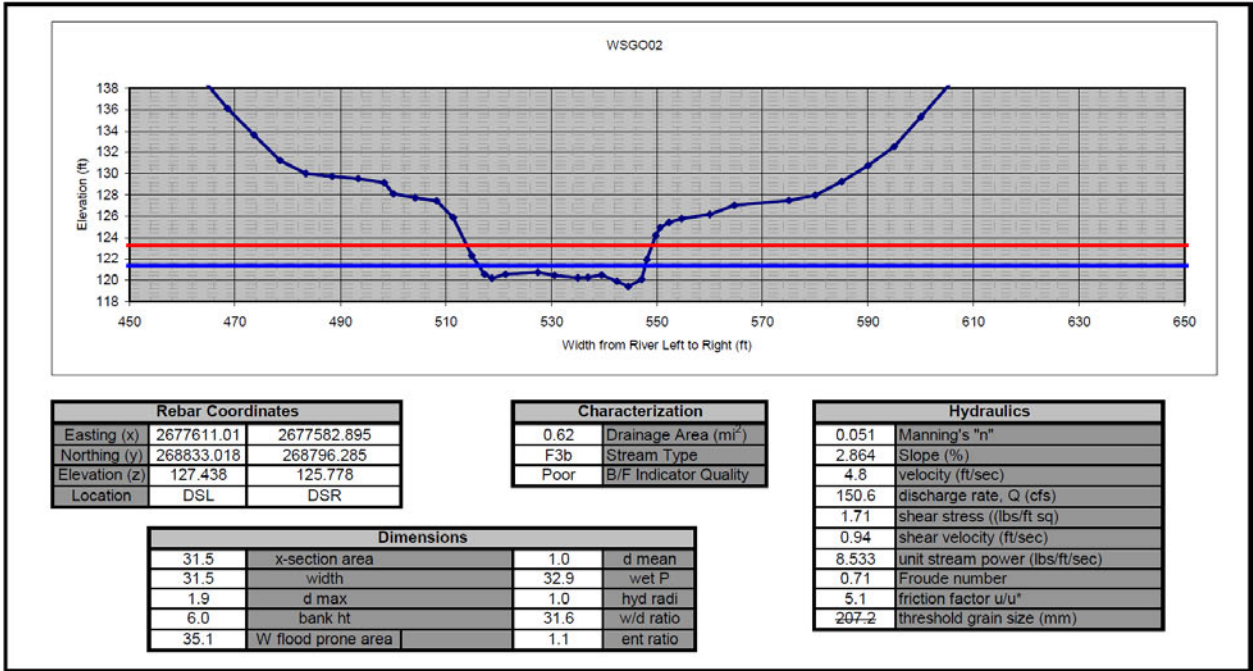
**Upstream View**



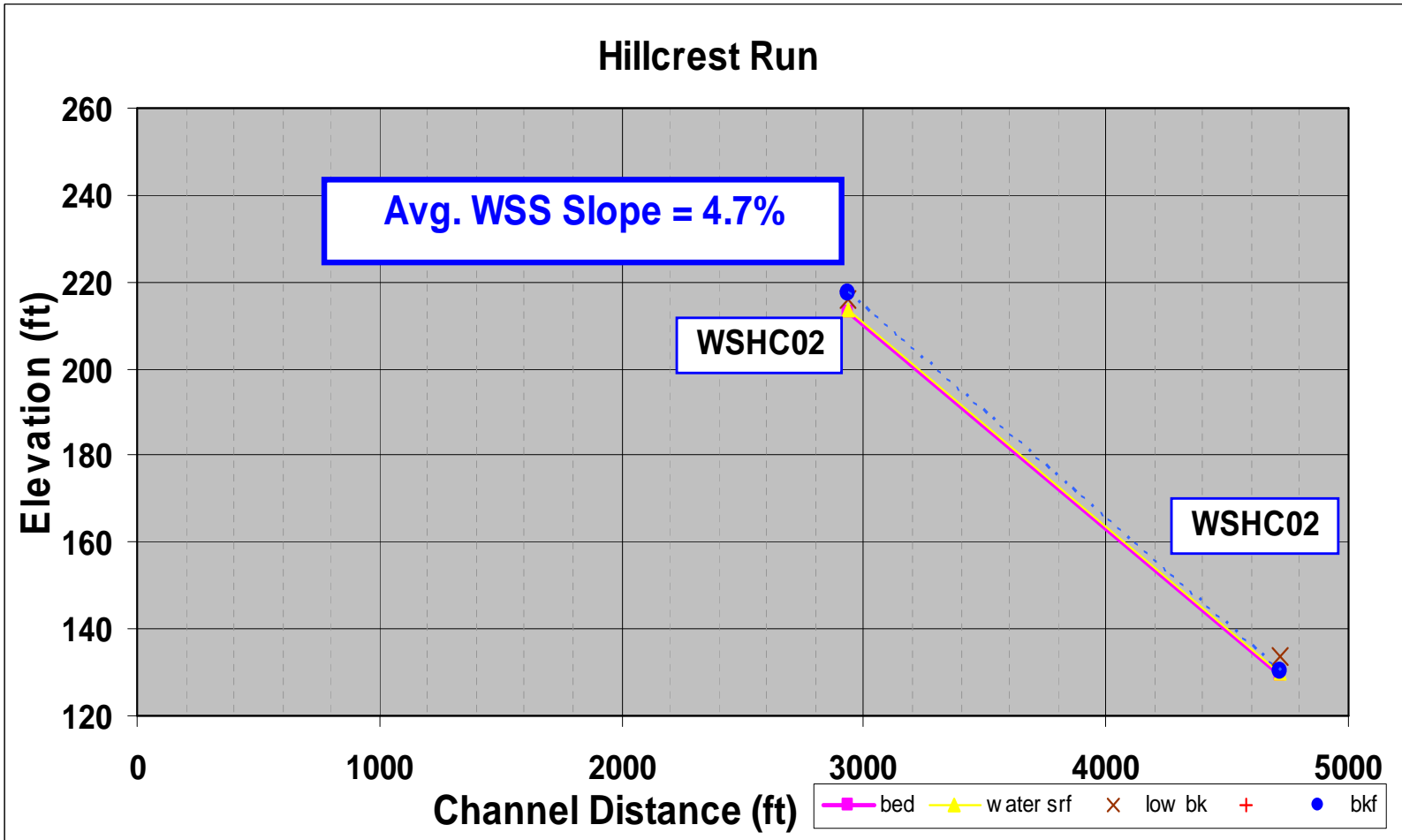
**Downstream View**



**XS = cross section / DSL = Downstream Left / DSR = Downstream Right**







Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section**  
**WSHC-02**

Philadelphia  
Drainage Area = 0.01 mi<sup>2</sup>  
04/19/2005



XS - DSR to DSL



XS - DSL to DSR

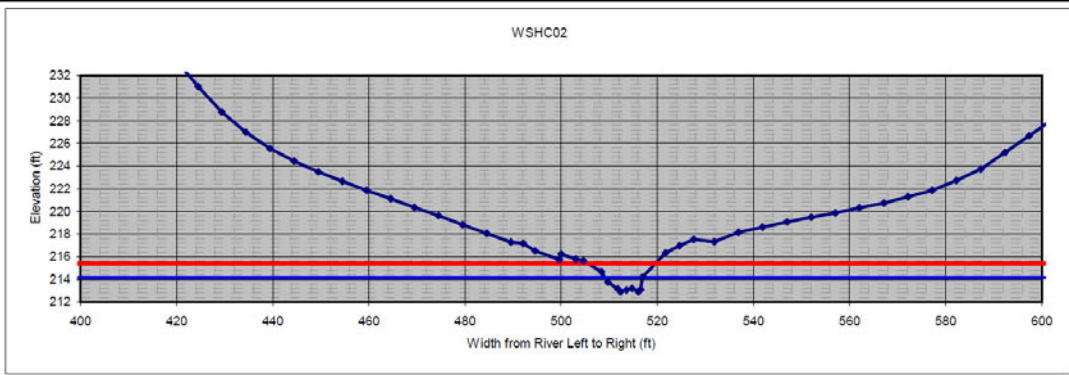
Upstream View



Downstream View



XS = cross section / DSL = Downstream Left / DSR = Downstream Right



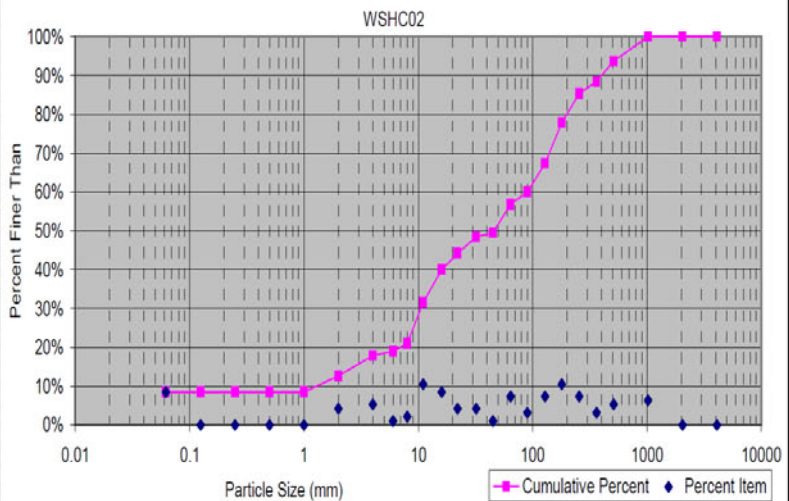
| Rebar Coordinates |            |            |
|-------------------|------------|------------|
| Easting (x)       | 2677914.96 | 2677928.41 |
| Northing (y)      | 283830.35  | 283840.67  |
| Elevation (z)     | 215.62     | 216.34     |
| Location          | DSL        | DSR        |

| Characterization |                                  |
|------------------|----------------------------------|
| 0.01             | Drainage Area (mi <sup>2</sup> ) |
| B4a              | Stream Type                      |
| Poor             | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.070      | Manning's "n"                  |
| 4.707      | Slope (%)                      |
| 3.6        | velocity (ft/sec)              |
| 25.7       | discharge rate, Q (cfs)        |
| 2.34       | shear stress ((lbs/ft sq)      |
| 1.10       | shear velocity (ft/sec)        |
| 9.706      | unit stream power (lbs/ft/sec) |
| 0.45       | Froude number                  |
| 3.3        | friction factor u/u*           |
| 381.4      | threshold grain size (mm)      |

| Dimensions |                    |     |            |
|------------|--------------------|-----|------------|
| 7.1        | x-section area     | 0.9 | d mean     |
| 7.8        | width              | 8.9 | wet P      |
| 1.2        | d max              | 0.8 | hyd radius |
| 2.9        | bank ht            | 8.5 | w/d ratio  |
| 14.1       | W flood prone area | 1.8 | ent ratio  |

| Material              | Size Range (mm) | Count |
|-----------------------|-----------------|-------|
| silt/clay             | 0 0.062         | 8     |
| very fine sand        | 0.062 0.13      | 0     |
| fine sand             | 0.13 0.25       | 0     |
| medium sand           | 0.25 0.5        | 0     |
| coarse sand           | 0.5 1           | 0     |
| very coarse sand      | 1 2             | 4     |
| very fine gravel      | 2 4             | 5     |
| fine gravel           | 4 6             | 1     |
| fine gravel           | 6 8             | 2     |
| medium gravel         | 8 11            | 10    |
| medium gravel         | 11 16           | 8     |
| coarse gravel         | 16 22           | 4     |
| coarse gravel         | 22 32           | 4     |
| very coarse gravel    | 32 45           | 1     |
| very coarse gravel    | 45 64           | 7     |
| small cobble          | 64 90           | 3     |
| medium cobble         | 90 128          | 7     |
| large cobble          | 128 180         | 10    |
| very large cobble     | 180 256         | 7     |
| small boulder         | 256 362         | 3     |
| small boulder         | 362 512         | 5     |
| medium boulder        | 512 1024        | 6     |
| large boulder         | 1024 2048       | 0     |
| very large boulder    | 2048 4096       | 0     |
| bedrock               |                 | 5     |
| Total Particle Count: |                 | 100   |



| Size percent less than (mm) |       |       |        |        | Percent by substrate type |      |        |        |         |         |
|-----------------------------|-------|-------|--------|--------|---------------------------|------|--------|--------|---------|---------|
| D16                         | D35   | D50   | D84    | D95    | silt/clay                 | sand | gravel | cobble | boulder | bedrock |
| 3.12                        | 12.81 | 46.15 | 241.00 | 591.54 | 0.08                      | 4%   | 42%    | 27%    | 14%     | 5%      |

Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section**  
**WSHC04**

Philadelphia  
Drainage Area = 0.25 mi<sup>2</sup>  
09/30/2005



XS - DSR to DSL



XS - DSL to DSR

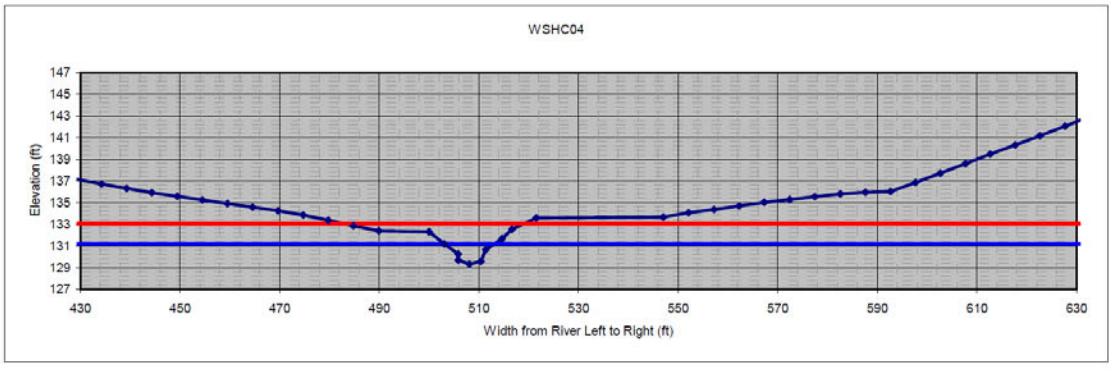
Upstream View



Downstream View



XS = cross section / DSL = Downstream Left / DSR = Downstream Right



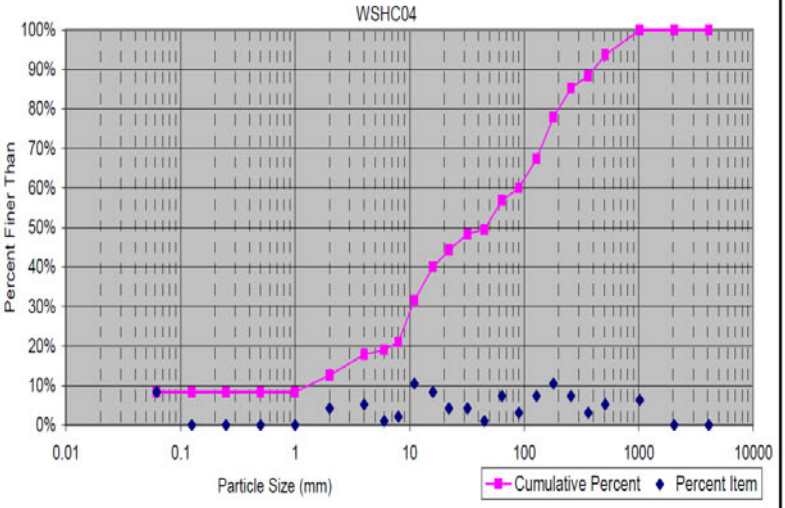
| Rebar Coordinates |             |             |
|-------------------|-------------|-------------|
| Easting (x)       | 2675697.571 | 2675690.983 |
| Northing (y)      | 284260.1741 | 284275.5064 |
| Elevation (z)     | 132.29      | 132.51      |
| Location          | DSL         | DSR         |

| Characterization |                                  |
|------------------|----------------------------------|
| 0.25             | Drainage Area (mi <sup>2</sup> ) |
| B4a              | Stream Type                      |
| Poor             | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.070      | Manning's "n"                  |
| 4.707      | Slope (%)                      |
| 4.4        | velocity (ft/sec)              |
| 46.4       | discharge rate, Q (cfs)        |
| 2.74       | shear stress ((lbs/ft sq)      |
| 1.19       | shear velocity (ft/sec)        |
| 13.536     | unit stream power (lbs/ft/sec) |
| 0.56       | Froude number                  |
| 3.7        | friction factor u/u*           |
| 518.3      | threshold grain size (mm)      |

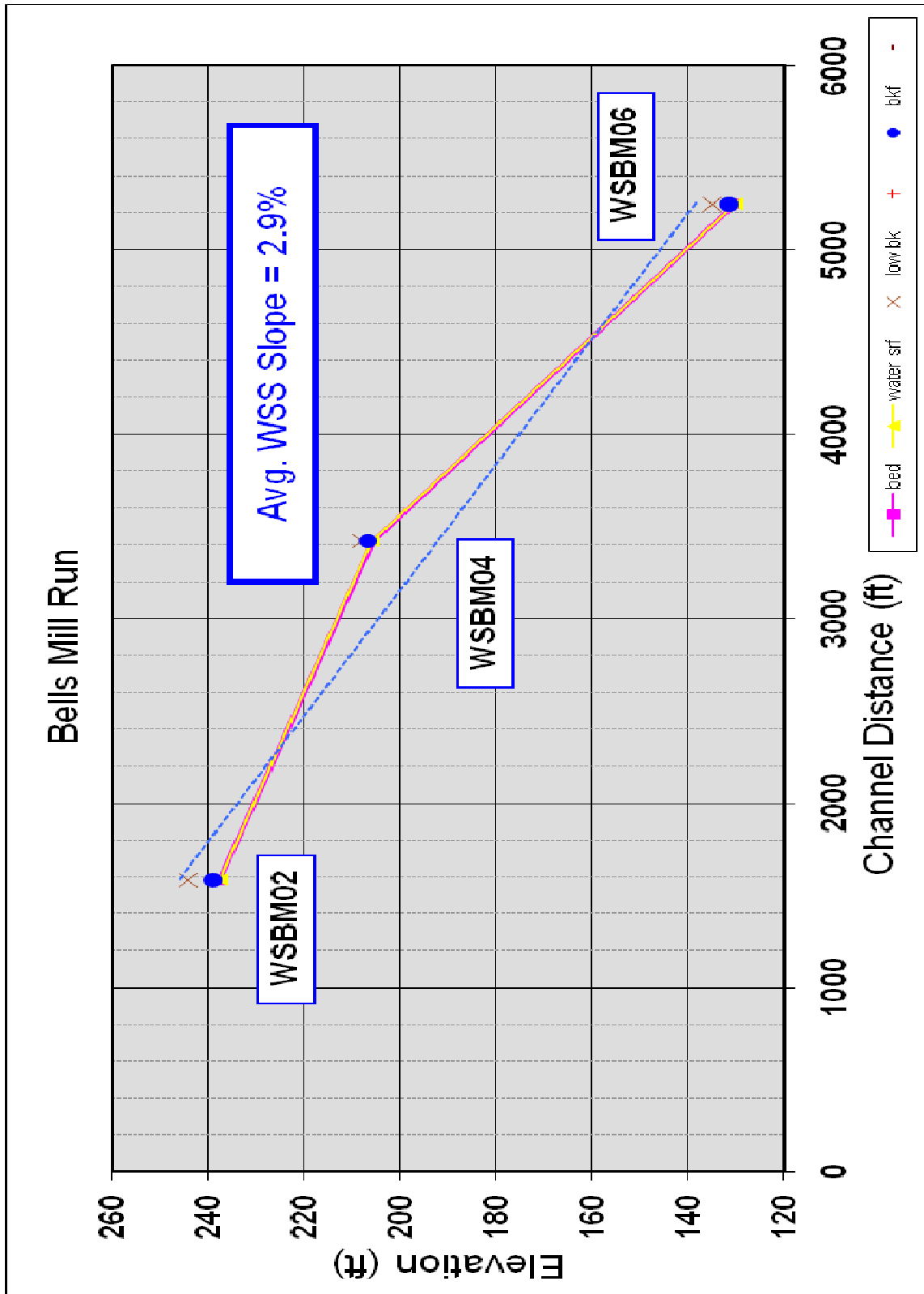
| Dimensions |                    |      |            |
|------------|--------------------|------|------------|
| 10.6       | x-section area     | 1.1  | d mean     |
| 10.1       | width              | 11.4 | wet P      |
| 1.8        | d max              | 0.9  | hyd radius |
| 4.3        | bank ht            | 9.6  | w/d ratio  |
| 35.9       | W flood prone area | 3.6  | ent ratio  |

| WSHC04                |                 |       |
|-----------------------|-----------------|-------|
| Material              | Size Range (mm) | Count |
| silt/clay             | 0 0.062         | 8     |
| very fine sand        | 0.062 0.13      | 0     |
| fine sand             | 0.13 0.25       | 0     |
| medium sand           | 0.25 0.5        | 0     |
| coarse sand           | 0.5 1           | 0     |
| very coarse sand      | 1 2             | 4     |
| very fine gravel      | 2 4             | 5     |
| fine gravel           | 4 6             | 1     |
| fine gravel           | 6 8             | 2     |
| medium gravel         | 8 11            | 10    |
| medium gravel         | 11 16           | 8     |
| coarse gravel         | 16 22           | 4     |
| coarse gravel         | 22 32           | 4     |
| very coarse gravel    | 32 45           | 1     |
| very coarse gravel    | 45 64           | 7     |
| small cobble          | 64 90           | 3     |
| medium cobble         | 90 128          | 7     |
| large cobble          | 128 180         | 10    |
| very large cobble     | 180 256         | 7     |
| small boulder         | 256 362         | 3     |
| small boulder         | 362 512         | 5     |
| medium boulder        | 512 1024        | 6     |
| large boulder         | 1024 2048       | 0     |
| very large boulder    | 2048 4096       | 0     |
| bedrock               |                 | 5     |
| Total Particle Count: |                 | 100   |



| Size percent less than (mm) |       |       |        |        | Percent by substrate type |      |        |        |         |         |
|-----------------------------|-------|-------|--------|--------|---------------------------|------|--------|--------|---------|---------|
| D16                         | D35   | D50   | D84    | D95    | silt/clay                 | sand | gravel | cobble | boulder | bedrock |
| 3.12                        | 12.81 | 46.15 | 241.00 | 591.54 | 8%                        | 4%   | 42%    | 27%    | 14%     | 5%      |

# SECTION A.7 BELLS MILL RUN



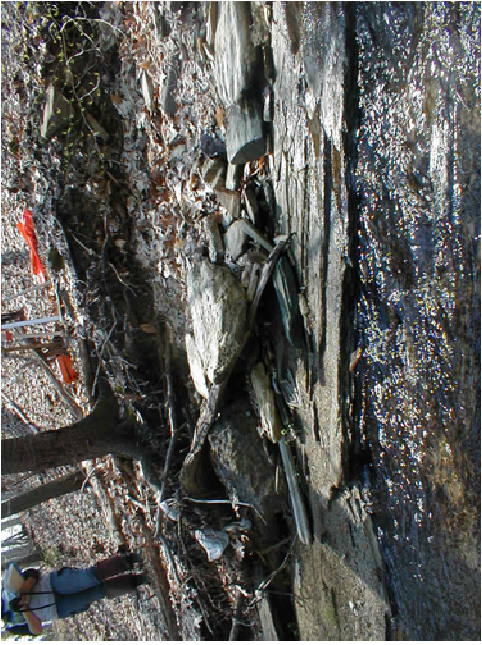
Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section**  
**WSBM-02**

Philadelphia  
Drainage Area = 0.19 mi<sup>2</sup>  
04/19/2005



XS – DSR to DSL



XS – DSL to DSR

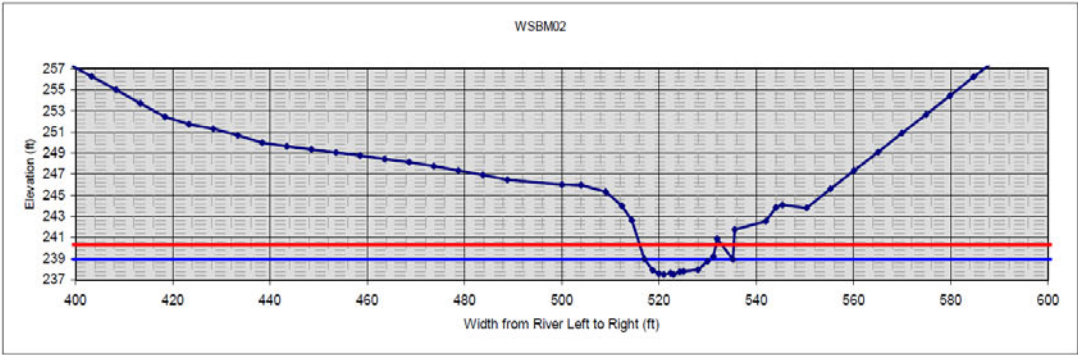
Upstream View



Downstream View



XS = cross section / DSL = Downstream Left / DSR = Downstream Right

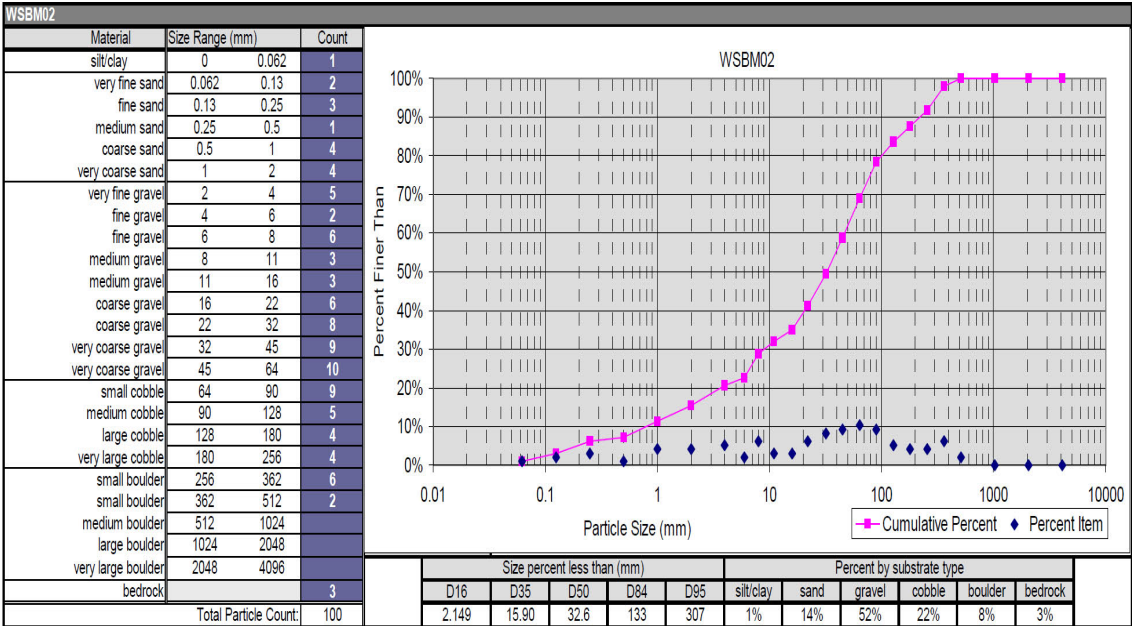


| Rebar Coordinates |             |            |
|-------------------|-------------|------------|
| Easting (x)       | 2671799.59  | 2671820.86 |
| Northing (y)      | 279732.6788 | 279716.092 |
| Elevation (z)     | 244.01      | 242.54     |
| Location          | DSL         | DSR        |

| Characterization |                                  |
|------------------|----------------------------------|
| 0.19             | Drainage Area (mi <sup>2</sup> ) |
| B4c              | Stream Type                      |
| Moderate         | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.050      | Manning's "n"                  |
| 1.72       | Slope (%)                      |
| 3.7        | velocity (ft/sec)              |
| 47.7       | discharge rate, Q (cfs)        |
| 1.00       | shear stress ((lbs/ft sq)      |
| 0.72       | shear velocity (ft/sec)        |
| 3.874      | unit stream power (lbs/ft/sec) |
| 0.43       | Froude number                  |
| 5.1        | friction factor u/u'           |
| 73.2       | threshold grain size (mm)      |

| Dimensions |                    |      |            |
|------------|--------------------|------|------------|
| 12.9       | x-section area     | 1.0  | d mean     |
| 13.2       | width              | 13.8 | wet P      |
| 1.4        | d max              | 0.9  | hyd radius |
| 6.6        | bank ht            | 13.6 | w/d ratio  |
| 16.3       | W flood prone area | 1.2  | ent ratio  |





Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section**  
**WSBM-04**

Philadelphia  
Drainage Area = 0.30 mi<sup>2</sup>  
04/19/2005



**XS - DSR to DSL**



**XS - DSL to DSR**

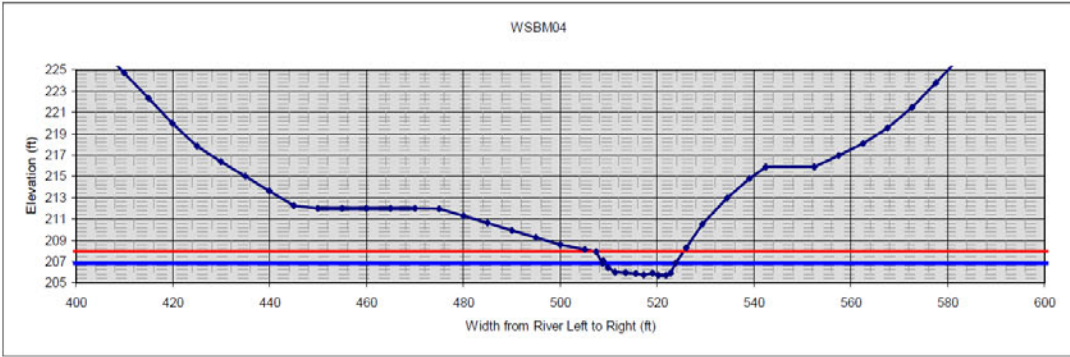
**Upstream View**



**Downstream View**



XS = cross section / DSL = Downstream Left / DSR = Downstream Right

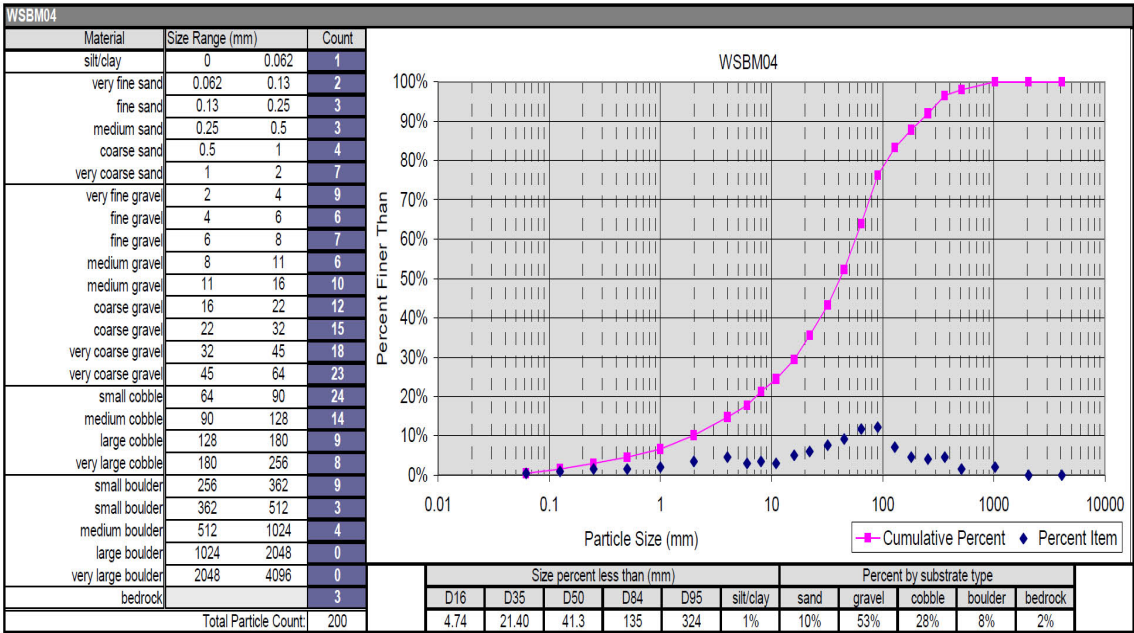


| Rebar Coordinates |             |             |
|-------------------|-------------|-------------|
| Easting (x)       | 2672577.90  | 2672602.792 |
| Northing (y)      | 280397.7867 | 280370.48   |
| Elevation (z)     | 208.13      | 215.87      |
| Location          | DSL         | DSR         |

| Characterization |                                  |
|------------------|----------------------------------|
| 0.30             | Drainage Area (mi <sup>2</sup> ) |
| B4               | Stream Type                      |
| Fair             | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.053      | Manning's "n"                  |
| 2.93       | Slope (%)                      |
| 4.3        | velocity (ft/sec)              |
| 54.3       | discharge rate, Q (cfs)        |
| 1.53       | shear stress ((lbs/ft sq)      |
| 0.89       | shear velocity (ft/sec)        |
| 6.84       | unit stream power (lbs/ft/sec) |
| 0.65       | Froude number                  |
| 4.8        | friction factor u/u*           |
| 166.5      | threshold grain size (mm)      |

| Dimensions |                    |      |            |
|------------|--------------------|------|------------|
| 12.7       | x-section area     | 0.9  | d mean     |
| 14.5       | width              | 15.1 | wet P      |
| 1.1        | d max              | 0.8  | hyd radius |
| 2.2        | bank ht            | 16.7 | w/d ratio  |
| 18.7       | W flood prone area | 1.3  | ent ratio  |



