

# MUNICIPAL STORMWATER SYSTEM MAINTENANCE: AN ASSESSMENT OF CURRENT PRACTICES AND METHODOLOGY FOR UPGRADING PROGRAMS

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## SURVEY RESULTS

Figures A.1 and A.2 show municipal and county responses. For these figures, levels of service have been arranged on a scale and values have been assigned to the levels: none, emergency, complaint driven, work order driven, and routine driven. (See Figure 8 in the body of the article.) Work order driven and routine driven levels do not fit perfectly into this scale since they are similar proactive approaches. However, this scale is useful insofar as it allows us to examine the respondents “average level of service.” Each respondent is assigned a single level of service: the “highest” level of service marked by the respondent in the extent and level of service matrix.

| Municipalities             | Level of Service | Extent of Service |                           |                           |                     |                         |
|----------------------------|------------------|-------------------|---------------------------|---------------------------|---------------------|-------------------------|
|                            |                  | Right of Way      | Public Water, in Easement | Public water, No easement | Private Residential | Private Non-residential |
| <i>Pipe</i>                | <b>None</b>      | 0.6               | 26.6                      | 26.7                      | 63.6                | 69.7                    |
|                            | <b>Emergency</b> | 3.4               | 24.3                      | 24.4                      | 13.6                | 10.9                    |
|                            | <b>Complaint</b> | 25.0              | 32.2                      | 32.4                      | 16.5                | 12.6                    |
|                            | <b>WO</b>        | 31.3              | 8.5                       | 8.0                       | 4.0                 | 4.0                     |
|                            | <b>Routine</b>   | 39.8              | 8.5                       | 8.5                       | 2.3                 | 2.9                     |
| <i>Culvert</i>             | <b>None</b>      | 1.7               | 3.4                       | 29.7                      | 64.9                | 70.1                    |
|                            | <b>Emergency</b> | 3.5               | 5.7                       | 26.7                      | 14.4                | 10.9                    |
|                            | <b>Complaint</b> | 26.0              | 39.1                      | 27.3                      | 13.8                | 12.6                    |
|                            | <b>WO</b>        | 31.8              | 24.7                      | 7.0                       | 4.0                 | 4.0                     |
|                            | <b>Routine</b>   | 37.0              | 27.0                      | 9.3                       | 2.9                 | 2.3                     |
| <i>Ditches</i>             | <b>None</b>      | 4.0               | 5.8                       | 34.5                      | 67.4                | 72.1                    |
|                            | <b>Emergency</b> | 3.4               | 5.2                       | 24.0                      | 12.8                | 9.3                     |
|                            | <b>Complaint</b> | 23.6              | 39.0                      | 28.1                      | 14.5                | 13.4                    |
|                            | <b>WO</b>        | 29.9              | 24.4                      | 6.4                       | 2.9                 | 2.9                     |
|                            | <b>Routine</b>   | 39.1              | 25.6                      | 7.0                       | 2.3                 | 2.3                     |
| <i>Streams</i>             | <b>None</b>      | 19.1              | 22.1                      | 40.5                      | 66.3                | 69.4                    |
|                            | <b>Emergency</b> | 10.4              | 10.5                      | 24.3                      | 16.3                | 12.1                    |
|                            | <b>Complaint</b> | 20.8              | 25.6                      | 19.7                      | 12.2                | 13.3                    |
|                            | <b>WO</b>        | 22.0              | 20.9                      | 8.7                       | 2.3                 | 2.3                     |
|                            | <b>Routine</b>   | 27.7              | 20.9                      | 6.9                       | 2.9                 | 2.9                     |
| <i>Catch Basins Inlets</i> | <b>None</b>      | 1.1               | 3.4                       | 31.4                      | 64.7                | 69.0                    |
|                            | <b>Emergency</b> | 2.3               | 2.8                       | 22.3                      | 16.8                | 11.5                    |
|                            | <b>Complaint</b> | 16.9              | 27.8                      | 25.1                      | 11.0                | 11.5                    |
|                            | <b>WO</b>        | 23.7              | 24.4                      | 8.0                       | 4.6                 | 5.7                     |
|                            | <b>Routine</b>   | 55.9              | 41.5                      | 13.1                      | 2.9                 | 2.3                     |

  

|                                      | Level of Service | Extent of Service |                                     |                     |                   |                       |
|--------------------------------------|------------------|-------------------|-------------------------------------|---------------------|-------------------|-----------------------|
|                                      |                  | Right of Way      | Homeowner's Association Residential | General Residential | Shared Commercial | Individual Commercial |
| <i>Detention Ponds</i>               | <b>None</b>      | 13.2              | 45.1                                | 32.7                | 57.3              | 64.5                  |
|                                      | <b>Emergency</b> | 4.6               | 15.0                                | 15.8                | 15.8              | 14.5                  |
|                                      | <b>Complaint</b> | 14.4              | 16.2                                | 20.5                | 9.9               | 7.6                   |
|                                      | <b>WO</b>        | 26.4              | 11.6                                | 13.5                | 7.6               | 6.4                   |
|                                      | <b>Routine</b>   | 41.4              | 12.1                                | 17.5                | 9.4               | 7.0                   |
| <i>Stormwater Quality Structures</i> | <b>None</b>      | 17.6              | 48.8                                | 37.9                | 61.7              | 67.1                  |
|                                      | <b>Emergency</b> | 2.4               | 11.9                                | 12.4                | 10.2              | 10.0                  |
|                                      | <b>Complaint</b> | 17.6              | 17.3                                | 23.7                | 14.4              | 10.0                  |
|                                      | <b>WO</b>        | 26.5              | 11.3                                | 11.2                | 6.6               | 5.9                   |
|                                      | <b>Routine</b>   | 35.9              | 10.7                                | 14.8                | 7.2               | 7.1                   |

