



# COST ESTIMATING

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# Estimating Theory

The more you know about the project the more accurate the estimate

## Expected Level of Accuracy by Development Phase

Planning / Pre-Scoping	Scoping	Preliminary Design	Detailed Design	Final Design/ RW Acquisition	Advertise Project
+/- 40%	+/- 30%	+/- 25%	+/- 20%	+/- 15%	+/- 10%

# Estimating Tools

- **Statewide Planning Level Cost Estimate Sheet**
  - Planning level tool for concept projects
- **PCES – Project Cost Estimating System**
  - Primary tool for preliminary design cost estimates
- **Trnsport**
  - Design and construction estimating tool
- **Other Techniques**
  - Cost per lane mile
  - Cost per square foot
  - Three times pavement

# Statewide Planning Cost Estimate Sheet

- **Menu of options with estimate ranges**
  - **Roadway project cost per mile for an urban typical or a rural typical**
    - Cost per mile includes signals, turn lanes, sidewalks, drainage, etc.
  - **Bridge cost per square foot**
  - **Commuter parking lot cost per space**
  - **Shared use path cost per mile**
  - **Noise wall cost per square foot**
  - **Grade separated interchange cost per each**
  - **Design & Contingency costs are included in the unit estimates**
  - **Right of Way & Utilities costs are added as percentage of the project**
    - % ranges from 25% (Rural Area) to 125% (Central Business District)

# Statewide Cost Planning Estimate Sheet

TRANSPORTATION & MOBILITY PLANNING DIVISION  
STATEWIDE PLANNING LEVEL COST ESTIMATES

Inflation Rate **3.0%** annually

To inflate cost to year of expenditure, please enter year below

**2018**

*Costs include 25% for PE and Construction Contingencies*

Cost Per  
Mile

**Bristol, Culpeper,  
Fredericksburg, Lynchburg,  
Richmond, Salem, Staunton**

**NOVA  
Hampton Roads**

The following typical section estimates do not include bridge, right-of-way (ROW) or other improvement costs. Use the bridge unit costs, ROW percentages and other improvement costs (highlighted in gray) figures provided below to add these additional costs to the planning level construction estimate.

Urban Typical Sections					LOW	HIGH	LOW	HIGH
<b>Bike Lanes</b>		<b>4' pavement both sides</b>		<b>CPM</b>	\$ 580,000	\$ 860,000	\$ 670,000	\$ 1,020,000
<b>2 lanes</b>	<b>U2</b>	<b>26'-30' pavement</b>	<b>Reconstruct or New</b>	<b>CPM</b>	\$ 3,730,000	\$ 5,650,000	\$ 4,470,000	\$ 6,790,000
<b>3 lanes</b>	<b>U3</b>	<b>36'-40' pavement</b>	<b>Reconstruct or New</b>	<b>CPM</b>	\$ 5,410,000	\$ 8,130,000	\$ 6,490,000	\$ 9,750,000
<b>4 lanes</b>	<b>U4</b>	<b>40'-48' pavement</b>	<b>Reconstruct or New</b>	<b>CPM</b>	\$ 7,340,000	\$ 11,010,000	\$ 8,800,000	\$ 13,210,000
<b>4 lanes divided</b>	<b>U4D</b>	<b>48' pavement w/16' raised median</b>	<b>Reconstruct or New</b>	<b>CPM</b>	\$ 9,550,000	\$ 14,400,000	\$ 11,460,000	\$ 17,280,000
<b>4 lanes divided</b>	<b>U4D</b>	<b>48' pavement w/28' raised median</b>	<b>Reconstruct or New</b>	<b>CPM</b>	\$ 11,210,000	\$ 16,510,000	\$ 13,460,000	\$ 19,820,000
<b>6 lanes divided</b>	<b>U6D</b>	<b>72' pavement w/16' raised median</b>	<b>Reconstruct or New</b>	<b>CPM</b>	\$ 12,010,000	\$ 17,720,000	\$ 14,410,000	\$ 21,260,000
<b>6 lanes divided</b>	<b>U6D</b>	<b>72' pavement w/28' raised median</b>	<b>Reconstruct or New</b>	<b>CPM</b>	\$ 12,360,000	\$ 18,260,000	\$ 14,830,000	\$ 21,910,000
<b>8 lanes divided</b>	<b>U8D</b>	<b>96' pavement w/16' raised median</b>	<b>Reconstruct or New</b>	<b>CPM</b>	\$ 17,480,000	\$ 26,170,000	\$ 20,980,000	\$ 31,400,000
<b>8 lanes divided</b>	<b>U8D</b>	<b>96' pavement w/ 28' raised median</b>	<b>Reconstruct or New</b>	<b>CPM</b>	\$ 18,670,000	\$ 28,070,000	\$ 22,410,000	\$ 33,680,000