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section**  
**WSBM-06**

Philadelphia  
Drainage Area = 0.51 mi<sup>2</sup>  
09/29/2005



XS – DSR to DSL



XS – DSL to DSR

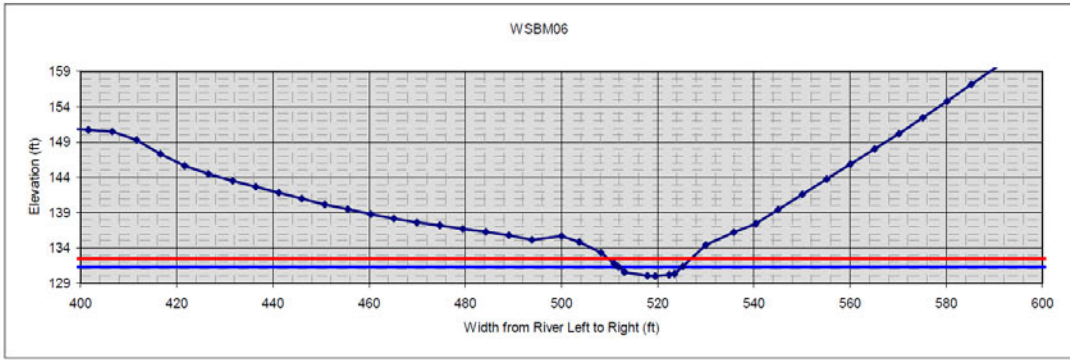
Upstream View



Downstream View



XS = cross section / DSL = Downstream Left / DSR = Downstream Right

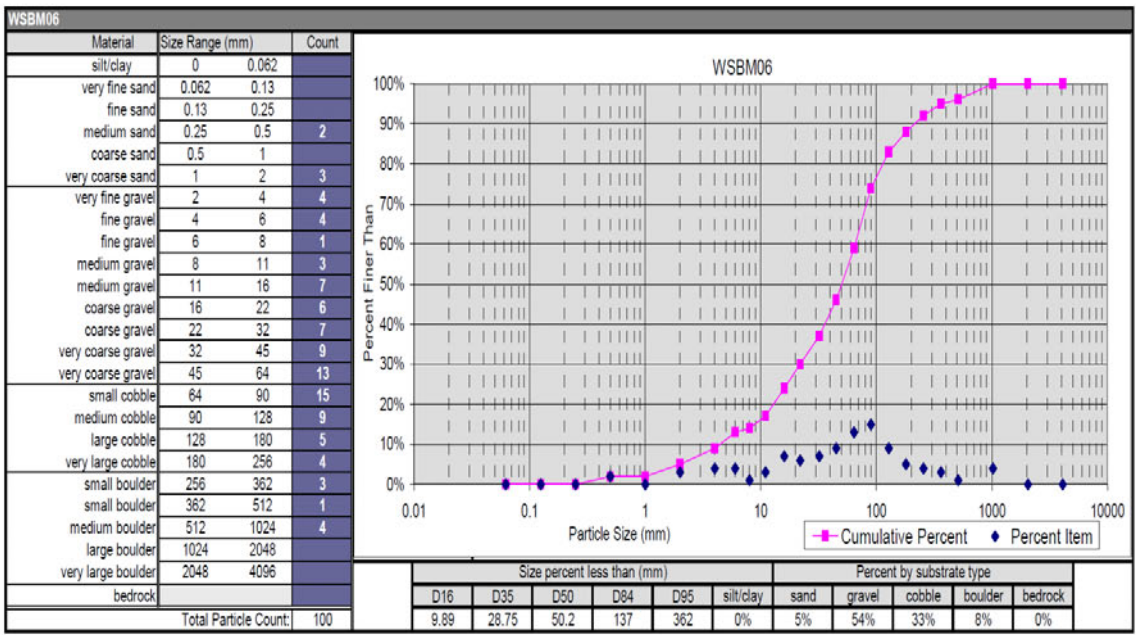


| Rebar Coordinates |                         |
|-------------------|-------------------------|
| Easting (x)       | 2674468.73   2674482.10 |
| Northing (y)      | 281435.48   281418.51   |
| Elevation (z)     | 244.01   242.54         |
| Location          | DSL   DSR               |

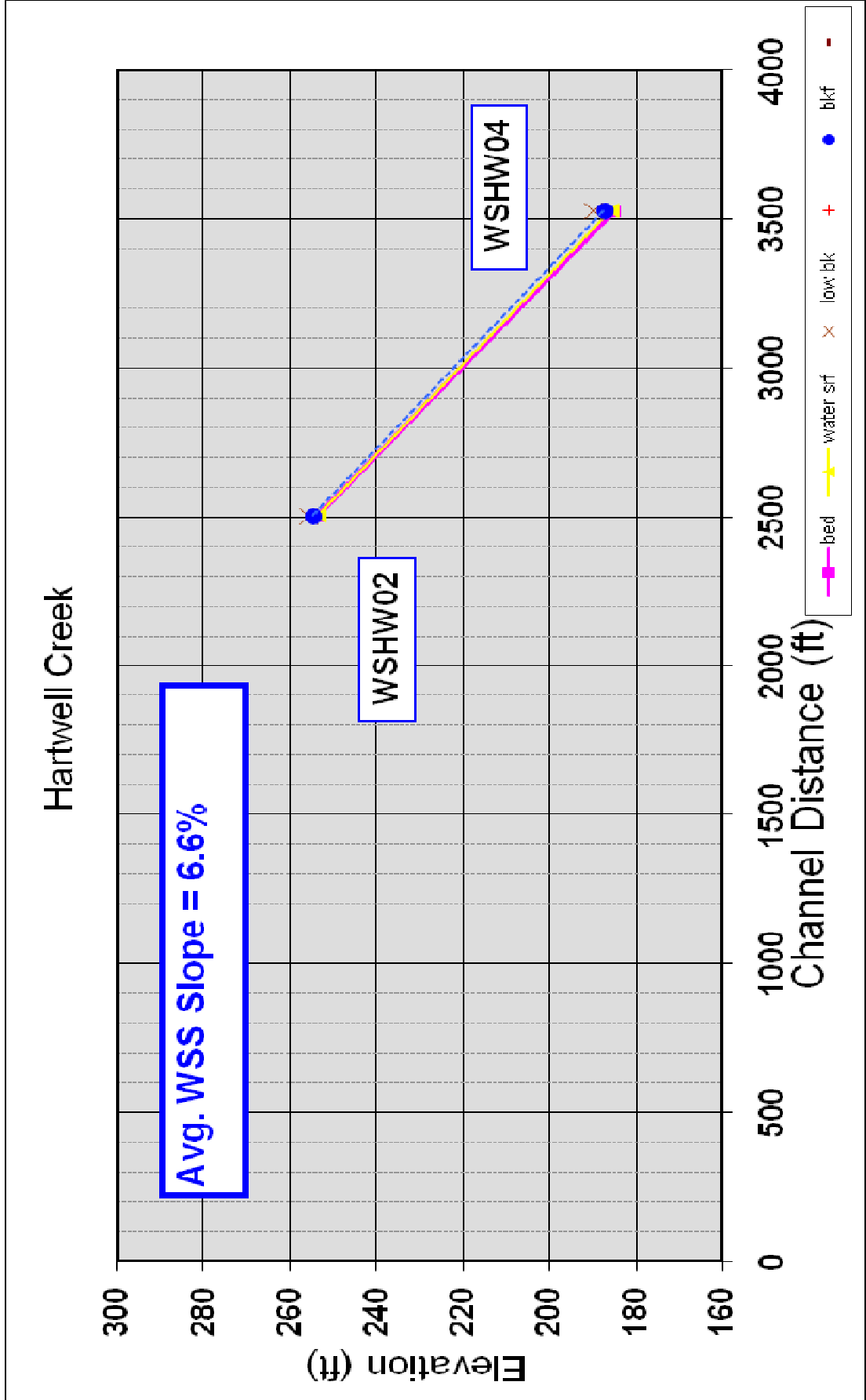
| Characterization |                                  |
|------------------|----------------------------------|
| 0.19             | Drainage Area (mi <sup>2</sup> ) |
| B4c              | Stream Type                      |
| Moderate         | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.050      | Manning's "n"                  |
| 1.72       | Slope (%)                      |
| 3.7        | velocity (ft/sec)              |
| 47.7       | discharge rate, Q (cfs)        |
| 1.00       | shear stress ((lbs/ft sq)      |
| 0.72       | shear velocity (ft/sec)        |
| 3.87       | unit stream power (lbs/ft/sec) |
| 0.43       | Froude number                  |
| 5.1        | friction factor u/u*           |
| 73.2       | threshold grain size (mm)      |

| Dimensions |                    |      |            |
|------------|--------------------|------|------------|
| 12.9       | x-section area     | 1.0  | d mean     |
| 13.2       | width              | 13.8 | wet P      |
| 1.4        | d max              | 0.9  | hyd radius |
| 6.6        | bank ht            | 13.6 | w/d ratio  |
| 16.3       | W flood prone area | 1.2  | ent ratio  |



SECTION A.8: HARTWELL CREEK



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section**  
**WSHW-02**

Philadelphia  
Drainage Area = 0.00 mi<sup>2</sup>  
04/20/2005



**XS - DSR to DSL**



**XS - DSL to DSR**

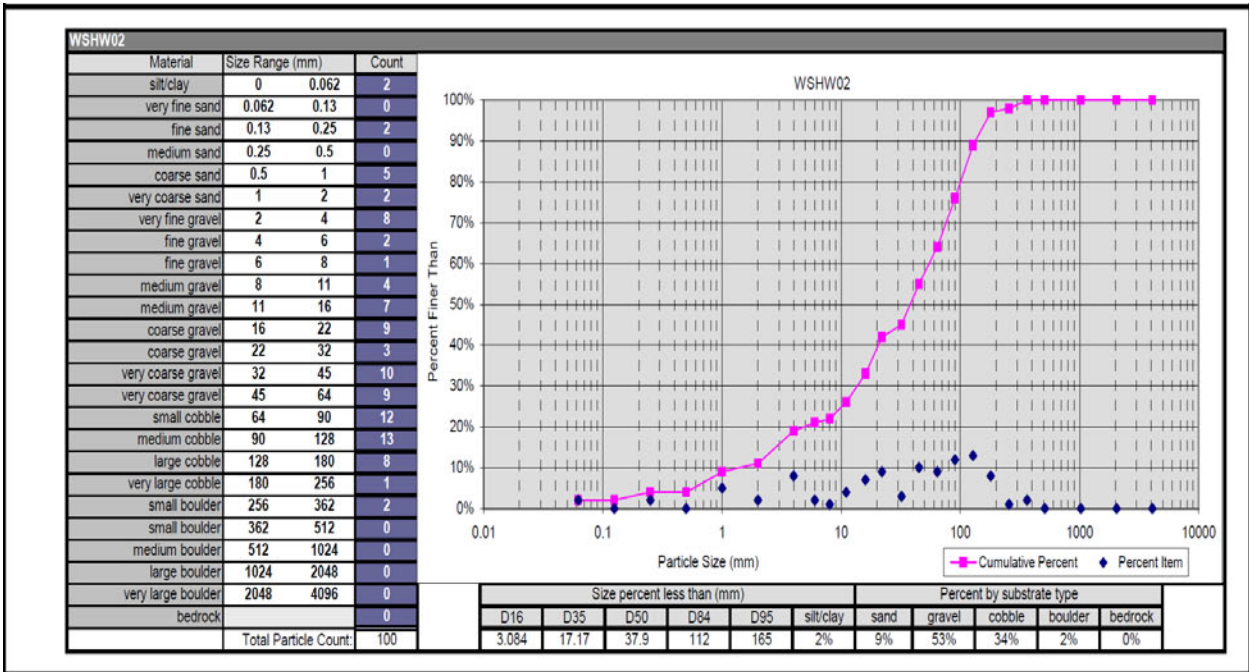
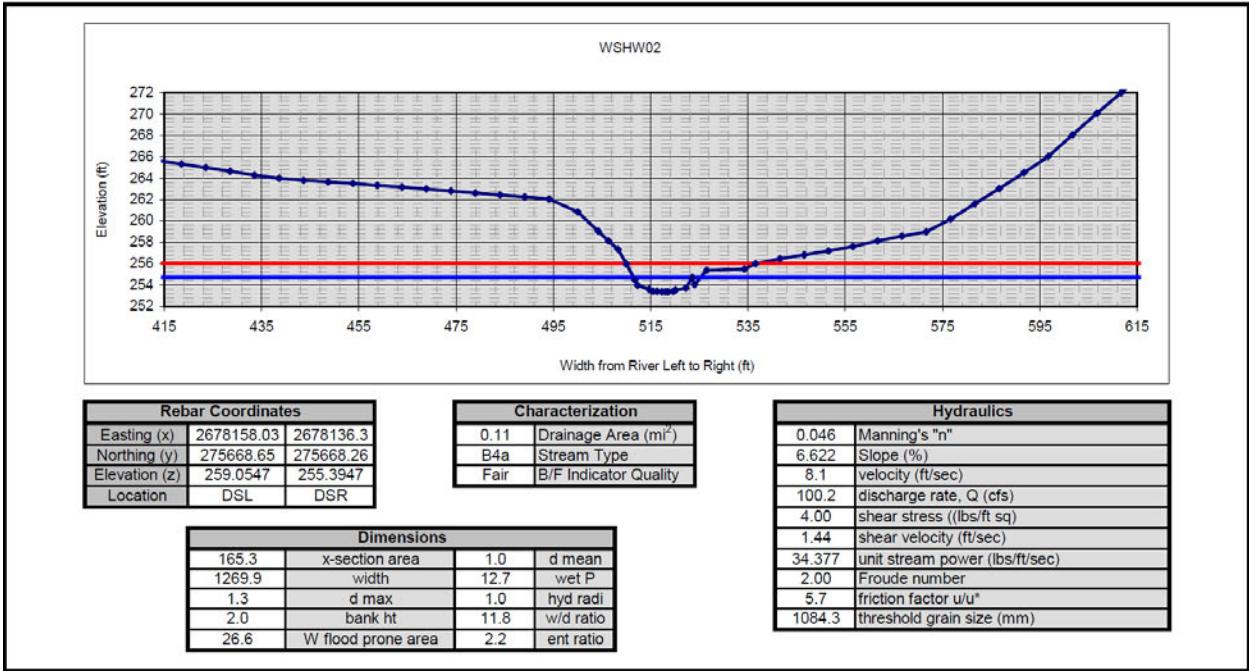
**Upstream View**



**Downstream View**



**XS = cross section / DSL = Downstream Left / DSR = Downstream Right**



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section**  
**WSHW-04**

Philadelphia  
Drainage Area = 0.21 mi<sup>2</sup>  
04/20/2005



**XS - DSR to DSL**



**XS - DSL to DSR**

**Upstream View**

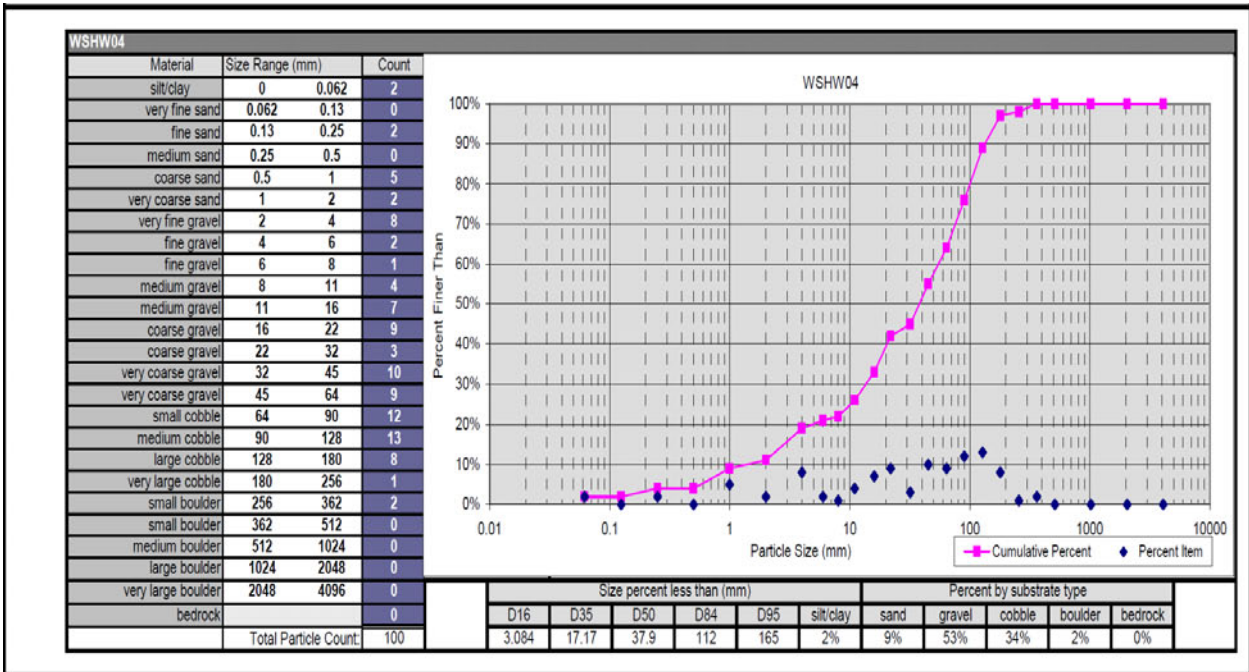
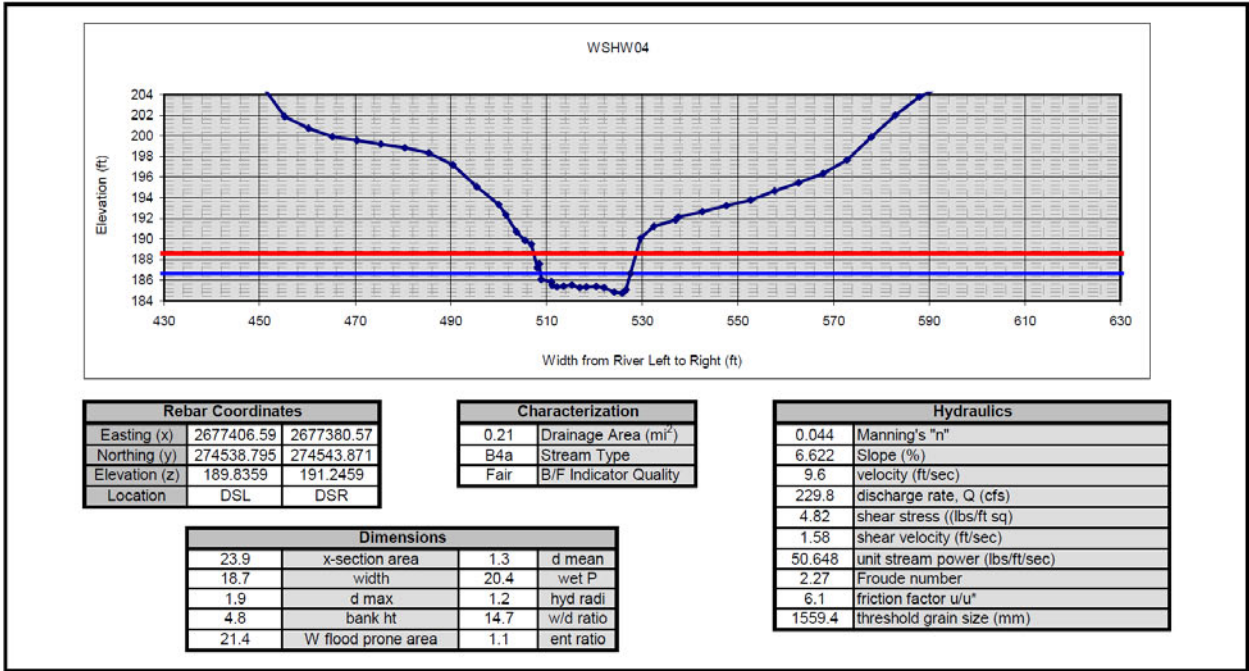


**Downstream View**

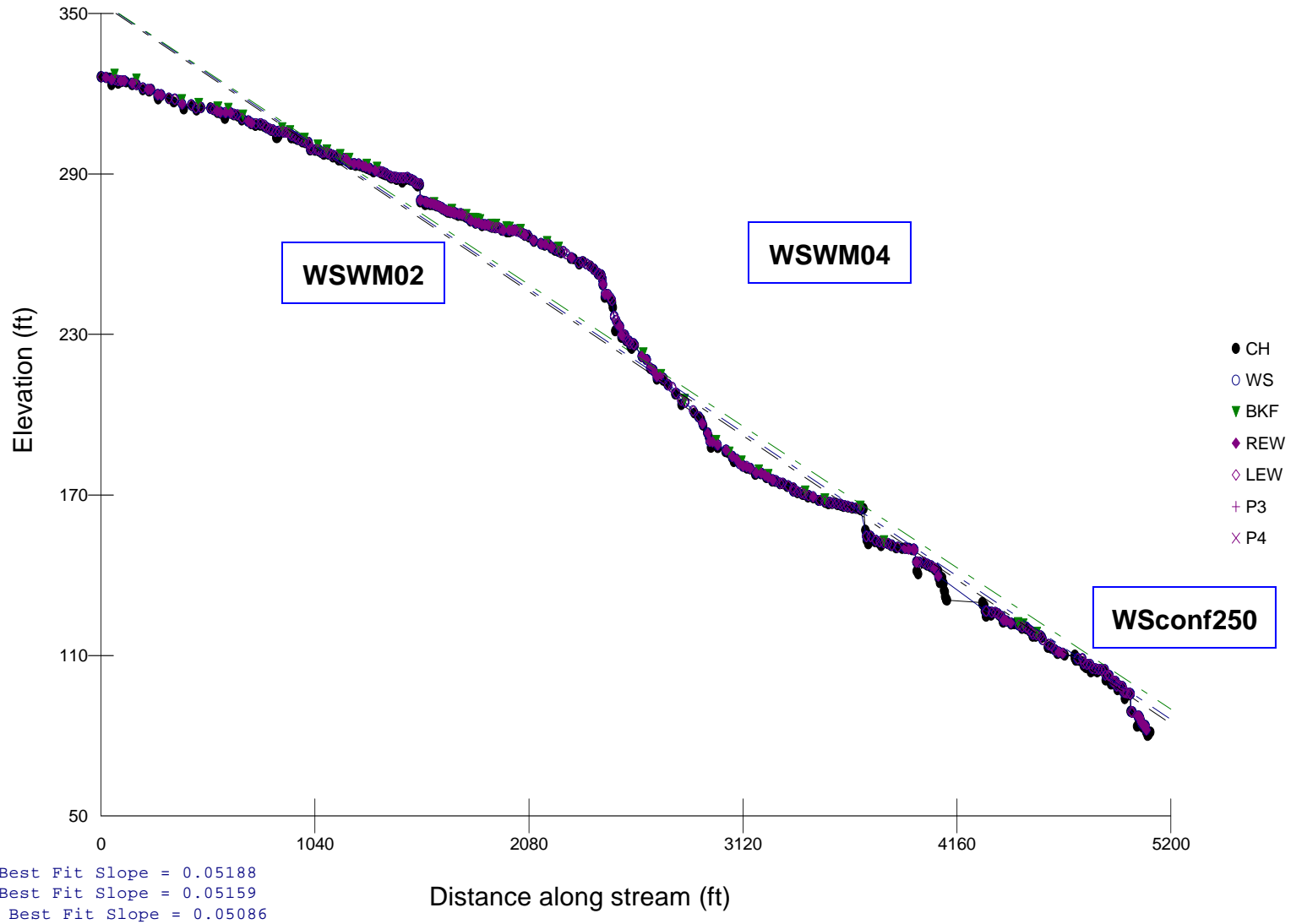


**XS = cross section / DSL = Downstream Left / DSR = Downstream Right**





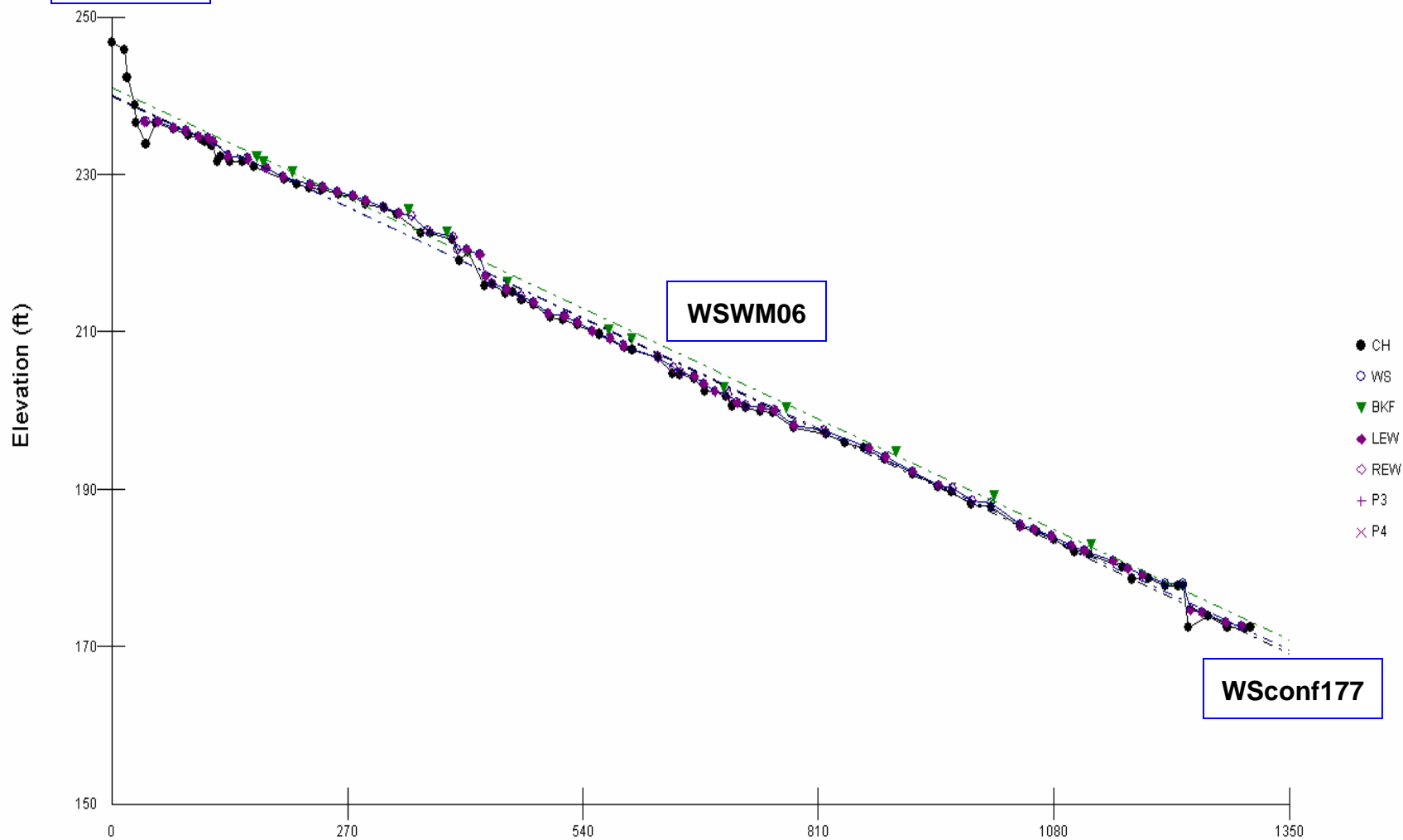
# Wise's Mill Mainstem



SECTION A.9 WISE'S MILL

# WSWM06

WSout572



CH Best Fit Slope = 0.05227  
WS Best Fit Slope = 0.05209  
BKF Best Fit Slope = 0.05198

Distance along stream (ft)

Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section**  
**WSWM-02**

Philadelphia Township  
Drainage Area = 0.28 mi<sup>2</sup>  
04/21/2005



XS – DSR to DSL



XS – DSL to DSR

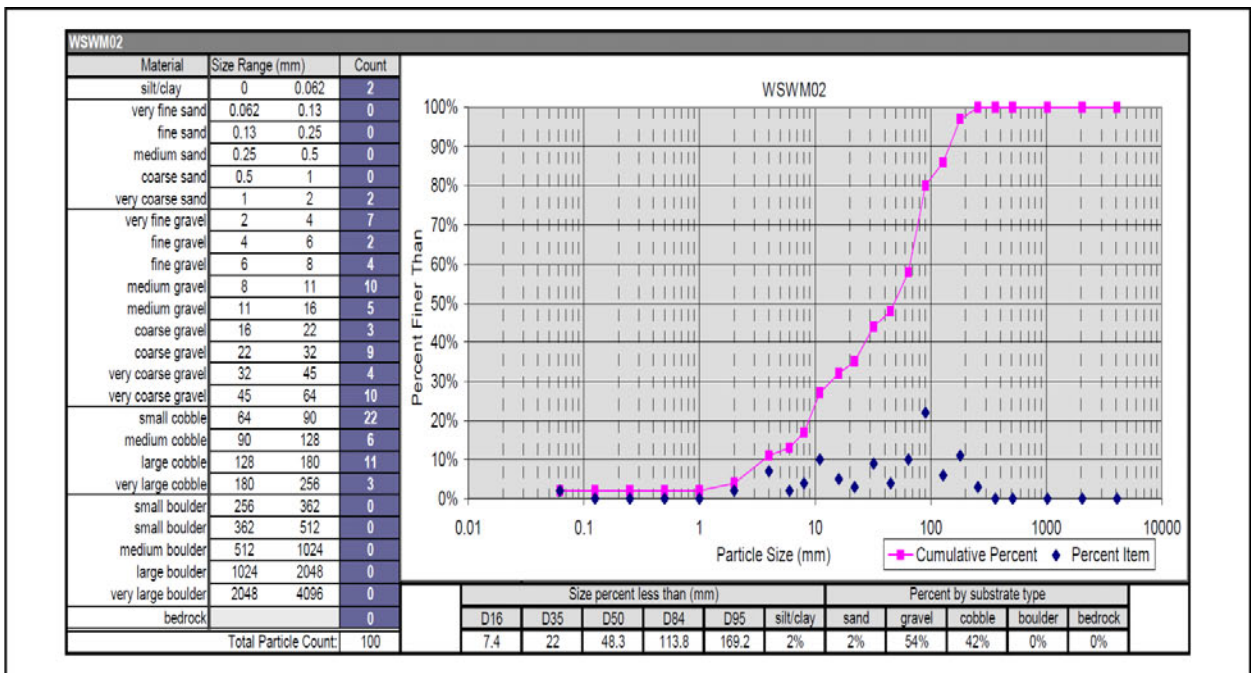
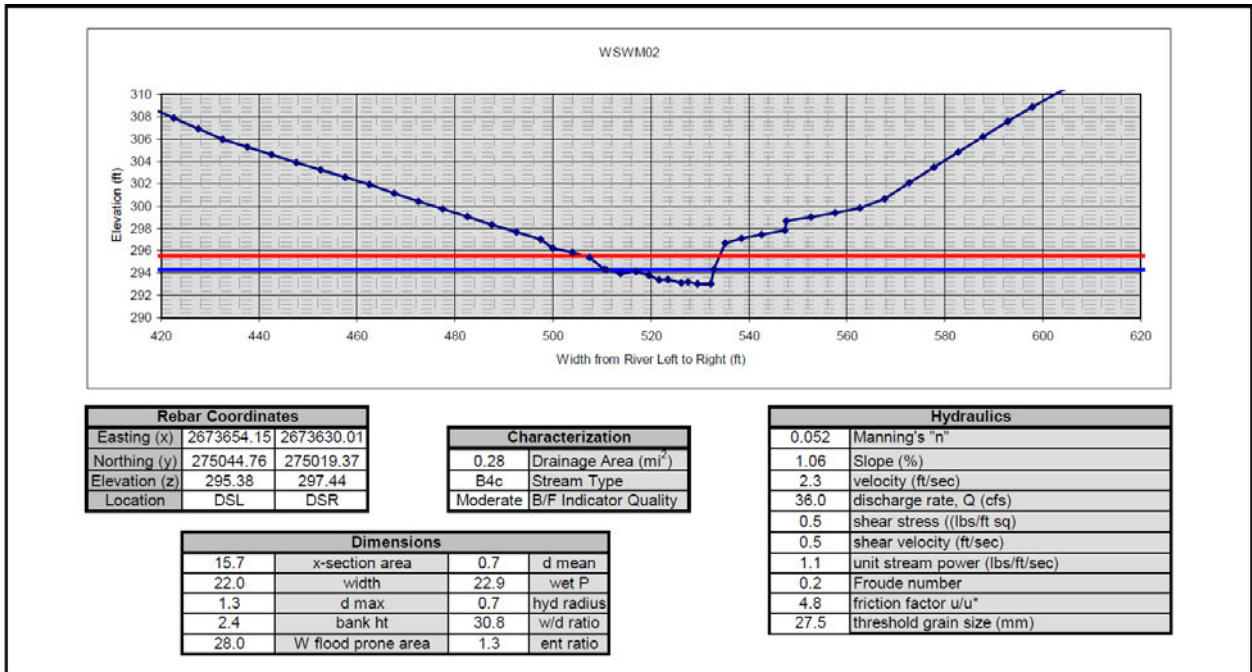
Upstream View



