Major Transportation Corridors Plan:

Road Impact Fee Study

El Paso County, Colorado

LSA

LSA ASSOCIATES, INC.

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INTRODUCTION AND SUMMARY

The unincorporated portion of El Paso County has been subject to an interim road impact fee since March 1, 2010. The interim fee replaced a similar fee program for the Falcon area that had been in place since 2001, and was adopted instead of another small-area fee program for the Lorson Ranch/Rolling Hills Ranch area. At the time of the adoption of the interim fee, the Housing and Building Association of Colorado Springs (HBA) and other stakeholders expressed support for the establishment of a county-wide fee system, as opposed to small-area fee programs, and agreed to work with El Paso County to develop a county-wide system for fees, credits and reimbursements. In addition, the HBA and County will use one or more Public Improvement Districts to help fund needed transportation improvements.

Fee Program Summary

The proposed fee system does not represent a completely new obligation for developers or builders. This fee program is only a more equitable method of establishing a fair-share contribution than individually-negotiated developer exaction or a small-area fee system. The purpose of the program is to develop a process to identify transportation improvements needed to accommodate growth, to fairly allocate the costs of transportation improvements among affected developments, and to ensure the proper and timely accounting of improvements and funds.

Types of Improvements. This program covers major corridors that accommodate regional travel. The program does not include all roads, only higher traffic and longer-distance roads (arterials and major rural collectors) within unincorporated El Paso County. Improvements currently included in the fee program have been identified in the current update of the Major Transportation Corridors Plan (MTCP). This transportation plan identifies improvements needed to accommodate anticipated growth in the unincorporated area over the 2010-2040 period based on small-area growth forecasts. Only capacity-expanding improvements to County arterials, County rural collectors and selected State roads ("major roads") within the unincorporated area are included. The improvements that are eligible for funding with road impact fees are those identified in the Appendix. The list of eligible projects, costs and fee amounts will be updated over time with input from the advisory committee and approval by the Board of County Commissioners.

Standardized Unit Costs. The costs of improvements included in the fee program have been estimated based on standardized unit costs, developed in consultation with a stakeholders committee. The unit costs developed by the stakeholders are intended to be conservative and are not intended to fully cover all actual costs. The amount of developer credits or reimbursements for improvements identified in the MTCP will be based on the same unit costs. A 5% contingency has been added to address unexpected situations and cases in which the County will need to make improvements and pay higher actual costs.

Non-Growth-Related Costs. The costs included in the fee calculations exclude any portions of project costs that are attributable to remedying existing deficiencies or accommodating future pass-through traffic.

Developer Credits/Reimbursements. Colorado law requires that developers who construct improvements for which impact fees are charged receive a credit against their impact fees or be reimbursed. The resolution establishing the current interim road impact fee refers to credits against the impact fee in lieu of fee payment. Other forms of credit application, including developer reimbursement, will be provided for the updated fees.

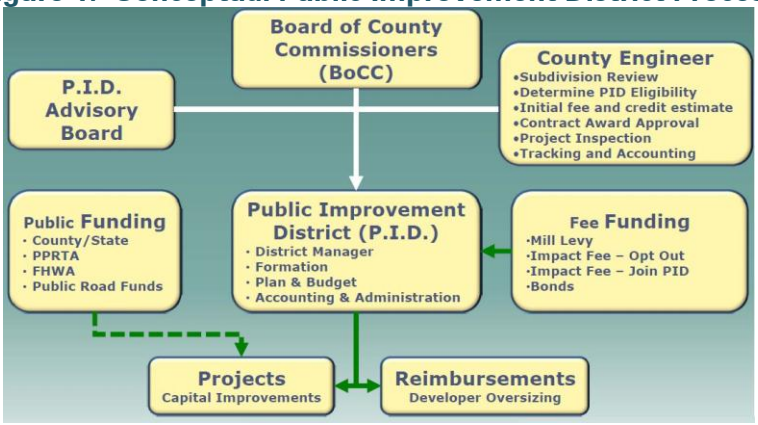
Public Improvement District

In conjunction with the fee program, the County formed three Public Improvement Districts (PIDs) as an option to supplement the fee program. The PID will issue bonds that will be used to reimburse developers for a portion of their eligible improvement costs. Developers will have the option of joining the PID at time of final plat. Developments within the PID will be subject to a lower fee at building permit than developments that do not belong to the PID. If a development chooses to join the PID, then the property would be subject to a mill levy of either 5 or 10 mills. The basic approach includes the following:

Percentage of Costs. For properties that join the PID, PID taxes will cover a percentage of the impact fee costs. For example, if the PID tax rate is set at 10 mills, the present value of future PID taxes might equal 80% of the fee obligation for a single-family home, so that the fee paid at time of building permit would only be 20% of the full fee amount paid by a single-family home not in the PID.

