



# Average Unit Cost Per Element for a Group of Projects

<b>Cost Per Mile of Alignment (Average) (\$X000):</b>	<b>\$68,343</b>
Selected Projects:	Charlotte - South Corridor LRT Denver - Southeast Corridor Project - T-Rex Denver - Southwest Corridor Los Angeles - East Side Extension Minneapolis - Hiawatha Corridor New Jersey - Newark Rail Link New Jersey - Southern NJ Light Rail Transit System Norfolk - Light Rail Transit Phoenix - Central Phoenix/East Valley Portland - Interstate MAX Portland - South Corridor/Portland Mall Sacramento - Folsom Corridor Sacramento - South Corridor Salt Lake City - Mid Jordan LRT Santa Clara VTA - Tasman West St. Louis - St. Clair County Extension
Cost Per Mile of Alignment (Minimum) (\$X000):	\$0
Cost Per Mile of Alignment (Maximum) (\$X000):	\$182,697
Miles of Alignment (Minimum):	5.75
Miles of Alignment (Maximum):	39.98
<b>Amount is in Selected Base Year:</b>	<b>2016</b>

Cost Category and Element		Units	Number of Projects	Average Unit Quantity	Average Unit Cost in National Average User Selected Base Year 2016
<b>10</b>	<b>Guideway &amp; Track Elements</b>	<b>LF Guideway</b>			<b>\$4,203</b>
10.010	Guideway: At-grade exclusive right-of-way	LF Guideway	12	57,850	\$2,101
10.020	Guideway: At-grade semi-exclusive (allows cross-traffic)	LF Guideway	7	27,301	\$2,277
10.030	Guideway: At-grade in mixed traffic	LF Guideway	4	9,768	\$3,353
10.040	Guideway: Aerial structure	LF Guideway	4	6,165	\$11,192
10.041	Bridges	LF Guideway	0	0	\$0
10.042	Viaduct	LF Guideway	0	0	\$0
10.043	Other Structure	LF Guideway	0	0	\$0



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10.044	Unspecified	LF Guideway	4	1,541	\$9,993
10.050	Guideway: Built-up fill	LF Guideway	3	5,095	\$4,089
10.060	Guideway: Underground cut & cover	LF Guideway	1	17,000	\$12,580
10.061	Cut & Cover Guideway Soft Soils	LF Guideway	0	0	\$0
10.062	Cut & Cover Guideway Hard Soils	LF Guideway	0	0	\$0
10.063	Cut & Cover Guideway Vent Soft Soils	LF Guideway	0	0	\$0
10.064	Cut & Cover Guideway Vent Hard Soils	LF Guideway	0	0	\$0
10.065	Unspecified	LF Guideway	1	17,000	\$12,580
10.070	Guideway: Underground tunnel	LF Guideway	1	8,976	\$33,878
10.071	Bored Earth Open	LF Guideway	0	0	\$0
10.072	Bored Earth Close	LF Guideway	0	0	\$0
10.073	Bored Earth Mixed Shield	LF Guideway	0	0	\$0
10.074	Bored Earth Mixes Shield SEM	LF Guideway	0	0	\$0
10.075	Rock Drill & Blast	LF Guideway	0	0	\$0
10.076	Rock Boring Machine	LF Guideway	0	0	\$0
10.077	Sunken Tunnel	LF Guideway	0	0	\$0
10.078	Unspecified	LF Guideway	0	0	\$0
10.080	Guideway: Retained cut or fill	LF Guideway	5	32,899	\$3,459
10.090	Track: Direct fixation	Track Feet	10	21,449	\$714
10.100	Track: Embedded	Track Feet	7	46,323	\$674
10.110	Track: Ballasted	Track Feet	11	91,815	\$340
10.120	Track: Special (switches, turnouts)	Track Feet	8	59,936	\$68,053
10.130	Track: Vibration & Noise Dampening	Track Feet	2	86,569	\$114
10.140	Special Structures	LF Guideway	1	147,878	\$708
<b>20</b>	<b>Stations, Stops, Terminals, Intermodels</b>	<b>Stations</b>			<b>\$4,729,938</b>
20.010	At-Grade Station, Stop, Shelter, Mall, Terminal, Platform	Stations	14	14	\$3,465,907
20.020	Aerial station, stop, shelter, mall, terminal, platform	Stations	0	0	\$0
20.030	Underground station, stop, shelter, mall, terminal, platform	Stations	1	1	\$42,325,165
20.031	Cut and Cover	Stations	0	0	\$0
20.032	Bored Earth Soft Soils	Stations	0	0	\$0
20.033	Bored Rock Hard Soils	Stations	0	0	\$0
20.034	Unspecified	Stations	1	1	\$33,922,639
20.040	Major stations, landings, terminals: Intermodal, ferry, trolley, etc.	Stations	2	2	\$792,414
20.050	Joint development	Stations	1	10	\$55,154
20.060	Automobile parking multi-story structure	Spaces	2	1,025	\$19,255
20.070	Elevators, escalators	Number	0	0	\$0