Figure A.1 Municipal Respondents' Highest Level of Service Offered

| Counties                             | Level of Service | Extent of Service |                                     |                           |                     |                         |
|--------------------------------------|------------------|-------------------|-------------------------------------|---------------------------|---------------------|-------------------------|
|                                      |                  | Right of Way      | Public Water, in Easement           | Public water, No easement | Private Residential | Private Non-residential |
| <i>Pipe</i>                          | <b>None</b>      | 12.5              | 42.5                                | 43.1                      | 68.1                | 72.2                    |
|                                      | <b>Emergency</b> | 6.9               | 17.8                                | 18.1                      | 12.5                | 12.5                    |
|                                      | <b>Complaint</b> | 26.4              | 30.1                                | 29.2                      | 16.7                | 12.5                    |
|                                      | <b>WO</b>        | 26.4              | 5.5                                 | 5.6                       | 1.4                 | 1.4                     |
|                                      | <b>Routine</b>   | 27.8              | 4.1                                 | 4.2                       | 1.4                 | 1.4                     |
| <i>Culvert</i>                       | <b>None</b>      | 8.5               | 6.9                                 | 45.8                      | 70.4                | 73.2                    |
|                                      | <b>Emergency</b> | 4.2               | 8.3                                 | 19.4                      | 8.5                 | 9.9                     |
|                                      | <b>Complaint</b> | 23.9              | 37.5                                | 19.4                      | 18.3                | 14.1                    |
|                                      | <b>WO</b>        | 29.6              | 27.8                                | 9.7                       | 2.8                 | 2.8                     |
|                                      | <b>Routine</b>   | 33.8              | 19.4                                | 5.6                       | 0.0                 | 0.0                     |
| <i>Ditches</i>                       | <b>None</b>      | 8.3               | 8.3                                 | 44.4                      | 71.8                | 73.2                    |
|                                      | <b>Emergency</b> | 4.2               | 8.3                                 | 18.1                      | 7.0                 | 8.5                     |
|                                      | <b>Complaint</b> | 18.1              | 37.5                                | 22.2                      | 16.9                | 14.1                    |
|                                      | <b>WO</b>        | 34.7              | 23.6                                | 8.3                       | 2.8                 | 2.8                     |
|                                      | <b>Routine</b>   | 34.7              | 22.2                                | 6.9                       | 1.4                 | 1.4                     |
| <i>Streams</i>                       | <b>None</b>      | 11.3              | 11.3                                | 45.1                      | 71.8                | 73.2                    |
|                                      | <b>Emergency</b> | 9.9               | 12.7                                | 19.7                      | 5.6                 | 8.5                     |
|                                      | <b>Complaint</b> | 23.9              | 31.0                                | 21.1                      | 16.9                | 12.7                    |
|                                      | <b>WO</b>        | 33.8              | 26.8                                | 7.0                       | 4.2                 | 4.2                     |
|                                      | <b>Routine</b>   | 21.1              | 18.3                                | 7.0                       | 1.4                 | 1.4                     |
| <i>Catch Basins Inlets</i>           | <b>None</b>      | 9.7               | 8.2                                 | 52.8                      | 73.6                | 72.2                    |
|                                      | <b>Emergency</b> | 5.6               | 12.3                                | 15.3                      | 8.3                 | 11.1                    |
|                                      | <b>Complaint</b> | 20.8              | 35.6                                | 19.4                      | 13.9                | 12.5                    |
|                                      | <b>WO</b>        | 29.2              | 19.2                                | 6.9                       | 2.8                 | 2.8                     |
|                                      | <b>Routine</b>   | 34.7              | 24.7                                | 5.6                       | 1.4                 | 1.4                     |
|                                      | Level of Service | Extent of Service |                                     |                           |                     |                         |
|                                      |                  | Right of Way      | Homeowner's Association Residential | General Residential       | Shared Commercial   | Individual Commercial   |
| <i>Detention Ponds</i>               | <b>None</b>      | 12.3              | 49.3                                | 41.4                      | 62.0                | 66.2                    |
|                                      | <b>Emergency</b> | 2.7               | 9.9                                 | 14.3                      | 5.6                 | 8.5                     |
|                                      | <b>Complaint</b> | 16.4              | 19.7                                | 18.6                      | 18.3                | 15.5                    |
|                                      | <b>WO</b>        | 23.3              | 9.9                                 | 10.0                      | 7.0                 | 5.6                     |
|                                      | <b>Routine</b>   | 45.2              | 11.3                                | 15.7                      | 7.0                 | 4.2                     |
| <i>Stormwater Quality Structures</i> | <b>None</b>      | 16.7              | 55.7                                | 49.3                      | 64.8                | 69.4                    |
|                                      | <b>Emergency</b> | 4.2               | 7.1                                 | 9.9                       | 4.2                 | 6.9                     |
|                                      | <b>Complaint</b> | 20.8              | 15.7                                | 14.1                      | 14.1                | 13.9                    |
|                                      | <b>WO</b>        | 22.2              | 10.0                                | 8.5                       | 7.0                 | 2.8                     |
|                                      | <b>Routine</b>   | 36.1              | 11.4                                | 18.3                      | 9.9                 | 6.9                     |

Figure A.2 County Respondents' Highest Level of Service Offered

After the respondents' answers were arranged along a scale, their responses were averaged, so that when the responses were averaged, we arrived at what can be called the "average level of service" for a group. For instance, if all of the counties offer "work order driven" maintenance on stormwater quality structures in the right of way, their "average level of service" would equal four, which would indicate that on average, counties offer a high level of service on those particular structures. It is most helpful to look at the average level of service in terms of high, medium, or low service since the scale does not account for the parity between "work order" and "routine" levels of service. The table of average levels of service for all respondents is found below in Figure A.11. Figures A.3, A.5, A.7, and A.9 show the average levels of service for various groups. Figures A.4, A.6, A.8, and A.10, show which of the averages are statistically significant.

| Municipality or County? |                | pipe in pub right of way                        | pipe in easement                 | pipe in not in easement                         | pipe residential                              | pipe non-residential                           | culverts in public right of way        | culverts in easement    | culvert not in easement                | culvert residential              | culvert non-residential               |
|-------------------------|----------------|---|----------------------------------|---|---|--|--|-------------------------|--|----------------------------------|---------------------------------------|
|                         | <b>Mean</b>    | <b>4.1</b>                                      | <b>2.5</b>                       | <b>2.5</b>                                      | <b>1.7</b>                                    | <b>1.6</b>                                     | <b>4.0</b>                             | <b>3.7</b>              | <b>2.4</b>                             | <b>1.7</b>                       | <b>1.6</b>                            |
|                         | N              | 176   | 177                              | 176   | 176   | 175  | 173                                    | 174                     | 172                                    | 174                              | 174                                   |
| Municipal Government    | Std. Deviation | 0.9   | 1.2                              | 1.2   | 1.0   | 1.0  | 1.0                                    | 1.0                     | 1.2                                    | 1.0                              | 1.0                                   |
|                         | <b>Mean</b>    | <b>3.5</b>                                      | <b>2.1</b>                       | <b>2.1</b>                                      | <b>1.6</b>                                    | <b>1.5</b>                                     | <b>3.8</b>                             | <b>3.4</b>              | <b>2.1</b>                             | <b>1.5</b>                       | <b>1.5</b>                            |
|                         | N              | 72  | 73                               | 72  | 72  | 72   | 71                                     | 72                      | 72                                     | 71                               | 71                                    |
| County Government       | Std. Deviation | 1.3   | 1.1                              | 1.2   | 0.9   | 0.9  | 1.2                                    | 1.1                     | 1.2                                    | 0.9                              | 0.8                                   |
|                         | Mean           | 3.9   | 2.4                              | 2.4   | 1.6   | 1.6  | 3.9                                    | 3.6                     | 2.3                                    | 1.6                              | 1.5                                   |
|                         | N              | 248   | 250                              | 248   | 248   | 247  | 244                                    | 246                     | 244                                    | 245                              | 245                                   |
| Total                   | Std. Deviation | 1.1   | 1.2                              | 1.2   | 1.0   | 1.0  | 1.0                                    | 1.1                     | 1.2                                    | 1.0                              | 1.0                                   |
| Municipality or County? |                | ditches in public right of way                  | ditches in easement              | ditches not in easement                         | ditches residential                           | ditches non-residential                        | streams in public right of way         | streams in easement     | streams not in easement                | ditches residential              | streams non-residential               |
|                         | <b>Mean</b>    | <b>4.0</b>                                      | <b>3.6</b>                       | <b>2.3</b>                                      | <b>1.6</b>                                    | <b>1.5</b>                                     | <b>3.3</b>                             | <b>3.1</b>              | <b>2.2</b>                             | <b>1.6</b>                       | <b>1.6</b>                            |
|                         | N              | 174   | 172                              | 171   | 172   | 173  | 172                                    | 173                     | 173                                    | 172                              | 173                                   |
| Municipal Government    | Std. Deviation | 1.1   | 1.1                              | 1.2   | 1.0   | 1.0  | 1.5                                    | 1.4                     | 1.2                                    | 1.0                              | 1.0                                   |
|                         | <b>Mean</b>    | <b>3.8</b>                                      | <b>3.4</b>                       | <b>2.2</b>                                      | <b>1.5</b>                                    | <b>1.5</b>                                     | <b>3.4</b>                             | <b>3.3</b>              | <b>2.1</b>                             | <b>1.6</b>                       | <b>1.5</b>                            |
|                         | N              | 72  | 72                               | 72  | 71  | 71   | 71                                     | 71                      | 71                                     | 71                               | 71                                    |
| County Government       | Std. Deviation | 1.2   | 1.2                              | 1.3   | 1.0   | 0.9  | 1.3                                    | 1.2                     | 1.3                                    | 1.0                              | 1.0                                   |
|                         | Mean           | 3.9   | 3.5                              | 2.2   | 1.6   | 1.5  | 3.3                                    | 3.1                     | 2.2                                    | 1.6                              | 1.6                                   |
|                         | N              | 246   | 244                              | 243   | 243   | 243  | 244                                    | 243                     | 244                                    | 243                              | 244                                   |
| Total                   | Std. Deviation | 1.1   | 1.1                              | 1.2   | 1.0   | 1.0  | 1.4                                    | 1.4                     | 1.2                                    | 1.0                              | 1.0                                   |
| Municipality or County? |                | catch basins inlets in public right of way      | catch basins inlets in easement  | catch basins inlets not in easement             | catch basin inlets residential                | catch basins inlets non-residential            | detention ponds in public right of way | detention ponds in HOAs | detention ponds in general residential | detention pond shared commercial | detention ponds individual commercial |
|                         | <b>Mean</b>    | <b>4.3</b>                                      | <b>4.0</b>                       | <b>2.5</b>                                      | <b>1.6</b>                                    | <b>1.6</b>                                     | <b>3.8</b>                             | <b>2.3</b>              | <b>2.7</b>                             | <b>2.0</b>                       | <b>1.8</b>                            |
|                         | N              | 177   | 176                              | 175   | 173   | 174  | 174                                    | 173                     | 171                                    | 171                              | 172                                   |
| Municipal Government    | Std. Deviation | 0.9   | 1.1                              | 1.4   | 1.0   | 1.0  | 1.4                                    | 1.4                     | 1.5                                    | 1.4                              | 1.2                                   |
|                         | <b>Mean</b>    | <b>3.7</b>                                      | <b>3.4</b>                       | <b>2.0</b>                                      | <b>1.5</b>                                    | <b>1.5</b>                                     | <b>3.9</b>                             | <b>2.2</b>              | <b>2.4</b>                             | <b>1.9</b>                       | <b>1.7</b>                            |
|                         | N              | 72  | 73                               | 72  | 72  | 72   | 73                                     | 71                      | 70                                     | 71                               | 71                                    |
| County Government       | Std. Deviation | 1.3   | 1.2                              | 1.2   | 0.9   | 0.9  | 1.4                                    | 1.4                     | 1.5                                    | 1.3                              | 1.2                                   |
|                         | Mean           | 4.1   | 3.8                              | 2.3   | 1.6   | 1.6  | 3.8                                    | 2.3                     | 2.6                                    | 1.9                              | 1.8                                   |
|                         | N              | 249   | 249                              | 247   | 245   | 246  | 247                                    | 244                     | 241                                    | 242                              | 243                                   |
| Total                   | Std. Deviation | 1.1   | 1.1                              | 1.3   | 1.0   | 1.0  | 1.4                                    | 1.4                     | 1.5                                    | 1.3                              | 1.2                                   |
| Municipality or County? |                | water quality structures in public right of way | water quality structures in HOAs | water quality structures in general residential | water quality structures in shared commercial | water quality structures individual commercial |  |                         |  |                                  |                                       |
|                         | <b>Mean</b>    | <b>3.6</b>                                      | <b>2.2</b>                       | <b>2.5</b>                                      | <b>1.9</b>                                    | <b>1.8</b>                                     |  |                         |  |                                  |                                       |
|                         | N              | 170   | 168                              | 169   | 167   | 170  |  |                         |  |                                  |                                       |
| Municipal Government    | Std. Deviation | 1.4   | 1.4                              | 1.5   | 1.3   | 1.3  |  |                         |  |                                  |                                       |
|                         | <b>Mean</b>    | <b>3.6</b>                                      | <b>2.1</b>                       | <b>2.4</b>                                      | <b>1.9</b>                                    | <b>1.7</b>                                     |  |                         |  |                                  |                                       |
|                         | N              | 72  | 70                               | 71  | 71  | 72   |  |                         |  |                                  |                                       |
| County Government       | Std. Deviation | 1.4   | 1.5                              | 1.6   | 1.4   | 1.2  |  |                         |  |                                  |                                       |
|                         | Mean           | 3.6   | 2.2                              | 2.5   | 1.9   | 1.7  |  |                         |  |                                  |                                       |
|                         | N              | 242   | 238                              | 240   | 238   | 242  |  |                         |  |                                  |                                       |
| Total                   | Std. Deviation | 1.4   | 1.4                              | 1.5   | 1.3   | 1.2  |  |                         |  |                                  |                                       |