Multiple Districts. The courts have generally held that PID bond authorizations only last for so long, perhaps 20 or 30 years. After that, the original authorization is held to be "stale," and a new election must be held. If there were only a single PID (with perhaps a residential and nonresidential sub-PID) that new developments are continually joining, it would likely be difficult after 20-30 years to persuade voters within the PID to approve new bond authorizations. For this reason, the concept would be to create multiple PIDs that sunset after the initial bond issues have been retired. It is estimated that a new PID would be created approximately every eight years.

Figure 1. Conceptual Public Improvement District Process



Updated Fee Schedule

The proposed fee schedule has fewer, broader land use categories than the current interim fee schedule. The current interim fee schedule lists 34 nonresidential land use categories, and the fees vary enormously. The interim fees for retail/commercial uses, for example, range from $266 per 1,000 sq. ft. for a furniture store to $17,141 per 1,000 sq. ft. for a fast food restaurant. The proposed approach drastically simplifies the fee schedule, reducing the listings in the fee schedule to a few, broadly-defined categories. This approach will eliminate the very high fees for some specific uses, simplify fee administration and avoid most fees for change of use. The rationale for this change is explained in the section on Travel Demand. The proposed fees are compared to the current interim fees in Table 1, as illustrated in Figure 2. The actual fee schedule will be far simpler (see Table 15 later in this report). The reasons the Steering Committee recommended the simplified fee schedule include the following:

- It will lower the rate for many commercial uses;
- It will allow redevelopment of property to occur without incurring additional fees (unless a rezoning is required and the new use generates more than 100 new trips).