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20.071	Elevators	Number	0	0	\$0
20.072	Escalators	Number	0	0	\$0
20.073	Unspecified	Number	0	0	\$0
20.080	Passenger Overpass	Number	3	2	\$1,709,983
20.090	Underground Interconnecting Tunnel	Number	0	0	\$0
20.091	Cut and Cover	Number	0	0	\$0
20.092	Bored Earth Soft Soils	Number	0	0	\$0
20.093	Bored Rock Hard Soils	Number	0	0	\$0
20.094	Unspecified	Number	0	0	\$0
20.100	Signage and Graphics	Stations	2	14	\$184,576
<b>30</b>	<b>Support Facilities: Yards, Shops, Admin. Bldgs</b>	<b>LF Guideway</b>			<b>\$1,588,570</b>
30.010	Administration Building: Office, sales, storage, revenue counting	LF Guideway	1	1,152,646	\$30
30.011	Administrative Building	LF Guideway	0	0	\$0
30.012	Central Control Facility	LF Guideway	1	147,878	\$106
30.013	Central Revenue Counting Facility	LF Guideway	0	0	\$0
30.014	Unspecified	LF Guideway	0	0	\$0
30.020	Light Maintenance Facility	Vehicles	4	4,380	\$291,547
30.030	Heavy Maintenance Facility	Vehicles	7	23,373	\$1,287,006
30.040	Storage or Maintenance of Way Building	LF Guideway	3	62,480	\$40
30.050	Yard and Yard Track	Track Feet	5	63,066	\$1,315,009
<b>40</b>	<b>Sitework &amp; Special Conditions</b>	<b>LF Guideway</b>			<b>\$1,459</b>
40.010	Demolition, Clearing, Earthwork	LF Guideway	9	57,747	\$155
40.020	Site Utilities, Utility Relocation	LF Guideway	7	1,152,646	\$549
40.021	Urban Replacement In-Kind Public Utilities	LF Guideway	6	74,503	\$67
40.022	Urban Replacement In-Kind Private Utilities	LF Guideway	6	74,503	\$66
40.023	Urban Replacement Betterment Public Utilities	LF Guideway	1	147,878	\$39
40.024	Urban Replacement Betterment Private Utilities	LF Guideway	1	147,878	\$39
40.025	Suburban Replacement In-Kind Public Utilities	LF Guideway	7	69,488	\$111
40.026	Suburban Replacement In-Kind Private Utilities	LF Guideway	6	74,503	\$57
40.027	Suburban Replacement Betterment Public Utilities	LF Guideway	1	147,878	\$39
40.028	Suburban Replacement Betterment Private Utilities	LF Guideway	1	147,878	\$39
40.029	Unspecified	LF Guideway	0	0	\$0
40.030	Haz. mat'l, contam'd soil removal/mitigation, ground water treatments	LF Guideway	2	1,152,646	\$28
40.031	HazMat Abatement	LF Guideway	0	0	\$0
40.032	Contaminated Soil Removal	LF Guideway	0	0	\$0
40.033	Ground Water Treatment	LF Guideway	0	0	\$0
40.034	Unspecified	LF Guideway	2	61,116	\$20