Figure A.3 Municipal and County Average Levels of Service

| One-way ANOVA: Municipalities and Counties     |                |                |     |             |          |          |
|--|----------------|----------------|-----|-------------|----------|----------|
|  |                | Sum of Squares | df  | Mean Square | F        | Sig.     |
| Pipe in Public Right of Way                    | Between Groups | 16.16733871    | 1   | 16.16733871 | 14.82288 | 0.000151 |
|  | Within Groups  | 268.3125       | 246 | 1.09070122  |          |          |
|  | Total          | 284.4798387    | 247 |             |          |          |
| Pipe, Public Water, In easement                | Between Groups | 7.099921368    | 1   | 7.099921368 | 4.983754 | 0.02648  |
|  | Within Groups  | 353.3040786    | 248 | 1.42461322  |          |          |
|  | Total          | 360.404        | 249 |             |          |          |
| Pipe, Public Water, No easement                | Between Groups | 7.161310688    | 1   | 7.161310688 | 5.030828 | 0.025791 |
|  | Within Groups  | 350.177399     | 246 | 1.423485362 |          |          |
|  | Total          | 357.3387097    | 247 |             |          |          |
| Catch Basins Inlets, In Public Right of Way    | Between Groups | 16.89946509    | 1   | 16.89946509 | 16.06093 | 8.12E-05 |
|  | Within Groups  | 259.8957156    | 247 | 1.052209375 |          |          |
|  | Total          | 276.7951807    | 248 |             |          |          |
| Catch Basins Inlets, Public Water, In easement | Between Groups | 17.35844499    | 1   | 17.35844499 | 14.13216 | 0.000213 |
|  | Within Groups  | 303.388543     | 247 | 1.228293696 |          |          |
|  | Total          | 320.746988     | 248 |             |          |          |
| Catch Basins Inlets, Public Water, No easement | Between Groups | 13.75161108    | 1   | 13.75161108 | 7.877694 | 0.005407 |
|  | Within Groups  | 427.6815873    | 245 | 1.745639132 |          |          |
|  | Total          | 441.4331984    | 246 |             |          |          |

Figure A.4 Statistically Significant Differences In Municipal and County Average Levels of Service