Figure 2. Comparison of Interim and Proposed Fees

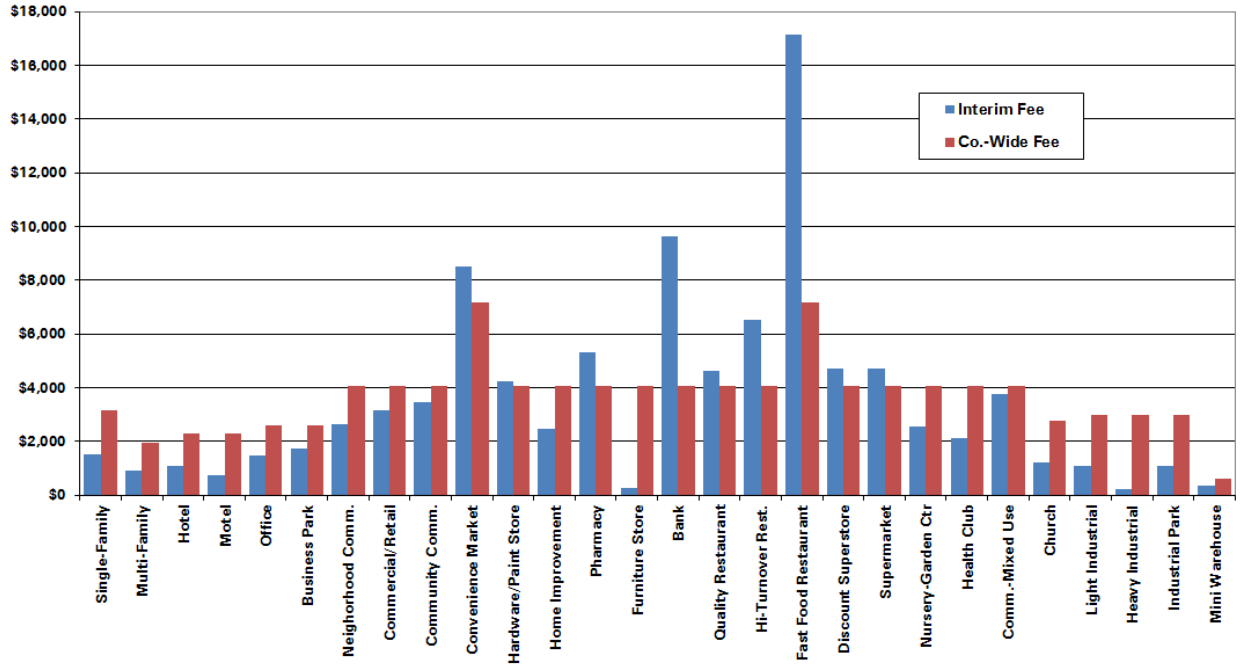


Table 1. Comparison of Interim and County-Wide Road Fees

Land Use	Unit	Interim Fee	Co.-Wide Fee	Percent Change
Single-Family	Dwelling	$1,500	$3,132	109%
Multi-Family	Dwelling	$906	$1,956	116%
Lodging				
Hotel	Room	$1,094	$2,283	109%
Motel	Room	$750	$2,283	204%
Office				
Office	1,000 sf	$1,484	$2,586	74%
Business Park	1,000 sf	$1,719	$2,586	50%
General Commercial				
Neighorhood Commercial (50,000 sf)	1,000 sf	$2,625	$4,054	54%
Commercial/Retail (100,000 sf)	1,000 sf	$3,141	$4,054	29%
Community Commercial (200,000 sf)	1,000 sf	$3,438	$4,054	18%
Hardware/Paint Store	1,000 sf	$4,234	$4,054	-4%
Home Improvement Superstore	1,000 sf	$2,453	$4,054	65%
Pharmacy	1,000 sf	$5,313	$4,054	-24%
Furniture Store	1,000 sf	$266	$4,054	1424%
Bank	1,000 sf	$9,609	$4,054	-58%
Quality Restaurant	1,000 sf	$4,609	$4,054	-12%
High-Turnover Restaurant	1,000 sf	$6,516	$4,054	-38%
Discount Superstore	1,000 sf	$4,703	$4,054	-14%
Supermarket	1,000 sf	$4,703	$4,054	-14%
Nursery - Garden Center	1,000 sf	$2,547	$4,054	59%
Nursery - Wholesale	Acre	$1,375	na	na
Health Club	1,000 sf	$2,125	$4,054	91%
Commercial - Mixed Use	1,000 sf	$3,750	$4,054	8%
Golf Course	Hole	$4,609	na	na
Convenience Commercial				
Convenience Market	1,000 sf	$8,500	$7,158	-16%
Fast Food Restaurant	1,000 sf	$17,141	$7,158	-58%
Gasoline Service Station	Pump	$7,766	na	na
Gasoline Service Station	1,000 sf	na	$7,158	na
Convenience Market w/Gas	Pump	$5,625	na	na
Public/Institutional				
Elementary School	Student	$31	na	na
Middle School	Student	$94	na	na
High School	Student	$141	na	na
Church	1,000 sf	$1,219	$2,742	125%
Park/Open Space	Acre	$203	na	na
Public/Institutional	1,000 sf	na	$2,742	na
Industrial/Warehouse				
Light Industrial	1,000 sf	$1,094	$2,968	171%
Heavy Industrial	1,000 sf	$234	$2,968	1168%
Industrial Park	1,000 sf	$1,094	$2,968	171%
Warehouse	1,000 sf	na	$1,517	na
Mini Warehouse	1,000 sf	$328	$588	79%

Source: Current interim fees from El Paso County interim fee resolution effective March 1, 2010; proposed county-wide fees from Table 15.

LEGAL FRAMEWORK

Impact fees are a way for local governments to require new developments to pay a proportionate share of the infrastructure costs they impose on the community. In contrast to "negotiated" developer exactions, impact fees are charges assessed on new development using a standard formula based on objective characteristics, such as the number and type of dwelling units constructed. The fees are a one-time, up-front charge, with the payment made at the time of building permit issuance. Impact fees require that each new development project pay a pro-rata share of the cost of new capital facilities required to serve that development.