Downstream View



XS = cross section / DSL = Downstream Left / DSR = Downstream Right



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section**  
**WSWM-04**

Philadelphia Township  
Drainage Area = 0.35 mi<sup>2</sup>  
04/19/2005



XS – DSR to DSL



XS – DSL to DSR

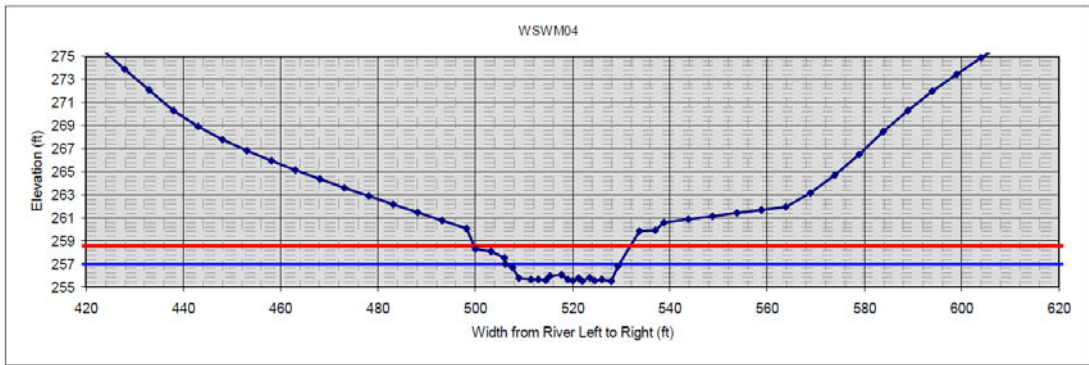
Upstream View



Downstream View



XS = cross section / DSL = Downstream Left / DSR = Downstream Right

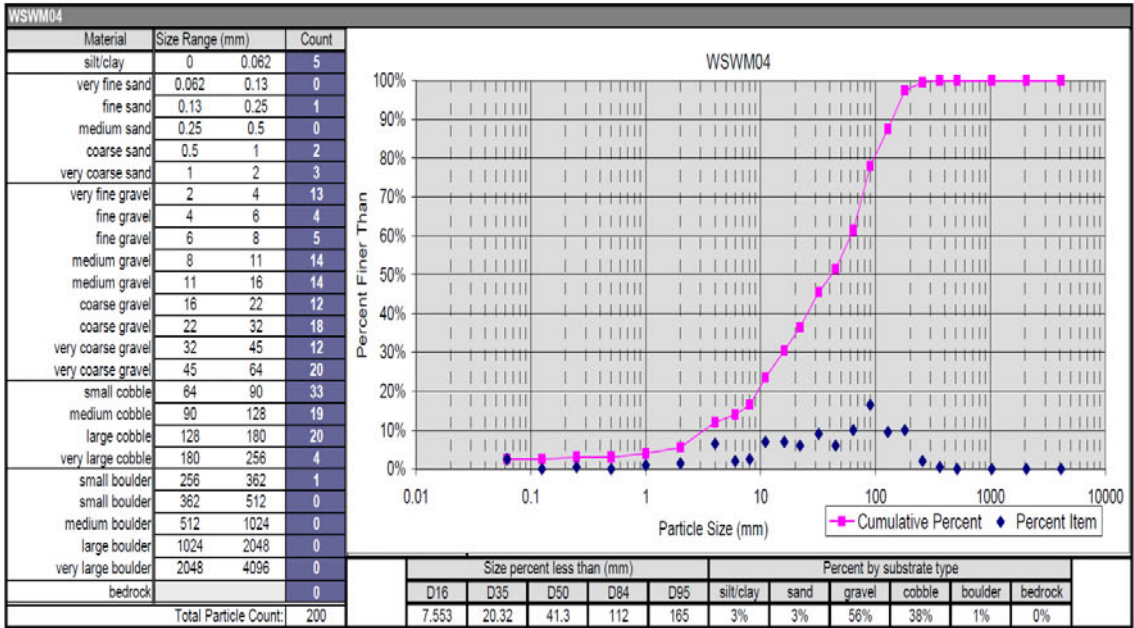


| Rebar Coordinates |            |            |
|-------------------|------------|------------|
| Easting (x)       | 2674540.18 | 2674526.62 |
| Northing (y)      | 274401.55  | 274374.65  |
| Elevation (z)     | 258.10     | 259.87     |
| Location          | DSL        | DSR        |

| Characterization |                                  |
|------------------|----------------------------------|
| 0.35             | Drainage Area (mi <sup>2</sup> ) |
| B4c              | Stream Type                      |
| Fair             | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.045      | Manning's "n"                  |
| 1.97       | Slope (%)                      |
| 5.0        | velocity (ft/sec)              |
| 138.5      | discharge rate, Q (cfs)        |
| 1.4        | shear stress ((lbs/ft sq)      |
| 0.8        | shear velocity (ft/sec)        |
| 7.2        | unit stream power (lbs/ft/sec) |
| 0.7        | Froude number                  |
| 6.0        | friction factor u/u*           |
| 134.1      | threshold grain size (mm)      |

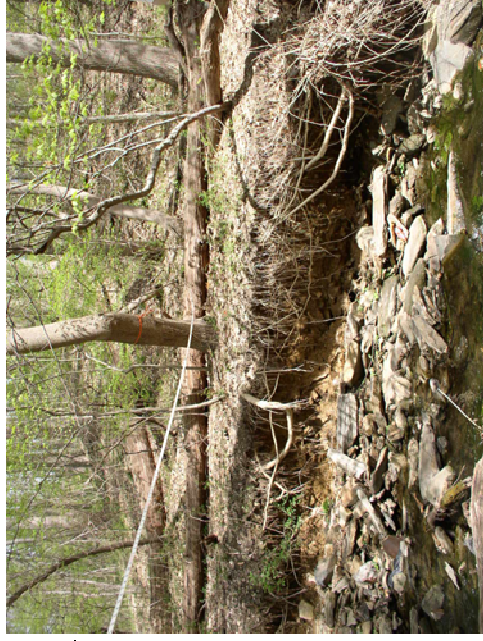
| Dimensions |                    |      |            |
|------------|--------------------|------|------------|
| 27.5       | x-section area     | 1.2  | d mean     |
| 23.5       | width              | 24.7 | wet P      |
| 1.5        | d max              | 1.1  | hyd radius |
| 2.6        | bank ht            | 20.1 | w/d ratio  |
| 32.1       | W flood prone area | 1.4  | ent ratio  |



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section**  
**WSWM-06**

Philadelphia Township  
Drainage Area = 0.56 mi<sup>2</sup>  
04/21/2005



XS - DSR to DSL



XS - DSL to DSR

Upstream View

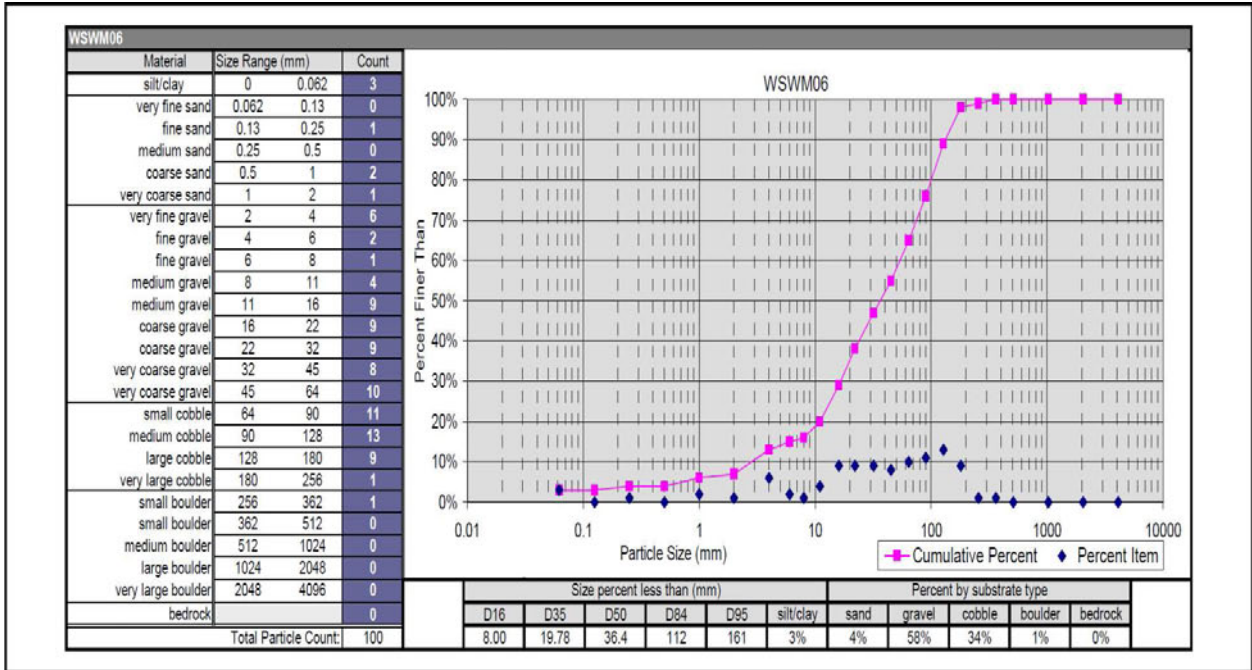
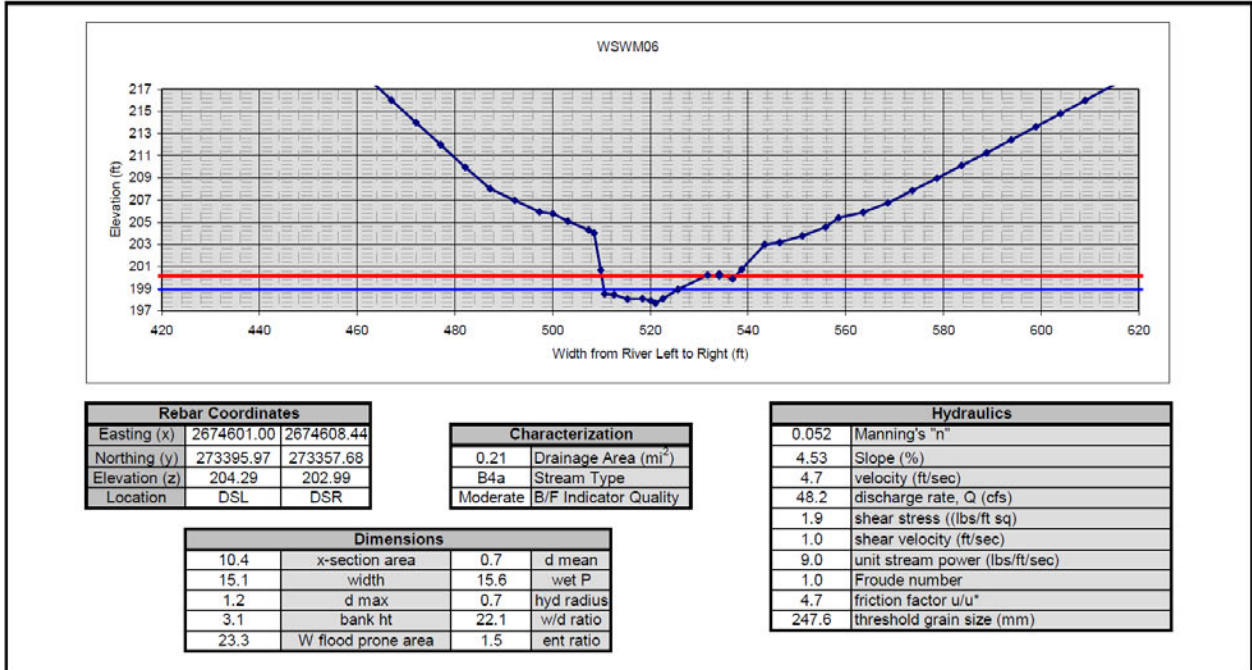


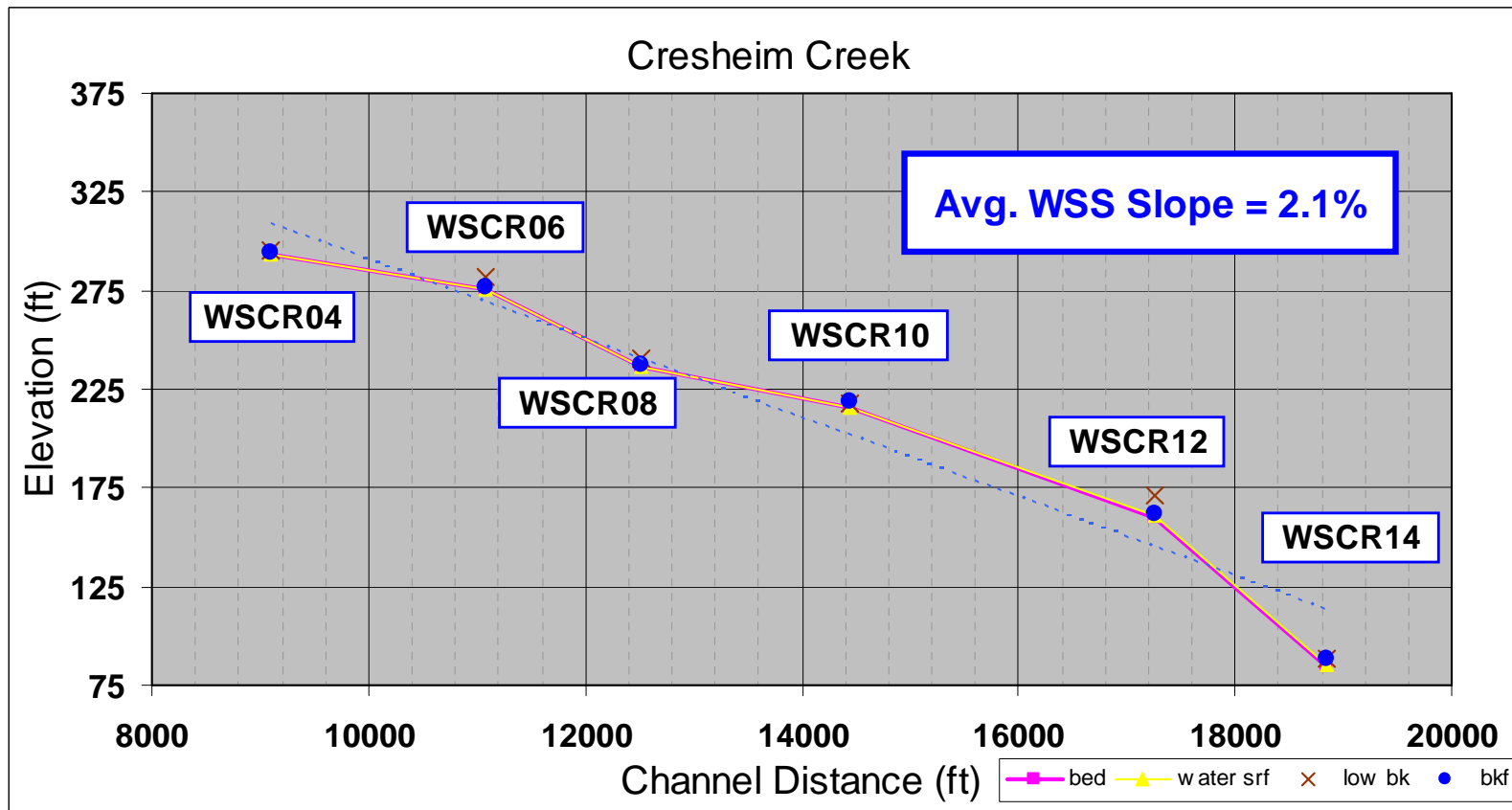
Downstream View



XS = cross section / DSL = Downstream Left / DSR = Downstream Right







SECTION A.10: CRESHEIM CREEK

Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section**  
**WSCR-04**

Philadelphia  
Drainage Area = 0.71 mi<sup>2</sup>  
04/12/2005



**XS - DSR to DSL**



**XS - DSL to DSR**

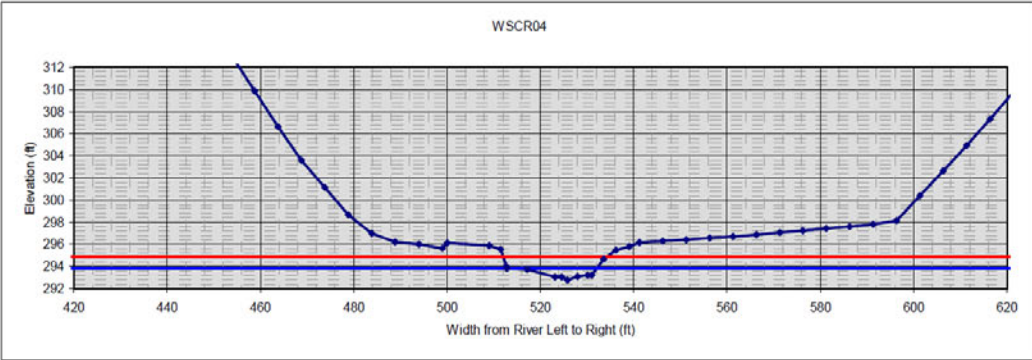
**Upstream View**



**Downstream View**



**XS = cross section · DSL = Downstream Left · DSR = Downstream Right**

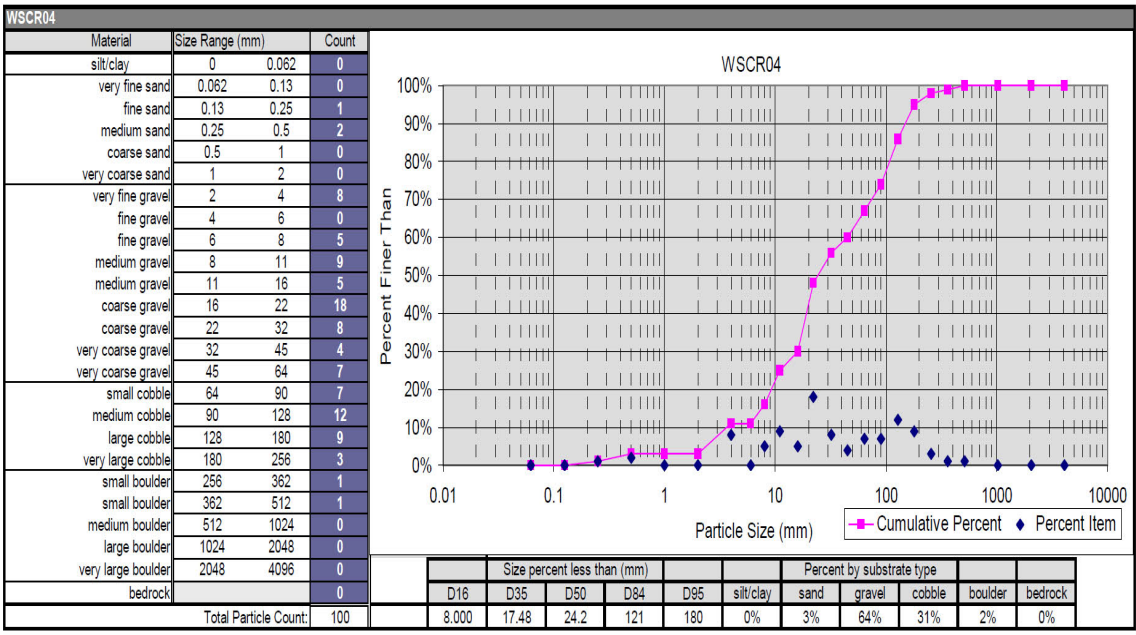


| Rebar Coordinates |            |            |
|-------------------|------------|------------|
| Easting (x)       | 2684241.15 | 2684214.60 |
| Northing (y)      | 278291.73  | 278286.00  |
| Elevation (z)     | 295.88     | 295.46     |
| Location          | DSL        | DSR        |

| Characterization |                                  |
|------------------|----------------------------------|
| 0.71             | Drainage Area (mi <sup>2</sup> ) |
| F4               | Stream Type                      |
| Good             | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.064      | Manning's "n"                  |
| 0.87       | Slope (%)                      |
| 1.3        | velocity (ft/sec)              |
| 11.5       | discharge rate, Q (cfs)        |
| 0.2        | shear stress ((lbs/ft sq)      |
| 0.4        | shear velocity (ft/sec)        |
| 0.3        | unit stream power (lbs/ft/sec) |
| 0.1        | Froude number                  |
| 3.6        | friction factor u/u*           |
| 13.9       | threshold grain size (mm)      |

| Dimensions |                    |      |            |
|------------|--------------------|------|------------|
| 8.9        | x-section area     | 0.5  | d mean     |
| 19.2       | width              | 19.5 | wet P      |
| 1.1        | d max              | 0.5  | hyd radius |
| 2.7        | bank ht            | 41.7 | w/d ratio  |
| 22.2       | W flood prone area | 1.2  | ent ratio  |



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section**  
**WSCR-06**

Philadelphia  
Drainage Area = 1.43 mi<sup>2</sup>  
04/12/2005



**XS - DSL to DSR**



**XS - DSR to DSL**

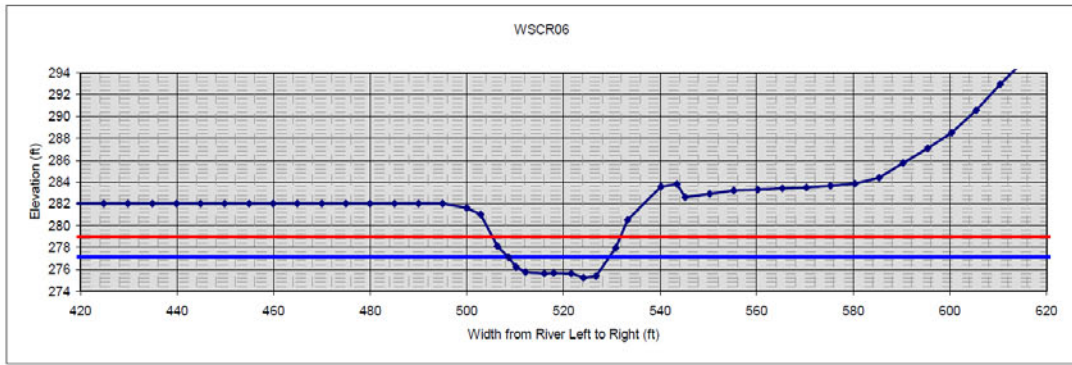
**Upstream View**



**Downstream View**



XS = cross section · DSL = DownstreamLeft · DSR = DownstreamRight

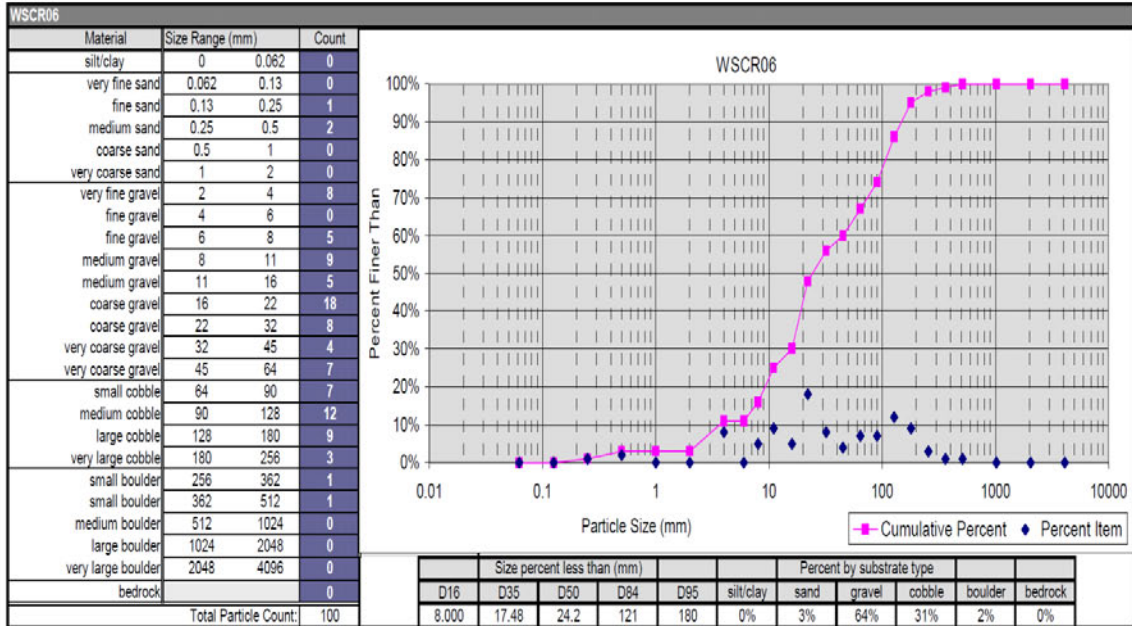


| Rebar Coordinates |            |            |
|-------------------|------------|------------|
| Easting (x)       | 2682968.92 | 2682939.24 |
| Northing (y)      | 277187.42  | 277214.36  |
| Elevation (z)     | 281.62     | 283.59     |
| Location          | DSL        | DSR        |

| Characterization |                                  |
|------------------|----------------------------------|
| 1.43             | Drainage Area (mi <sup>2</sup> ) |
| F4               | Stream Type                      |
| Good             | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.044      | Manning's "n"                  |
| 1.67       | Slope (%)                      |
| 5.1        | velocity (ft/sec)              |
| 142.6      | discharge rate, Q (cfs)        |
| 1.3        | shear stress ((lbs/ft sq)      |
| 0.8        | shear velocity (ft/sec)        |
| 7.1        | unit stream power (lbs/ft/sec) |
| 0.6        | Froude number                  |
| 6.2        | friction factor u/u*           |
| 127.8      | threshold grain size (mm)      |

| Dimensions |                    |      |            |
|------------|--------------------|------|------------|
| 27.9       | x-section area     | 1.3  | d mean     |
| 20.9       | width              | 21.7 | wet P      |
| 1.9        | d max              | 1.3  | hyd radius |
| 5.8        | bank ht            | 15.6 | w/d ratio  |
| 26.5       | W flood prone area | 1.3  | ent ratio  |



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section**  
**WSCR-08**

Philadelphia  
Drainage Area = 1.86 mi<sup>2</sup>  
04/12/2005



XS - DSR to DSL



XS - DSL to DSR

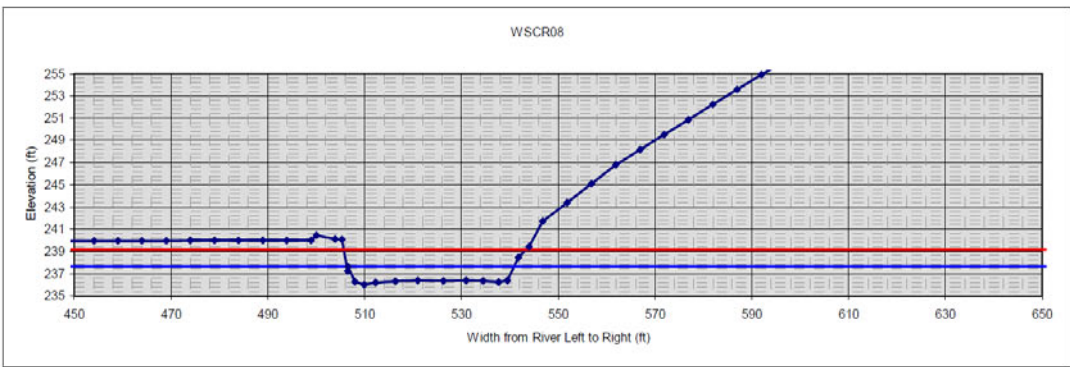
Upstream View



Downstream View



XS = cross section · DSL = Downstream Left · DSR = Downstream Right

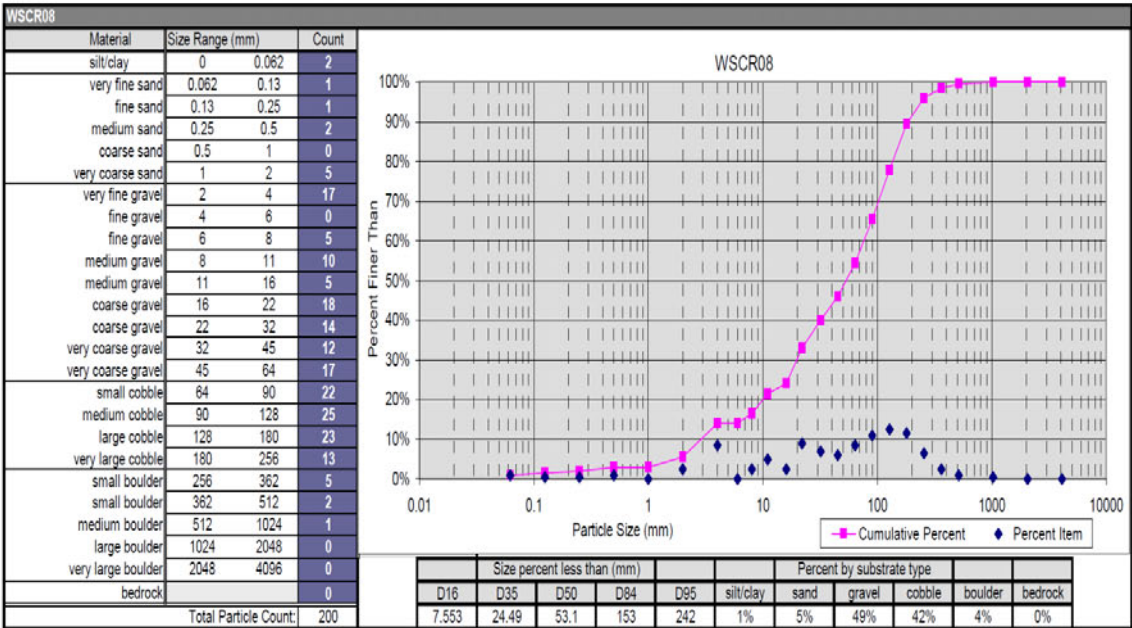


| Rebar Coordinates |            |            |
|-------------------|------------|------------|
| Easting (x)       | 2681877.77 | 2681842.78 |
| Northing (y)      | 275597.95  | 275612.34  |
| Elevation (z)     | 240.12     | 238.45     |
| Location          | DSL        | DSR        |

| Characterization |                                  |
|------------------|----------------------------------|
| 1.86             | Drainage Area (mi <sup>2</sup> ) |
| F4               | Stream Type                      |
| Fair             | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.050      | Manning's "n"                  |
| 1.78       | Slope (%)                      |
| 4.4        | velocity (ft/sec)              |
| 185.1      | discharge rate, Q (cfs)        |
| 1.3        | shear stress ((lbs/ft sq)      |
| 0.8        | shear velocity (ft/sec)        |
| 6.0        | unit stream power (lbs/ft/sec) |
| 0.5        | Froude number                  |
| 5.3        | friction factor u/u*           |
| 121.0      | threshold grain size (mm)      |

| Dimensions |                    |      |            |
|------------|--------------------|------|------------|
| 42.3       | x-section area     | 1.2  | d mean     |
| 34.5       | width              | 36.1 | wet P      |
| 1.6        | d max              | 1.2  | hyd radius |
| 4.1        | bank ht            | 28.2 | w/d ratio  |
| 37.8       | W flood prone area | 1.1  | ent ratio  |





Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section  
WSCR-10**

Philadelphia  
Drainage Area = 1.88 mi<sup>2</sup>  
04/12/2005



**XS - DSR to DSL**



**XS - DSL to DSR**

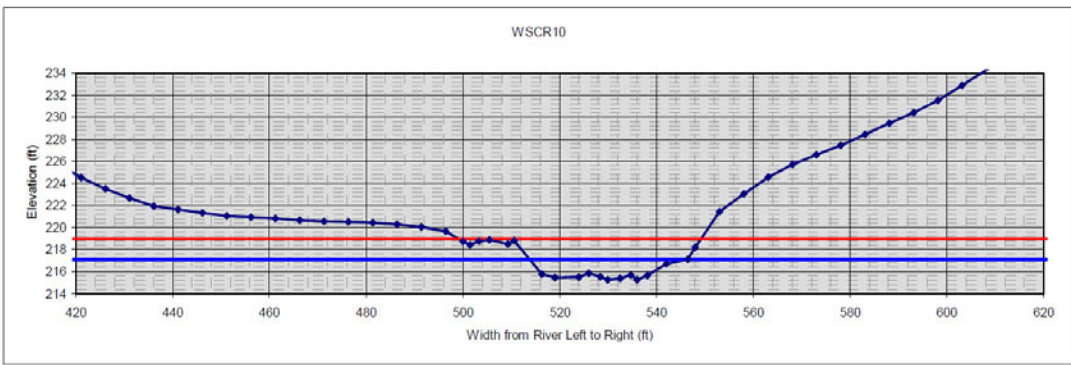
**Upstream View**



**Downstream View**



XS = cross-section · DSL = DownstreamLeft · DSR = DownstreamRight

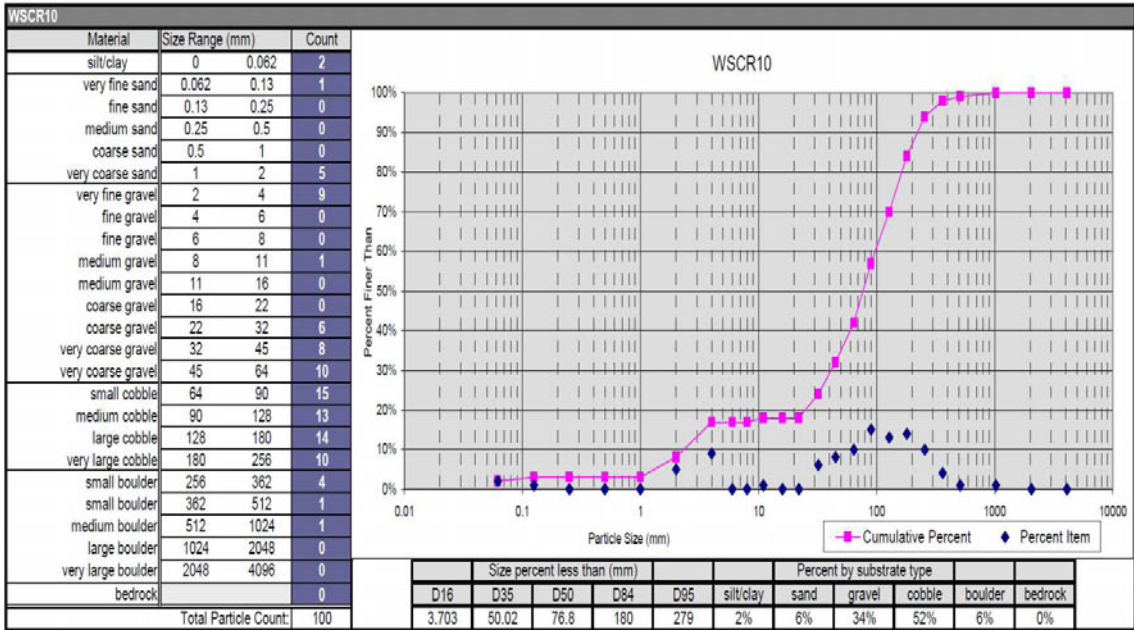


| Rebar Coordinates |            |            |
|-------------------|------------|------------|
| Easting (x)       | 2681705.63 | 2681659.87 |
| Northing (y)      | 275030.56  | 275039.97  |
| Elevation (z)     | 218.44     | 218.21     |
| Location          | DSL        | DSR        |

| Characterization |                                  |
|------------------|----------------------------------|
| 1.88             | Drainage Area (mi <sup>2</sup> ) |
| B4a              | Stream Type                      |
| Good             | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.053      | Manning's "n"                  |
| 1.59       | Slope (%)                      |
| 4.0        | velocity (ft/sec)              |
| 166.8      | discharge rate, Q (cfs)        |
| 1.2        | shear stress ((lbs/ft sq)      |
| 0.8        | shear velocity (ft/sec)        |
| 5.1        | unit stream power (lbs/ft/sec) |
| 0.4        | Froude number                  |
| 5.1        | friction factor w/u*           |
| 108.2      | threshold grain size (mm)      |

| Dimensions |                    |      |            |
|------------|--------------------|------|------------|
| 41.3       | x-section area     | 1.3  | d mean     |
| 32.7       | width              | 33.4 | wet P      |
| 1.9        | d max              | 1.2  | hyd radius |
| 3.0        | bank ht            | 25.9 | w/d ratio  |
| 50.1       | W flood prone area | 1.5  | ent ratio  |



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section**  
**WSCR-12**

Philadelphia  
Drainage Area = 2.20 mi<sup>2</sup>  
04/12/2005



XS - DSR to DSL



XS - DSL to DSR

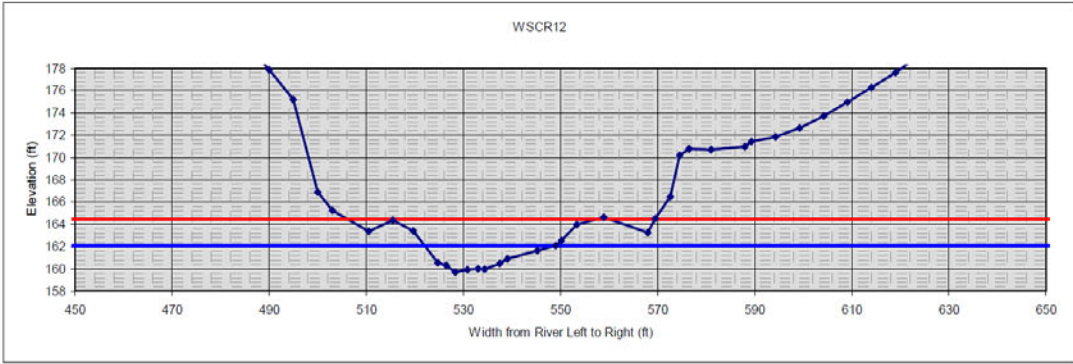
Upstream View



Downstream View



XS = cross section · DSL = DownstreamLeft · DSR = DownstreamRight

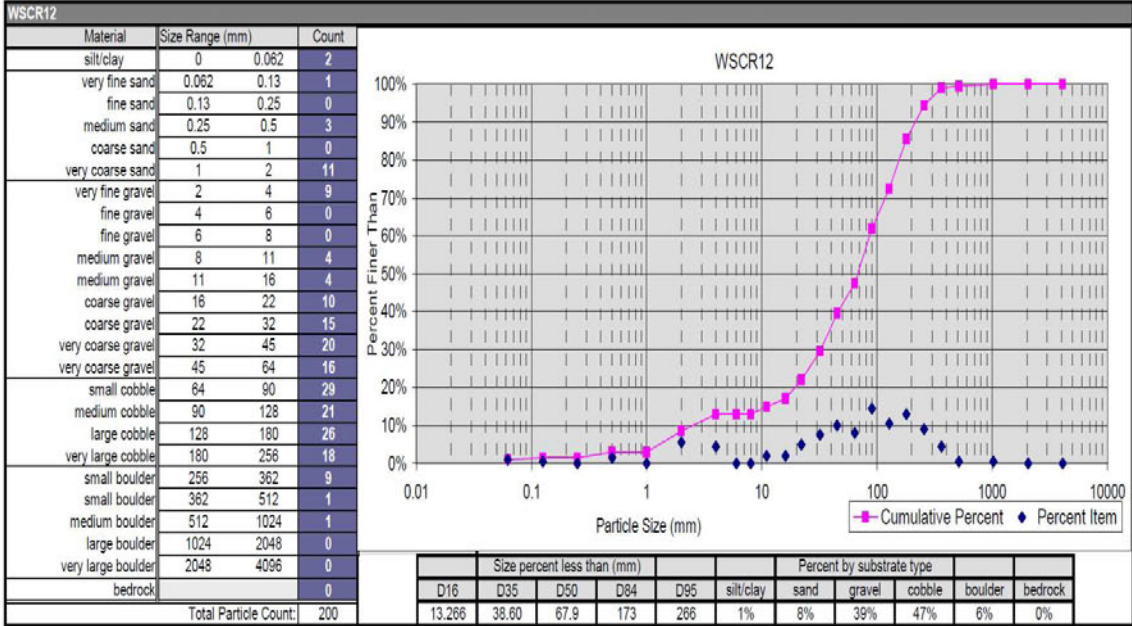


| Rebar Coordinates |            |            |
|-------------------|------------|------------|
| Easting (x)       | 2681705.63 | 2681659.87 |
| Northing (y)      | 275030.56  | 275039.97  |
| Elevation (z)     | 166.89     | 170.21     |
| Location          | DSL        | DSR        |

| Characterization |                                  |
|------------------|----------------------------------|
| 2.20             | Drainage Area (mi <sup>2</sup> ) |
| B4               | Stream Type                      |
| Moderate         | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.052      | Manning's "n"                  |
| 2.96       | Slope (%)                      |
| 5.9        | velocity (ft/sec)              |
| 210.9      | discharge rate, Q (cfs)        |
| 2.4        | shear stress ((lbs/ft sq)      |
| 1.1        | shear velocity (ft/sec)        |
| 14.4       | unit stream power (lbs/ft/sec) |
| 0.8        | Froude number                  |
| 5.3        | friction factor u/u*           |
| 397.4      | threshold grain size (mm)      |

| Dimensions |                    |      |            |
|------------|--------------------|------|------------|
| 35.9       | x-section area     | 1.3  | d mean     |
| 27.0       | width              | 27.7 | wet P      |
| 2.4        | d max              | 1.3  | hyd radius |
| 11.1       | bank ht            | 20.3 | w/d ratio  |
| 42.0       | W flood prone area | 1.6  | ent ratio  |



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section**  
**WSCR-14**

Philadelphia  
Drainage Area = 2.39 mi<sup>2</sup>  
04/12/2005



XS - DSR to DSL



XS - DSL to DSR

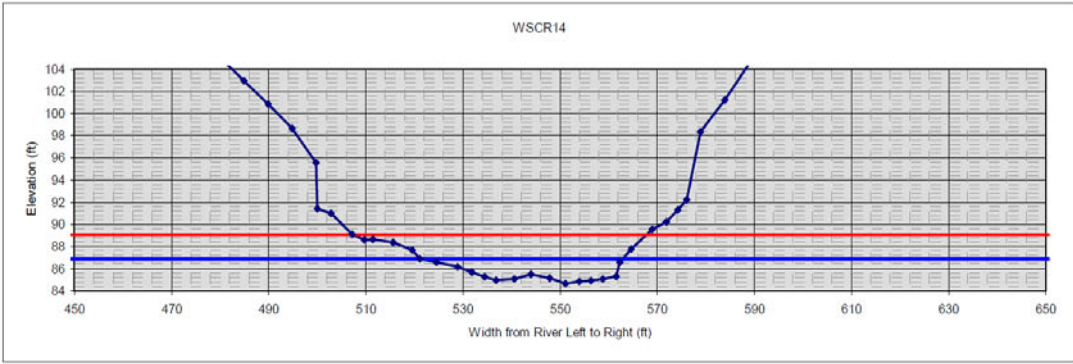
Upstream View



Downstream View



XS = cross section · DSL = Downstream Left · DSR = Downstream Right

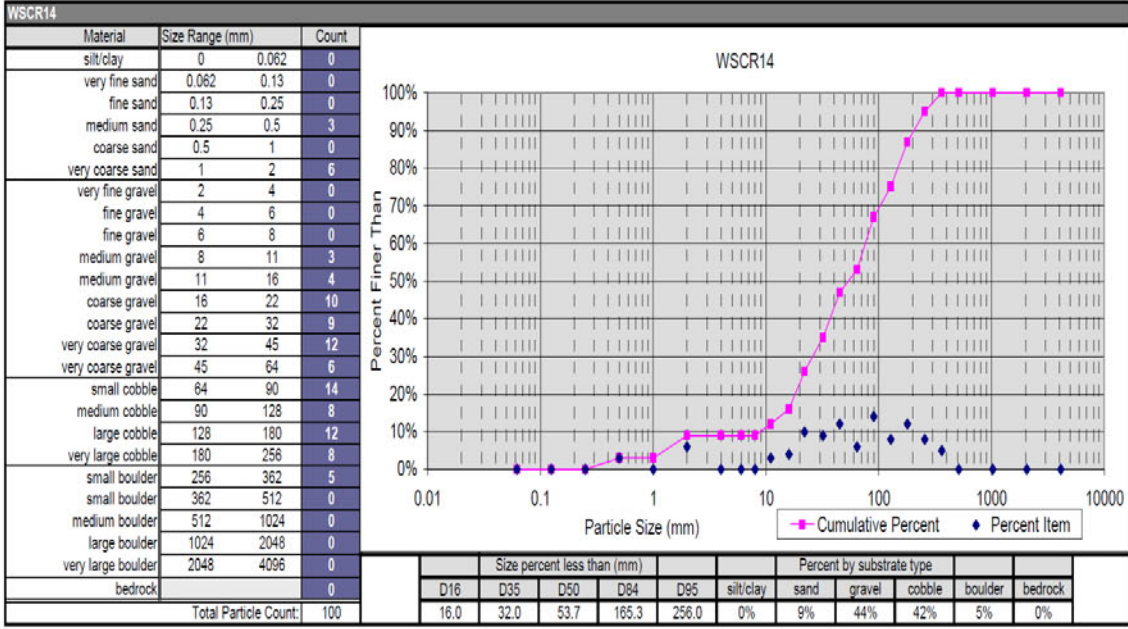


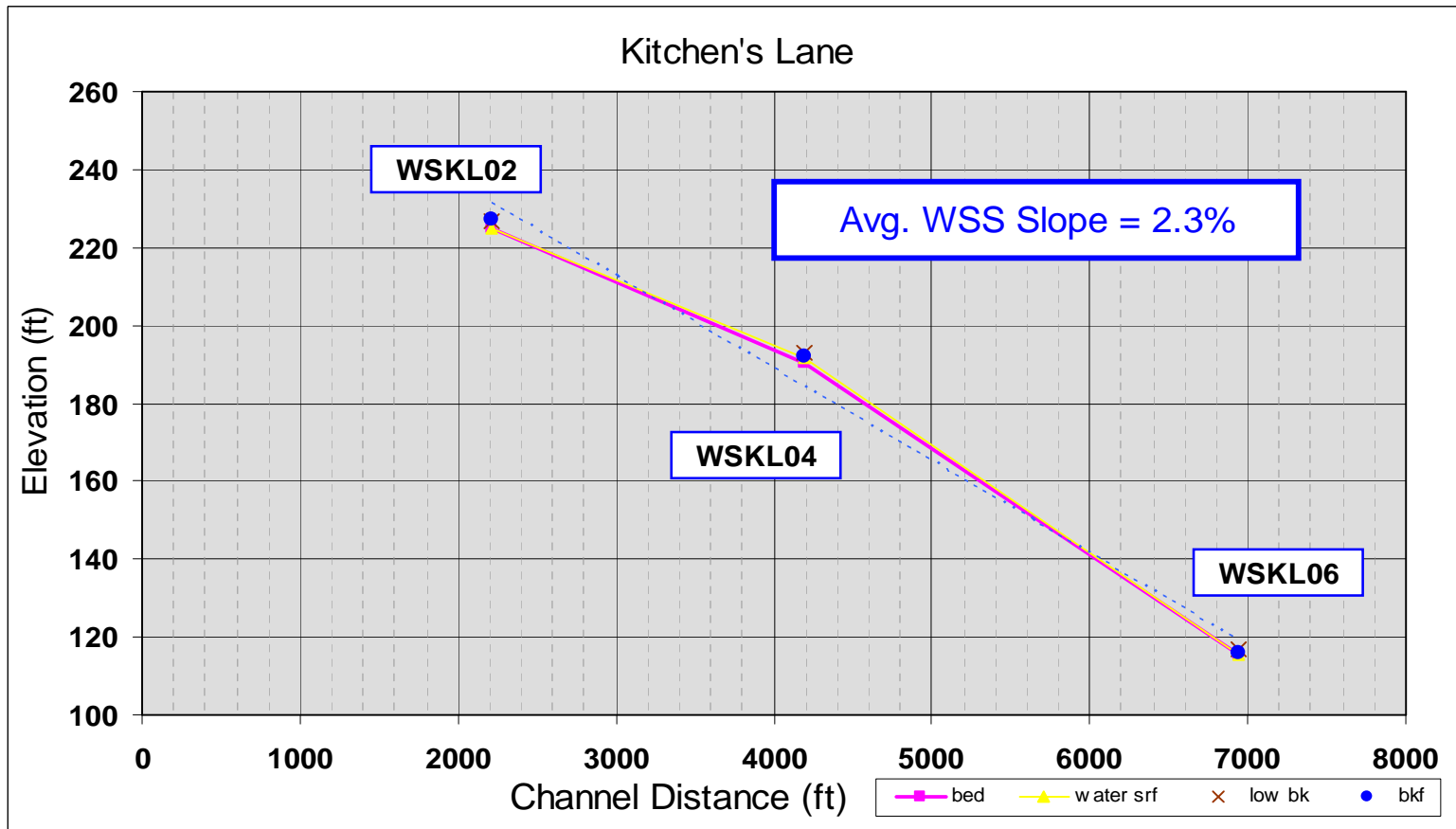
| Rebar Coordinates |            |            |
|-------------------|------------|------------|
| Easting (x)       | 2676388.34 | 2676339.22 |
| Northing (y)      | 271865.27  | 271866.55  |
| Elevation (z)     | 87.69      | 89.58      |
| Location          | DSL        | DSR        |

| Characterization |                                  |
|------------------|----------------------------------|
| 2.39             | Drainage Area (mi <sup>2</sup> ) |
| B4a              | Stream Type                      |
| Moderate         | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.050      | Manning's "n"                  |
| 4.71       | Slope (%)                      |
| 8.0        | velocity (ft/sec)              |
| 469.4      | discharge rate, Q (cfs)        |
| 4.0        | shear stress ((lbs/ft sq)      |
| 1.4        | shear velocity (ft/sec)        |
| 33.1       | unit stream power (lbs/ft/sec) |
| 1.4        | Froude number                  |
| 5.5        | friction factor u/u*           |
| 1101.5     | threshold grain size (mm)      |

| Dimensions |                    |      |            |
|------------|--------------------|------|------------|
| 58.7       | x-section area     | 1.4  | d mean     |
| 41.7       | width              | 42.8 | wet P      |
| 2.2        | d max              | 1.4  | hyd radius |
| 3.7        | bank ht            | 29.7 | w/d ratio  |
| 60.3       | W flood prone area | 1.4  | ent ratio  |





SECTION A.11: KITCHEN'S LANE

Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section**  
**WSKL-02**

Philadelphia  
Drainage Area = 0.10 mi<sup>2</sup>  
04/28/2005



**XS - DSR to DSL**



**XS - DSL to DSR**

**Upstream View**

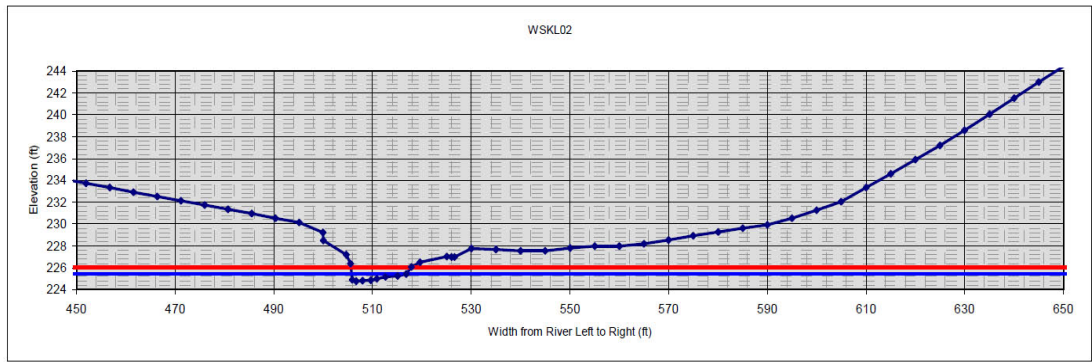


**Downstream View**



**XS = cross section · DSL = DownstreamLeft DSR = DownstreamRight**



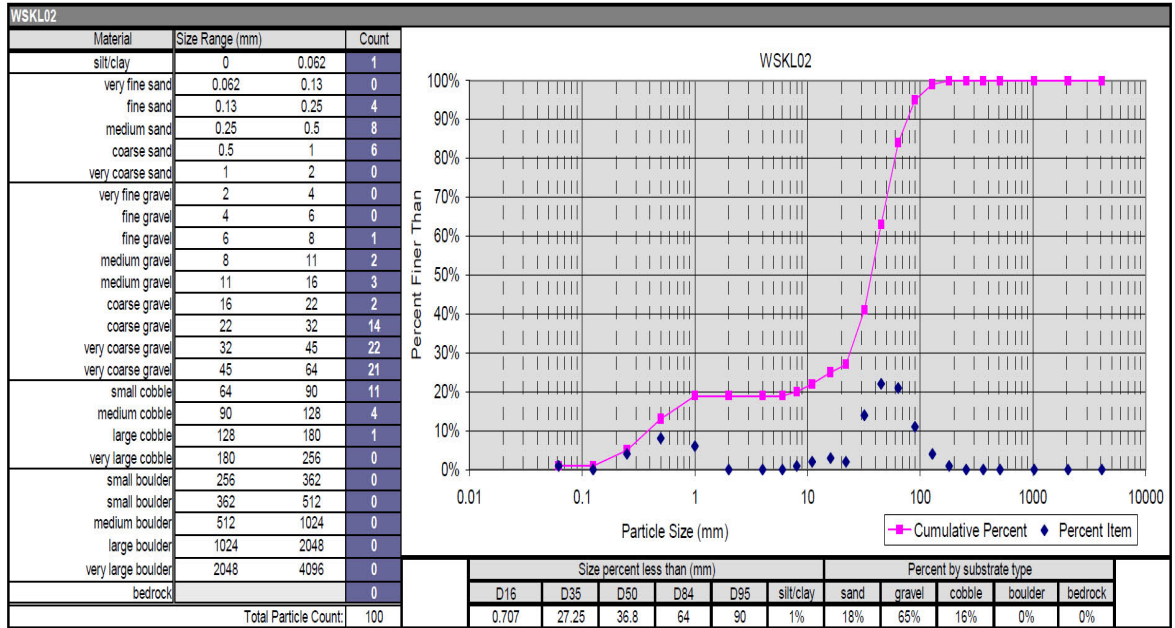


| Rebar Coordinates |            |            |
|-------------------|------------|------------|
| Easting (x)       | 2681788.36 | 2681768.87 |
| Northing (y)      | 269892.20  | 269897.33  |
| Elevation (z)     | 227.19     | 227.03     |
| Location          | DSL        | DSR        |

| Characterization |                                  |
|------------------|----------------------------------|
| 0.10             | Drainage Area (mi <sup>2</sup> ) |
| F4               | Stream Type                      |
| Good             | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.049      | Manning's "n"                  |
| 1.69       | Slope (%)                      |
| 1.9        | velocity (ft/sec)              |
| 7.6        | discharge rate, Q (cfs)        |
| 0.36       | shear stress ((lbs/ft sq)      |
| 0.43       | shear velocity (ft/sec)        |
| 0.73       | unit stream power (lbs/ft/sec) |
| 0.33       | Froude number                  |
| 4.5        | friction factor u/u*           |
| 21.5       | threshold grain size (mm)      |

| Dimensions |                    |      |            |
|------------|--------------------|------|------------|
| 3.9        | x-section area     | 0.4  | d mean     |
| 11.0       | width              | 11.5 | wet P      |
| 0.6        | d max              | 0.3  | hyd radius |
| 1.7        | bank ht            | 30.9 | w/d ratio  |
| 12.3       | W flood prone area | 1.1  | ent ratio  |



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section**  
**WSKL-04**

Philadelphia  
Drainage Area = 0.22 mi<sup>2</sup>  
04/28/2005



XS – DSR to DSL



XS – DSL to DSR

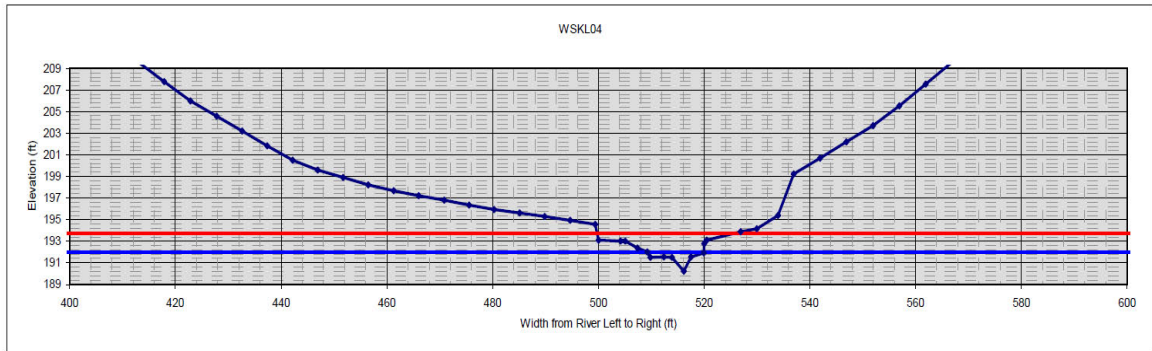
Upstream View



Downstream View



XS = cross section / DSL = Downstream Left / DSR = Downstream Right

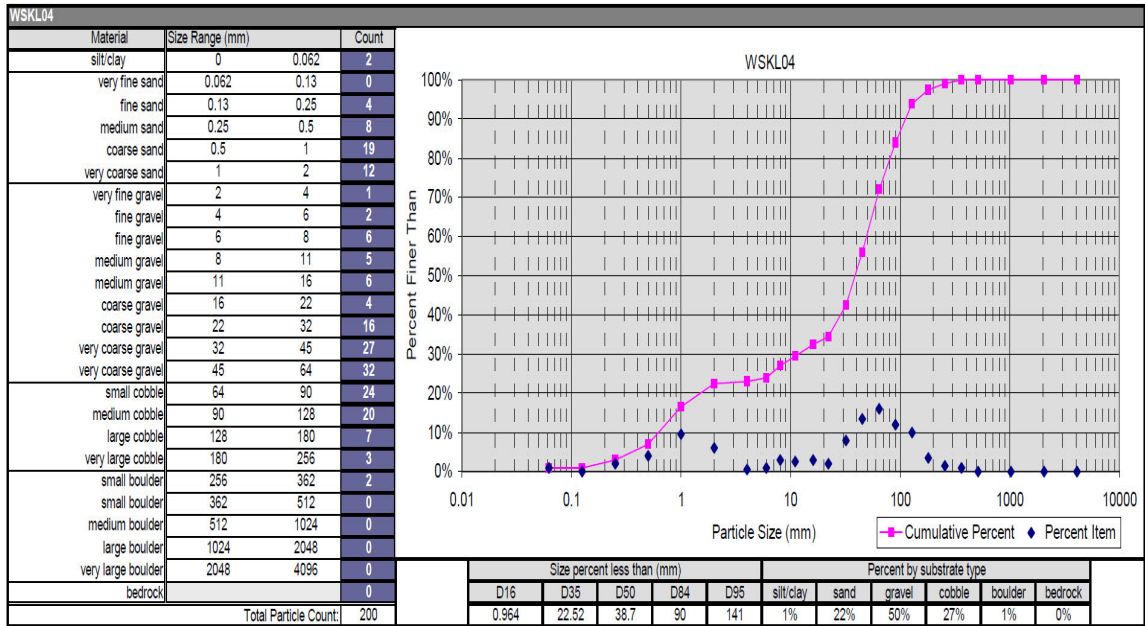


| Rebar Coordinates |            |            |
|-------------------|------------|------------|
| Easting (x)       | 2681139.87 | 2681125.51 |
| Northing (y)      | 269051.24  | 269069.07  |
| Elevation (z)     | 193.00     | 193.88     |
| Location          | DSL        | DSR        |

| Characterization |                                  |
|------------------|----------------------------------|
| 0.22             | Drainage Area (mi <sup>2</sup> ) |
| C4b              | Stream Type                      |
| Poor             | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.049      | Manning's "n"                  |
| 2.31       | Slope (%)                      |
| 3.2        | velocity (ft/sec)              |
| 21.0       | discharge rate, Q (cfs)        |
| 0.82       | shear stress ((lbs/ft sq)      |
| 0.65       | shear velocity (ft/sec)        |
| 2.85       | unit stream power (lbs/ft/sec) |
| 0.49       | Froude number                  |
| 4.9        | friction factor u/u*           |
| 52.8       | threshold grain size (mm)      |

| Dimensions |                    |      |            |
|------------|--------------------|------|------------|
| 6.6        | x-section area     | 0.6  | d mean     |
| 10.6       | width              | 11.7 | wet P      |
| 1.8        | d max              | 0.6  | hyd radius |
| 2.8        | bank ht            | 16.9 | w/d ratio  |
| 26.1       | W flood prone area | 2.5  | ent ratio  |



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section  
WSKL-06**

Philadelphia  
Drainage Area = 0.28 mi<sup>2</sup>  
04/28/2005



**XS – DSR to DSL**



**XS – DSL to DSR**

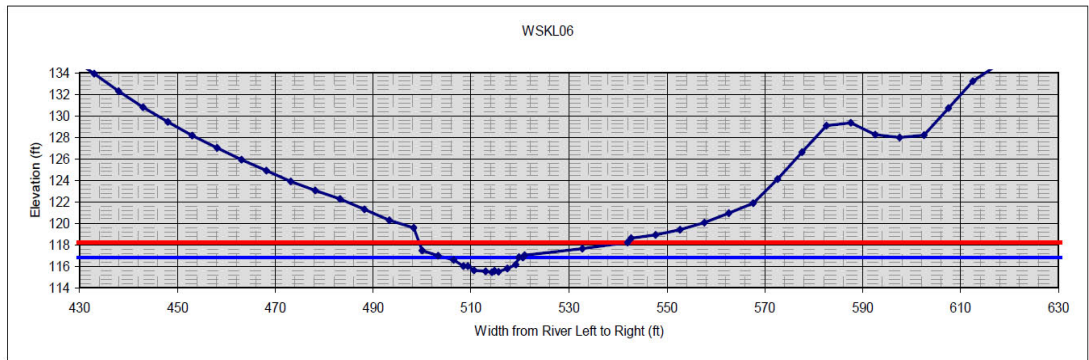
**Upstream View**



**Downstream View**



**XS = cross section / DSL = Downstream Left / DSR = Downstream Right**

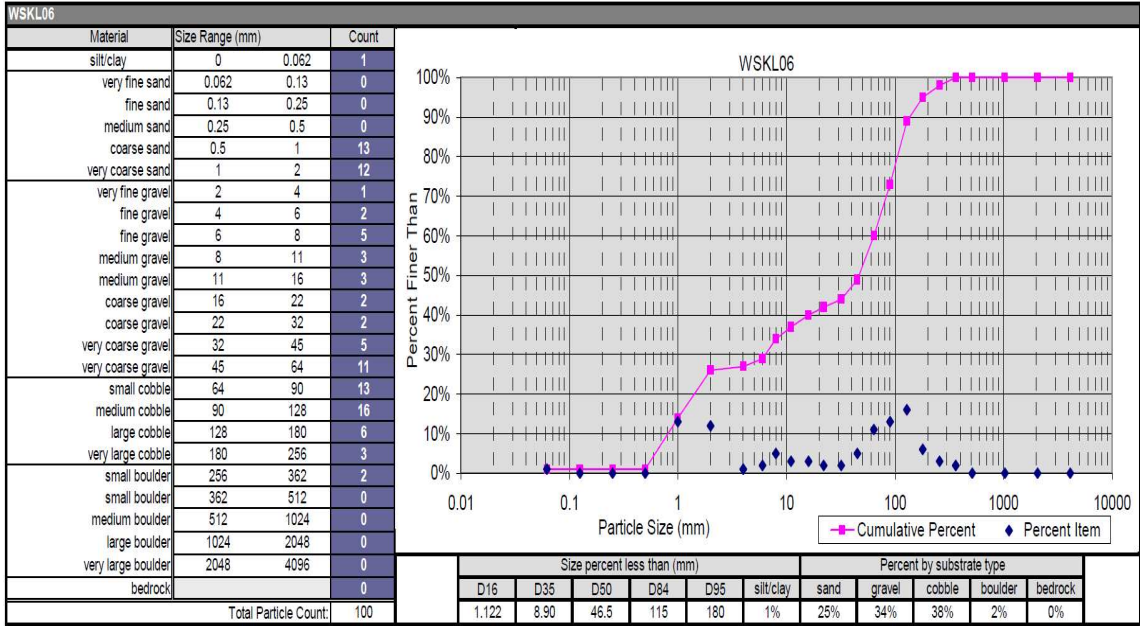


| Rebar Coordinates |             |            |
|-------------------|-------------|------------|
| Easting (x)       | 2680965.017 | 2680973.34 |
| Northing (y)      | 267100.35   | 267100.35  |
| Elevation (z)     | 116.99      | 117.67     |
| Location          | DSL         | DSR        |