| Municipal Quartiles  |                | pipe in right of way                            | pipe in easement                 | pipe in not in easement                         | pipe residential                              | pipe non-residential                           | culverts in public right of way        | culverts in easement    | culvert not in easement                | culvert residential              | culvert non-residential               |
|----------------------|----------------|---|----------------------------------|---|---|--|--|-------------------------|--|----------------------------------|---------------------------------------|
|                      | <b>Mean</b>    | <b>3.9</b>                                      | <b>2.3</b>                       | <b>2.3</b>                                      | <b>1.6</b>                                    | <b>1.6</b>                                     | <b>3.9</b>                             | <b>3.4</b>              | <b>2.3</b>                             | <b>1.7</b>                       | <b>1.6</b>                            |
|                      | N              | 45  | 45                               | 45  | 45  | 45   | 44                                     | 44                      | 43                                     | 44                               | 44                                    |
|                      | Std. Deviation | 0.9   | 1.0                              | 1.0   | 0.8   | 0.8  | 1.0                                    | 0.9                     | 1.1                                    | 0.9                              | 0.9                                   |
| Less than 22,000     | <b>Mean</b>    | <b>4.0</b>                                      | <b>2.5</b>                       | <b>2.5</b>                                      | <b>1.5</b>                                    | <b>1.5</b>                                     | <b>3.9</b>                             | <b>3.7</b>              | <b>2.4</b>                             | <b>1.5</b>                       | <b>1.4</b>                            |
|                      | N              | 41  | 42                               | 41  | 41  | 41   | 41                                     | 41                      | 40                                     | 41                               | 41                                    |
|                      | Std. Deviation | 0.9   | 1.1                              | 1.1   | 1.0   | 1.0  | 1.0                                    | 1.0                     | 1.2                                    | 1.0                              | 0.8                                   |
| 22001 to 50,804      | <b>Mean</b>    | <b>4.2</b>                                      | <b>2.7</b>                       | <b>2.7</b>                                      | <b>1.8</b>                                    | <b>1.7</b>                                     | <b>4.2</b>                             | <b>3.9</b>              | <b>2.5</b>                             | <b>1.8</b>                       | <b>1.7</b>                            |
|                      | N              | 45  | 45                               | 45  | 45  | 45   | 44                                     | 44                      | 44                                     | 44                               | 44                                    |
|                      | Std. Deviation | 0.9   | 1.4                              | 1.4   | 1.1   | 1.3  | 1.0                                    | 1.0                     | 1.4                                    | 1.2                              | 1.2                                   |
| 50,805 to 100,000    | <b>Mean</b>    | <b>4.1</b>                                      | <b>2.3</b>                       | <b>2.3</b>                                      | <b>1.8</b>                                    | <b>1.6</b>                                     | <b>4.1</b>                             | <b>3.6</b>              | <b>2.4</b>                             | <b>1.6</b>                       | <b>1.5</b>                            |
|                      | N              | 41  | 41                               | 41  | 41  | 40   | 40                                     | 41                      | 41                                     | 41                               | 41                                    |
|                      | Std. Deviation | 1.0   | 1.3                              | 1.3   | 1.2   | 1.1  | 1.0                                    | 1.2                     | 1.3                                    | 1.1                              | 1.1                                   |
| Greater than 100,000 | <b>Mean</b>    | <b>4.1</b>                                      | <b>2.5</b>                       | <b>2.5</b>                                      | <b>1.7</b>                                    | <b>1.6</b>                                     | <b>4.0</b>                             | <b>3.7</b>              | <b>2.4</b>                             | <b>1.7</b>                       | <b>1.6</b>                            |
|                      | N              | 172   | 173                              | 172   | 172   | 171  | 169                                    | 170                     | 168                                    | 170                              | 170                                   |
|                      | Std. Deviation | 0.9   | 1.2                              | 1.2   | 1.0   | 1.0  | 1.0                                    | 1.1                     | 1.2                                    | 1.1                              | 1.0                                   |
| Municipal Quartiles  |                | ditches in public right of way                  | ditches in easement              | ditches not in easement                         | ditches residential                           | ditches non-residential                        | streams in public right of way         | streams in easement     | streams not in easement                | streams residential              | streams non-residential               |
|                      | <b>Mean</b>    | <b>3.8</b>                                      | <b>3.3</b>                       | <b>2.3</b>                                      | <b>1.7</b>                                    | <b>1.6</b>                                     | <b>3.2</b>                             | <b>3.0</b>              | <b>2.2</b>                             | <b>1.7</b>                       | <b>1.6</b>                            |
|                      | N              | 43  | 44                               | 44  | 44  | 44   | 44                                     | 44                      | 44                                     | 44                               | 44                                    |
|                      | Std. Deviation | 1.2   | 1.1                              | 1.1   | 0.9   | 0.9  | 1.5                                    | 1.4                     | 1.3                                    | 1.0                              | 0.9                                   |
| Less than 22,000     | <b>Mean</b>    | <b>4.0</b>                                      | <b>3.5</b>                       | <b>2.3</b>                                      | <b>1.3</b>                                    | <b>1.3</b>                                     | <b>3.0</b>                             | <b>2.9</b>              | <b>2.0</b>                             | <b>1.3</b>                       | <b>1.4</b>                            |
|                      | N              | 42  | 41                               | 40  | 40  | 41   | 41                                     | 40                      | 40                                     | 40                               | 40                                    |
|                      | Std. Deviation | 1.0   | 1.1                              | 1.3   | 0.7   | 0.7  | 1.4                                    | 1.3                     | 1.1                                    | 0.7                              | 0.7                                   |
| 22001 to 50,804      | <b>Mean</b>    | <b>4.1</b>                                      | <b>3.9</b>                       | <b>2.3</b>                                      | <b>1.7</b>                                    | <b>1.6</b>                                     | <b>3.6</b>                             | <b>3.2</b>              | <b>2.4</b>                             | <b>1.8</b>                       | <b>1.7</b>                            |
|                      | N              | 44  | 43                               | 43  | 43  | 43   | 43                                     | 44                      | 44                                     | 44                               | 44                                    |
|                      | Std. Deviation | 1.0   | 0.9                              | 1.3   | 1.2   | 1.2  | 1.5                                    | 1.5                     | 1.4                                    | 1.1                              | 1.1                                   |
| 50,805 to 100,000    | <b>Mean</b>    | <b>4.1</b>                                      | <b>3.7</b>                       | <b>2.2</b>                                      | <b>1.6</b>                                    | <b>1.6</b>                                     | <b>3.3</b>                             | <b>3.2</b>              | <b>2.1</b>                             | <b>1.6</b>                       | <b>1.6</b>                            |
|                      | N              | 41  | 40                               | 40  | 41  | 40   | 41                                     | 40                      | 41                                     | 40                               | 41                                    |
|                      | Std. Deviation | 1.0   | 1.2                              | 1.2   | 1.1   | 1.1  | 1.5                                    | 1.5                     | 1.2                                    | 1.1                              | 1.1                                   |
| Greater than 100,000 | <b>Mean</b>    | <b>4.0</b>                                      | <b>3.6</b>                       | <b>2.3</b>                                      | <b>1.6</b>                                    | <b>1.5</b>                                     | <b>3.3</b>                             | <b>3.1</b>              | <b>2.2</b>                             | <b>1.6</b>                       | <b>1.6</b>                            |
|                      | N              | 170   | 168                              | 167   | 168   | 168  | 169                                    | 168                     | 169                                    | 168                              | 169                                   |
|                      | Std. Deviation | 1.1   | 1.1                              | 1.2   | 1.0   | 1.0  | 1.5                                    | 1.4                     | 1.3                                    | 1.0                              | 1.0                                   |
| Municipal Quartiles  |                | catch basins inlets in public right of way      | catch basins inlets in easement  | catch basins inlets not in easement             | catch basin inlets residential                | catch basins inlets non-residential            | detention ponds in public right of way | detention ponds in HOAs | detention ponds in general residential | detention pond shared commercial | detention ponds individual commercial |
|                      | <b>Mean</b>    | <b>4.2</b>                                      | <b>3.8</b>                       | <b>2.4</b>                                      | <b>1.7</b>                                    | <b>1.6</b>                                     | <b>3.7</b>                             | <b>2.0</b>              | <b>2.2</b>                             | <b>1.8</b>                       | <b>1.7</b>                            |
|                      | N              | 45  | 45                               | 45  | 44  | 45   | 45                                     | 45                      | 45                                     | 45                               | 45                                    |
|                      | Std. Deviation | 1.0   | 1.1                              | 1.2   | 0.8   | 0.9  | 1.4                                    | 1.3                     | 1.3                                    | 1.3                              | 1.2                                   |
| Less than 22,000     | <b>Mean</b>    | <b>4.3</b>                                      | <b>3.9</b>                       | <b>2.5</b>                                      | <b>1.4</b>                                    | <b>1.5</b>                                     | <b>3.7</b>                             | <b>2.4</b>              | <b>2.7</b>                             | <b>1.8</b>                       | <b>1.6</b>                            |
|                      | N              | 42  | 41                               | 40  | 40  | 40   | 39                                     | 38                      | 38                                     | 37                               | 38                                    |
|                      | Std. Deviation | 0.9   | 1.1                              | 1.4   | 0.9   | 1.0  | 1.4                                    | 1.5                     | 1.5                                    | 1.2                              | 1.1                                   |
| 22001 to 50,804      | <b>Mean</b>    | <b>4.5</b>                                      | <b>4.1</b>                       | <b>2.6</b>                                      | <b>1.9</b>                                    | <b>1.8</b>                                     | <b>3.9</b>                             | <b>2.6</b>              | <b>3.0</b>                             | <b>2.1</b>                       | <b>1.8</b>                            |
|                      | N              | 45  | 45                               | 45  | 45  | 45   | 44                                     | 44                      | 43                                     | 44                               | 44                                    |
|                      | Std. Deviation | 0.9   | 1.0                              | 1.5   | 1.2   | 1.2  | 1.4                                    | 1.6                     | 1.7                                    | 1.5                              | 1.3                                   |
| 50,805 to 100,000    | <b>Mean</b>    | <b>4.3</b>                                      | <b>4.1</b>                       | <b>2.5</b>                                      | <b>1.6</b>                                    | <b>1.6</b>                                     | <b>3.9</b>                             | <b>2.3</b>              | <b>2.8</b>                             | <b>2.1</b>                       | <b>2.0</b>                            |
|                      | N              | 41  | 41                               | 41  | 40  | 40   | 42                                     | 42                      | 41                                     | 42                               | 42                                    |
|                      | Std. Deviation | 1.0   | 1.1                              | 1.4   | 1.1   | 1.1  | 1.3                                    | 1.4                     | 1.4                                    | 1.4                              | 1.3                                   |
| Greater than 100,000 | <b>Mean</b>    | <b>4.3</b>                                      | <b>4.0</b>                       | <b>2.5</b>                                      | <b>1.6</b>                                    | <b>1.6</b>                                     | <b>3.8</b>                             | <b>2.3</b>              | <b>2.7</b>                             | <b>2.0</b>                       | <b>1.8</b>                            |
|                      | N              | 173   | 172                              | 171   | 169   | 170  | 170                                    | 169                     | 167                                    | 168                              | 169                                   |
|                      | Std. Deviation | 0.9   | 1.1                              | 1.4   | 1.0   | 1.1  | 1.4                                    | 1.5                     | 1.5                                    | 1.4                              | 1.3                                   |
| Municipal Quartiles  |                | water quality structures in public right of way | water quality structures in HOAs | water quality structures in general residential | water quality structures in shared commercial | water quality structures individual commercial |  |                         |  |                                  |                                       |
|                      | <b>Mean</b>    | <b>3.1</b>                                      | <b>2.0</b>                       | <b>2.1</b>                                      | <b>1.7</b>                                    | <b>1.7</b>                                     |  |                         |  |                                  |                                       |
|                      | N              | 45  | 45                               | 45  | 44  | 45   |  |                         |  |                                  |                                       |
|                      | Std. Deviation | 1.6   | 1.4                              | 1.4   | 1.2   | 1.2  |  |                         |  |                                  |                                       |
| Less than 22,000     | <b>Mean</b>    | <b>3.5</b>                                      | <b>2.3</b>                       | <b>2.5</b>                                      | <b>1.8</b>                                    | <b>1.6</b>                                     |  |                         |  |                                  |                                       |
|                      | N              | 37  | 36                               | 37  | 37  | 37   |  |                         |  |                                  |                                       |
|                      | Std. Deviation | 1.5   | 1.4                              | 1.4   | 1.2   | 1.2  |  |                         |  |                                  |                                       |
| 22001 to 50,804      | <b>Mean</b>    | <b>3.8</b>                                      | <b>2.2</b>                       | <b>2.6</b>                                      | <b>1.9</b>                                    | <b>1.7</b>                                     |  |                         |  |                                  |                                       |
|                      | N              | 44  | 42                               | 43  | 43  | 43   |  |                         |  |                                  |                                       |
|                      | Std. Deviation | 1.3   | 1.5                              | 1.5   | 1.3   | 1.2  |  |                         |  |                                  |                                       |
| 50,805 to 100,000    | <b>Mean</b>    | <b>4.0</b>                                      | <b>2.4</b>                       | <b>2.9</b>                                      | <b>2.1</b>                                    | <b>2.0</b>                                     |  |                         |  |                                  |                                       |