Since impact fees were pioneered in states that lacked specific enabling legislation, such fees have generally been legally defended as an exercise of local government's broad "police power" to regulate land development in order to protect the health, safety and welfare of the community. The courts have developed guidelines for constitutionally-valid impact fees, based on the "dual rational nexus" standard. The standard essentially requires that fees must be proportional to the need for additional infrastructure created by the new development, and the fees must be spent to provide that same type of infrastructure to benefit the new development.

State Statutes

Prior to 2001, the authority of counties in Colorado to impose impact fees was not entirely clear. Several counties had adopted impact fees, which they felt were authorized under counties' implied powers. This uncertainty was removed with the passage of SB 15 by the Legislature and its signature by the governor on November 16, 2001. Among other things, this bill created a new Section 104.5: Impact Fees, in Article 20 of Title 29, Colorado Revised Statutes, which specifically provides that:

> *Pursuant to the authority granted in section 29-20-104 (1) (g) and as a condition of issuance of a development permit, a local government may impose an impact fee or other similar development charge to fund expenditures by such local government on capital facilities needed to serve new development.*

Section 29-20-104.5(1) requires that impact fees be based on a schedule of fees that is legislatively adopted, applies to development generally, as opposed to an individual development project, and only covers the cost of capital improvements needed to serve new development:

> *No impact fee or other similar development charge shall be imposed except pursuant to a schedule that is:*
>
> *(a) legislatively adopted;*
> *(b) generally applicable to a broad class of property; and*
> *(c) intended to defray the project impacts on capital facilities caused by proposed development.*

Section 29-20-104.5(2) requires the preparation of a report that quantifies the cost attributable to new development and ensures that new development is not charged for the cost to remedy existing deficiencies:

> *A local government shall quantify the reasonable impacts of proposed development on existing capital facilities and establish the impact fee or development charge at a level no greater than necessary to defray such impacts directly related to proposed development. No impact fee or other similar development charge shall be imposed to remedy any deficiency in capital facilities that exists without regard to the proposed development.*

Section 29-20-104.5(3) provides that credit against impact fees must be given for required developer contributions of land or improvements for the same facilities for which the impact fees are charged:

> *Any schedule of impact fees or other similar development charges adopted by a local government pursuant to this section shall include provisions to ensure that no individual landowner is required to provide any site specific dedication or improvement to meet the same need for capital facilities for which the impact fee or other similar development charge is imposed.*

Impact fees may be imposed for a broad range of facilities. Section 29-20-104.5(4) provides that impact fees can be imposed to "defray the projected impacts on capital facilities caused by proposed development." It defines "capital facility" to mean any improvement or facility that:

> *(a) is directly related to any service that a local government is authorized to provide;*
> *(b) has an estimated useful life of five years or longer; and*
> *(c) is required by the charter or general policy of a local government pursuant to a resolution or ordinance.*

Section 29-20-104.5(5) requires that impact fees collected must be earmarked and spent for the same types of improvements for which they were collected, and also authorizes waivers for affordable housing:

> *Any impact fee or other similar development charge shall be collected and accounted for in accordance with part 8 of Article 1 of this title. Notwithstanding the provisions of this section, a local government may waive an impact fee or other similar development charge on the development of low- or moderate- income housing or affordable employee housing as defined by the local government.*

The statutory provision referenced above (Section 29-1-803) requires separate accounting for each type of fee, and requires that interest earned on each account be retained in that account:

> *Except as otherwise provided in this section, all moneys from land development charges collected, including any such moneys collected but not expended prior to January 1, 1991, shall be deposited or, if collected for another local government, transmitted for deposit, in an interest-bearing account which clearly identifies the category, account, or fund of capital expenditure for which such charge was imposed. Each such category, account, or fund shall be accounted for separately. The determination as to whether the accounting requirement shall be by category, account, or fund and by aggregate or individual land development shall be within the discretion of the local government. Any interest or other income earned on moneys deposited in said interest-bearing account shall be credited to the account.*

Constitutional Requirements

While State law provides a broad grant of authority, impact fees must also comply with constitutional standards that have been developed by the courts to ensure that local governments do not abuse their power to regulate the development of land. The courts have gradually developed guidelines for constitutionally-valid impact fees, based on a "rational nexus" that must exist between the regulatory fee or exaction and the activity that is being regulated. The standards set by court cases generally require that an impact fee meet a two-part test:

1) The fees must be proportional to the need for new facilities created by new development (the "needs test"); and

2) The expenditure of impact fee revenues must provide benefit to the fee-paying development (the "benefit test").