# Commuter Parking Lot Planning Cost Estimate

TRANSPORTATION & MOBILITY PLANNING DIVISION  
STATEWIDE PLANNING LEVEL COST ESTIMATES

Inflation Rate **3.0%** annually

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Fredericksburg, Lynchburg, Richmond,  
Salem, Staunton**

**NOVA  
Hampton Roads**

The following typical section estimates do not include bridge, right-of-way (ROW) or other improvement costs. Use the bridge unit costs, ROW percentages and other improvement costs (highlighted in gray) figures provided below to add these additional costs to the planning level construction estimate.

Other Improvements		LOW	HIGH	LOW	HIGH
Provide park & ride facility	Cost per Parking Space	\$ 8,600	\$ 11,000	\$ 9,500	\$ 12,600

# Commuter Parking Lot Planning Cost Estimate

## Using the Statewide Planning Cost Sheet

- **Parking Lot = # of spaces X unit cost per space**
- **Roadway Improvements = length X cost per mile**

**OR**

- **Turn Lanes = # of turn lanes X cost per turn lane**
- **Shared Use Path = length X cost per mile**

**Total planning cost estimate = Parking Lot + Roadway Improvements (or Turn Lanes) + Shared Use Path + RW/Utilities %**



# Commuter Parking Lot Planning Cost Estimate

## Example

- **GWRC would like to build a 300 space commuter parking lot on Route 3 in Stafford County a few miles east of the city line**
- **There is an existing crossover at the property with a substandard left turn lane and no right turn lane**
- **No traffic signal will be needed based on traffic counts**
- **There is a neighborhood shared use path about one half mile away that will be connected to this new parking lot**

# Commuter Parking Lot Planning Cost Estimate

Item	Estimate
Parking Lot – assume 300 spaces	Number of spaces X unit cost per space 300 spaces X \$11,000 per space = \$ 3,300,000
Turn Lanes – assume a right turn lane and a left turn lane on a 4 lane divided road at an existing crossover	Number of turn lanes X cost per each 1 right turn lane X \$240,000 + 1 left turn lane X \$260,000 = \$ 500,000
Shared Use Path – assume ½ mile of shared use path	Length of path X cost per mile 0.5 mile X \$1,800,000 per mile = \$ 900,000
Right of Way & Utilities – assume low density residential area	Percent of the sum of the above estimates 65% X (\$3,300,000 + \$500,000 + \$900,000) = \$ 3,055,000
Total Planning Cost Estimate	Sum of the above \$3,300,000 + \$500,000 + \$900,000 + \$3,055,000 = \$ 7,755,000

# PCES – Project Cost Estimating System

- **Key information needed**
  - Traffic counts
  - Length of project, number of lanes, lane width
  - Turn lanes, curb & gutter or shoulder
  - Pedestrian and/or bicycle facilities
  - Bridges or large drainage structures, storm water facilities
  - Traffic signals, large sign structures, lighting
  - Right of way impacts, utility impacts
  - Comments – document scope details and assumptions

# PCES – Project Cost Estimating System

**VDOT Project Cost Estimating System SUMMARY PAGE**

DISTRICT: **\*\* MISSING DATA \*\***

PROJECT NUMBER: **\*\* MISSING DATA \*\***

CONSTRUCTION END YEAR: **FY2021** UPC: **\*\*\*\***

AD YEAR: **FY2020** RATE OF INFLATION TO AD: **6.95%**

ESTIMATE YEAR: **FY2017** INFLATION RATE DURING CL: **N/A**

Date of previous estimate: **N/A**

PROJECT MANAGER / DESIGNER: **\*\* MISSING DATA \*\***

Preliminary Engineering Estimate: **PCES**

Construction Estimate: **PCES**

Right-of-Way Estimate: **PCES**

Utilities Estimate: **PCES**

DATE: **8/4/2016**

THE FOLLOWING DATA WILL BE PROVIDED UPON COMPLETION OF THE REMAINDER OF THE WORKBOOK, WHICH IS ACCESSED BY SELECTING THE CONST, RW, & UTIL TABS BELOW