Figure A.5 Municipalities' (divided into four equal groups based on population) Average Levels of Service

| One-way ANOVA: Municipalities divided into Quartiles |                |           |         |             |       |       |
|--|----------------|-----------|---------|-------------|-------|-------|
|  |                | Sum of Sq | df      | Mean Square | F     | Sig.  |
| water quality structures in public right of way      | Between Groups | 19.177    | 3.000   | 6.392       | 3.148 | 0.027 |
|  | Within Groups  | 328.968   | 162.000 | 2.031       |       |       |
|  | Total          | 348.145   | 165.000 |             |       |       |

Figure A.6 Statistically Significant Differences Among Municipal Population Groups (Quartiles) Average Levels of Service

|                               |                |   |                                  |   |   |  |  |                         |  |                                  |                                       |
|-------------------------------|----------------|---|----------------------------------|---|---|--|--|-------------------------|--|----------------------------------|---------------------------------------|
| Small versus Medium and Large |                | pipe in pub rite of way                         | pipe in easement                 | pipe in not in easement                         | pipe residential                              | pipe non-residential                           | culverts in public right of way        | culverts in easement    | culvert not in easement                | culvert residential              | culvert non-residential               |
|                               | Mean           | 4.1   | 2.5                              | 2.5   | 1.6   | 1.6  | 4.0                                    | 3.7                     | 2.4                                    | 1.7                              | 1.6                                   |
|                               | N              | 131   | 132                              | 131   | 131   | 131  | 129                                    | 129                     | 127                                    | 129                              | 129                                   |
|                               | Std. Deviation | 0.9   | 1.2                              | 1.2   | 1.0   | 1.0  | 1.0                                    | 1.0                     | 1.2                                    | 1.0                              | 1.0                                   |
| Small                         | Mean           | 4.1   | 2.3                              | 2.3   | 1.8   | 1.6  | 4.1                                    | 3.6                     | 2.4                                    | 1.6                              | 1.5                                   |
|                               | N              | 41  | 41                               | 41  | 41  | 40   | 40                                     | 41                      | 41                                     | 41                               | 41                                    |
|                               | Std. Deviation | 1.0   | 1.3                              | 1.3   | 1.2   | 1.1  | 1.0                                    | 1.2                     | 1.3                                    | 1.1                              | 1.1                                   |
| Medium and Large              | Mean           | 4.1   | 2.5                              | 2.5   | 1.7   | 1.6  | 4.0                                    | 3.7                     | 2.4                                    | 1.7                              | 1.6                                   |
|                               | N              | 172   | 173                              | 172   | 172   | 171  | 169                                    | 170                     | 168                                    | 170                              | 170                                   |
|                               | Std. Deviation | 0.9   | 1.2                              | 1.2   | 1.0   | 1.0  | 1.0                                    | 1.1                     | 1.2                                    | 1.1                              | 1.0                                   |
| Small versus Medium and Large |                | ditches in public right of way                  | ditches in easement              | ditches not in easement                         | ditches residential                           | ditches non-residential                        | streams in public right of way         | streams in easement     | streams not in easement                | ditches residential              | streams non-residential               |
|                               | Mean           | 3.9   | 3.6                              | 2.3   | 1.6   | 1.5  | 3.3                                    | 3.1                     | 2.2                                    | 1.6                              | 1.6                                   |
|                               | N              | 129   | 128                              | 127   | 127   | 128  | 128                                    | 128                     | 128                                    | 128                              | 128                                   |
|                               | Std. Deviation | 1.1   | 1.1                              | 1.2   | 0.9   | 0.9  | 1.5                                    | 1.4                     | 1.3                                    | 1.0                              | 1.0                                   |
| Small                         | Mean           | 4.1   | 3.7                              | 2.2   | 1.6   | 1.6  | 3.3                                    | 3.2                     | 2.1                                    | 1.6                              | 1.6                                   |
|                               | N              | 41  | 40                               | 40  | 41  | 40   | 41                                     | 40                      | 41                                     | 40                               | 41                                    |
|                               | Std. Deviation | 1.0   | 1.2                              | 1.2   | 1.1   | 1.1  | 1.5                                    | 1.5                     | 1.2                                    | 1.1                              | 1.1                                   |
| Medium and Large              | Mean           | 4.0   | 3.6                              | 2.3   | 1.6   | 1.5  | 3.3                                    | 3.1                     | 2.2                                    | 1.6                              | 1.6                                   |
|                               | N              | 170.0   | 168.0                            | 167.0   | 168.0   | 168.0  | 169.0                                  | 168.0                   | 169.0                                  | 168.0                            | 169.0                                 |
|                               | Std. Deviation | 1.1   | 1.1                              | 1.2   | 1.0   | 1.0  | 1.5                                    | 1.4                     | 1.3                                    | 1.0                              | 1.0                                   |
| Small versus Medium and Large |                | catch basins inlets in public right of way      | catch basins inlets in easement  | catch basins inlets not in easement             | catch basin inlets residential                | catch basins inlets non-residential            | detention ponds in public right of way | detention ponds in HOAs | detention ponds in general residential | detention pond shared commercial | detention ponds individual commercial |
|                               | Mean           | 4.3   | 3.9                              | 2.5   | 1.7   | 1.6  | 3.8                                    | 2.3                     | 2.6                                    | 1.9                              | 1.7                                   |
|                               | N              | 132   | 131                              | 130   | 129   | 130  | 128                                    | 127                     | 126                                    | 126                              | 127                                   |
|                               | Std. Deviation | 0.9   | 1.1                              | 1.4   | 1.0   | 1.0  | 1.4                                    | 1.5                     | 1.5                                    | 1.3                              | 1.2                                   |
| Small                         | Mean           | 4.3   | 4.1                              | 2.5   | 1.6   | 1.6  | 3.9                                    | 2.3                     | 2.8                                    | 2.1                              | 2.0                                   |
|                               | N              | 41  | 41                               | 41  | 40  | 40   | 42                                     | 42                      | 41                                     | 42                               | 42                                    |
|                               | Std. Deviation | 1.0   | 1.1                              | 1.4   | 1.1   | 1.1  | 1.3                                    | 1.4                     | 1.4                                    | 1.4                              | 1.3                                   |
| Medium and Large              | Mean           | 4.3   | 4.0                              | 2.5   | 1.6   | 1.6  | 3.8                                    | 2.3                     | 2.7                                    | 2.0                              | 1.8                                   |
|                               | N              | 173   | 172                              | 171   | 169   | 170  | 170                                    | 169                     | 167                                    | 168                              | 169                                   |
|                               | Std. Deviation | 0.9   | 1.1                              | 1.4   | 1.0   | 1.1  | 1.4                                    | 1.5                     | 1.5                                    | 1.4                              | 1.3                                   |
| Small versus Medium and Large |                | water quality structures in public right of way | water quality structures in HOAs | water quality structures in general residential | water quality structures in shared commercial | water quality structures individual commercial |  |                         |  |                                  |                                       |
|                               | Mean           | 3.5   | 2.2                              | 2.4   | 1.8   | 1.7  |  |                         |  |                                  |                                       |
|                               | N              | 126   | 123                              | 125   | 124   | 125  |  |                         |  |                                  |                                       |
|                               | Std. Deviation | 1.5   | 1.4                              | 1.4   | 1.2   | 1.2  |  |                         |  |                                  |                                       |
| Small                         | Mean           | 4.0   | 2.4                              | 2.9   | 2.1   | 2.0  |  |                         |  |                                  |                                       |
|                               | N              | 40  | 41                               | 40  | 39  | 41   |  |                         |  |                                  |                                       |
|                               | Std. Deviation | 1.2   | 1.4                              | 1.5   | 1.4   | 1.4  |  |                         |  |                                  |                                       |
| Medium and Large              | Mean           | 3.6   | 2.2                              | 2.5   | 1.8   | 1.7  |  |                         |  |                                  |                                       |
|                               | N              | 166   | 164                              | 165   | 163   | 166  |  |                         |  |                                  |                                       |
|                               | Std. Deviation | 1.5   | 1.4                              | 1.5   | 1.3   | 1.2  |  |                         |  |                                  |                                       |