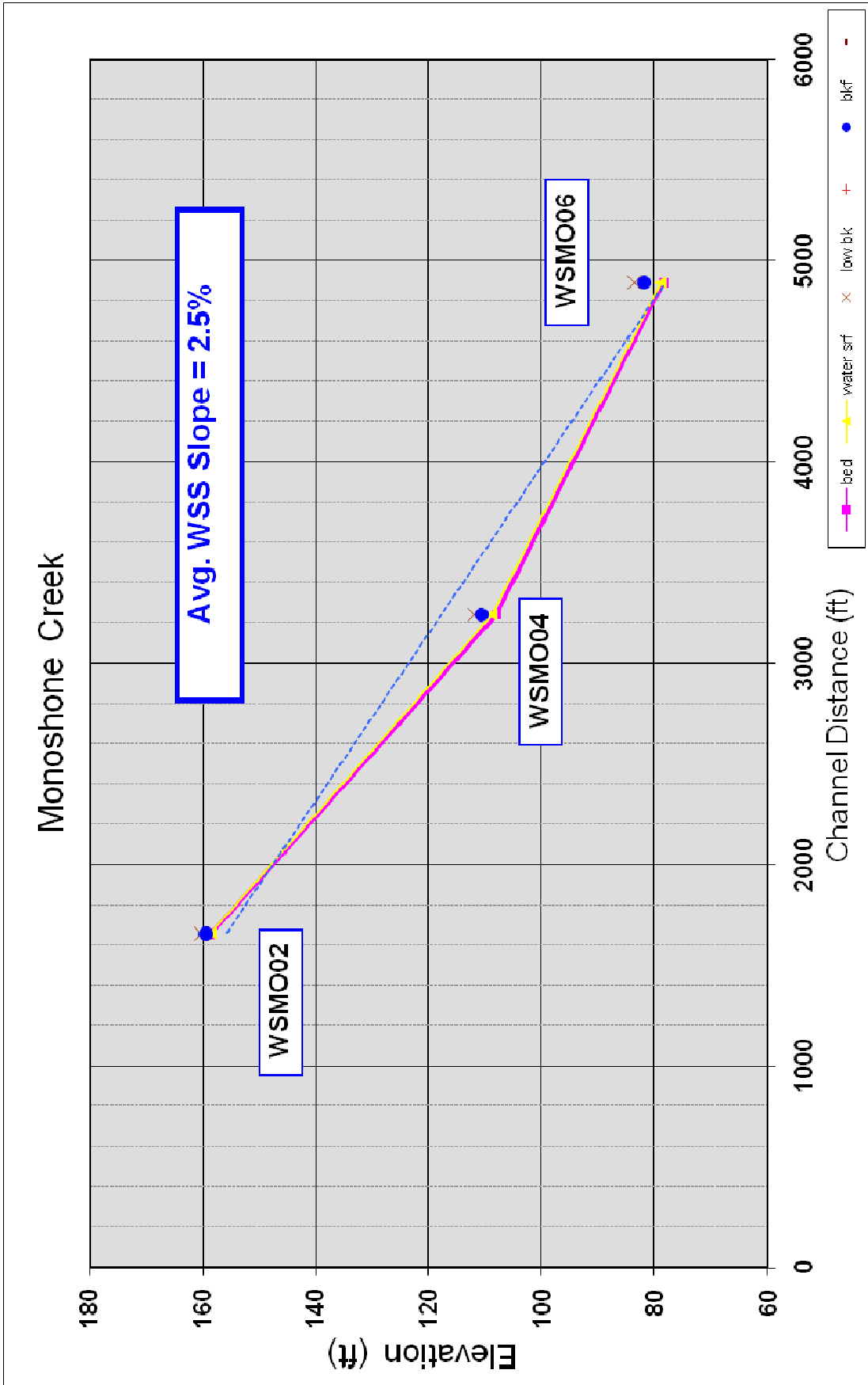
| Characterization |                                  |
|------------------|----------------------------------|
| 0.28             | Drainage Area (mi <sup>2</sup> ) |
| C4b              | Stream Type                      |
| Moderate         | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.048      | Manning's "n"                  |
| 2.760      | Slope (%)                      |
| 4.6        | velocity (ft/sec)              |
| 62.9       | discharge rate, Q (cfs)        |
| 1.5        | shear stress ((lbs/ft sq)      |
| 0.9        | shear velocity (ft/sec)        |
| 7.086      | unit stream power (lbs/ft/sec) |
| 0.75       | Froude number                  |
| 5.3        | friction factor u/u*           |
| 155.7      | threshold grain size (mm)      |

| Dimensions |                    |      |            |
|------------|--------------------|------|------------|
| 13.6       | x-section area     | 0.9  | d mean     |
| 15.3       | width              | 15.8 | wet P      |
| 1.4        | d max              | 0.9  | hyd radius |
| 1.6        | bank ht            | 17.2 | w/d ratio  |
| 42.7       | W flood prone area | 2.8  | ent ratio  |



SECTION A.12: MONOSHONE CREEK



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section**  
**WSMO-02**

Philadelphia  
Drainage Area = 0.99 mi<sup>2</sup>  
05/03/2005



XS - DSR to DSL

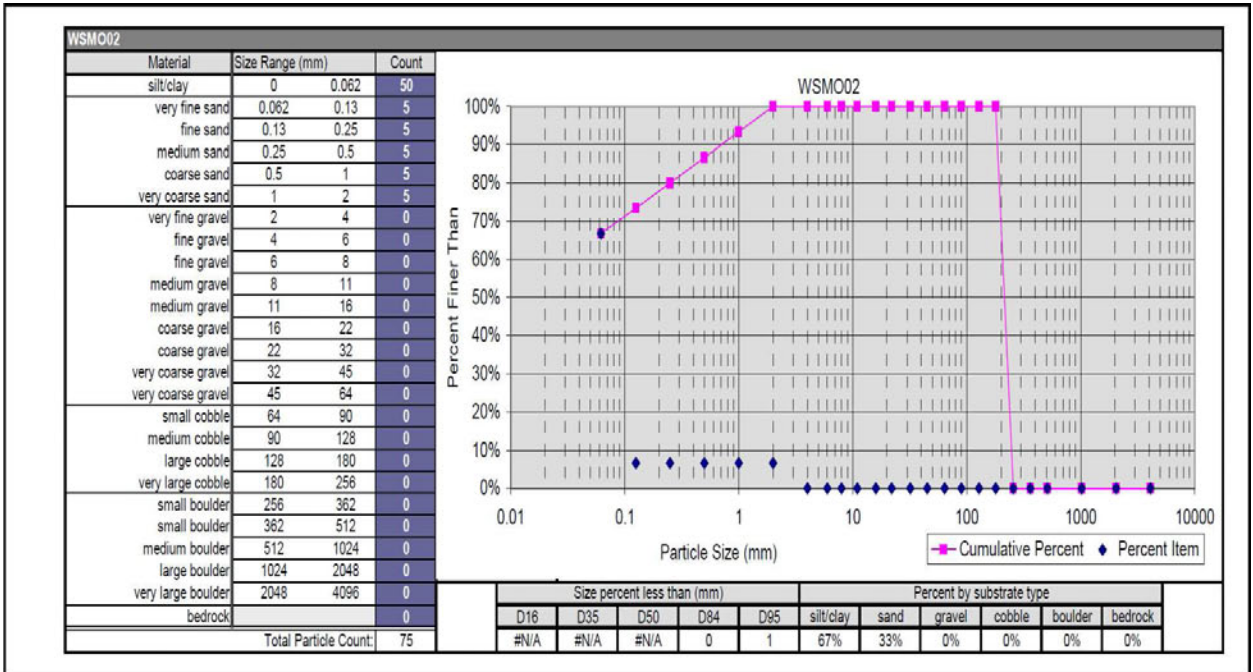
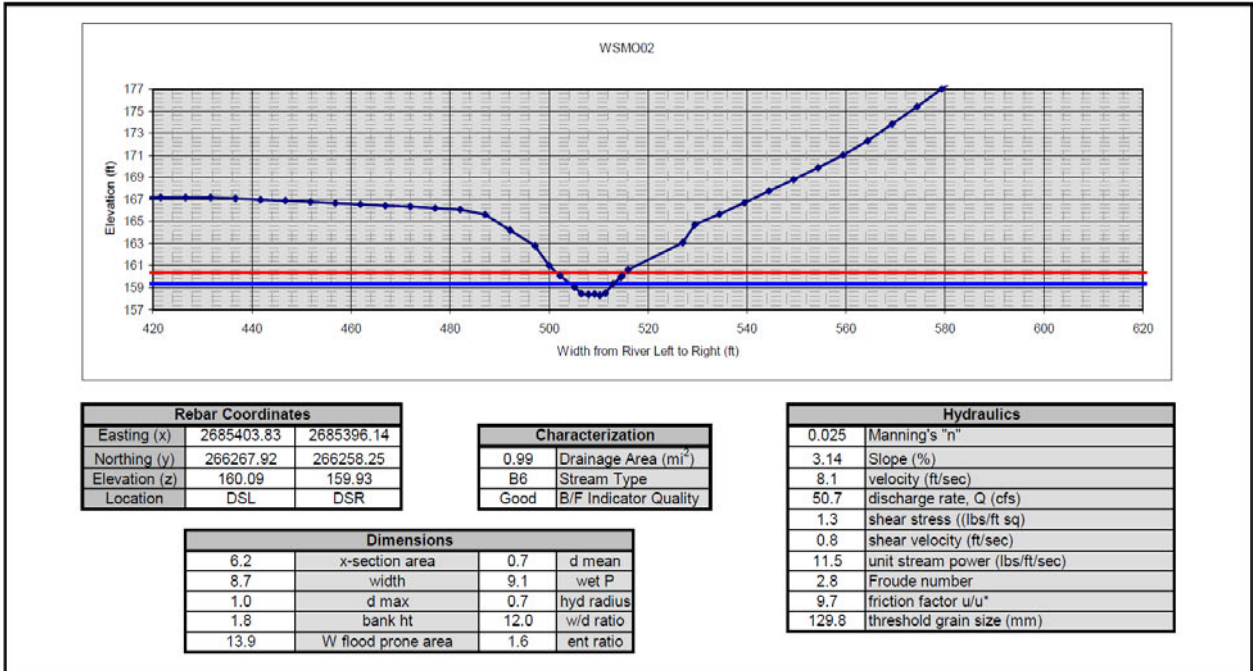


XS - DSL to DSR

Downstream View



XS = cross section / DSL = Downstream Left / DSR = Downstream Right





Wissanickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section**  
**WSMIO-04**

Philadelphia  
Drainage Area = 1.23 mi<sup>2</sup>  
05/03/2005



XS - DSR to DSL



XS - DSL to DSR

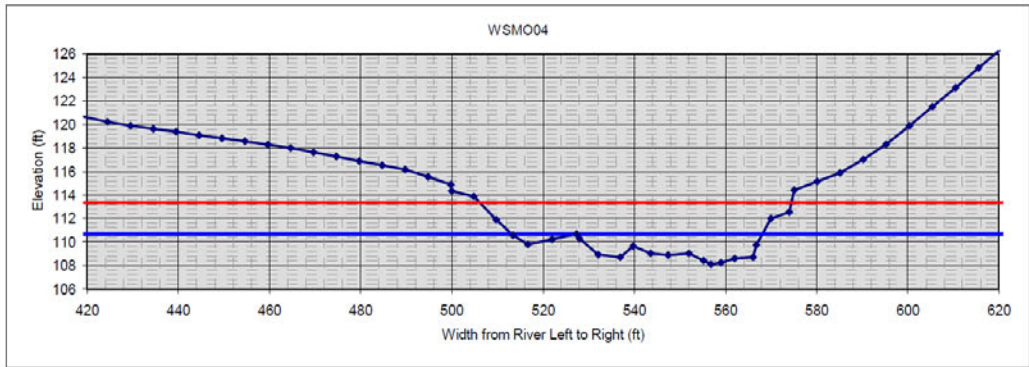
Upstream View



Downstream View



XS = cross section · DSL = DownstreamLeft DSR = DownstreamRight

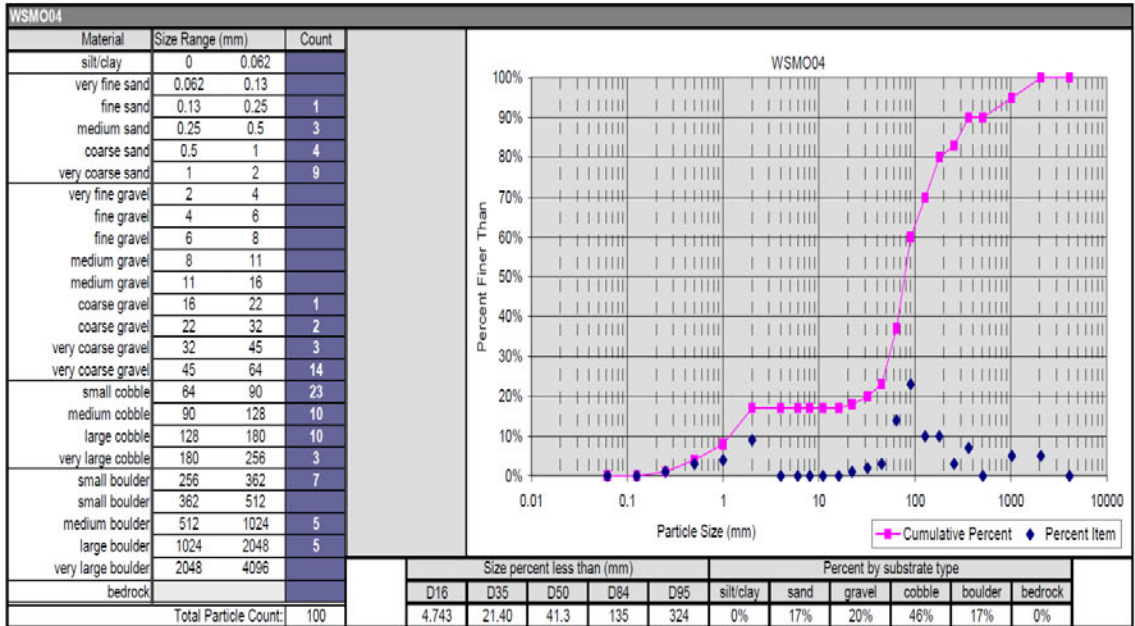


| Rebar Coordinates |            |            |
|-------------------|------------|------------|
| Easting (x)       | 2685760.73 | 2685695.79 |
| Northing (y)      | 264402.98  | 264405.72  |
| Elevation (z)     | 113.89     | 112.02     |
| Location          | DSL        | DSR        |

| Characterization |                                  |
|------------------|----------------------------------|
| 1.23             | Drainage Area (mi <sup>2</sup> ) |
| B3               | Stream Type                      |
| Good             | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.059      | Manning's "n"                  |
| 2.46       | Slope (%)                      |
| 5.6        | velocity (ft/sec)              |
| 395.2      | discharge rate, Q (cfs)        |
| 2.6        | shear stress ((lbs/ft sq)      |
| 1.2        | shear velocity (ft/sec)        |
| 14.9       | unit stream power (lbs/ft/sec) |
| 0.6        | Froude number                  |
| 4.8        | friction factor u/u*           |
| 457.7      | threshold grain size (mm)      |

| Dimensions |                    |      |            |
|------------|--------------------|------|------------|
| 70.9       | x-section area     | 1.7  | d mean     |
| 40.8       | width              | 42.3 | wet P      |
| 2.6        | d max              | 1.7  | hyd radius |
| 3.9        | bank ht            | 23.5 | w/d ratio  |
| 68.3       | W flood prone area | 1.7  | ent ratio  |



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section**  
**WSMO-06**

Philadelphia  
Drainage Area = 1.61 mi<sup>2</sup>  
05/03/2005



**XS - DSR to DSL**

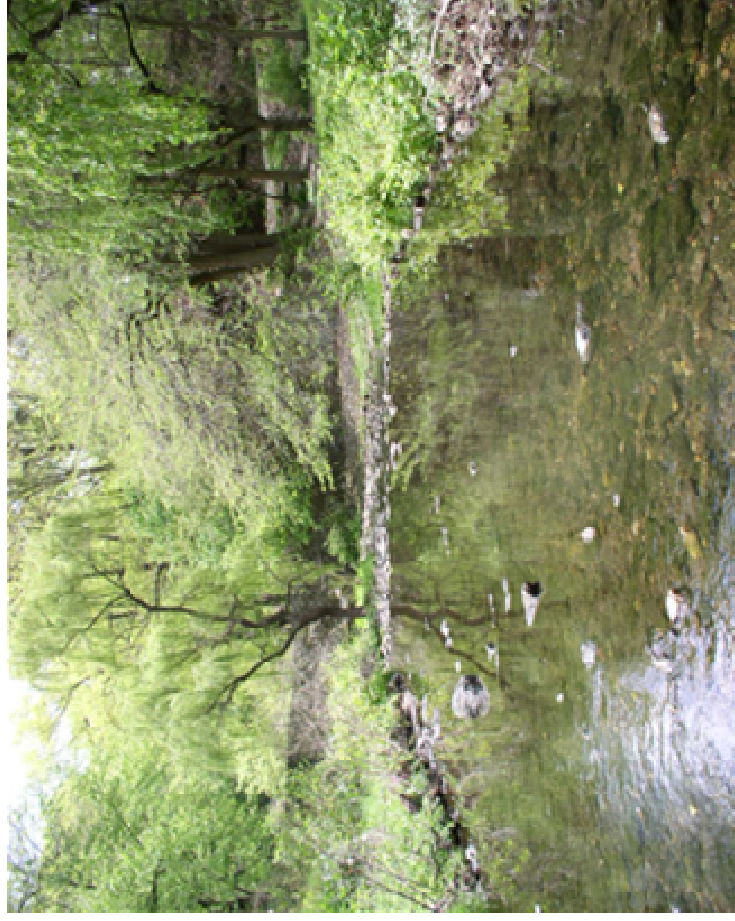


**XS - DSL to DSR**

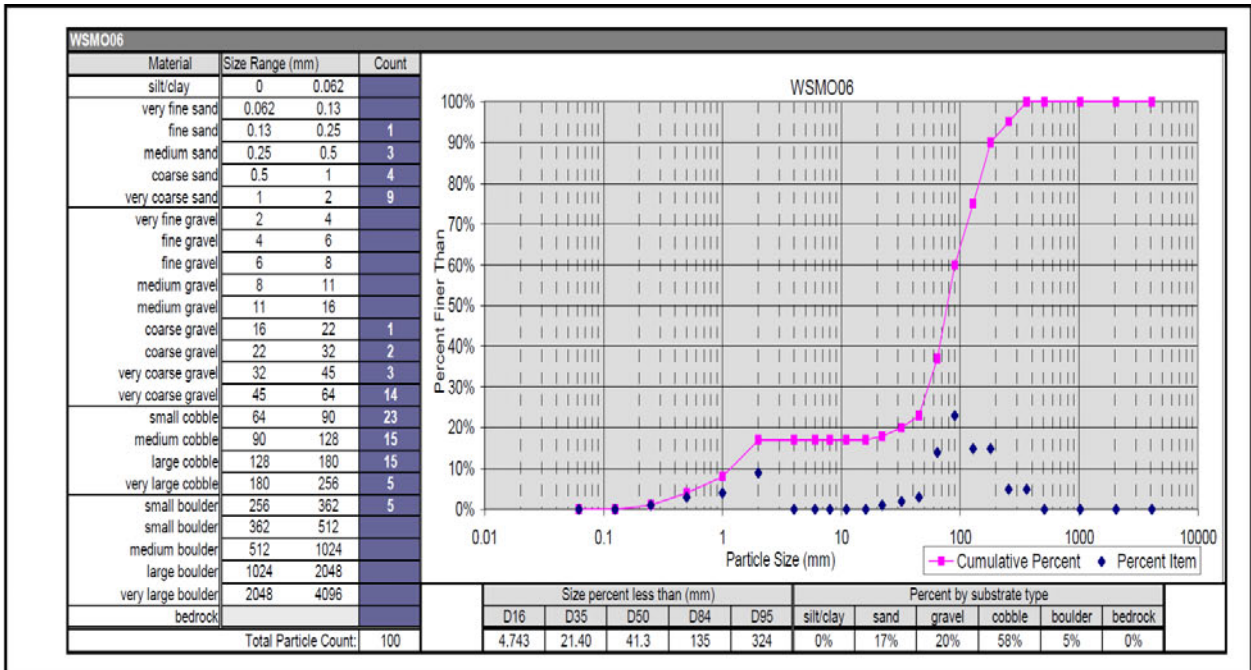
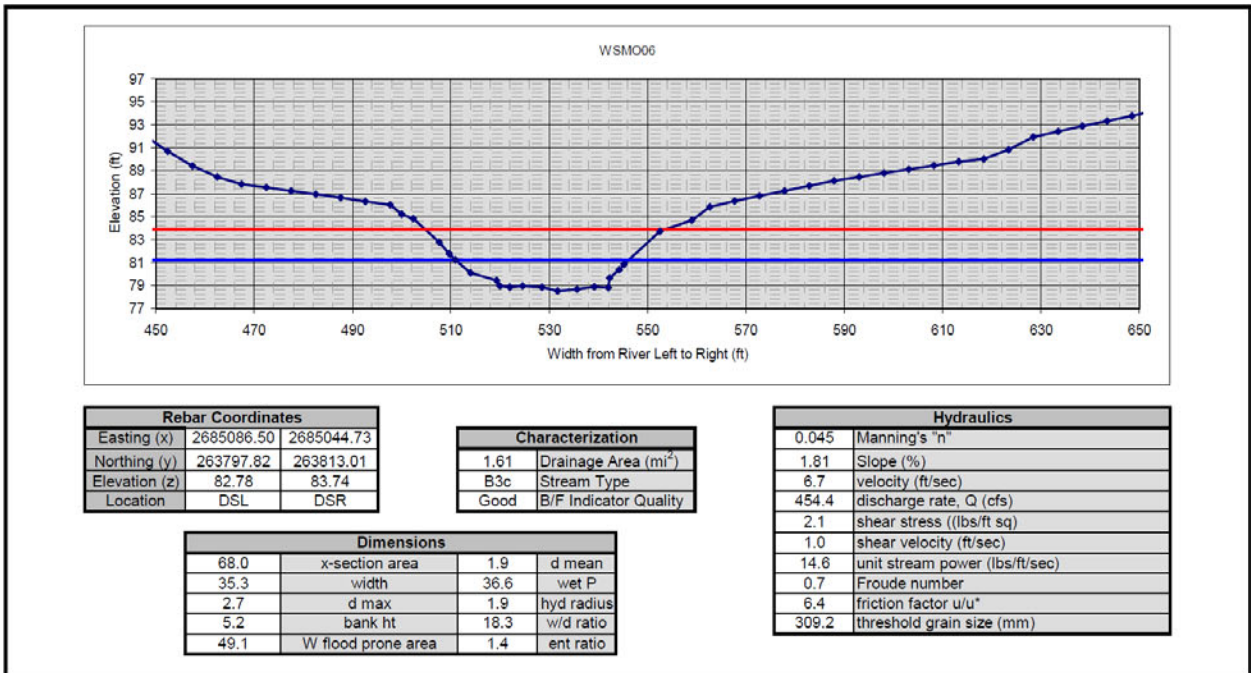
**Upstream View**



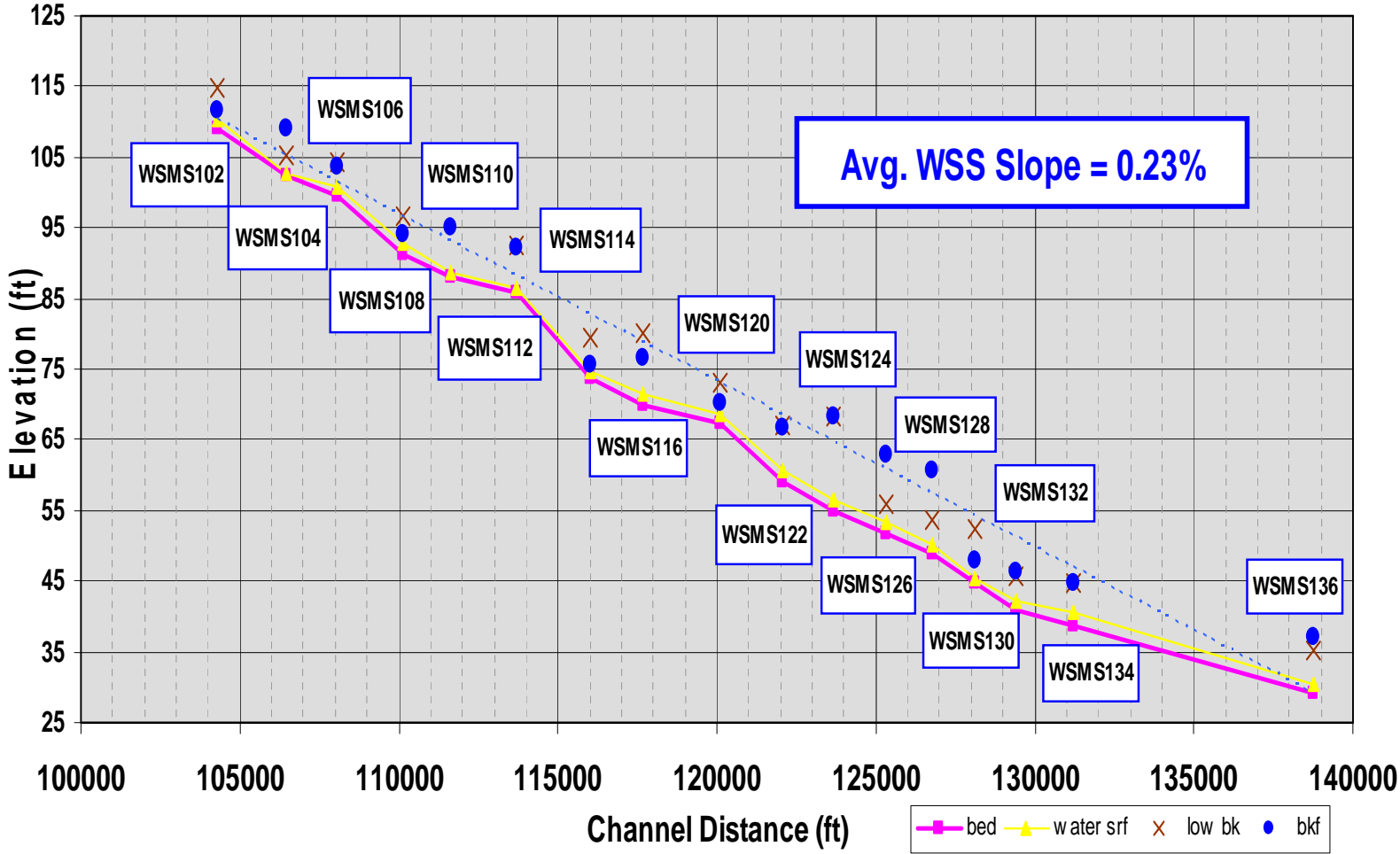
**Downstream View**



**XS = cross section DSL = DownstreamLeft DSR = DownstreamRight**



### Main Stem - Wissahickon Creek Wissahickon



SECTION A.13: LOWER WISSAHICKON MAINSTEM

Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section  
WSMS-102**

Philadelphia  
Drainage Area = 16.07 mi<sup>2</sup>  
04/19/2005



**XS – DSR to DSL**



**XS – DSL to DSR**

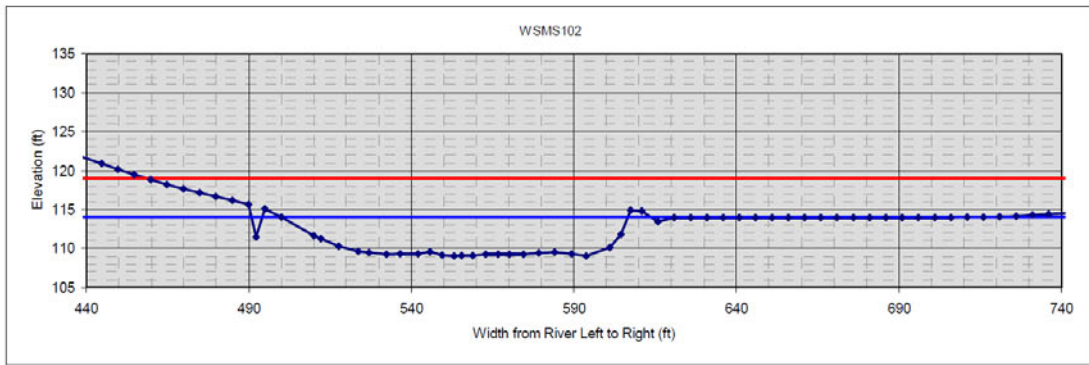
**Upstream View**



**Downstream View**



**XS = cross section / DSL = Downstream Left / DSR = Downstream Right**

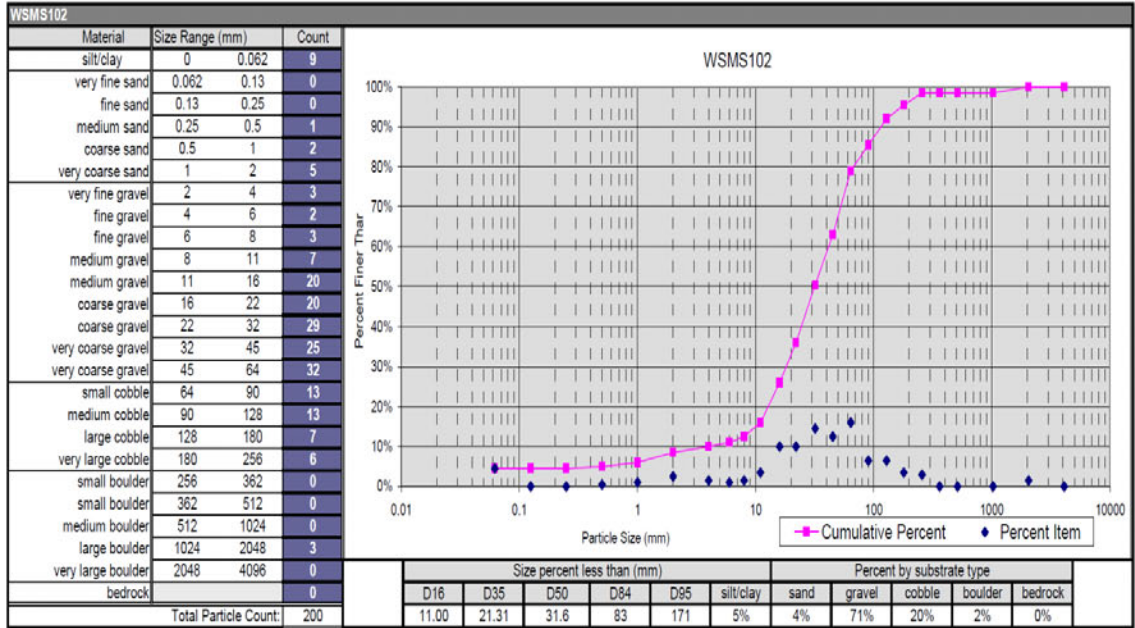


| Rebar Coordinates |                         |
|-------------------|-------------------------|
| Easting (x)       | 2673460.42   2673412.16 |
| Northing (y)      | 283355.18   283451.99   |
| Elevation (z)     | 114.04   114.82         |
| Location          | DSL   DSR               |

| Characterization |                                  |
|------------------|----------------------------------|
| 52.45            | Drainage Area (mi <sup>2</sup> ) |
| B4c              | Stream Type                      |
| Moderate         | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.0358     | Manning's "n"                  |
| 0.2494     | Slope (%)                      |
| 3.4        | velocity (ft/sec)              |
| 1533.70    | discharge rate, Q (cfs)        |
| 0.33       | shear stress (lbs/ft sq)       |
| 0.41       | shear velocity (ft/sec)        |
| 1.16       | unit stream power (lbs/ft/sec) |
| 0.17       | Froude number                  |
| 8.30       | friction factor u/u*           |
| 19.37      | threshold grain size (mm)      |

| Dimensions |                    |       |            |
|------------|--------------------|-------|------------|
| 447.9      | x-section area     | 2.2   | d mean     |
| 206.1      | width              | 210.9 | wet P      |
| 5.0        | d max              | 2.1   | hyd radius |
| 5.9        | bank ht            | 94.8  | w/d ratio  |
| 358.0      | W flood prone area | 1.7   | ent ratio  |