Bridge PE ESTIMATE	<b>\$0</b>
Bridge CN ESTIMATE	<b>\$0</b>
Bridge RW ESTIMATE	<b>\$0</b>
PRELIMINARY ENGINEERING ESTIMATE (excluding Bridge PE)	<b>\$0</b>
CONSTRUCTION ESTIMATE (excluding Bridge CN)	<b>\$0</b>
RIGHT-OF-WAY & UTILITIES ESTIMATE(excluding Bridge RW)	<b>\$0</b>
TOTAL PROJECT ESTIMATE (excluding Bridge estimate)	<b>\$0</b>

© Virginia Department of Transportation 2005  
Revised 02/16/16  
Estimate Class: Blank  
Version 6.10

**VDOT Project Cost Estimating System CONSTRUCTION / BRIDGE / PE**

Project No.: **\*\* MISSING DATA \*\***

Interstate Project?  Maintenance Project?  Route Number:  Geometric Standard:  Ad Date: **2020** Design Year ADT:  Current (Recent) ADT:

Box Must Be Empty  Design Speed =

Box Must Be Empty

Box Must Be Empty

Project Length (mi.):  Number of Additional Lanes:  Length of Add'l. Lanes (mi.):

Total Length - Adding or Building Two Lanes (mi.):

Total Length - Adding or Building Four Lanes (mi.):

Total Length - Building Ramps and Loops (mi.):

Shoulder or Curb & Gutter? (Select S or C&G)  Enter Lane Width (ft) >

Median Type - Graded, Raised, or None?  Normal Lane Width(ft)

Number of Crossovers (Divided Highways ONLY)

Length - Curb & Gutter - Left PLUS Right Side (ft)

Length - Sidewalk - Left PLUS Right Side (ft)

Bike / Pedestrian Type

Total Length - Raised Median (ft)

Number of Right Turn Lanes - Left PLUS Right Side

Number of Left Turn Lanes - (Undivided Only)

Signals, ITS, Signs and Lighting Costs\*  \$0

Cost of Large Drainage Structures  \$0

In-Plan Utility Costs\*  \$0

Adjustment for Unusual Construction Costs  \$0

\* Totals include district factor calculations

Additional (or Unusual) P. E. Costs

Select % of PE to be performed by Consultants

Construction Costs

Base #1 (PCES)  \$0

Base #2  \$0

Enter Const CE Cost >  \$0

CE (0%)  \$0

Estimate (2017)  \$0

PE Cost (PCES)  **\$0**

**VDOT Project Cost Estimating System RIGHT-OF-WAY ESTIMATE**

Project No.: **\*\* MISSING DATA \*\***

VDOT Construction District: **\*\* MISSING DATA \*\*** # 0

Select Project Area Real Estate Costs:

Define Project Land Use Characteristics:

Agricultural:	<input type="text"/>
Residential:	<input type="text"/>
Industrial:	<input type="text"/>
Commercial:	<input type="text"/>

Instructions: Please fill-in all applicable White Boxes or make a choice from the Drop-down Lists

Enter the Approximate Number of Parcels on the Project:

**1. LAND VALUE**

Total Right-of-Way Project Length (ML + Connections)	<input type="text"/> ft	Computed RW Cost per sq ft =	<b>\$0.00</b>
Average width of Existing RW	<input type="text"/> ft	Enter Right-of-Way Estimator's Right-of-Way Cost per sq ft	<input type="text"/>
Average width of Proposed RW	<input type="text"/> ft	Enter total sq ft (override calculation)	<input type="text"/>
Total area of all additional Prop. Right-of-Way	<input type="text"/> sf	0 sq ft =	<b>0.000</b> Ac
Approx. % of Prop. CL within Approx. % of Prop. CL between Approx. % of Prop. CL greater than	<input type="text"/> ft of Exist. CL	ft of Exist. CL	(Total) Must = 100%

