

---

## 6.0 CAPITAL, OPERATING, AND MAINTENANCE COSTS

### Chapter Summary

Provision of significantly improved transit service to the Downtown/Natomas/Airport (DNA) Corridor will involve the Regional Transit District (RT) and other agencies and private interests sharing program capital costs (land acquisition and costs of construction, and required vehicles and equipment). RT will then assume the responsibility for operating and maintenance (O&M) costs.

Both capital and O&M costs have been evaluated on a preliminary basis for the final Corridor alignment and transit mode alternatives. A comparison of the alternatives is provided to facilitate selection of the Locally Preferred Alternative (LPA).

### 6.1 Capital Costs

The total cost to construct a new transit system, or “Capital Costs” are summarized in this chapter for the Baseline/Transportation Systems Management (TSM), bus rapid transit (BRT) and light rail transit (LRT) alternatives. Capital costs include all construction costs (including construction of the transit guideway, maintenance facilities, park and ride lots, special conditions, stations and associated facilities, and utility relocations); costs for new transit vehicles and initial spare parts; acquisition of right-of-way (ROW); and allowances for final engineering design, construction management, construction change orders and an allocation for costs to RT for managing the construction. Cost estimates prepared for each alternative are summarized in Table 6.1-1.

Total estimated capital cost estimates for the five LRT alternatives (3, 3A, 3B, 5, and 7) in the DNA Corridor range between \$290.8 million and \$793.1 million in 2002 dollars. In comparison, total estimated capital costs for the five BRT alternatives (4, 4A, 4B, 6, and 8) range between \$142.3 million and \$327.5 million, also in 2002 dollars. For both technologies, the capital costs include a valuation of the dedicated and public properties that they would occupy in addition to the value of new property needed to be purchased.

The construction costs vary considerably due to alignment length, the number of stations, vehicle and right-of-way requirements, the number of structures needed, and other factors. For example, the LRT alternatives are generally more expensive than the BRT alternatives because light rail requires significant track, signalization, and electrification improvements.

Alternatives 3, 5, and 7 would provide different alignments from Downtown Sacramento to the Sacramento International Airport; however, they share the following design characteristics: double-track guideway stations; and a full-service maintenance facility with storage for 16 vehicles. These alternatives also have the same alignment between Downtown Sacramento and Richards Boulevard.

Of the three full-length LRT alternatives – 3, 5, and 7 – the total cost for Alternative 3, the Truxel LRT Alternative, is the least expensive. However, to identify greater cost savings, two additional sub-alternatives were created. For Alternatives 3A and 3B, the crossing over the American River would consist of double-track to the River bank, and single-track over the water, thereby significantly reducing the structure costs of these two alternatives. The overall length of Alternative 3B, the Truxel LRT Minimal Operable Segment (MOS) Alternative, is also approximately six miles shorter than Alternatives 3 and 3A, extending from

**TABLE 6.1-1  
SUMMARY OF CAPITAL COSTS FOR DNA ALTERNATIVES (MILLIONS OF 2002\$)**

Alternative		Construction Costs	Vehicles	Right-of-Way	Final Engineering, Construction Management, Project Reserve	Total Costs
2	Baseline/TSM	\$17.5	\$54.3	\$0	\$18.5	\$90.3
3	Truxel LRT	\$327.8	\$55.7	\$63.5	\$176.1	\$623.1
3A	Truxel LRT Starter Line	\$213.0	\$59.2	\$54.5	\$121.2	\$447.9
3B	Truxel LRT MOS	\$140.7	\$39.4	\$31.4	\$79.3	\$290.8
4	Truxel BRT	\$165.2	\$6.9	\$65.3	\$90.1	\$327.5
4A	Truxel BRT Starter Line	\$101.7	\$7.3	\$43.5	\$56.3	\$208.8
4B	Truxel BRT MOS	\$67.9	\$12.2	\$24.6	\$37.6	\$142.3
5	I-5/Truxel LRT	\$463.9	\$55.7	\$38.1	\$235.5	\$793.1
6	I-5/Truxel BRT	\$177.2	\$13.9	\$29.9	\$90.0	\$311.0
7	I-5 LRT	\$435.2	\$55.7	\$34.3	\$221.3	\$746.4
8	I-5 BRT (new guideway)	\$143.1	\$16.4	\$27.9	\$73.9	\$261.3

Sources: Parsons Brinckerhoff Quade & Douglas, Inc. and McCormick Rankin International, October 2003.

Downtown Sacramento only to the Natomas Town Center (instead of the Airport), for a total of 6.82 miles. The total cost of Alternative 3B is nearly \$291 million, compared to approximately \$623 million for Alternative 3 and \$448 for Alternative 3A

Similarly, two sub-alternatives (Alternatives 4A and 4B) were created to improve the cost-effectiveness of Alternative 4, the Truxel BRT Alternative. Alternative 4A, the Truxel BRT Starter Line Alternative, would construct a BRT extension similar to Alternative 4, with fewer structures and grade separations to provide a lower-cost alternative. The total estimated capital cost of Alternative 4A is approximately \$209 million, roughly \$119 million less than Alternative 4. Alternative 4B, the Truxel BRT MOS Alternative, would also construct a BRT guideway with fewer structures and grade separations, however, it would extend only 5.9 miles from Downtown Sacramento to the Natomas Town Center, at a cost of \$142 million.