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section  
WSMS-104**

Philadelphia  
Drainage Area = 16.96 mi<sup>2</sup>  
04/19/2005



**XS – DSR to DSL**

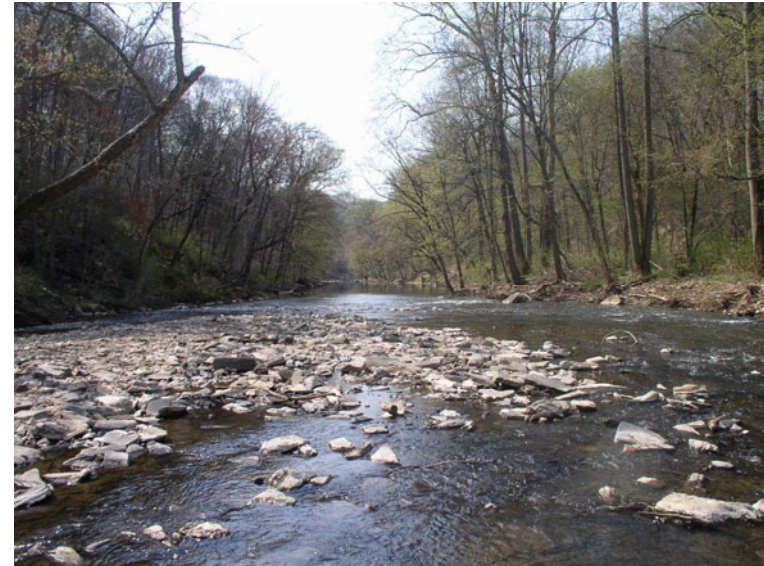


**XS – DSL to DSR**

**Upstream View**

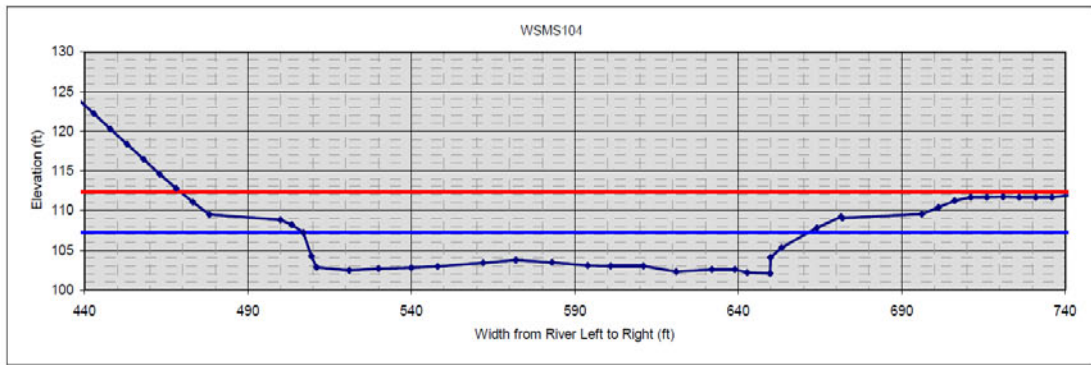


**Downstream View**



**XS = cross section / DSL = Downstream Left / DSR = Downstream Right**



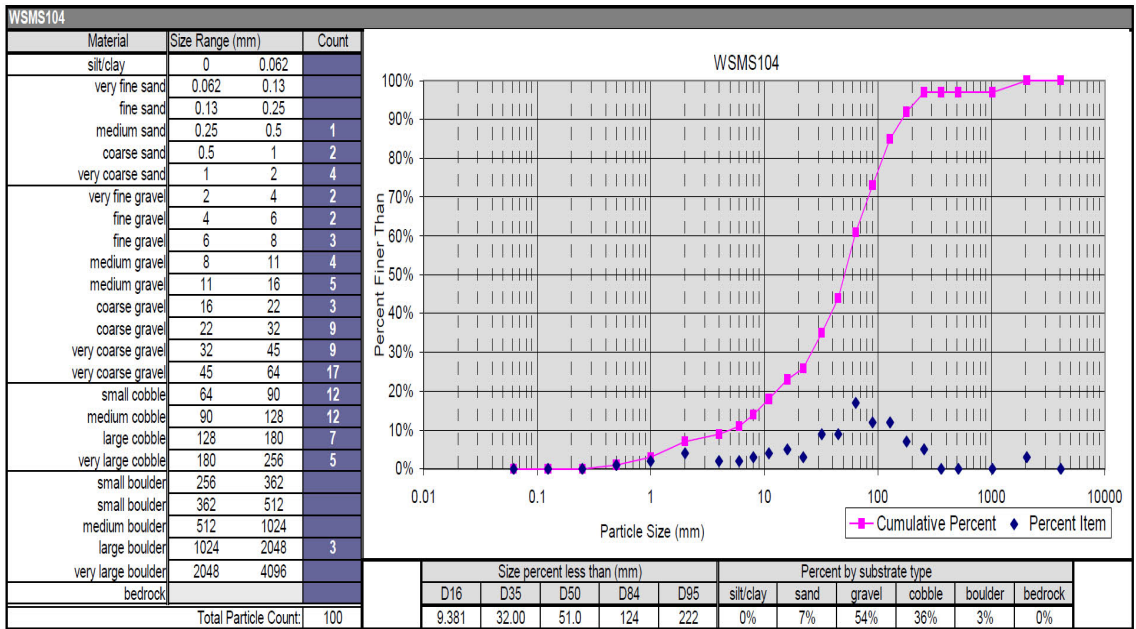


| Rebar Coordinates |            |             |
|-------------------|------------|-------------|
| Easting (x)       | 2675049.97 | 2673412.164 |
| Northing (y)      | 281627.19  | 283451.99   |
| Elevation (z)     | 108.20     | 242.54      |
| Location          | DSL        | DSR         |

| Characterization |                                  |
|------------------|----------------------------------|
| 53.84            | Drainage Area (mi <sup>2</sup> ) |
| B4c              | Stream Type                      |
| Moderate         | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.037302   | Manning's "n"                  |
| 0.248099   | Slope (%)                      |
| 4.9        | velocity (ft/sec)              |
| 3093.7     | discharge rate, Q (cfs)        |
| 0.61       | shear stress (lbs/ft sq)       |
| 0.56       | shear velocity (ft/sec)        |
| 3.10       | unit stream power (lbs/ft/sec) |
| 0.19       | Froude number                  |
| 8.82       | friction factor u/u*           |
| 38.22      | threshold grain size (mm)      |

| Dimensions |                    |       |            |
|------------|--------------------|-------|------------|
| 625.6      | x-section area     | 4.0   | d mean     |
| 154.5      | width              | 158.9 | wet P      |
| 5.1        | d max              | 3.9   | hyd radius |
| 3.2        | bank ht            | 38.1  | w/d ratio  |
| 276.9      | W flood prone area | 1.8   | ent ratio  |



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section  
WSMS-106**

Philadelphia  
Drainage Area = 17.06 mi<sup>2</sup>  
04/19/2005



**XS – DSR to DSL**



**XS – DSL to DSR**

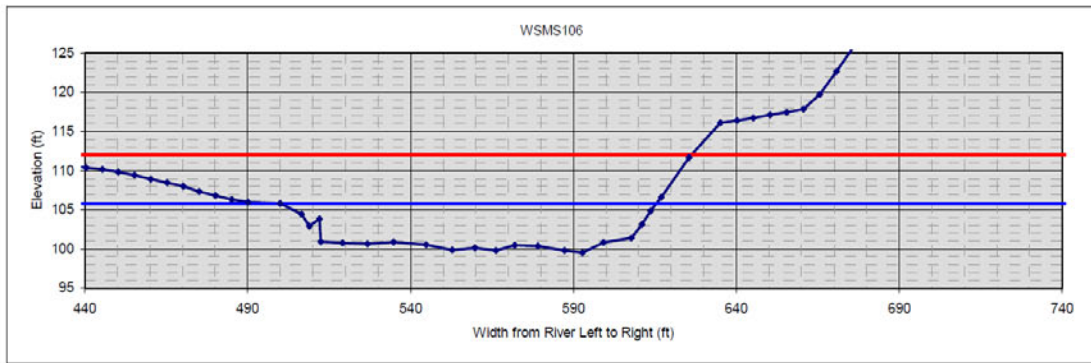
**Upstream View**



**Downstream View**



**XS = cross section / DSL = Downstream Left / DSR = Downstream Right**

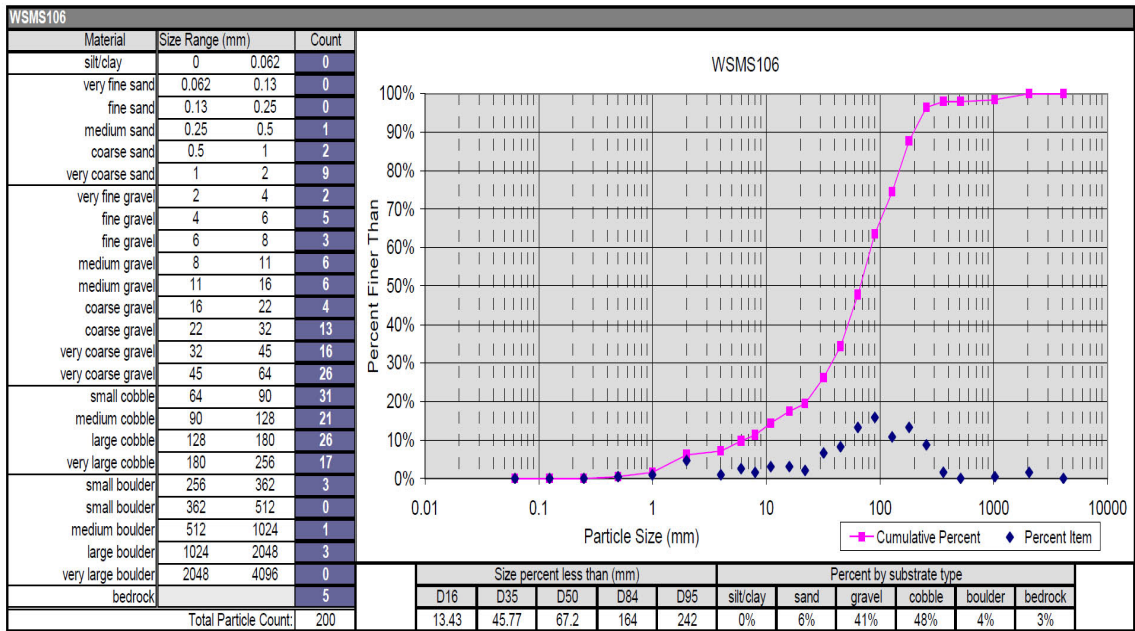


| Rebar Coordinates |            |            |
|-------------------|------------|------------|
| Easting (x)       | 2675535.05 | 2675411.93 |
| Northing (y)      | 280385.86  | 280334.20  |
| Elevation (z)     | 105.80     | 116.13     |
| Location          | DSL        | DSR        |

| Characterization |                                  |
|------------------|----------------------------------|
| 53.95            | Drainage Area (mi <sup>2</sup> ) |
| B3c              | Stream Type                      |
| Moderate         | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.0373     | Manning's "n"                  |
| 0.2481     | Slope (%)                      |
| 5.5        | velocity (ft/sec)              |
| 2967.4     | discharge rate, Q (cfs)        |
| 0.8        | shear stress (lbs/ft sq)       |
| 0.6        | shear velocity (ft/sec)        |
| 4.6        | unit stream power (lbs/ft/sec) |
| 0.2        | Froude number                  |
| 8.6        | friction factor u/u*           |
| 52.2       | threshold grain size (mm)      |

| Dimensions |                    |       |            |
|------------|--------------------|-------|------------|
| 5.5        | x-section area     | 4.9   | d mean     |
| 2967.4     | width              | 114.1 | wet P      |
| 0.8        | d max              | 4.7   | hyd radius |
| 0.6        | bank ht            | 22.6  | w/d ratio  |
| 4.6        | W flood prone area | 2.0   | ent ratio  |



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section  
WSMS-108**

Philadelphia  
Drainage Area = 17.30 mi<sup>2</sup>  
04/19/2005



**XS – DSR to DSL**

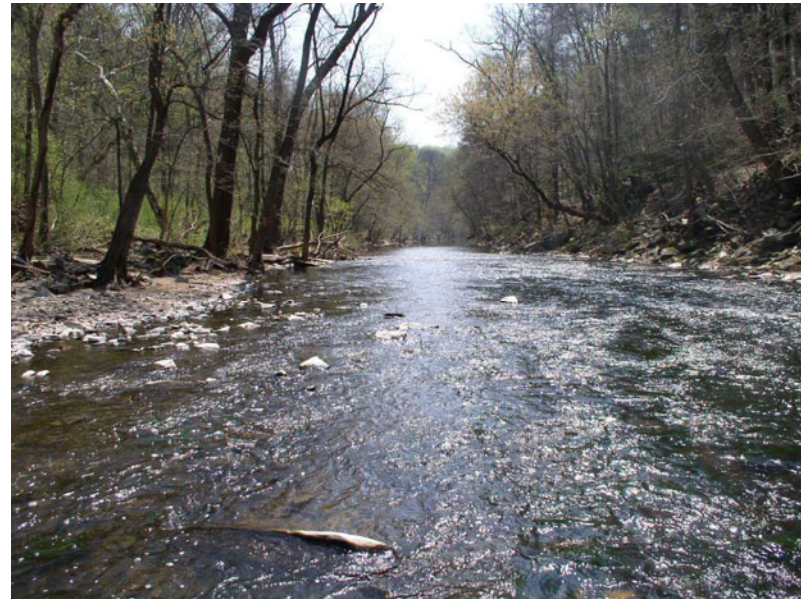


**XS – DSL to DSR**

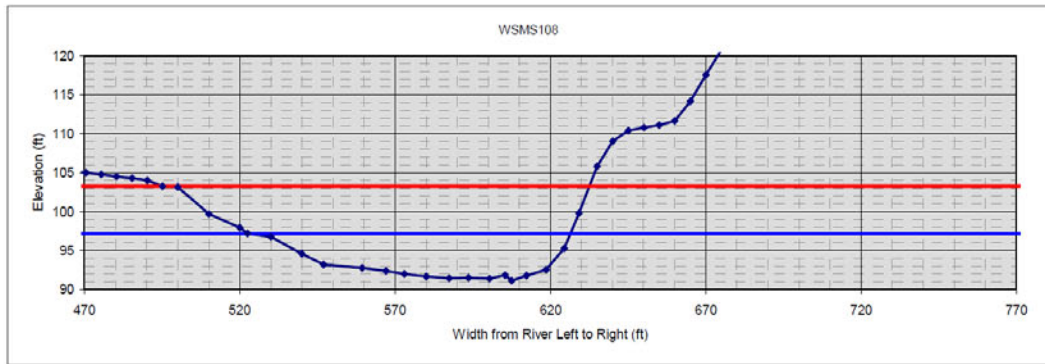
**Upstream View**



**Downstream View**



**XS = cross section / DSL = Downstream Left / DSR = Downstream Right**

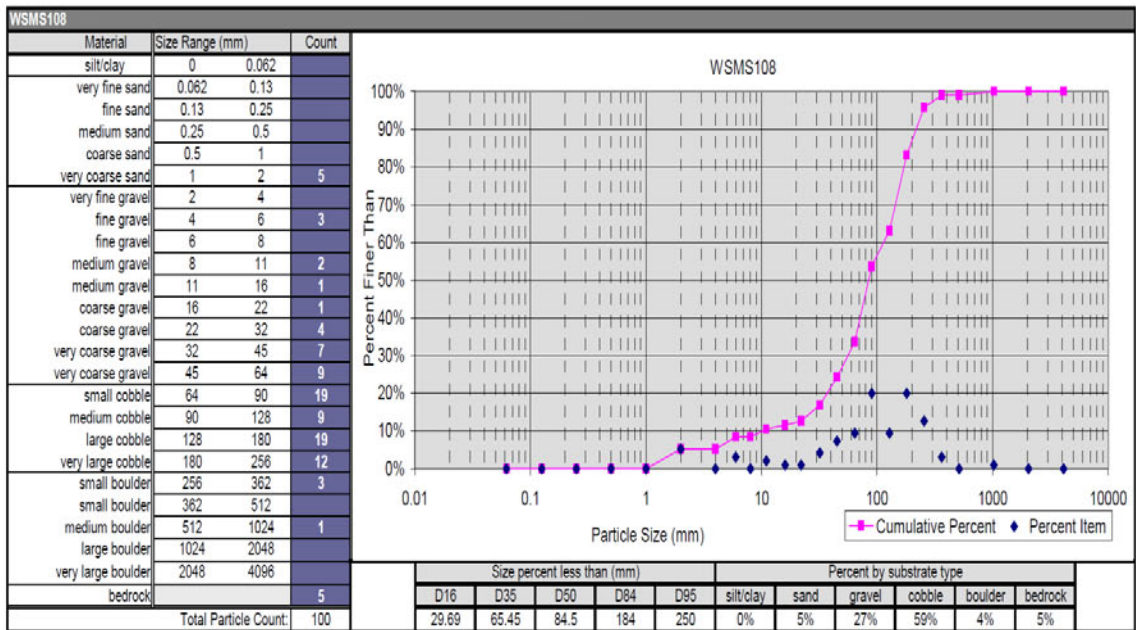


| Rebar Coordinates |            |             |
|-------------------|------------|-------------|
| Easting (x)       | 2675118.55 | 2675026.63  |
| Northing (y)      | 278938.87  | 278838.6882 |
| Elevation (z)     | 103.13     | 109.03      |
| Location          | DSL        | DSR         |

| Characterization |                                  |
|------------------|----------------------------------|
| 54.26            | Drainage Area (mi <sup>2</sup> ) |
| F3               | Stream Type                      |
| Good             | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.042      | Manning's "n"                  |
| 0.35       | Slope (%)                      |
| 5.4        | velocity (ft/sec)              |
| 2302.0     | discharge rate, Q (cfs)        |
| 0.88       | shear stress (lbs/ft sq)       |
| 0.68       | shear velocity (ft/sec)        |
| 4.82       | unit stream power (lbs/ft/sec) |
| 0.22       | Froude number                  |
| 7.93       | friction factor u/u*           |
| 57.00      | threshold grain size (mm)      |

| Dimensions |                    |       |            |
|------------|--------------------|-------|------------|
| 430.0      | x-section area     | 4.1   | d mean     |
| 103.9      | width              | 106.0 | wet P      |
| 6.1        | d max              | 4.1   | hyd radius |
| 5.7        | bank ht            | 25.1  | w/d ratio  |
| 137.6      | W flood prone area | 1.3   | ent ratio  |



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section  
WSMS-110**

Philadelphia  
Drainage Area = 17.50 mi<sup>2</sup>  
04/20/2005



**XS – DSR to DSL**



**XS – DSL to DSR**

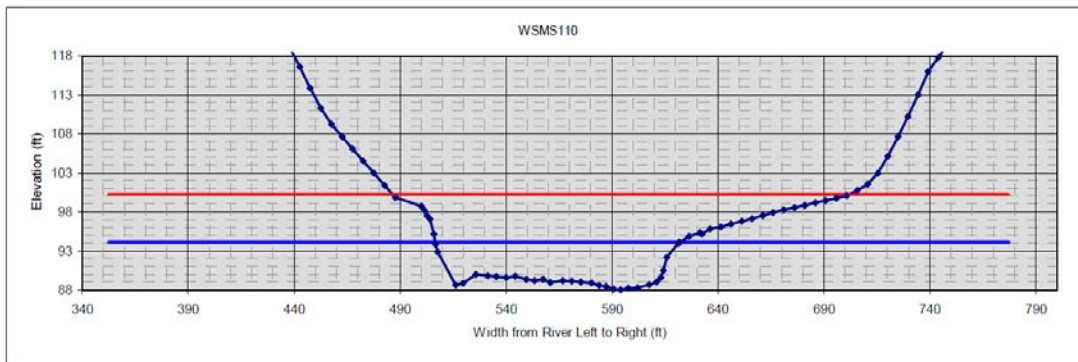
**Upstream View**



**Downstream View**



**XS = cross section / DSL = Downstream Left / DSR = Downstream Right**

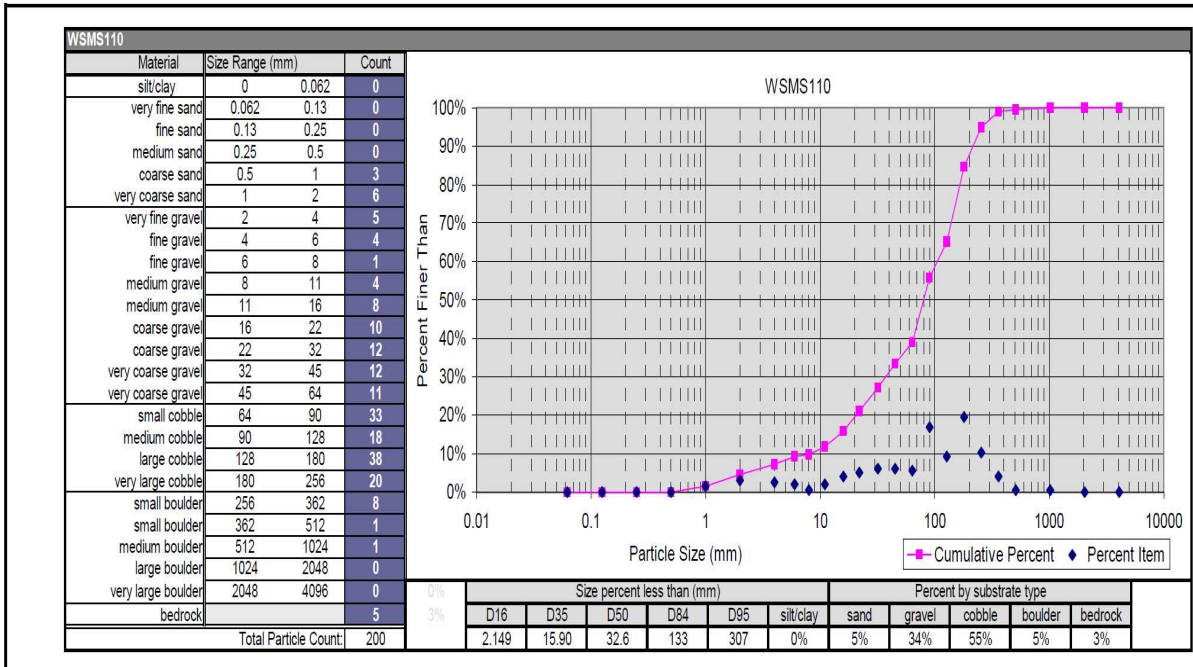


| Rebar Coordinates |                       |
|-------------------|-----------------------|
| Easting (x)       | 2676468.95 2676352.08 |
| Northing (y)      | 277272.40 277251.03   |
| Elevation (z)     | 97.53 93.94           |
| Location          | DSL DSR               |

| Characterization |                                  |
|------------------|----------------------------------|
| 54.62            | Drainage Area (mi <sup>2</sup> ) |
| B3c              | Stream Type                      |
| Fair             | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.0407     | Manning's 'n'                  |
| 0.1752     | Slope (%)                      |
| 4.1        | velocity (ft/sec)              |
| 2199.6     | discharge rate, Q (cfs)        |
| 0.49       | shear stress (lbs/ft sq)       |
| 0.50       | shear velocity (ft/sec)        |
| 2.08       | unit stream power (lbs/ft/sec) |
| 0.12       | Froude number                  |
| 8.24       | friction factor u/u'           |
| 29.80      | threshold grain size (mm)      |

| Dimensions |                    |       |            |
|------------|--------------------|-------|------------|
| 532.4      | x-section area     | 4.6   | d mean     |
| 115.6      | width              | 119.4 | wet P      |
| 6.1        | d max              | 4.5   | hyd radius |
| 4.2        | bank ht            | 25.1  | w/d ratio  |
| 215.3      | W flood prone area | 1.9   | ent ratio  |



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section  
WSMS-112**

Philadelphia  
Drainage Area = 17.62 mi<sup>2</sup>  
04/21/2005



**XS – DSR to DSL**



**XS – DSL to DSR**

**Upstream View**

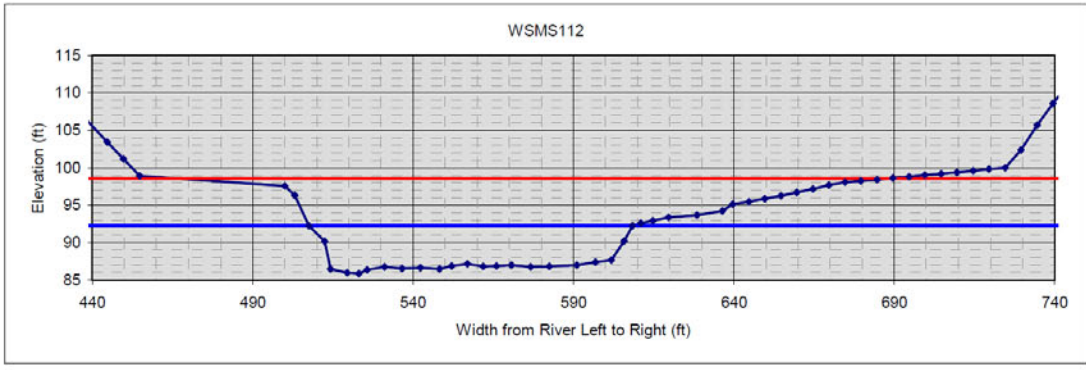


**Downstream View**



**XS = cross section / DSL = Downstream Left / DSR = Downstream Right**





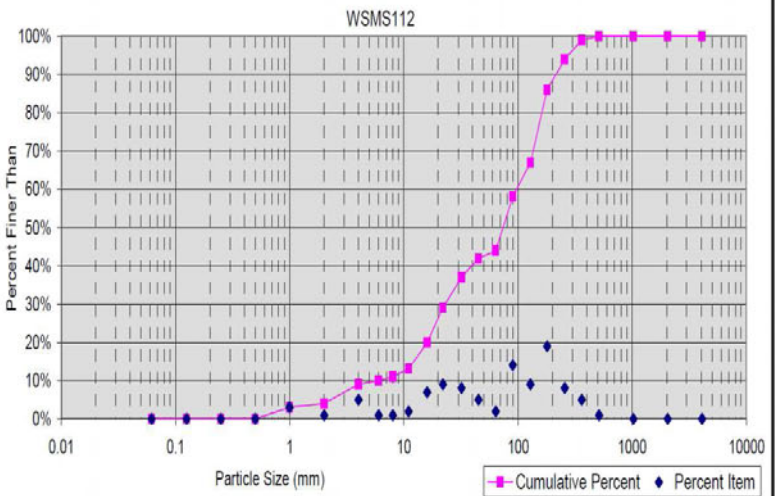
| Rebar Coordinates |            |            |
|-------------------|------------|------------|
| Easting (x)       | 2675926.05 | 2675852.90 |
| Northing (y)      | 276605.83  | 276692.91  |
| Elevation (z)     | 97.59      | 92.94      |
| Location          | DSL        | DSR        |

| Characterization |                                  |
|------------------|----------------------------------|
| 54.90            | Drainage Area (mi <sup>2</sup> ) |
| B3c              | Stream Type                      |
| Good             | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.0400     | Manning's "n"                  |
| 0.3132     | Slope (%)                      |
| 5.9        | velocity (ft/sec)              |
| 2998.2     | discharge rate, Q (cfs)        |
| 0.94       | shear stress (lbs/ft sq)       |
| 0.70       | shear velocity (ft/sec)        |
| 5.82       | unit stream power (lbs/ft/sec) |
| 0.22       | Froude number                  |
| 8.50       | friction factor u/u*           |
| 64.58      | threshold grain size (mm)      |

| Dimensions |                    |       |            |
|------------|--------------------|-------|------------|
| 506.2      | x-section area     | 5.0   | d mean     |
| 100.7      | width              | 105.0 | wet P      |
| 6.3        | d max              | 4.8   | hyd radius |
| 6.7        | bank ht            | 20.0  | w/d ratio  |
| 221.4      | W flood prone area | 2.2   | ent ratio  |

| Material              | Size Range (mm) | Count |
|-----------------------|-----------------|-------|
| silt/clay             | 0 0.062         | 0     |
| very fine sand        | 0.062 0.13      | 0     |
| fine sand             | 0.13 0.25       | 0     |
| medium sand           | 0.25 0.5        | 0     |
| coarse sand           | 0.5 1           | 3     |
| very coarse sand      | 1 2             | 1     |
| very fine gravel      | 2 4             | 5     |
| fine gravel           | 4 6             | 1     |
| fine gravel           | 6 8             | 1     |
| medium gravel         | 8 11            | 2     |
| medium gravel         | 11 16           | 7     |
| coarse gravel         | 16 22           | 9     |
| coarse gravel         | 22 32           | 8     |
| very coarse gravel    | 32 45           | 5     |
| very coarse gravel    | 45 64           | 2     |
| small cobble          | 64 90           | 14    |
| medium cobble         | 90 128          | 9     |
| large cobble          | 128 180         | 19    |
| very large cobble     | 180 256         | 8     |
| small boulder         | 256 362         | 5     |
| small boulder         | 362 512         | 1     |
| medium boulder        | 512 1024        | 0     |
| large boulder         | 1024 2048       | 0     |
| very large boulder    | 2048 4096       | 0     |
| bedrock               |                 | 0     |
| Total Particle Count: |                 | 100   |



| Size percent less than (mm) |       |      |     |     | Percent by substrate type |      |        |        |         |         |
|-----------------------------|-------|------|-----|-----|---------------------------|------|--------|--------|---------|---------|
| D16                         | D35   | D50  | D84 | D95 | silt/clay                 | sand | gravel | cobble | boulder | bedrock |
| 12.92                       | 29.14 | 74.1 | 174 | 274 | 0%                        | 4%   | 40%    | 50%    | 6%      | 0%      |

Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section  
WSMS-114**

Philadelphia  
Drainage Area = 18.01 mi<sup>2</sup>  
10/04/2005



**XS – DSR to DSL**



**XS – DSL to DSR**

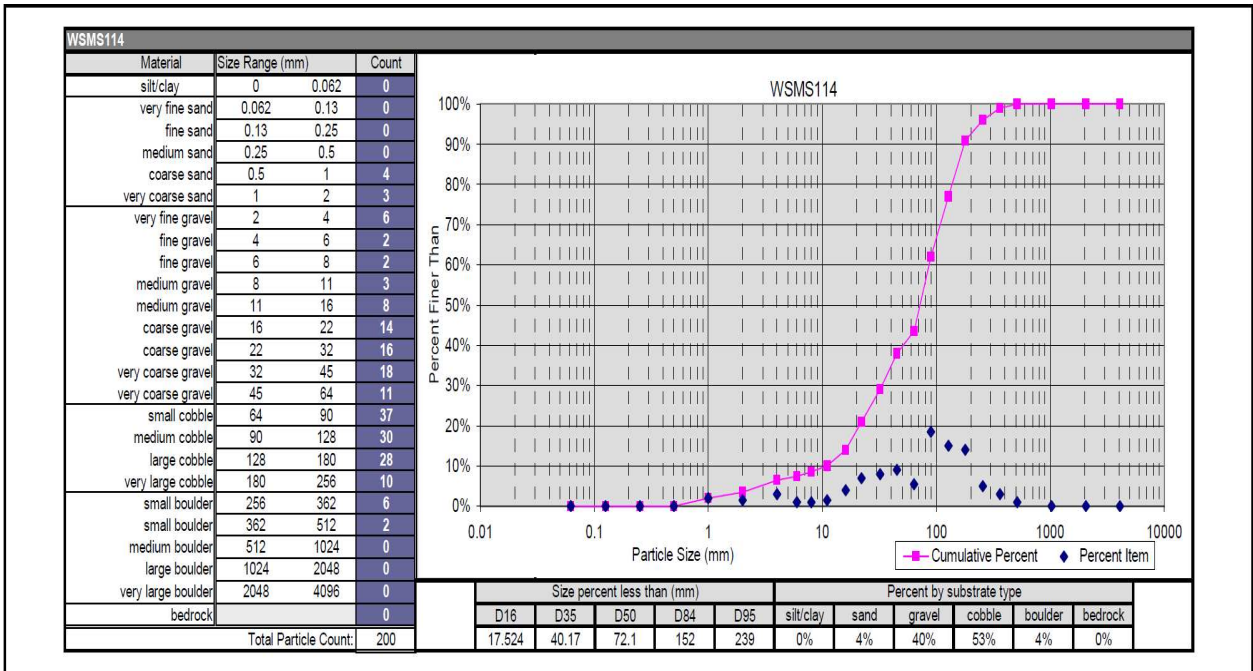
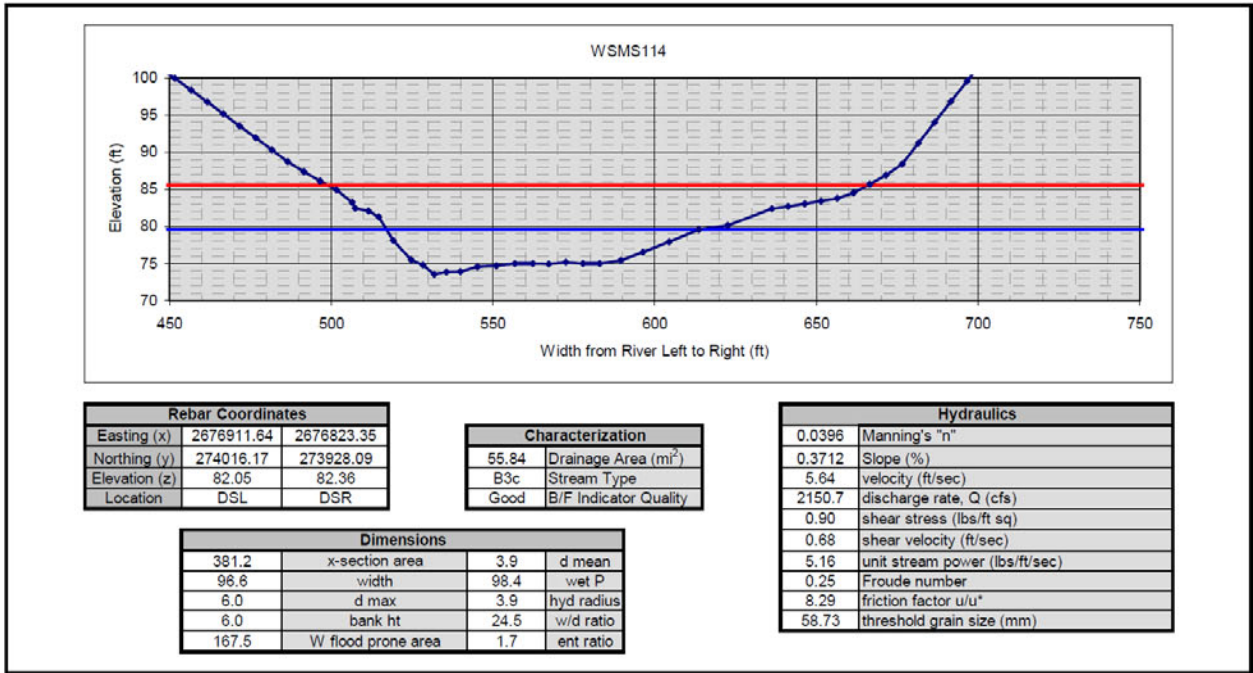
**Upstream View**