Figure A.7 Municipalities' Average Levels of Service (divided into two groups as a proxy for NPDES Phase I and II communities)

| One-way ANOVA: Small versus Medium and Large MS4s |                |                |     |             |       |       |
|---|----------------|----------------|-----|-------------|-------|-------|
|   |                | Sum of Squares | df  | Mean Square | F     | Sig.  |
| water quality structures in public right of way   | Between Groups | 12.26732026    | 1   | 12.26732026 | 5.882 | 0.016 |
|   | Within Groups  | 527.6699346    | 253 | 2.085651916 |       |       |
|   | Total          | 539.9372549    | 254 |             |       |       |

Figure A.8 Statistically Significant Differences Among Municipal Population Groups (divided into two groups as a proxy for NPDES Phase I and II communities) Average Levels of Service

| Stormwater Maintenance Funding Sources |                | pipe in right of way                            | pipe in easement                 | pipe in not in easement                         | pipe residential                              | pipe non-residential                              | culverts in public right of way        | culverts in easement    | culvert not in easement                | culvert residential              | culvert non-residential               |
|--|----------------|---|----------------------------------|---|---|---|--|-------------------------|--|----------------------------------|---------------------------------------|
|  | Mean           | 4.1   | 2.7                              | 2.6   | 1.5   | 1.4   | 4.1                                    | 3.9                     | 2.4                                    | 1.5                              | 1.4                                   |
|  | N              | 89.0  | 89.0                             | 87.0  | 88.0  | 88.0  | 88.0                                   | 88.0                    | 86.0                                   | 88.0                             | 88.0                                  |
| Utility                                | Std. Deviation | 1.0   | 1.3                              | 1.3   | 0.9   | 0.9   | 1.0                                    | 1.2                     | 1.4                                    | 0.9                              | 0.9                                   |
|  | Mean           | 3.7   | 2.3                              | 2.3   | 1.7   | 1.7   | 3.8                                    | 3.4                     | 2.3                                    | 1.7                              | 1.7                                   |
|  | N              | 135.0   | 136.0                            | 136.0   | 134.0   | 134.0   | 134.0                                  | 134.0                   | 134.0                                  | 133.0                            | 133.0                                 |
| General Fund                           | Std. Deviation | 1.1   | 1.1                              | 1.1   | 1.1   | 1.1   | 1.1                                    | 1.0                     | 1.2                                    | 1.1                              | 1.1                                   |
|  | Mean           | 4.0   | 2.2                              | 2.2   | 1.9   | 1.9   | 3.8                                    | 3.6                     | 2.4                                    | 1.9                              | 1.8                                   |
|  | N              | 47.0  | 47.0                             | 47.0  | 47.0  | 46.0  | 45.0                                   | 46.0                    | 46.0                                   | 45.0                             | 45.0                                  |
| Other                                  | Std. Deviation | 1.0   | 1.4                              | 1.4   | 1.3   | 1.3   | 1.1                                    | 1.1                     | 1.4                                    | 1.2                              | 1.1                                   |
|  | Mean           | 3.9   | 2.4                              | 2.4   | 1.7   | 1.6   | 3.9                                    | 3.6                     | 2.3                                    | 1.7                              | 1.6                                   |
|  | N              | 271.0   | 272.0                            | 270.0   | 269.0   | 268.0   | 267.0                                  | 268.0                   | 266.0                                  | 266.0                            | 266.0                                 |
| Total                                  | Std. Deviation | 1.1   | 1.2                              | 1.2   | 1.1   | 1.1   | 1.1                                    | 1.1                     | 1.3                                    | 1.1                              | 1.0                                   |
| Stormwater Maintenance Funding Sources |                | ditches in public right of way                  | ditches in easement              | ditches not in easement                         | ditches residential                           | ditches non-residential                           | streams in public right of way         | streams in easement     | streams not in easement                | streams residential              | streams non-residential               |
|  | Mean           | 4.1   | 3.7                              | 2.3   | 1.4   | 1.4   | 3.4                                    | 3.3                     | 2.4                                    | 1.5                              | 1.6                                   |
|  | N              | 89.0  | 87.0                             | 86.0  | 87.0  | 88.0  | 87.0                                   | 86.0                    | 86.0                                   | 85.0                             | 86.0                                  |
| Utility                                | Std. Deviation | 1.1   | 1.2                              | 1.3   | 0.9   | 0.9   | 1.3                                    | 1.4                     | 1.4                                    | 0.9                              | 1.0                                   |
|  | Mean           | 3.8   | 3.4                              | 2.3   | 1.7   | 1.7   | 3.5                                    | 3.1                     | 2.2                                    | 1.8                              | 1.7                                   |
|  | N              | 135.0   | 134.0                            | 133.0   | 132.0   | 131.0   | 134.0                                  | 133.0                   | 133.0                                  | 133.0                            | 133.0                                 |
| General Fund                           | Std. Deviation | 1.1   | 1.1                              | 1.2   | 1.1   | 1.1   | 1.4                                    | 1.3                     | 1.2                                    | 1.1                              | 1.1                                   |
|  | Mean           | 3.8   | 3.5                              | 2.3   | 1.8   | 1.8   | 3.2                                    | 3.0                     | 1.8                                    | 1.5                              | 1.5                                   |
|  | N              | 45.0  | 45.0                             | 46.0  | 45.0  | 45.0  | 46.0                                   | 46.0                    | 46.0                                   | 46.0                             | 46.0                                  |
| Other                                  | Std. Deviation | 1.1   | 1.2                              | 1.3   | 1.1   | 1.1   | 1.6                                    | 1.6                     | 1.2                                    | 1.0                              | 1.0                                   |
|  | Mean           | 3.9   | 3.5                              | 2.3   | 1.6   | 1.6   | 3.4                                    | 3.2                     | 2.2                                    | 1.6                              | 1.6                                   |
|  | N              | 269.0   | 266.0                            | 265.0   | 264.0   | 264.0   | 267.0                                  | 265.0                   | 265.0                                  | 264.0                            | 265.0                                 |
| Total                                  | Std. Deviation | 1.1   | 1.2                              | 1.2   | 1.0   | 1.0   | 1.4                                    | 1.4                     | 1.3                                    | 1.0                              | 1.0                                   |
| Stormwater Maintenance Funding Sources |                | catch basins inlets in public right of way      | catch basins inlets in easement  | catch basins inlets not in easement             | catch basin inlets residential                | catch basins inlets non-residential               | detention ponds in public right of way | detention ponds in HOAs | detention ponds in general residential | detention pond shared commercial | detention ponds individual commercial |
|  | Mean           | 4.3   | 4.1                              | 2.6   | 1.4   | 1.4   | 3.9                                    | 2.6                     | 3.0                                    | 2.0                              | 1.7                                   |