The "needs test" requires that impact fees for various types of developments should be proportional to the impact of each development on the need to construct additional or expanded facilities. The fees do not have to recover the full cost, but if the fees are reduced by a percentage from the full cost, the percentage reduction should apply evenly to all types of developments. This requirement is echoed in the requirements in the Colorado act that impact fees be "intended to defray the projected impacts on capital facilities caused by proposed development" and "be generally applicable to a broad class of property."

The "benefit test" requires that impact fees be spent to provide benefit to new development. Benefit is ensured by providing that the funds be earmarked for capacity-expanding improvements of the type for which the fees are collected. The Colorado act requires this type of earmarking. Additional methods of ensuring benefit are to require that the fees be refunded if they have not been used within a reasonable period of time, or to earmark the funds collected within a geographic subarea be spent within the same geographic subarea.

A fundamental principle of impact fees, rooted in both case law and norms of equity, is that impact fees should not charge new development for a higher level of service than is provided to existing development. This principle, which is a critical part of the "needs test," is reflected in the Colorado impact fee statute's prohibition against using impact fee funds to remedy existing deficiencies (Section 29-20-104.5(2)). In addition, impact fees must generally be reduced to ensure that new development does not pay twice for the same level of service, once through impact fees and again through general taxes that are used to remedy the capacity deficiency for existing development.

A corollary principle is that new development should not have to pay twice for the same level of service. As noted above, the fees should be reduced by a credit that accounts for the contribution of new development toward remedying the existing deficiencies. A similar situation arises when the existing level of service has not been fully paid for. Outstanding debt on existing facilities that are counted in the existing level of service will be retired, in part, by revenues generated from new development. To avoid requiring new development to pay more than its proportional share, impact fees should be reduced to account for future tax payments that will retire outstanding debt on existing facilities.

In general, credit against impact fees is not required for other types of funding that may be used to help pay for growth-related, capacity-expanding improvements. While new development may contribute toward such funding, so does existing development, and both existing and new development benefit from the higher level of service that the additional funding makes possible.