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Cost Category and Element	Units	Number of Projects	Average Unit Quantity	Average Unit Cost in National Average User Selected Base Year 2016
40.040 Environmental mitigation, e.g. wetlands, historic/archeologic, parks	LF Guideway	10	67,480	\$87
40.050 Site structures including retaining walls, sound walls	LF Guideway	5	0	\$210
40.051 Mechanically Stabilized Earth Walls	LF Guideway	0	0	\$0
40.052 Concrete Walls	LF Guideway	0	0	\$0
40.053 Other Walls	LF Guideway	0	0	\$0
40.054 Unspecified	LF Guideway	0	0	\$0
40.060 Pedestrian / bike access and accommodation, landscaping	LF Guideway	6	70,398	\$259
40.070 Automobile, bus, van accessways including roads, parking lots	Spaces	2	4,720	\$14,940
40.071 Surface Parking Lot	Spaces	2	2,360	\$7,567
40.072 Auto Access	Stations	0	0	\$0
40.073 Bus Access	Spaces	0	0	\$0
40.074 Bus Parking and Berthing	Spaces	0	0	\$0
40.075 Unspecified	Spaces	0	0	\$0
40.080 Temporary Facilities and other indirect costs during construction	LF Guideway	3	1,152,646	\$1,031
40.081 Roadway Changes	LF Guideway	3	82,103	\$102
40.082 Third-Party Work	LF Guideway	2	53,735	\$105
40.083 Mobilization	LF Guideway	1	68,070	\$21
40.084 Maintenance of Traffic	LF Guideway	0	0	\$0
40.085 Unallocated Indirect Costs	LF Guideway	0	0	\$0
40.086 Unspecified	LF Guideway	1	30,360	\$1,866
<b>50 Systems</b>	<b>Track Feet</b>			<b>\$944</b>
50.010 Train control and signals	Track Feet	7	1,548,719	\$318
50.011 Train Control - Wayside	Track Feet	7	131,021	\$319
50.012 Train Control - On Board Systems	Track Feet	1	95,262	\$5
50.013 Train Control - Centralized Systems	Track Feet	0	0	\$0
50.014 Unspecified	Track Feet	0	0	\$0
50.020 Traffic signals and crossing protection	Track Feet	7	131,372	\$165
50.030 Traction power supply: substations	Track Feet	13	119,614	\$156
50.040 Traction power distribution: catenary and third rail	Track Feet	6	1,548,719	\$258
50.041 Catenary	Track Feet	6	103,565	\$257
50.042 Third Rail	Track Feet	0	0	\$0
50.043 Power Distribution and Connections	Track Feet	1	66,528	\$45
50.044 Unspecified	Track Feet	1	74,250	\$228
50.050 Communications	Track Feet	6	1,548,719	\$176
50.051 Wired	Track Feet	0	0	\$0
50.052 Radio Based	Track Feet	0	0	\$0
50.053 Unspecified	Track Feet	6	138,721	\$146



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Cost Category and Element		Units	Number of Projects	Average Unit Quantity	Average Unit Cost in National Average User Selected Base Year 2016
50.060	Fare collection system and equipment	Stations	7	200	\$277,689
50.061	Central Revenue Counting Systems	Stations	0	0	\$0
50.062	Revenue Collection - In Station	Stations	7	14	\$303,178
50.063	Revenue Collection - On Vehicle	Vehicles	0	0	\$0
50.064	Unspecified	Stations	1	28	\$70,146
50.070	Central Control System	LF Guideway	4	72,851	\$70
<b>60</b>	<b>Row, Land, Existing Improvements</b>	<b>LF Guideway</b>			<b>\$1,010</b>
60.010	Purchase or lease of real estate	LF Guideway	8	1,152,646	\$926
60.011	Full Takes	LF Guideway	0	0	\$0
60.012	Part Takes	LF Guideway	0	0	\$0
60.013	Easement Acquisitions	LF Guideway	0	0	\$0
60.014	Other Rights	LF Guideway	0	0	\$0
60.015	Donated Value	LF Guideway	0	0	\$0
60.016	Unspecified	LF Guideway	8	64,597	\$842
60.020	Relocation of existing households and businesses	LF Guideway	4	1,152,646	\$118
60.021	Residential (Owners)	LF Guideway	0	0	\$0
60.022	Residential (Tenants)	LF Guideway	0	0	\$0
60.023	Business (Owners and Tenants)	LF Guideway	0	0	\$0
60.024	Others (Personal Property Moves)	LF Guideway	0	0	\$0
60.025	Unspecified	LF Guideway	4	57,426	\$39
60.030	Services	LF Guideway	2	1,152,646	\$31
60.031	Property Management	LF Guideway	0	0	\$0
60.032	Agency	LF Guideway	2	50,667	\$11
60.033	Contractor R/W Services (Title/Appraisal, etc)	LF Guideway	2	79,971	\$28
60.034	Legal Services	LF Guideway	0	0	\$0
60.035	Unspecified	LF Guideway	1	39,400	\$60
60.040	Other Real Estate Costs	LF Guideway	2	38,184	\$1,031
<b>70</b>	<b>Vehicles</b>	<b>Vehicles</b>			<b>\$5,139,784</b>
70.010	Light Rail	Vehicles	6	160	\$5,098,119
70.011	Static	Vehicles	0	0	\$0
70.012	Articulated	Vehicles	2	17	\$5,151,807
70.013	Unspecified	Vehicles	6	21	\$5,239,587
70.020	Heavy Rail	Vehicles	0	0	\$0
70.021	Small Scale	Vehicles	0	0	\$0
70.022	Large Scale	Vehicles	0	0	\$0
70.023	Unspecified	Vehicles	0	0	\$0
70.030	Commuter Rail	Vehicles	0	0	\$0