|  | N              | 89.0  | 89.0                             | 87.0  | 86.0  | 86.0  | 87.0                                   | 85.0                    | 82.0                                   | 84.0                             | 84.0                                  |
| Utility                                | Std. Deviation | 1.0   | 1.1                              | 1.5   | 0.9   | 0.9   | 1.4                                    | 1.6                     | 1.6                                    | 1.4                              | 1.3                                   |
|  | Mean           | 3.9   | 3.5                              | 2.3   | 1.7   | 1.7   | 3.7                                    | 2.1                     | 2.3                                    | 1.8                              | 1.8                                   |
|  | N              | 136.0   | 135.0                            | 135.0   | 134.0   | 134.0   | 135.0                                  | 134.0                   | 134.0                                  | 134.0                            | 134.0                                 |
| General Fund                           | Std. Deviation | 1.2   | 1.2                              | 1.2   | 1.1   | 1.1   | 1.4                                    | 1.3                     | 1.4                                    | 1.3                              | 1.2                                   |
|  | Mean           | 4.2   | 3.9                              | 2.4   | 1.8   | 1.9   | 3.9                                    | 2.3                     | 2.7                                    | 2.2                              | 2.0                                   |
|  | N              | 47.0  | 47.0                             | 47.0  | 46.0  | 47.0  | 47.0                                   | 47.0                    | 47.0                                   | 46.0                             | 47.0                                  |
| Other                                  | Std. Deviation | 1.0   | 1.1                              | 1.5   | 1.3   | 1.3   | 1.3                                    | 1.5                     | 1.6                                    | 1.5                              | 1.4                                   |
|  | Mean           | 4.1   | 3.8                              | 2.4   | 1.6   | 1.6   | 3.8                                    | 2.3                     | 2.6                                    | 2.0                              | 1.8                                   |
|  | N              | 272.0   | 271.0                            | 269.0   | 266.0   | 267.0   | 269.0                                  | 266.0                   | 263.0                                  | 264.0                            | 265.0                                 |
| Total                                  | Std. Deviation | 1.1   | 1.2                              | 1.4   | 1.1   | 1.1   | 1.4                                    | 1.5                     | 1.5                                    | 1.4                              | 1.3                                   |
| Stormwater Maintenance Funding Sources |                | water quality structures in public right of way | water quality structures in HOAs | water quality structures in general residential | water quality structures in shared commercial | water quality structures in individual commercial |  |                         |  |                                  |                                       |
|  | Mean           | 4.0   | 2.5                              | 3.0   | 2.1   | 1.8   |  |                         |  |                                  |                                       |
|  | N              | 84.0  | 83.0                             | 81.0  | 82.0  | 83.0  |  |                         |  |                                  |                                       |
| Utility                                | Std. Deviation | 1.2   | 1.5                              | 1.6   | 1.5   | 1.3   |  |                         |  |                                  |                                       |
|  | Mean           | 3.4   | 2.1                              | 2.2   | 1.7   | 1.7   |  |                         |  |                                  |                                       |
|  | N              | 134.0   | 133.0                            | 135.0   | 134.0   | 135.0   |  |                         |  |                                  |                                       |
| General Fund                           | Std. Deviation | 1.5   | 1.4                              | 1.3   | 1.1   | 1.2   |  |                         |  |                                  |                                       |
|  | Mean           | 3.5   | 2.2                              | 2.5   | 2.2   | 2.0   |  |                         |  |                                  |                                       |
|  | N              | 46.0  | 44.0                             | 46.0  | 44.0  | 46.0  |  |                         |  |                                  |                                       |
| Other                                  | Std. Deviation | 1.6   | 1.5                              | 1.6   | 1.6   | 1.6   |  |                         |  |                                  |                                       |
|  | Mean           | 3.6   | 2.2                              | 2.5   | 1.9   | 1.8   |  |                         |  |                                  |                                       |
|  | N              | 264.0   | 260.0                            | 262.0   | 260.0   | 264.0   |  |                         |  |                                  |                                       |
| Total                                  | Std. Deviation | 1.4   | 1.5                              | 1.5   | 1.4   | 1.3   |  |                         |  |                                  |                                       |

Figure A.9 All Respondents' Average Levels of Service (divided into groups by maintenance program funding source)

|   |                | Sum of Squares | df  | Mean Square | F        | Sig.  |
|---|----------------|----------------|-----|-------------|----------|-------|
| pipe in pub rite of way                         | Between Groups | 7.756520831    | 2   | 3.878260416 | 3.351303 | 0.037 |
|   | Within Groups  | 310.1401581    | 268 | 1.157239396 |          |       |
|   | Total          | 317.896679     | 270 |             |          |       |
| pipe in easement                                | Between Groups | 8.897956188    | 2   | 4.448978094 | 3.037422 | 0.050 |
|   | Within Groups  | 394.010132     | 269 | 1.46472168  |          |       |
|   | Total          | 402.9080882    | 271 |             |          |       |
| pipe non-residential                            | Between Groups | 7.86403457     | 2   | 3.932017285 | 3.421222 | 0.034 |
|   | Within Groups  | 304.5650699    | 265 | 1.149302151 |          |       |
|   | Total          | 312.4291045    | 267 |             |          |       |
| culverts in public right of way                 | Between Groups | 8.405872027    | 2   | 4.202936014 | 3.725109 | 0.025 |
|   | Within Groups  | 297.8637909    | 264 | 1.128271935 |          |       |
|   | Total          | 306.2696629    | 266 |             |          |       |
| culverts in easement                            | Between Groups | 11.08544481    | 2   | 5.542722406 | 4.795854 | 0.009 |
|   | Within Groups  | 306.2690328    | 265 | 1.155732199 |          |       |
|   | Total          | 317.3544776    | 267 |             |          |       |
| culvert non-residential                         | Between Groups | 6.911217438    | 2   | 3.455608719 | 3.197776 | 0.042 |
|   | Within Groups  | 284.2053239    | 263 | 1.080628608 |          |       |
|   | Total          | 291.1165414    | 265 |             |          |       |
| catch basins inlets non-residential             | Between Groups | 7.970242591    | 2   | 3.985121296 | 3.415156 | 0.034 |
|   | Within Groups  | 308.05972      | 264 | 1.166892879 |          |       |
|   | Total          | 316.0299625    | 266 |             |          |       |
| detention ponds in general residential          | Between Groups | 20.31869502    | 2   | 10.15934751 | 4.655885 | 0.010 |
|   | Within Groups  | 567.3314951    | 260 | 2.182044212 |          |       |
|   | Total          | 587.6501901    | 262 |             |          |       |
| water quality structures in public right of way | Between Groups | 23.09999234    | 2   | 11.54999617 | 5.734195 | 0.004 |
|   | Within Groups  | 525.7144016    | 261 | 2.014231424 |          |       |
|   | Total          | 548.8143939    | 263 |             |          |       |
| water quality structures in HOAs                | Between Groups | 11.33587484    | 2   | 5.667937421 | 2.710808 | 0.068 |
|   | Within Groups  | 537.3525867    | 257 | 2.090866096 |          |       |
|   | Total          | 548.6884615    | 259 |             |          |       |
| water quality structures in general residential | Between Groups | 32.60264574    | 2   | 16.30132287 | 7.448434 | 0.001 |
|   | Within Groups  | 566.8362856    | 259 | 2.188557087 |          |       |
|   | Total          | 599.4389313    | 261 |             |          |       |
| water quality structures in shared commercial   | Between Groups | 12.44807915    | 2   | 6.224039575 | 3.453593 | 0.033 |
|   | Within Groups  | 463.1634593    | 257 | 1.802192449 |          |       |
|   | Total          | 475.6115385    | 259 |             |          |       |