**Downstream View**



**XS = cross section / DSL = Downstream Left / DSR = Downstream Right**



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section  
WSMS-116**

Philadelphia  
Drainage Area = 18.07 mi<sup>2</sup>  
04/21/2005



**XS – DSR to DSL**



**XS – DSL to DSR**

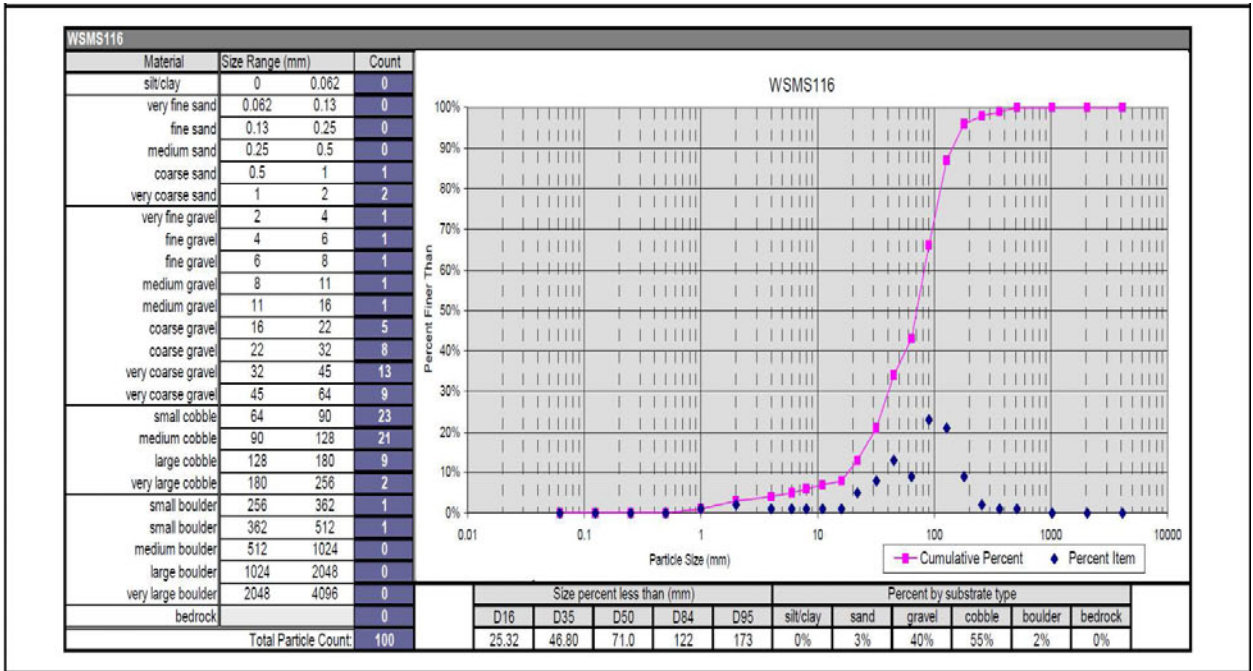
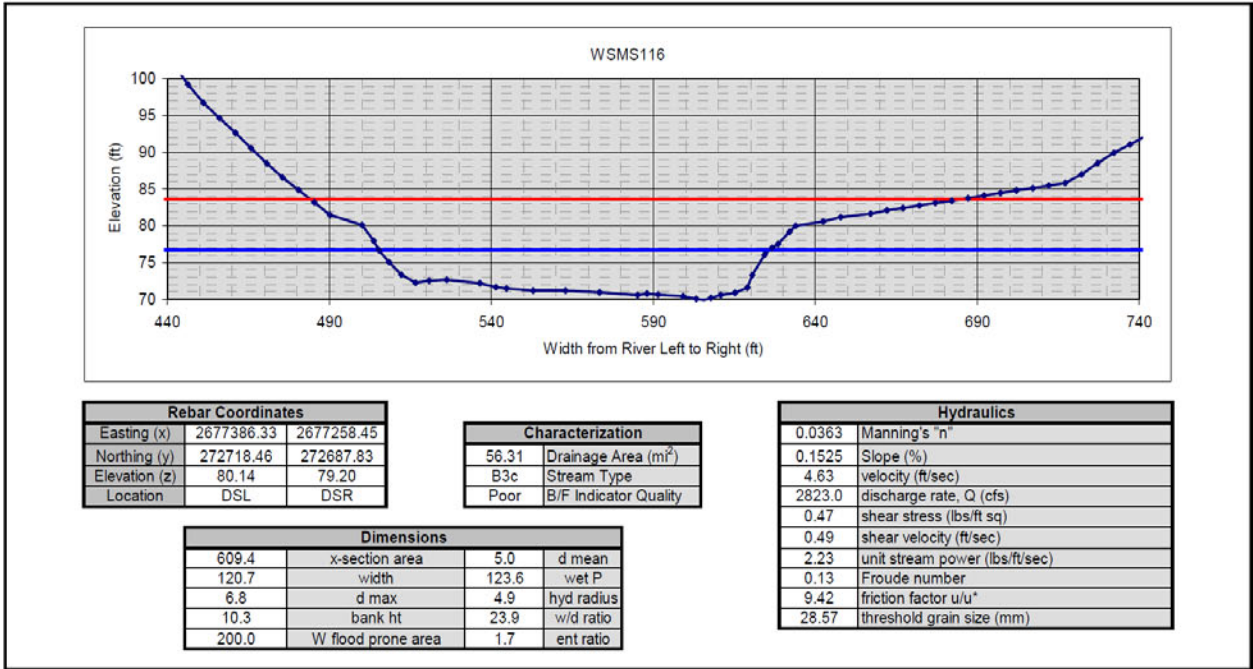
**Upstream View**



**Downstream View**



**XS = cross section / DSL = Downstream Left / DSR = Downstream Right**



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section  
WSMS-120**

Philadelphia  
Drainage Area = 18.24 mi<sup>2</sup>  
04/26/2005



**XS – DSR to DSL**



**XS – DSL to DSR**

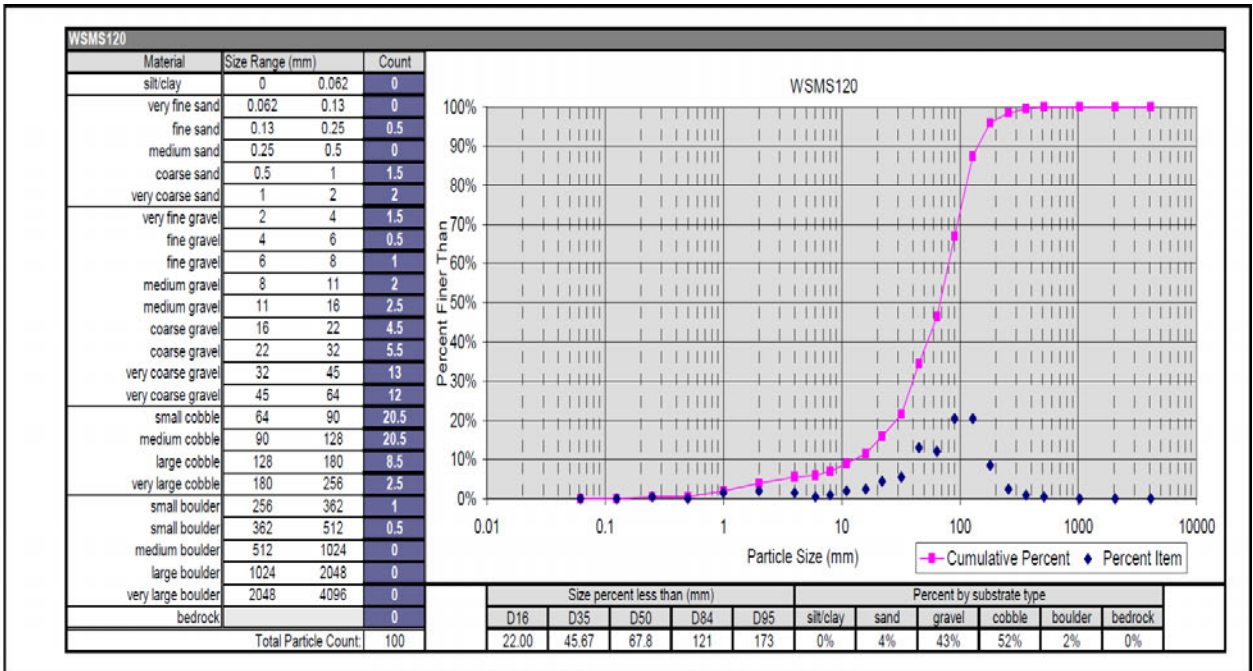
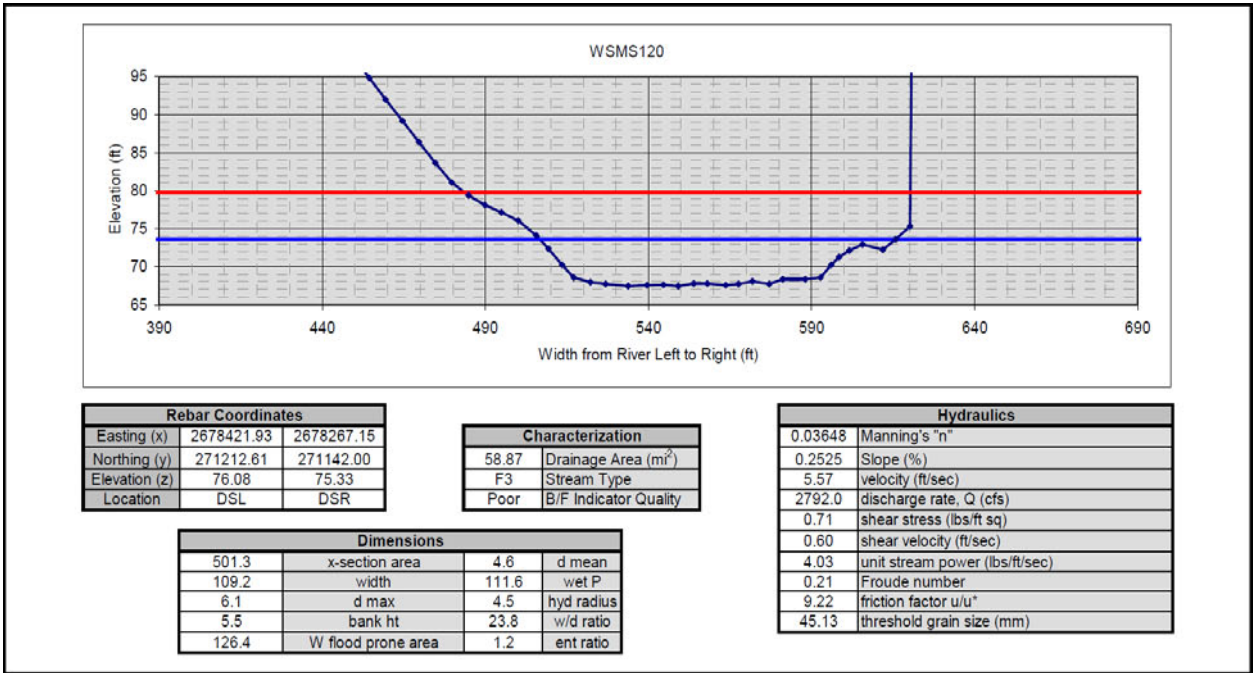
**Upstream View**



**Downstream View**



**XS = cross section / DSL = Downstream Left / DSR = Downstream Right**



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section  
WSMS-122**

Philadelphia  
Drainage Area = 18.59 mi<sup>2</sup>  
04/26/2005



XS – DSR to DSL

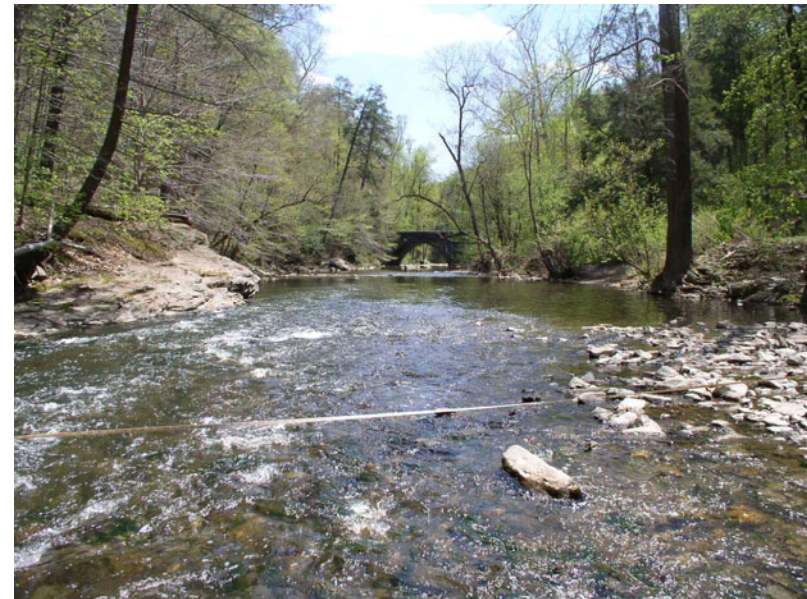


XS – DSL to DSR

**Upstream View**

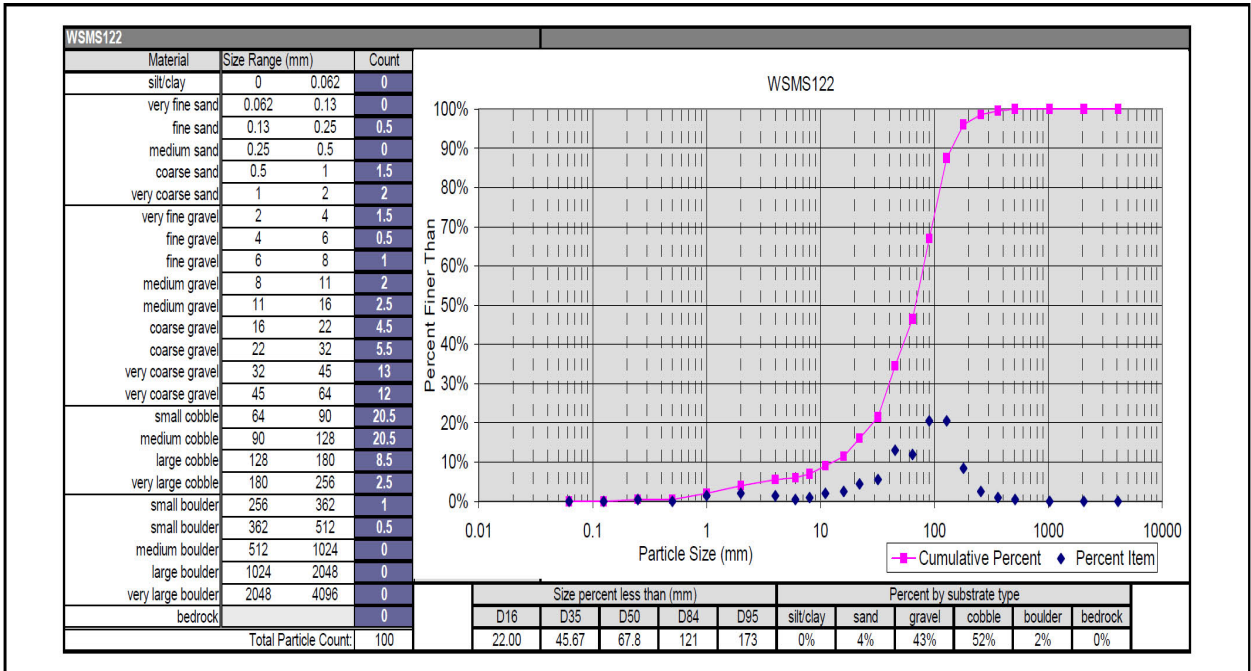
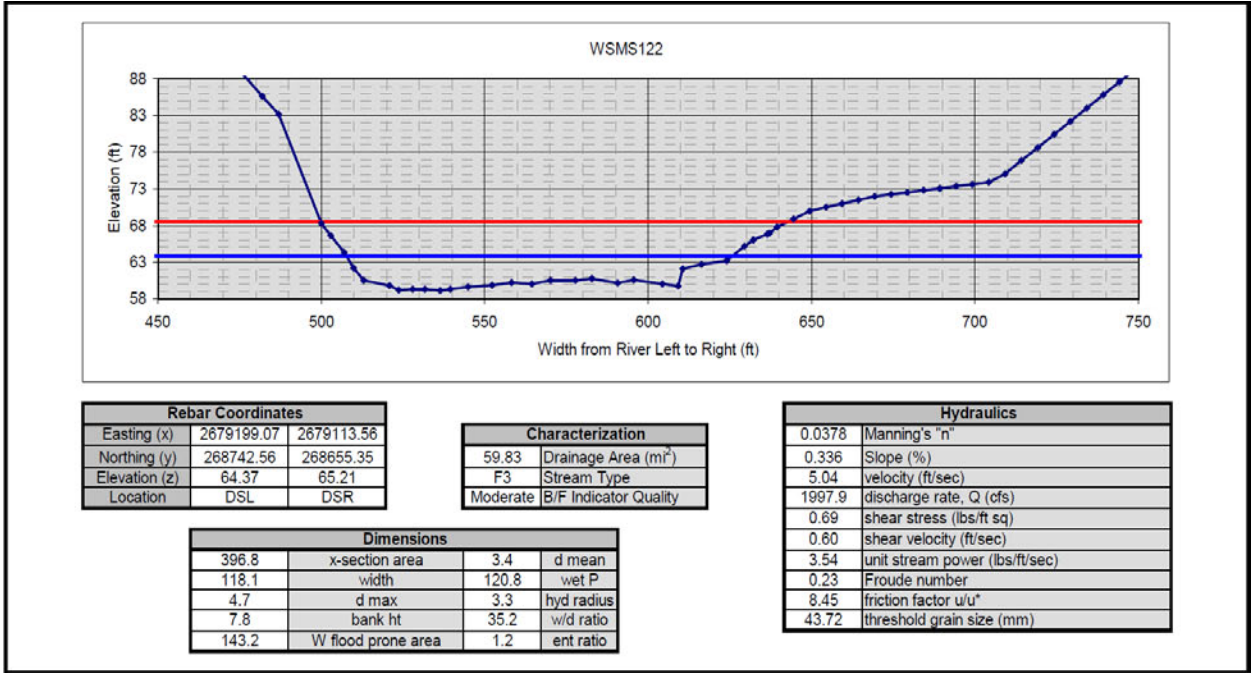


**Downstream View**



XS = cross section / DSL = Downstream Left / DSR = Downstream Right





Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section  
WSMS-124**

Philadelphia  
Drainage Area = 18.71 mi<sup>2</sup>  
04/26/2005



**XS – DSR to DSL**

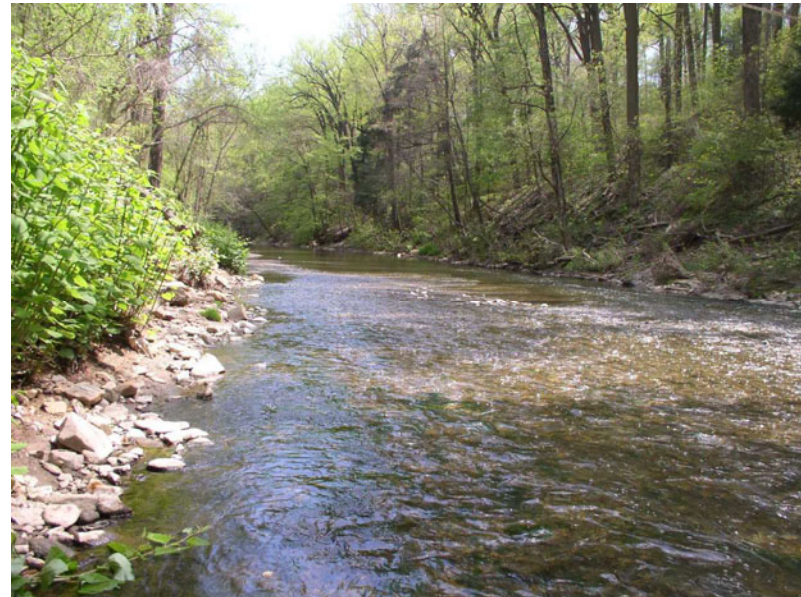


**XS – DSL to DSR**

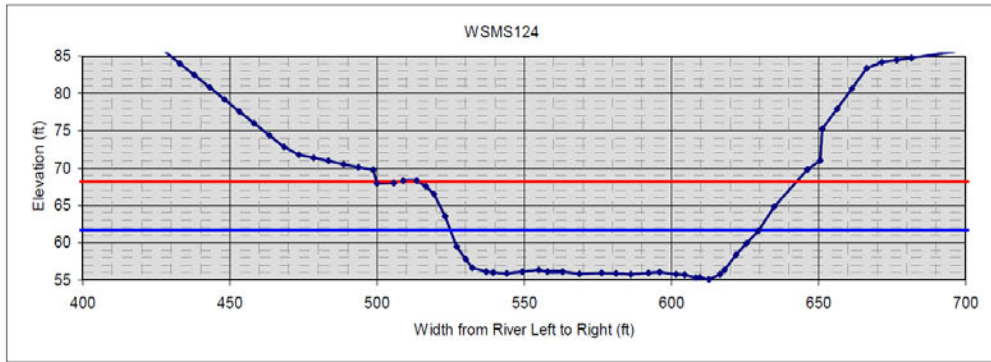
**Upstream View**



**Downstream View**



**XS = cross section / DSL = Downstream Left / DSR = Downstream Right**

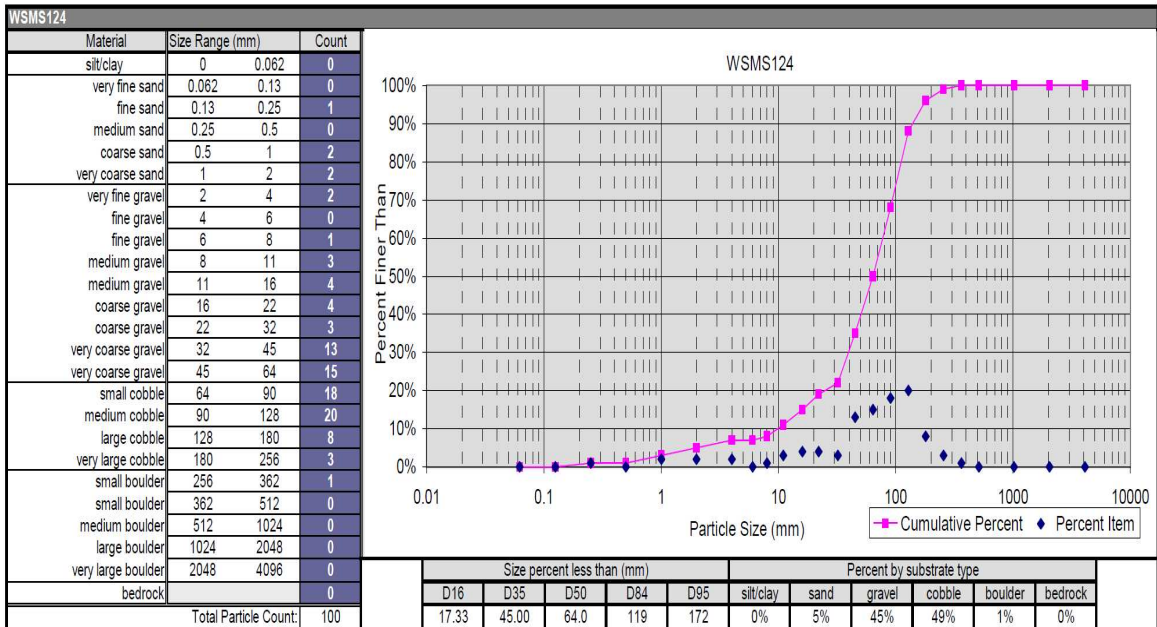


| Rebar Coordinates |            |            |
|-------------------|------------|------------|
| Easting (x)       | 2679628.34 | 2679511.55 |
| Northing (y)      | 267708.57  | 267637.84  |
| Elevation (z)     | 68.29      | 69.81      |
| Location          | DSL        | DSR        |

| Characterization |                                  |
|------------------|----------------------------------|
| 59.83            | Drainage Area (mi <sup>2</sup> ) |
| F4               | Stream Type                      |
| Poor             | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.0360     | Manning's n'                   |
| 0.1046     | Slope (%)                      |
| 3.9        | velocity (ft/sec)              |
| 2115.6     | discharge rate, Q (cfs)        |
| 0.33       | shear stress (lbs/ft sq)       |
| 0.41       | shear velocity (ft/sec)        |
| 1.32       | unit stream power (lbs/ft/sec) |
| 0.09       | Froude number                  |
| 9.51       | friction factor u/u'           |
| 19.18      | threshold grain size (mm)      |

| Dimensions |                    |       |            |
|------------|--------------------|-------|------------|
| 541.1      | x-section area     | 5.2   | d mean     |
| 104.7      | width              | 107.8 | wet P      |
| 6.6        | d max              | 5.0   | hyd radius |
| 13.2       | bank ht            | 20.3  | w/d ratio  |
| 136.4      | W flood prone area | 1.3   | ent ratio  |



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section  
WSMS-126**

Philadelphia  
Drainage Area = 18.99 mi<sup>2</sup>  
05/16/2005



XS – DSR to DSL



XS – DSL to DSR

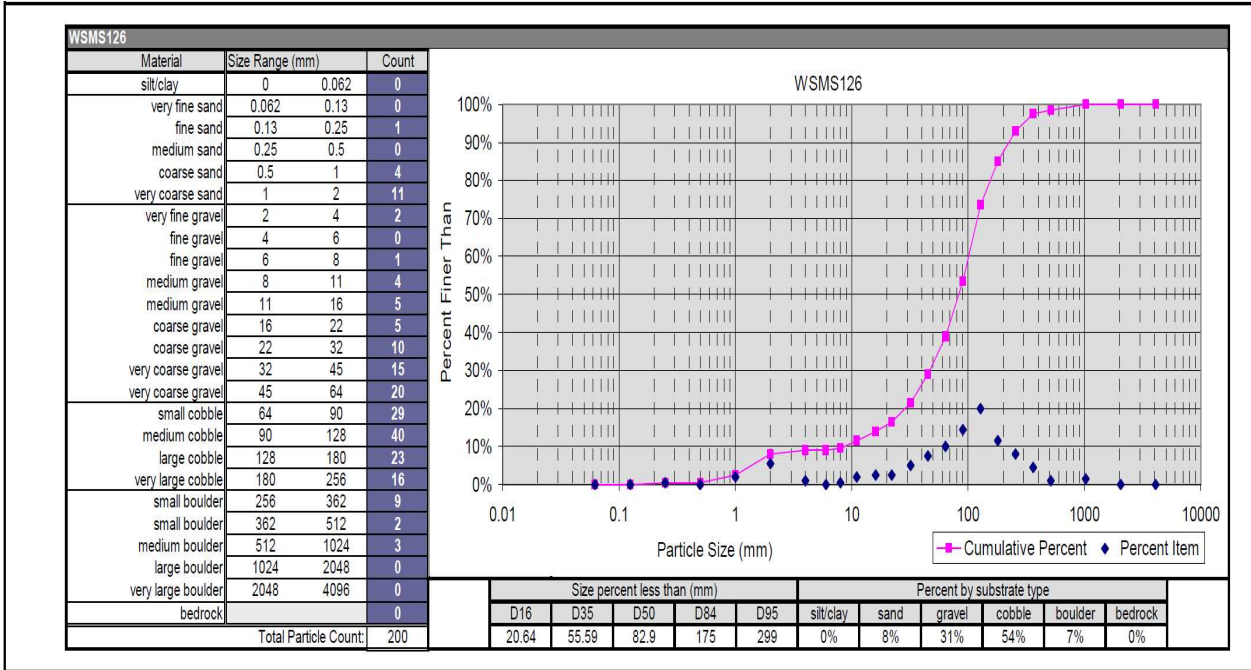
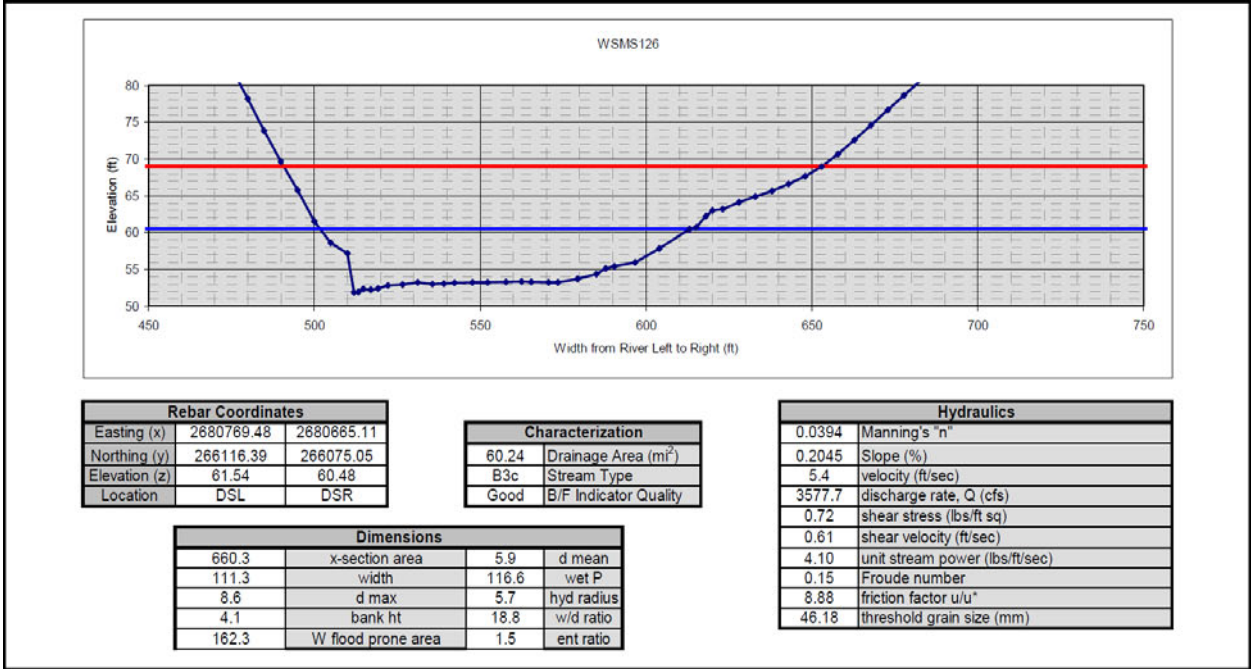
Upstream View



Downstream View



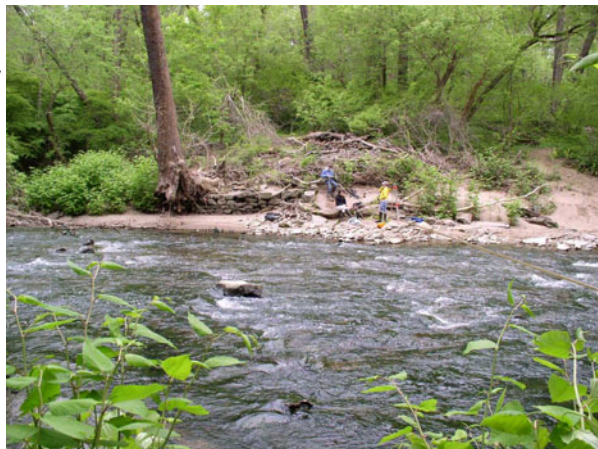
XS = cross section / DSL = Downstream Left / DSR = Downstream Right



