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## King County Tabula: Task 4—Add New Unit Costs for Easements, Acquisitions, and Culverts to Component Modules

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This memorandum pertains to the King County Wastewater Treatment Division's Work Order #3 for revisions and updates to its Tabula cost estimating program, and specifically discusses Task 4: add new unit costs for easements, acquisitions, and culverts to component modules. King County will review and discuss the suggestions and recommendations presented in this memo.

### Easement/Acquisitions

In order to refine the cost calculations that involve easements, Brown and Caldwell added a multiplier value that reflects the relative cost of land within specific municipalities. The average value for King County, 1.00, is the default. These values were calculated based on three factors that we consider indicators of overall land value:

- 1) Average residence value
- 2) Tax rates
- 3) Land type classification (rural, suburban, urban, industrial, or commercial).

Table 4.1 (below) provides the listing of relative land values for each municipality.

| Table 4.1. Easement Adjustment Factors |                       |
|--|-----------------------|
| City                                   | Land Cost Adj. Factor |
| King County Average                    | 1.00                  |
| Seattle                                | 0.79                  |
| Algona                                 | 0.36                  |
| Auburn                                 | 0.43                  |
| Beaux Arts                             | 1.61                  |

| Table 4.1. Easement Adjustment Factors |                       |
|--|-----------------------|
| City                                   | Land Cost Adj. Factor |
| Bellevue                               | 1.01                  |
| Black Diamond                          | 0.59                  |
| Bothell                                | 0.66                  |
| Burien                                 | 0.56                  |
| Carnation                              | 0.49                  |
| Clyde Hill                             | 2.33                  |
| Covington                              | 0.46                  |
| Des Moines                             | 0.49                  |
| Duvall                                 | 0.60                  |
| Enumclaw                               | 0.41                  |
| Federal Way                            | 0.49                  |
| Hunts Point                            | 6.55                  |
| Issaquah                               | 0.88                  |
| Kenmore                                | 0.68                  |
| Kent                                   | 0.49                  |
| Kirkland                               | 0.93                  |
| Lake Forest Park                       | 0.73                  |
| Maple Valley                           | 0.51                  |
| Medina                                 | 3.66                  |
| Mercer Island                          | 1.82                  |
| Milton                                 | 0.44                  |
| Newcastle                              | 0.95                  |
| Normandy Park                          | 0.88                  |
| North Bend                             | 0.60                  |
| Pacific                                | 0.40                  |
| Redmond                                | 0.77                  |
| Renton                                 | 0.55                  |
| Sammamish                              | 0.96                  |
| SeaTac                                 | 0.43                  |
| Shoreline                              | 0.61                  |
| Skykomish                              | 0.21                  |
| Snoqualmie                             | 0.76                  |
| Tukwila                                | 0.44                  |
| Woodinville                            | 0.75                  |
| Yarrow Point                           | 3.05                  |
| Unincorporated Area                    | 0.65                  |

## Culverts

The County requested that we include an additional Tabula model for culverts. We incorporated these into Tabula. Based on our cost estimators' experience, we used Class III reinforced concrete pipe (RCP) because of a very slight cost savings for Class II RCP. All costs were developed by referencing previous projects from within King County (where possible) and then extrapolating to other areas of the country. All costs are adjusted to October 2008 dollars and, if necessary, adjusted for King County labor rates.

The culvert cost estimate is calculated by adding the material and installation cost, multiplying by the number of linear feet, and then adding the fixed costs and end treatment costs. Tables 4.2 through 4.4 provide specific recommended values for these calculations. Where appropriate, costs are scaled based on the pipe diameter used.

| Table 4.2. Culvert Fixed Input Parameters |       |   |
|---|-------|---|
| Items                                     | Units | Recommended Unit Cost (Oct. 2008 Dollars) |
| Mob/Demob                                 | LS    | 6%  |
| Special Shoring                           | SF    | \$17                                      |
| Excavation                                | CY    | \$26                                      |
| Imported Backfill                         | CY    | \$34                                      |
| Place Backfill                            | CY    | \$6                                       |
| Spoil Load and Haul                       | CY    | \$16                                      |
| Asphalt Paving                            | SY    | \$42                                      |

| Table 4.3. Culvert Pipe Material and Installation Costs |   |   |
|---|---|---|
| Pipe Diameter (in.)                                     | Recommended Culvert Pipe Material Costs (\$/LF) | Recommended Culvert Pipe Installation Costs (\$/LF) |
| 12  | \$13  | \$15  |
| 15  | \$12  | \$19  |
| 18  | \$15  | \$25  |
| 21  | \$24  | \$27  |
| 24  | \$34  | \$33  |
| 30  | \$53  | \$42  |
| 36  | \$73  | \$52  |
| 42  | \$94  | \$52  |
| 48  | \$115   | \$58  |

| Table 4.4. Culvert End Treatment Costs |                                      |                                       |
|--|--------------------------------------|---------------------------------------|
| Pipe Diameter (in.)                    | Recommended Flared End Cost (\$/ea.) | Recommended Beveled End Cost (\$/ea.) |
| 12                                     | \$500                                | \$300                                 |
| 15                                     | \$1,000                              | \$600                                 |
| 18                                     | \$1,500                              | \$900                                 |
| 21                                     | \$2,000                              | \$1,200                               |
| 24                                     | \$2,500                              | \$1,500                               |
| 30 *                                   | \$3,800                              | \$2,800                               |
| 36 *                                   | \$4,050                              | \$2,900                               |
| 42 *                                   | \$4,250                              | \$3,100                               |
| 48 *                                   | \$4,500                              | \$3,300                               |

\* The end treatment costs greater than 24" include safety bars.