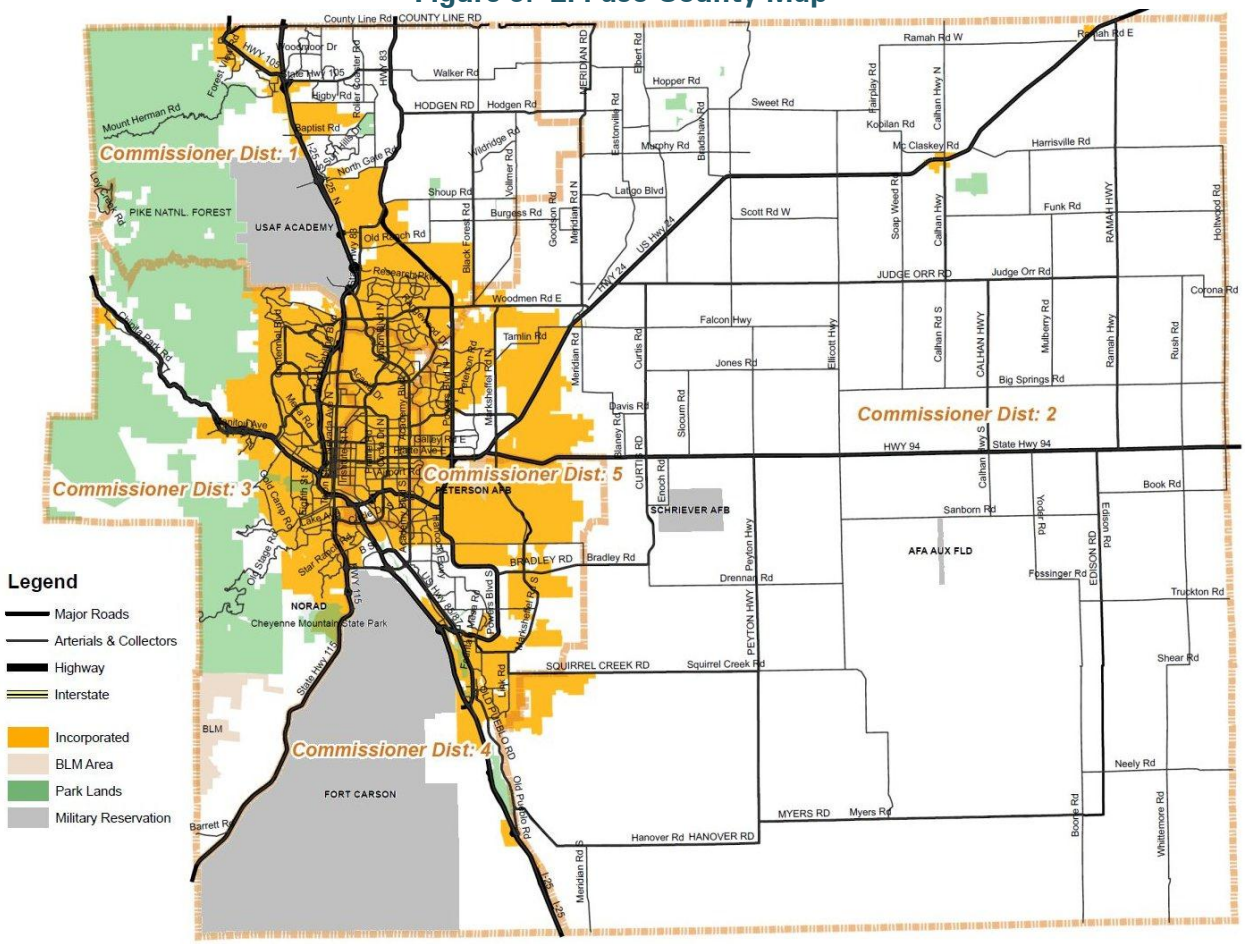
ASSESSMENT AND BENEFIT DISTRICTS

In an impact fee system, it is important to clearly define the geographic areas within which impact fees will be collected and spent. There are two types of geographic areas that serve different functions in an impact fee system: assessment districts and benefit districts. An assessment district is a geographic area that is subject to a uniform fee schedule. In the case of the County's interim road impact fee, the current assessment district is the entire unincorporated area. Benefit districts, on the other hand, represent areas within which the collected fees must be spent. Benefit districts ensure that improvements funded by impact fees are constructed within reasonable proximity of the fee-paying developments.

Assessment Districts

The County's interim road impact fee is charged to new development in the unincorporated areas of the county. The County currently uses a single fee schedule that applies uniformly throughout the unincorporated area.

Figure 3. El Paso County Map



Benefit Districts

The current interim fee revenues can be spent anywhere in the unincorporated area. While the County had initially considered dividing the unincorporated area into several benefit districts, the County has opted for a single benefit district encompassing the entire unincorporated area. There were several reasons for this decision. First, the fee program is limited primarily to arterial roadways, whose function is to move traffic long distances. The arterial road system forms an integrated network, and any attempt to draw lines to divide it into subareas would inevitably be somewhat artificial. Larimer County, for example, which is somewhat larger than El Paso County, has a single county-wide benefit district for regional roads, which are comparable to the types of roads covered by El Paso County's fee program. Second, the creation of multiple benefit districts would increase the complexity of the system. For example, it would likely necessitate establishing a separate Public Improvement District (PID) for each benefit district. It would also increase the administrative burden of tracking and accounting fee collections and expenditures. Third, a county-wide benefit district would essentially be self-regulating in terms of matching the geographic location of need and benefit. Since the fee program will primarily function to reimburse those who make needed improvements, the expenditures will tend to go to the areas were development is occurring. Fourth, multiple benefit districts would unnecessarily restrict the use of impact fee funds and credits, making it more difficult to accumulate sufficient funds to make improvements and making it more difficult to use credits to offset fees.

METHODOLOGY

This section describes the methodology used to develop the proposed county-wide road impact fees.