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section**  
**WSMS-128**

Philadelphia  
Drainage Area = 19.05 mi<sup>2</sup>  
05/04/2005

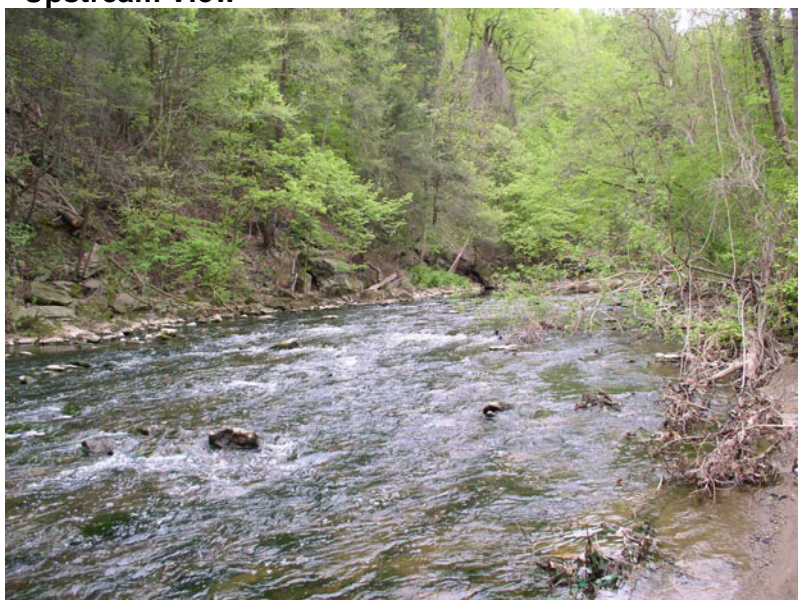


**XS – DSR to DSL**



**XS – DSL to DSR**

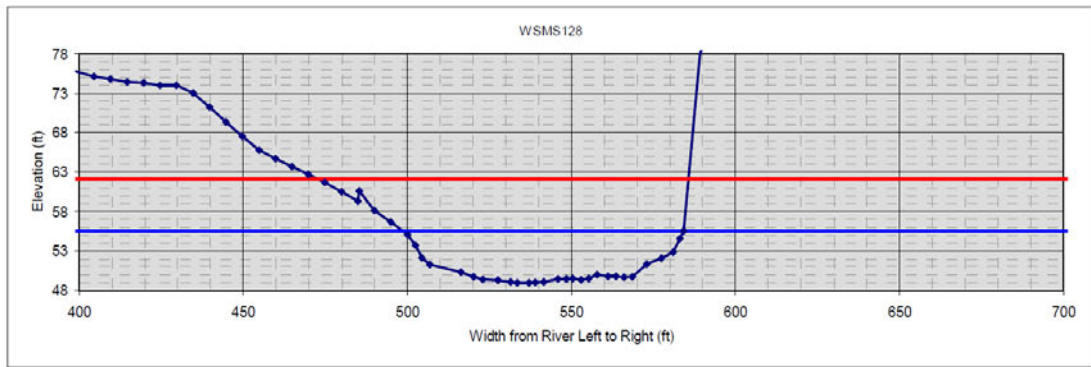
**Upstream View**



**Downstream View**



**XS = cross section / DSL = Downstream Left / DSR = Downstream Right**



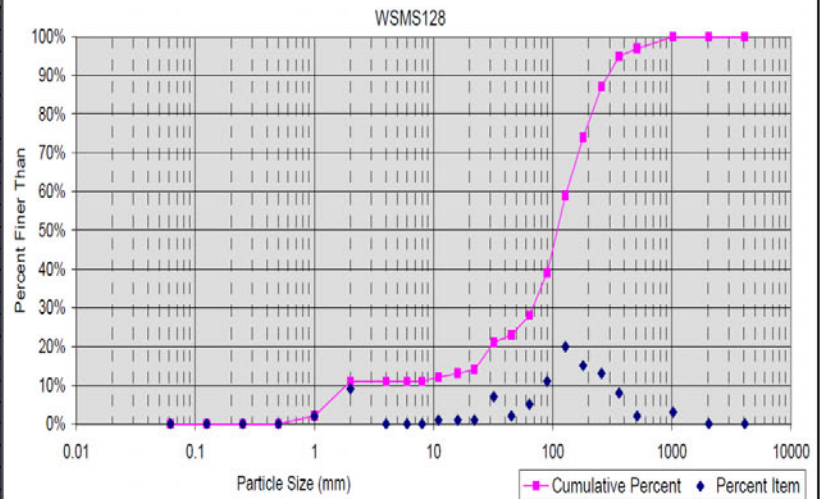
| Rebar Coordinates |            |            |
|-------------------|------------|------------|
| Easting (x)       | 2681685.76 | 2681760.31 |
| Northing (y)      | 266084.68  | 266044.91  |
| Elevation (z)     | 55.07      | 55.54      |
| Location          | DSL        | DSR        |

| Characterization |                                  |
|------------------|----------------------------------|
| 60.29            | Drainage Area (mi <sup>2</sup> ) |
| F3               | Stream Type                      |
| Good             | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.0438     | Manning's "n"                  |
| 0.2820     | Slope (%)                      |
| 5.2        | velocity (ft/sec)              |
| 2284.2     | discharge rate, Q (cfs)        |
| 0.87       | shear stress (lbs/ft sq)       |
| 0.67       | shear velocity (ft/sec)        |
| 4.65       | unit stream power (lbs/ft/sec) |
| 0.17       | Froude number                  |
| 7.80       | friction factor u/u*           |
| 54.72      | threshold grain size (mm)      |

| Dimensions |                    |      |            |
|------------|--------------------|------|------------|
| 434.8      | x-section area     | 5.1  | d mean     |
| 85.7       | width              | 88.4 | wet P      |
| 6.6        | d max              | 4.9  | hyd radius |
| 4.8        | bank ht            | 16.9 | w/d ratio  |
| 112.7      | W flood prone area | 1.3  | ent ratio  |

| WSMS128               |                 |       |
|-----------------------|-----------------|-------|
| Material              | Size Range (mm) | Count |
| silt/clay             | 0               | 0.062 |
| very fine sand        | 0.062           | 0.13  |
| fine sand             | 0.13            | 0.25  |
| medium sand           | 0.25            | 0.5   |
| coarse sand           | 0.5             | 1     |
| very coarse sand      | 1               | 2     |
| very fine gravel      | 2               | 4     |
| fine gravel           | 4               | 6     |
| fine gravel           | 6               | 8     |
| medium gravel         | 8               | 11    |
| medium gravel         | 11              | 16    |
| coarse gravel         | 16              | 22    |
| coarse gravel         | 22              | 32    |
| very coarse gravel    | 32              | 45    |
| very coarse gravel    | 45              | 64    |
| small cobble          | 64              | 90    |
| medium cobble         | 90              | 128   |
| large cobble          | 128             | 180   |
| very large cobble     | 180             | 256   |
| small boulder         | 256             | 362   |
| small boulder         | 362             | 512   |
| medium boulder        | 512             | 1024  |
| large boulder         | 1024            | 2048  |
| very large boulder    | 2048            | 4096  |
| bedrock               |                 |       |
| Total Particle Count: |                 | 100   |



| Size percent less than (mm) |       |       |     |     | Percent by substrate type |      |        |        |         |         |
|-----------------------------|-------|-------|-----|-----|---------------------------|------|--------|--------|---------|---------|
| D16                         | D35   | D50   | D84 | D95 | silt/clay                 | sand | gravel | cobble | boulder | bedrock |
| 24.49                       | 79.51 | 109.2 | 236 | 362 | 0%                        | 11%  | 17%    | 59%    | 13%     | 0%      |

Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section  
WSMS-130**

Philadelphia  
Drainage Area = 19.22 mi<sup>2</sup>  
05/06/2005

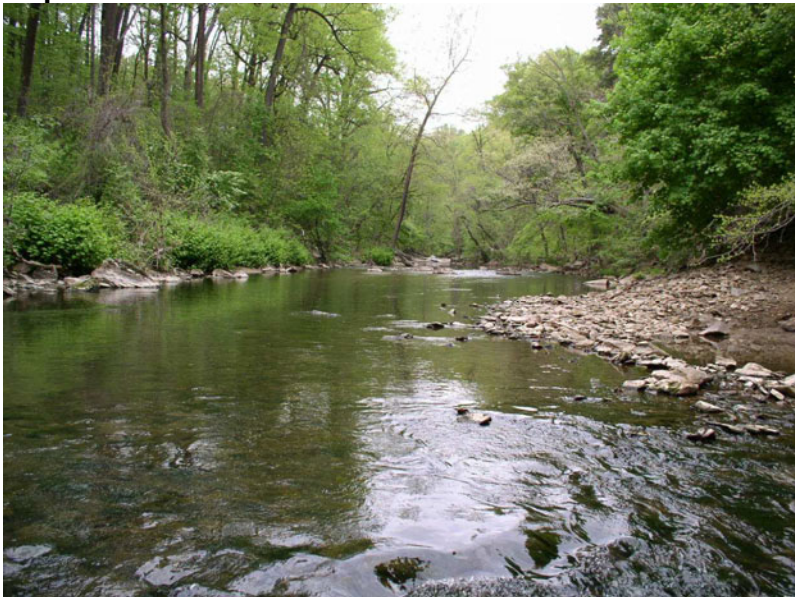


**XS – DSR to DSL**

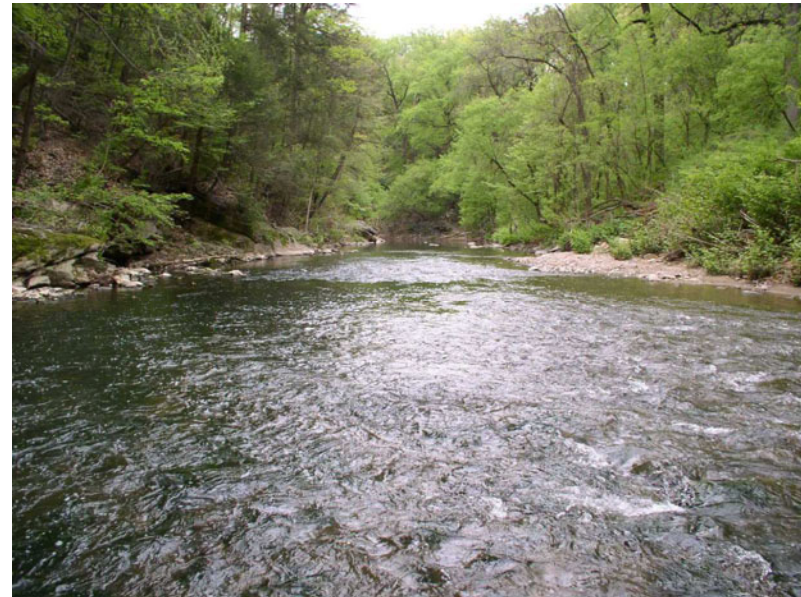


**XS – DSL to DSR**

**Upstream View**

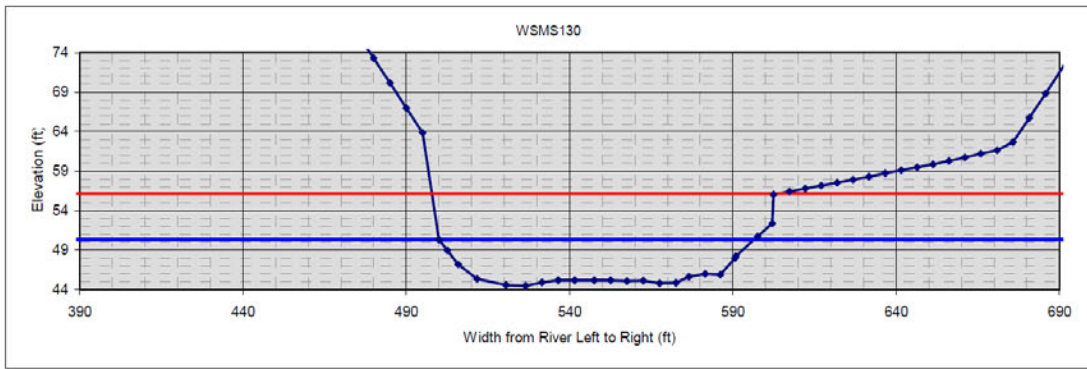


**Downstream View**



**XS = cross section / DSL = Downstream Left / DSR = Downstream Right**



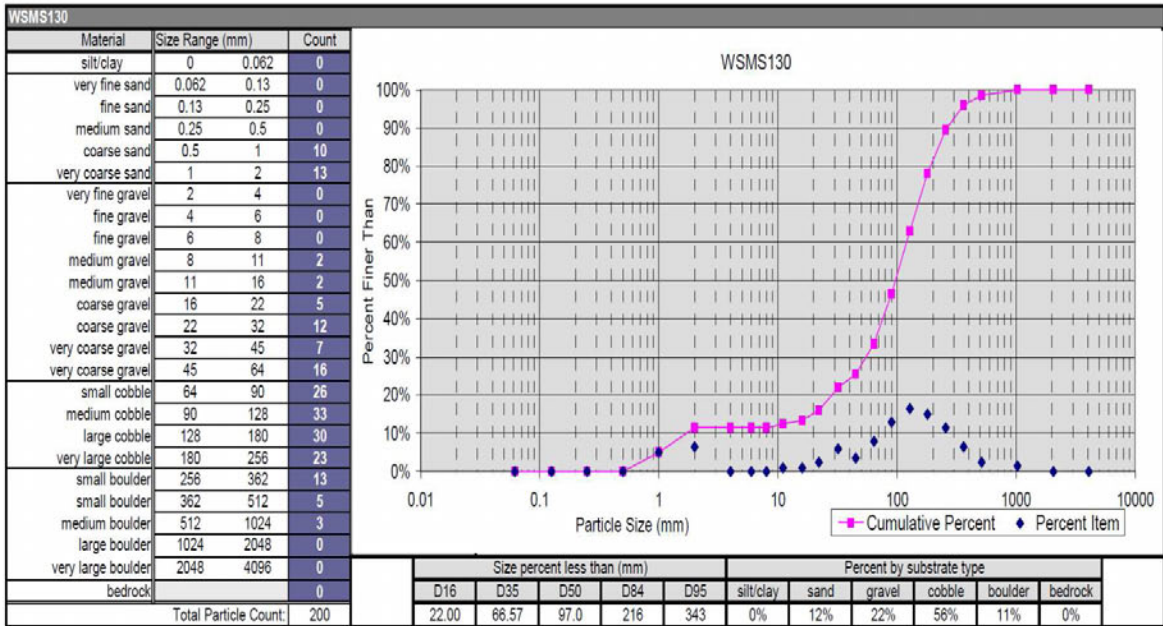


| Rebar Coordinates |            |            |
|-------------------|------------|------------|
| Easting (x)       | 2682497.36 | 2682401.92 |
| Northing (y)      | 265543.27  | 265524.76  |
| Elevation (z)     | 50.31      | 50.74      |
| Location          | DSL        | DSR        |

| Characterization |                                  |
|------------------|----------------------------------|
| 60.75            | Drainage Area (mi <sup>2</sup> ) |
| F3               | Stream Type                      |
| Moderate         | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.0432     | Manning's "n"                  |
| 0.3095     | Slope (%)                      |
| 5.2        | velocity (ft/sec)              |
| 2295.9     | discharge rate, Q (cfs)        |
| 0.87       | shear stress (lbs/ft sq)       |
| 0.67       | shear velocity (ft/sec)        |
| 4.60       | unit stream power (lbs/ft/sec) |
| 0.18       | Froude number                  |
| 7.78       | friction factor u/u*           |
| 54.71      | threshold grain size (mm)      |

| Dimensions |                    |      |            |
|------------|--------------------|------|------------|
| 441.7      | x-section area     | 4.6  | d mean     |
| 96.4       | width              | 98.6 | wet P      |
| 5.8        | d max              | 4.5  | hyd radius |
| 7.9        | bank ht            | 21.0 | w/d ratio  |
| 105.8      | W flood prone area | 1.1  | ent ratio  |



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section  
WSMS-132**

Philadelphia  
Drainage Area = 19.43 mi<sup>2</sup>  
05/06/2005

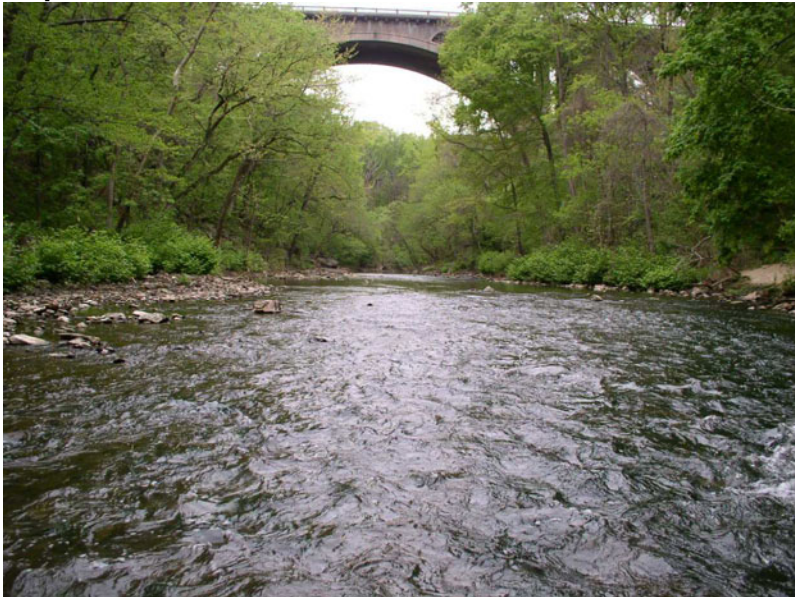


**XS – DSR to DSL**

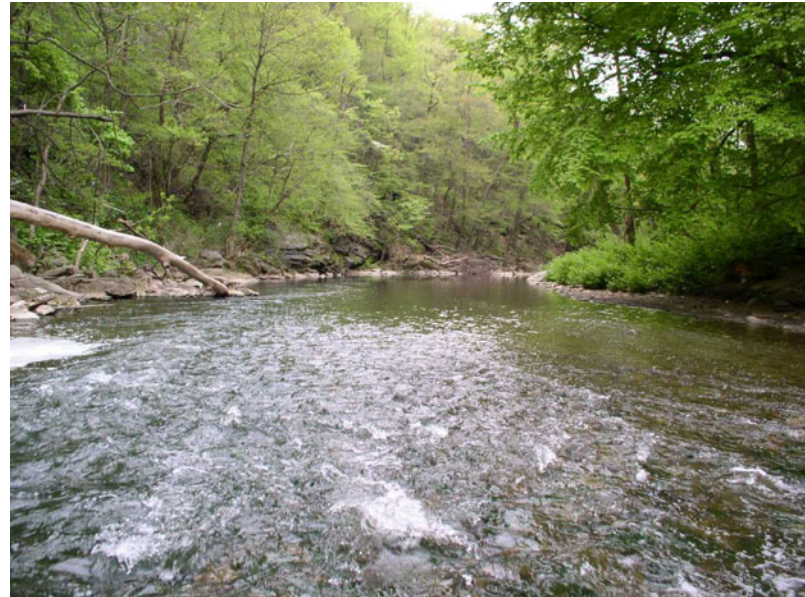


**XS – DSL to DSR**

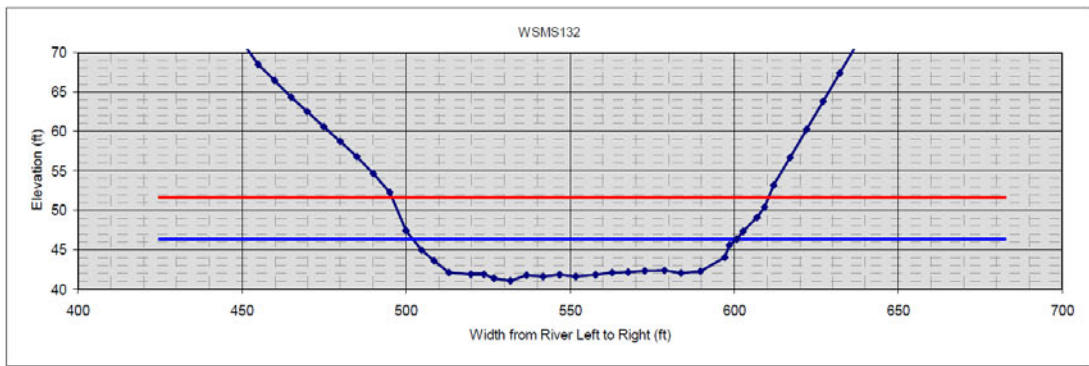
**Upstream View**



**Downstream View**



**XS = cross section / DSL = Downstream Left / DSR = Downstream Right**

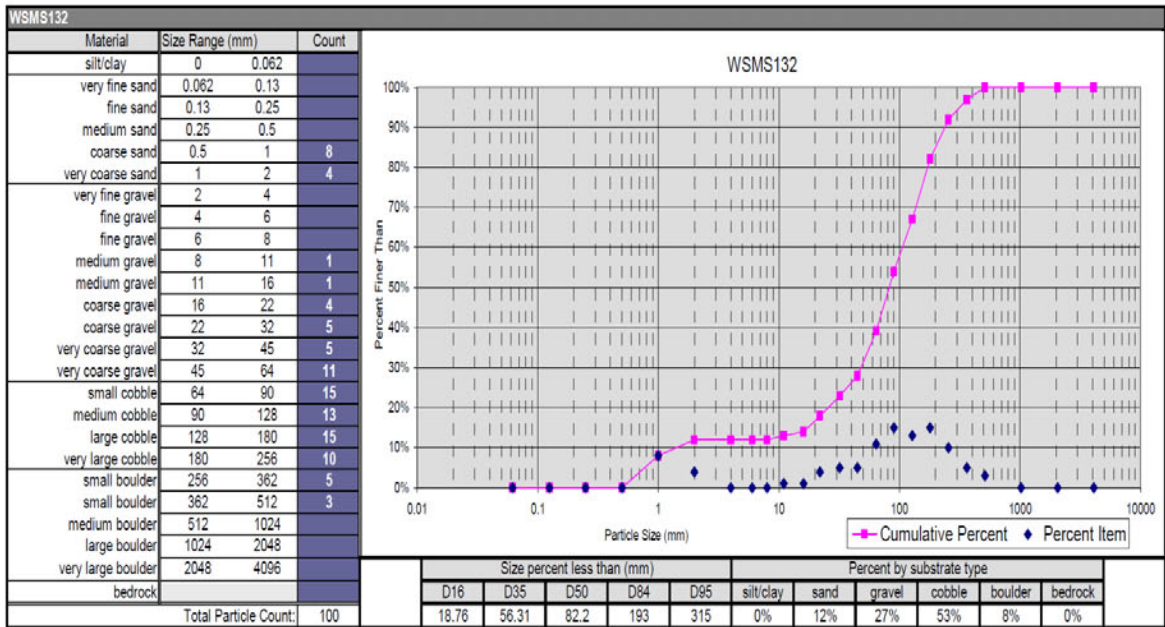


| Rebar Coordinates |                         |
|-------------------|-------------------------|
| Easting (x)       | 2682950.93   2682879.73 |
| Northing (y)      | 264679.00   264599.48   |
| Elevation (z)     | 47.41   49.11           |
| Location          | DSL   DSR               |

| Characterization |                                  |
|------------------|----------------------------------|
| 60.96            | Drainage Area (mi <sup>2</sup> ) |
| F3               | Stream Type                      |
| Poor             | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.0425     | Manning's 'n'                  |
| 0.1493     | Slope (%)                      |
| 3.4        | velocity (ft/sec)              |
| 1326.0     | discharge rate, Q (cfs)        |
| 0.37       | shear stress (lbs/ft sq)       |
| 0.43       | shear velocity (ft/sec)        |
| 1.25       | unit stream power (lbs/ft/sec) |
| 0.09       | Froude number                  |
| 7.73       | friction factor u/u*           |
| 21.65      | threshold grain size (mm)      |

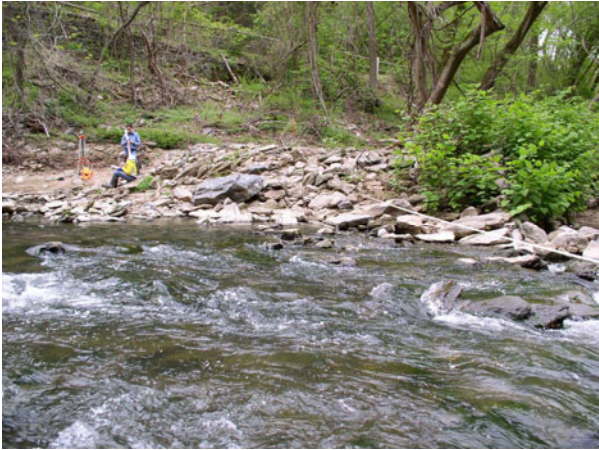
| Dimensions |                    |       |            |
|------------|--------------------|-------|------------|
| 395.2      | x-section area     | 4.0   | d mean     |
| 98.8       | width              | 100.8 | wet P      |
| 5.3        | d max              | 3.9   | hyd radius |
| 4.5        | bank ht            | 24.7  | w/d ratio  |
| 114.9      | W flood prone area | 1.2   | ent ratio  |



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section  
WSMS-134**

Philadelphia  
Drainage Area = 19.64 mi<sup>2</sup>  
05/06/2005



**XS – DSR to DSL**



**XS – DSL to DSR**

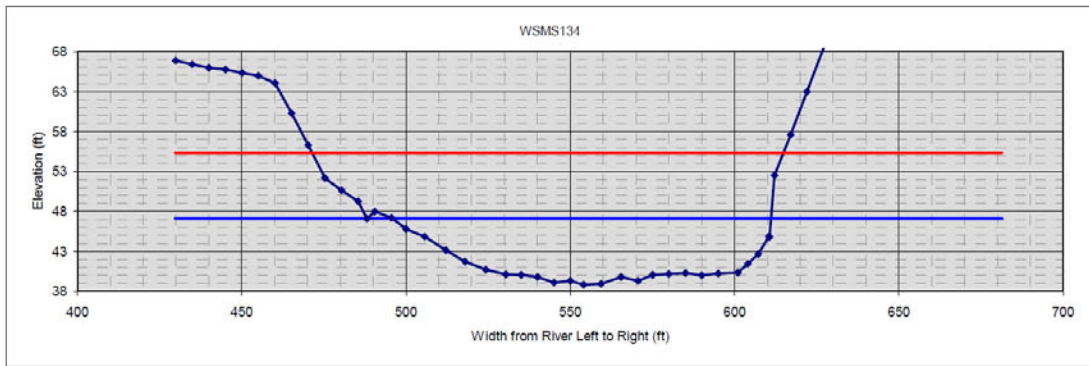
**Upstream View**



**Downstream View**



XS = cross section / DSL = Downstream Left / DSR = Downstream Right

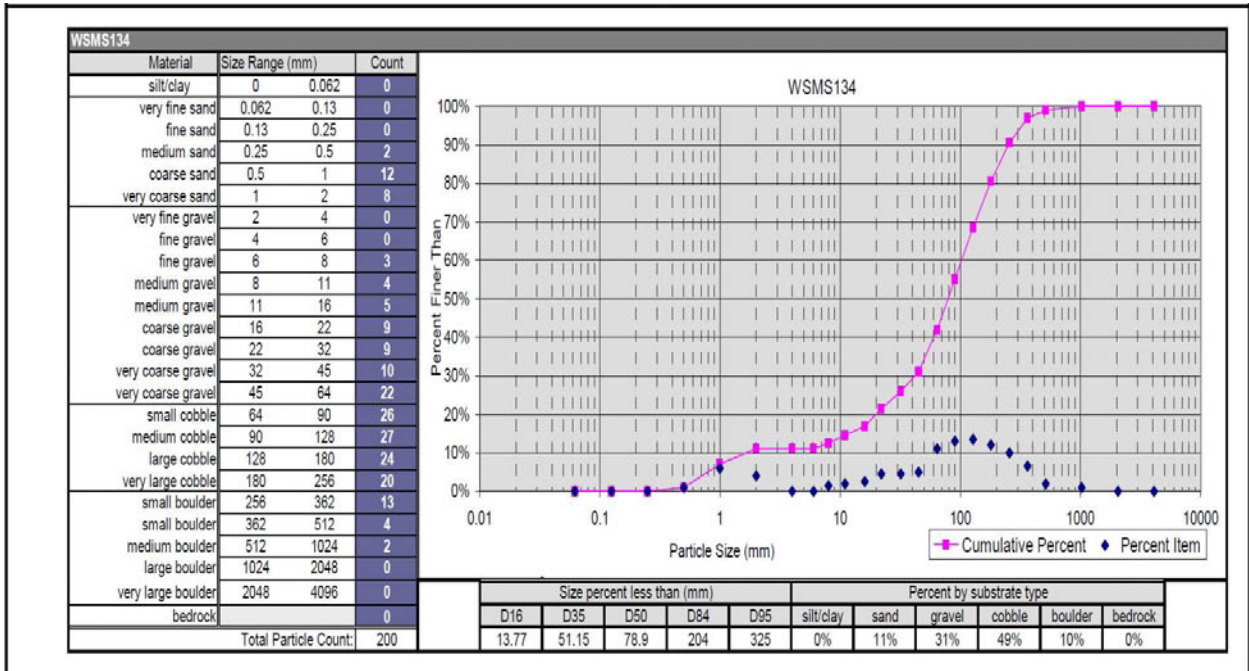


| Rebar Coordinates |                         |
|-------------------|-------------------------|
| Easting (x)       | 2683224.86   2683139.48 |
| Northing (y)      | 263332.90   263278.64   |
| Elevation (z)     | 44.86   42.69           |
| Location          | DSL   DSR               |

| Characterization |                                  |
|------------------|----------------------------------|
| 61.17            | Drainage Area (mi <sup>2</sup> ) |
| F3               | Stream Type                      |
| Fair             | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.0409     | Manning's "n"                  |
| 0.1254     | Slope (%)                      |
| 4.2        | velocity (ft/sec)              |
| 2948.5     | discharge rate, Q (cfs)        |
| 0.46       | shear stress (lbs/ft sq)       |
| 0.49       | shear velocity (ft/sec)        |
| 2.00       | unit stream power (lbs/ft/sec) |
| 0.09       | Froude number                  |
| 8.60       | friction factor u/u'           |
| 28.04      | threshold grain size (mm)      |

| Dimensions |                    |       |            |
|------------|--------------------|-------|------------|
| 703.3      | x-section area     | 6.1   | d mean     |
| 115.3      | width              | 119.3 | wet P      |
| 8.3        | d max              | 5.9   | hyd radius |
| 6.0        | bank ht            | 18.9  | w/d ratio  |
| 143.4      | W flood prone area | 1.2   | ent ratio  |



Wissahickon Watershed Stream Study  
Philadelphia Water Department  
Office of Watersheds

**Section  
WSMS-136**

Philadelphia  
Drainage Area = 19.74 mi<sup>2</sup>  
05/06/2005



**XS – DSR to DSL**

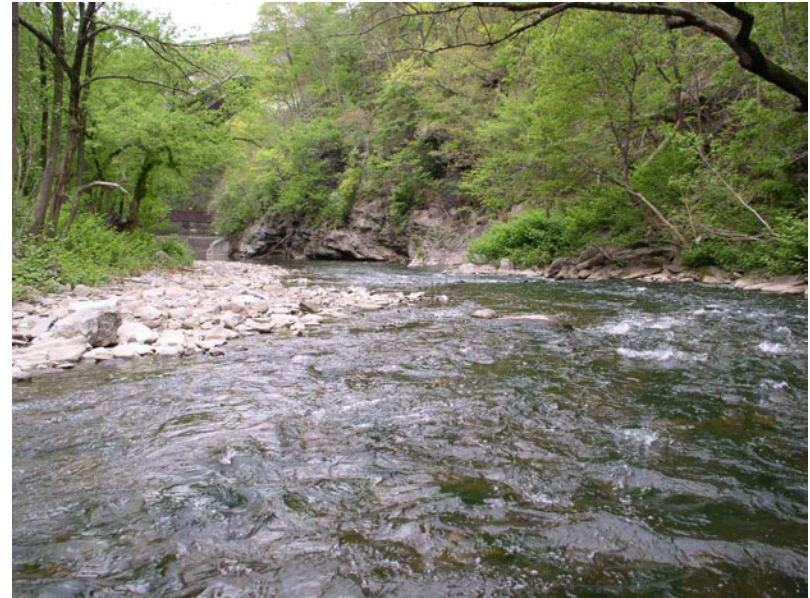


**XS – DSL to DSR**

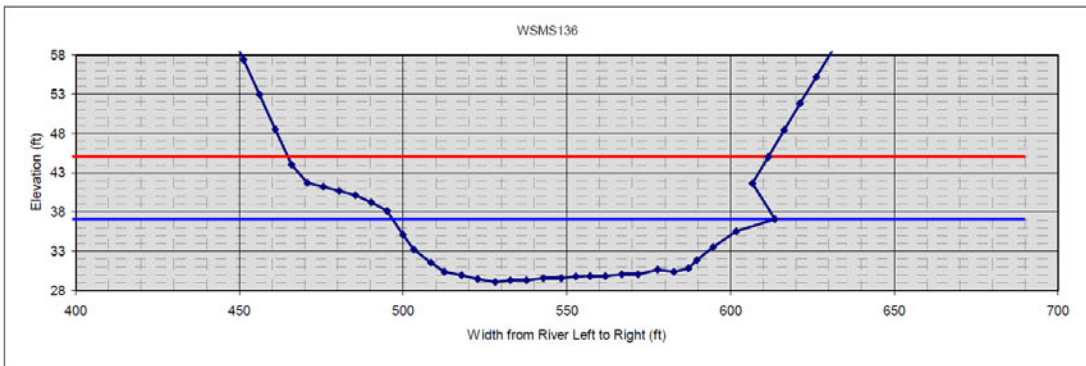
**Upstream View**



**Downstream View**



**XS = cross section / DSL = Downstream Left / DSR = Downstream Right**



| Rebar Coordinates |           |            |
|-------------------|-----------|------------|
| Easting (x)       | 2684006.8 | 2683931.33 |
| Northing (y)      | 262604.7  | 262672.412 |
| Elevation (z)     | 35.09     | 37.08      |
| Location          | DSL       | DSR        |

| Characterization |                                  |
|------------------|----------------------------------|
| 62.89            | Drainage Area (mi <sup>2</sup> ) |
| F3               | Stream Type                      |
| Excellent        | B/F Indicator Quality            |

| Hydraulics |                                |
|------------|--------------------------------|
| 0.0418     | Manning's 'n'                  |
| 0.1374     | Slope (%)                      |
| 4.1        | velocity (ft/sec)              |
| 2769.0     | discharge rate, Q (cfs)        |
| 0.5        | shear stress (lbs/ft sq)       |
| 0.5        | shear velocity (ft/sec)        |
| 2.0        | unit stream power (lbs/ft/sec) |
| 0.1        | Froude number                  |
| 8.3        | friction factor u/u*           |
| 29.3       | threshold grain size (mm)      |

| Dimensions |                    |       |            |
|------------|--------------------|-------|------------|
| 667.2      | x-section area     | 5.7   | d mean     |
| 116.7      | width              | 119.2 | wet P      |
| 8.0        | d max              | 5.6   | hyd radius |
| 6.0        | bank ht            | 20.4  | w/d ratio  |
| 146.9      | W flood prone area | 1.3   | ent ratio  |