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Cost Category and Element		Units	Number of Projects	Average Unit Quantity	Average Unit Cost in National Average User Selected Base Year 2016
70.031	Locomotive	Vehicles	0	0	\$0
70.032	Passenger Car	Vehicles	0	0	\$0
70.033	Bi-Level Passenger Car	Vehicles	0	0	\$0
70.034	Self-Propelled Passenger Car	Vehicles	0	0	\$0
70.035	Unspecified	Vehicles	0	0	\$0
70.040	Bus	Vehicles	0	0	\$0
70.041	Small Bus	Vehicles	0	0	\$0
70.042	Standard 40 Foot Bus	Vehicles	0	0	\$0
70.043	Articulated Bus	Vehicles	0	0	\$0
70.044	Unspecified	Vehicles	0	0	\$0
70.050	Other Vehicles	Vehicles	0	0	\$0
70.060	Non-revenue vehicles	Vehicles	1	329	\$76,933
70.061	Maintenance of Way Vehicles	Vehicles	1	24	\$131,142
70.062	Automobiles	Vehicles	0	0	\$0
70.063	Trucks	Vehicles	0	0	\$0
70.064	Unspecified	Vehicles	1	24	\$22,724
70.070	Spare parts/ Rotable Components	Vehicles	2	25	\$214,721
<b>80</b>	<b>Professional Services</b>	<b>Hard Costs</b>			
80.010	Preliminary Engineering	Hard Costs	6	5.43%	5.43%
80.020	Final Design	Hard Costs	15	13.82%	13.82%
80.030	Project Management for Design and Construction	Hard Costs	5	9.77%	9.77%
80.031	Agency Project Management	Hard Costs	5	8.85%	8.85%
80.032	Project Management Oversight Support	Hard Costs	2	0.70%	0.70%
80.033	Agency Force Account	Hard Costs	0	0.07%	0.07%
80.034	Unspecified	Hard Costs	1	15.82%	15.82%
80.040	Construction Administration & Management	Hard Costs	14	8.75%	8.75%
80.050	Professional Liability and other Non-Construction Insurance	Hard Costs	10	1.73%	1.73%
80.060	Legal; Permits; Review Fees by other agencies, cities, etc.	Hard Costs	5	2.08%	2.08%
80.070	Surveys, Testing, Investigation, Inspection	Hard Costs	5	3.06%	3.06%
80.080	Start up	Hard Costs	6	2.33%	2.33%
80.081	Training/Start-up	Hard Costs	0	0.00%	0.00%
80.082	Safety Certification	Hard Costs	1	0.31%	0.31%
80.083	Off-Site Vehicle Testing, Test Runs	Hard Costs	6	1.56%	1.56%
80.084	Commissioning	Hard Costs	0	0.00%	0.00%
80.085	Unspecified	Hard Costs	1	4.71%	4.71%
80.090	Other	Hard Costs	8	1.18%	1.18%