Figure A.10 Statistically Significant Differences Among All Respondents' Average Levels of Service (divided into groups by maintenance program funding source)

| Extent of Service                               | Mean Level of Service | High Medium or Low LOS? |
|---|-----------------------|-------------------------|
| pipe in right of way                            | 3.89                  | Medium                  |
| pipe in easement                                | 2.40                  | Low                     |
| pipe in not in easement                         | 2.38                  | Low                     |
| pipe residential                                | 1.70                  | Low                     |
| pipe non-residential                            | 1.63                  | Low                     |
| culverts in public right of way                 | 3.91                  | Medium                  |
| culverts in easement                            | 3.59                  | Medium                  |
| culvert not in easement                         | 2.34                  | Low                     |
| culvert residential                             | 1.67                  | Low                     |
| culvert non-residential                         | 1.61                  | Low                     |
| ditches in public right of way                  | 3.93                  | Medium                  |
| ditches in easement                             | 3.53                  | Medium                  |
| ditches not in easement                         | 2.29                  | Low                     |
| ditches residential                             | 1.63                  | Low                     |
| ditches non-residential                         | 1.59                  | Low                     |
| streams in public right of way                  | 3.38                  | Medium                  |
| streams in easement                             | 3.17                  | Medium                  |
| streams not in easement                         | 2.20                  | Low                     |
| ditches residential                             | 1.62                  | Low                     |
| streams non-residential                         | 1.60                  | Low                     |
| catch basins inlets in public right of way      | 4.10                  | High                    |
| catch basins inlets in easement                 | 3.78                  | Medium                  |
| catch basins inlets not in easement             | 2.38                  | Low                     |
| catch basin inlets residential                  | 1.65                  | Low                     |
| catch basins inlets non-residential             | 1.63                  | Low                     |
| detention ponds in public right of way          | 3.81                  | Medium                  |
| detention ponds in HOAs                         | 2.29                  | Low                     |
| detention ponds in general residential          | 2.57                  | Low                     |
| detention pond shared commercial                | 1.96                  | Low                     |
| detention ponds individual commercial           | 1.79                  | Low                     |
| water quality structures in public right of way | 3.62                  | Medium                  |
| water quality structures in HOAs                | 2.22                  | Low                     |
| water quality structures in general residential | 2.47                  | Low                     |
| water quality structures in shared commercial   | 1.90                  | Low                     |
| water quality structures individual commercial  | 1.77                  | Low                     |

Figure A.11 Mean Level of Service (All Respondents)

Figure A.12 Stormwater Maintenance Practice Survey

Your name or organization: \* *This is a required form field—we will not use the information or pass it along to anyone else.*

Your email address: \* *This is a required form field—we will not use the information or pass it along to anyone else.*

**1. Local Government Characteristics**

A. This local government is a (check one):

City                      County                      Other

B. Name of local government:

C. The local government's approximate population is:

**2. Funding for Stormwater Functions**

A. In many cases, multiple sources of funding are used to fund *all* activities in a stormwater program. Please list the sources of funding used to fund the *overall* stormwater program in your municipality:

B. For stormwater maintenance activities, which of these sources of funding is used:

If other, please name funding source:

**3. Extent and Level of Service**

Please fill out each row of the following level and extent of service matrix by checking *each* level of service block that most closely fits a description of your maintenance program:

| <b>Conveyance Systems</b>                               |                                  |                  |                         |  |                                |
|---|----------------------------------|------------------|-------------------------|--|--------------------------------|
| <b>Stormwater Infrastructure Element &amp; Location</b> | <b>Level of Service Provided</b> |                  |                         |  |                                |
|   | <b>None</b>                      | <b>Emergency</b> | <b>Complaint Driven</b> | <b>Inspector Generated Work Order Driven</b> | <b>Routine Calendar Driven</b> |
| <b>Pipe Systems</b>                                     |                                  |                  |                         |  |                                |
| In public right-of-way (ROW)                            |                                  |                  |                         |  |                                |
| Outside ROW, but in easement                            |                                  |                  |                         |  |                                |
| Outside ROW, carries water, <b>no</b> easement          |                                  |                  |                         |  |                                |
| Private drainage (no street water)—residential          |                                  |                  |                         |  |                                |
| Private drainage (no street water)—non-residential      |                                  |                  |                         |  |                                |

**Culverts**

|  |  |  |  |  |  |
|--|--|--|--|--|--|
| In public right-of-way (ROW)                       |  |  |  |  |  |
| Outside ROW, but in easement                       |  |  |  |  |  |
| Outside ROW, carries water, <b>no</b> easement     |  |  |  |  |  |
| Private drainage (no street water)—residential     |  |  |  |  |  |
| Private drainage (no street water)—non-residential |  |  |  |  |  |

**Ditches—Wet Weather**

|  |  |  |  |  |  |
|--|--|--|--|--|--|
| In public right-of-way (ROW)                       |  |  |  |  |  |
| Outside ROW, but in easement                       |  |  |  |  |  |
| Outside ROW, carries water, <b>no</b> easement     |  |  |  |  |  |
| Private drainage (no street water)—residential     |  |  |  |  |  |
| Private drainage (no street water)—non-residential |  |  |  |  |  |

**Streams—Perennial**

|  |  |  |  |  |  |
|--|--|--|--|--|--|
| In public right-of-way (ROW)                       |  |  |  |  |  |
| Outside ROW, but in easement                       |  |  |  |  |  |
| Outside ROW, carries water, <b>no</b> easement     |  |  |  |  |  |
| Private drainage (no street water)—residential     |  |  |  |  |  |
| Private drainage (no street water)—non-residential |  |  |  |  |  |

**Catch Basins and Inlets**

|   |  |  |  |  |  |
|---|--|--|--|--|--|
| In public right-of-way (ROW)                      |  |  |  |  |  |
| Outside ROW, but in easement                      |  |  |  |  |  |
| Outside ROW, carries water, <b>no</b> easement    |  |  |  |  |  |
| Private drainage (no street water)—residential    |  |  |  |  |  |
| Private drainage (no street water)—nonresidential |  |  |  |  |  |

**Detention Ponds**

|  |  |  |  |  |  |
|--|--|--|--|--|--|
| In Right-of-way or easement            |  |  |  |  |  |
| In homeowner association neighborhoods |  |  |  |  |  |
| In general residential neighborhoods   |  |  |  |  |  |
| On shared commercial property          |  |  |  |  |  |
| On individual commercial property      |  |  |  |  |  |

**Stormwater Quality Structures (*bioretention, water quality swales, etc.*)**

|  |  |  |  |  |  |
|--|--|--|--|--|--|
| In Right-of-way or easement            |  |  |  |  |  |
| In homeowner association neighborhoods |  |  |  |  |  |
| In general residential neighborhoods   |  |  |  |  |  |
| On shared commercial property          |  |  |  |  |  |
| On individual commercial property      |  |  |  |  |  |

**4. CONTACT INFORMATION**

May we contact you to clarify answers on this survey, if necessary?

Yes                  No