## 6.2 Operating and Maintenance Costs

An overview follows of estimated O&M costs associated with each of the proposed Corridor alternatives. O&M costs include all expenditures required to provide daily transit service, including pro-rata RT system administrative costs, wages and benefits for transit vehicle operators and maintenance workers, security, and the maintenance of the transit guideway, stations, facilities and vehicles.

---

### 6.2.1 Current RT Operating and Maintenance (O&M) Costs

In fiscal year (FY) 2002, RT bus revenue miles totaled 7.73 million and 0.60 million hours of revenue vehicle service was provided. The cost per passenger and cost per passenger mile for operating the bus system was \$3.23 and \$0.81, respectively.

Light rail annual revenue miles for FY 2002 were close to 2.13 million with 0.104 million hours of revenue service provided. The cost per passenger and cost per passenger mile for operating the LRT system was \$2.83 and \$0.52, respectively.

### 6.2.2 Projected Operating and Maintenance Costs for DNA Baseline Alternative

An estimate of the O&M costs for the No-Build and DNA Baseline/TSM Alternative were developed as follows:

- First, the study team estimated RT system-wide expenses to operate existing and proposed DNA Corridor transit services with new Corridor services provided under the Baseline/TSM Alternative.
- O&M costs were prepared using existing unit maintenance costs and applying an estimated rate of change to these costs to generate year 2025 figures.
- Following FTA evaluation criteria, costs for the DNA Corridor program are calculated as the incremental change between the No-Build, Baseline/TSM, and the ten build alternatives. Estimates of operating costs for the No-Build and Baseline/TSM Alternatives are presented in Table 6.2-1.

### 6.2.3 Projected Operating and Maintenance Costs for DNA Build Alternatives

An estimate of the O&M costs for the DNA Build Alternatives was developed by estimating the cost to operate existing and proposed RT services along with the provision of new transit service in the DNA corridor.

O&M costs are calculated using a systemwide approach, since the impacts from new service often extend beyond the route or corridor served. Under the DNA study, both the BRT and LRT alternatives rely on modifications to existing trunk routes and the establishment of new bus services that extend outside the DNA corridor. In addition, several of the BRT trunk lines are merged with existing RT routes. This interconnection with the future RT route network requires operating and maintenance costs to be examined systemwide. Costs specific to the DNA corridor are identified as the incremental change between the Baseline/TSM Alternative and the Build Alternatives. Estimates of operating costs for the Baseline/TSM Alternative are presented below in Table 6.2-1.

Like capital costs, the O&M costs vary by alternative depending on route length, the number of stations served, the frequency of service, and the number of vehicles required to meet passenger demand.

Table 6.2.1 shows the Truxel BRT alternatives that have total O&M costs less than the O&M cost for the Baseline Alternative. With use of the BRT busway, the average vehicle speed ranges from 22 to 26 mph depending on the alternative, whereas under the Baseline the buses operate in mixed traffic at an average corridor speed of only 10.8 miles mph. As a result, the BRT busway requires fewer vehicles to provide the same level of service (i.e., headway) as under the Baseline Alternative. While the Truxel BRT alternatives require 14 to 18 additional peak-period regular-length buses as compared to the Baseline alternative, it is anticipated that

there will be less of a need for the more-expensive-to-operate articulated buses, thereby reducing the number of vehicles from 17 to 5 and resulting in a net cost savings.

**TABLE 6.2-1  
SUMMARY OF ANNUAL SYSTEMWIDE OPERATING AND MAINTENANCE COSTS  
FOR DNA ALTERNATIVES FOR 2025 (MILLIONS OF 2002\$)**

Alternative		Bus Revenue Hours	LRT Revenue Hours	2025 O&M Costs	Annual Cost Increase Over Baseline/TSM Alternative
1	No-Build	950,600	116,355	\$156.3	--
2	Baseline/TSM	1,019,600	116,355	\$164.6	--
3	Truxel LRT	956,200	140,100	\$172.8	\$8.2
3A	Truxel LRT Starter Line	956,200	147,200	\$173.7	\$9.1
3B	Truxel LRT MOS	969,600	140,100	\$169.7	\$5.1
4	Truxel BRT	999,600	116,400	\$164.0	-\$0.6
4A	Truxel BRT Starter Line	1,002,400	116,400	\$164.1	-\$0.5
4B	Truxel BRT MOS	1,008,200	116,400	\$164.4	-\$0.2
5	I-5/Truxel LRT	939,500	140,100	\$171.3	\$6.7
6	I-5/Truxel BRT	1,012,900	116,400	\$166.4	\$1.8
7	I-5 LRT	960,500	140,100	\$172.1	\$7.5
8	I-5 BRT	1,009,700	116,400	\$165.5	\$0.9

Source: Manuel Padron & Associates, October, 2003.