Average Width of parallel Temporary Easements Left  ft

Total Length of parallel Temporary Easements Left  ft

Average Width of parallel Temporary Easements Right  ft

Total Length of parallel Temporary Easements Right  ft

Enter Right-of-Way Estimator's Temp. Ease. Cost per sq ft

Enter total sq ft (override calculation)

0 sq ft = **0.000** Ac

Total Area of All Replacement Utility Easements AND Select % of RW Cost for Util. Ease.  sf

Comp. Temp. Ease. Cost / sq ft = **\$0.00**

RW Est's. Utility Ease. Cost per sq ft

0 sq ft = **0.000** Ac

Total Number of Replacement Easements Required  ea

Comp. Perm. Ease. Cost / sq ft = **\$0.00**

RW Est's. Perm. Ease. Cost per sq ft

0 sq ft = **0.000** Ac

Total area of All Permanent Easements  sf

0 sq ft = **0.000** Ac

**COST OF LAND (Item # 1)** **\$0**

**2. BUILDING VALUE**

Based upon comparison to similar, occupied Residential Dwellings in the Project Area, enter the Number of

A. Low Cost Residential Dwellings:	<input type="text"/>	Computed:	\$0
B. Moderately Low Cost Dwellings:	<input type="text"/>		\$0
C. Average Cost Residential Dwellings:	<input type="text"/>		\$0
D. Moderately High Cost Dwellings:	<input type="text"/>		\$0
E. High Cost Residential Dwellings:	<input type="text"/>		\$0

Computed Total Residential Dwelling Costs:

Estimator's Total Residential Dwelling Costs:

Enter the total estimated cost of ALL COMMERCIAL & INDUSTRIAL BUILDINGS to be taken. Note: No Computed Costs Available. Use User Defined Costs Below.

Estimator's Total Commercial / Industrial Buildings Costs:

**3. OTHER IMPROVEMENTS**

Enter the estimated cost of ALL OTHER IMPROVEMENTS on the Project

Computed Total Other Improvements Costs:

Estimator's Total Other Improvements Costs:

**4. DAMAGES**

Anticipated % of Parcels Affected by Damages to Remainder:

Anticipated Relative Cost Impact of Damages to Remainder:

Moderately High

Approximate Number of Parcels Affected:

Computed Cost of Damages to Remainder:

Estimator's Total Cost of Damages to Remainder:

**TOTAL ACQUISITIONS (Items # 1 - 4)** **\$0**

# PCES – Project Cost Estimating System

- **How does this system work for non standard roadway projects such as Commuter Parking Lots?**
  - **Options for other improvements**
  - **Manual estimate option for items that are not included as standard items in the system**

# Estimating Accuracy

**Remember – the more you know about the project the more accurate the estimate**

## Expected Level of Accuracy by Development Phase

Planning / Pre-Scoping	Scoping	Preliminary Design	Detailed Design	Final Design/ RW Acquisition	Advertise Project
+/- 40%	+/- 30%	+/- 25%	+/- 20%	+/- 15%	+/- 10%



## **Marcie Parker, P.E.**

### **Fredericksburg District Engineer**

[Marcie.Parker@VDOT.virginia.gov](mailto:Marcie.Parker@VDOT.virginia.gov)



Marcie Parker, P.E., was appointed VDOT Fredericksburg District Engineer in March 2014.

Parker oversees construction, maintenance and operations for 11,500 miles of state-maintained roads in the 14-county Fredericksburg District.

Parker has more than 20 years of transportation experience in Virginia. Prior to her current role, Parker was Assistant District Administrator for Maintenance and Operations in the Fredericksburg District. Parker led emergency response operations for snow removal and was responsible for delivering a \$120 million maintenance program districtwide, which includes oversight of all bridges, overpasses, structures and pavement conditions.

Under her leadership, pavement conditions were elevated on Interstate 95 in Caroline, Spotsylvania and Stafford counties to reach 100 percent compliance with ride quality standards.

Parker served as Saluda Residency Administrator from 2001-2010 in the Middle Peninsula, and as Norfolk Residency Assistant Residency Administrator from 1996-2001 in Hampton Roads. She joined VDOT in 1993 as a transportation engineer trainee.

Parker is a graduate of Clemson University, and holds an undergraduate degree in civil engineering. She has held a Professional Engineer's license in Virginia since 1999.

Parker lives in Spotsylvania County with her husband and two sons.