Plan-Based Approach

The proposed road impact fees are calculated using a "plan-based" methodology. The plan-based approach uses a travel demand model to forecast future traffic volumes, which are then compared to existing roadway capacities to identify needed improvements. The portion of the total cost of those improvements that is attributable to growth (after deductions for adjacent developer responsibility, through trips and existing deficiencies) is divided by the number of new trips over the planning period to determine a cost per trip.

Improvements included in the fee program have been identified in the most recently adopted Major Transportation Corridors Plan (MTCP). This transportation plan identifies improvements needed to accommodate anticipated growth in the unincorporated area over the 2010-2040 period based on small-area growth forecasts.

Types of Improvements

This program covers major corridors that provide regional travel. The program does not include all roads, only County arterials and major rural collectors, as wells as a few selected State roads ("major roads") within unincorporated El Paso County. Only capacity-expanding improvements to major roads identified in the MTCP are included. Types of eligible improvements include construction of new roads, widening existing roads, paving gravel roads, intersection improvements and signalization, as well as acquisition of additional rights-of-way (ROW) required for such improvements. Intersection improvements and signalization improvements included in the program are limited to the intersection of two major roads. The specific improvements that can be funded by the fee program, or for which credits or reimbursements may be provided, are identified in Table 18, Table 19 and Table 20 in the Appendix. The list of eligible projects, costs and fee amounts will be updated over time with input from the advisory committee and approval by the Board of County Commissioners.

Standardized Unit Costs

The fee program uses a standardized unit cost approach. The same costs used to calculate the fees will also be used to determine the amount of credit or reimbursement due for eligible improvements. In order for an eligible road to qualify for a credit or a reimbursement, all aspects of the road must be constructed to County standards and be accepted by the County. The standardized unit costs are summarized in Table 2.

The construction cost of segment and intersection improvements have been estimated using a standard cost per linear foot based on unit costs for a limited number of components, including asphalt, curb & gutter/shoulders, earthwork and construction management. The component unit costs developed by the stakeholders are intended to be conservative and are not intended to fully cover all actual costs. Certain cost components, such as utility relocation, were purposely omitted because they are extremely variable.

Intersection costs are calculated as the additional cost beyond the cost of the standard road segment needed to accommodate the intersection. Intersection costs include both additional construction and additional right-of-way. Diagrams of intersection improvements are in the Appendix (Figure 8).

Right-of-way (ROW) costs are estimated based on the acres and a standard, county-wide cost per acre. While construction and ROW costs are lumped together in the segment and intersection unit costs shown below, developers will receive credit separately for linear feet constructed and ROW dedicated. Signal costs are estimated based on the number of needed signals and a standard cost per signal.

Table 2. Summary of Standardized Unit Costs

Improvement Type	Unit	Unit Cost
Segment Improvements:		
Urban Residential Collector (base)	Linear Foot	$176.12
Rural Road Paving	Linear Foot	$56.82
Rural Road Upgrade	Linear Foot	$189.39
Rural Minor Arterial	Linear Foot	$210.69
Urban Nonresidential Collector	Linear Foot	$226.29
Urban Minor Arterial	Linear Foot	$312.45
Urban Principal Arterial (4 lanes)	Linear Foot	$453.23
Urban Principal Arterial (6 lanes)	Linear Foot	$616.40
Urban Expressway (4 lanes)	Linear Foot	$492.55
Urban Expressway (6 lanes)	Linear Foot	$616.40
Rural Principal Arterial (4 lane)	Linear Foot	$442.43
Rural Principal Arterial (6 lane)	Linear Foot	$682.50
Rural Expressway (4 lane)	Linear Foot	$461.12
Rural Expressway (6 lane)	Linear Foot	$629.74
State Road, Type A (4 lane divided)	Linear Foot	$400.06
State Road, Type AA (6 lane divided)	Linear Foot	$640.06
Intersection Improvements:		
Urban Minor Arterial (4 lanes)	Intersection Leg	$13,741
Urban Principal Arterial (4 lanes), 1 Turn Lane	Intersection Leg	$69,798
Urban Principal Arterial (4 lanes), 2 Turn Lanes	Intersection Leg	$108,767
Urban Principal Arterial (6 lanes)	Intersection Leg	$110,630
Traffic Signal	Each	$250,000

Note: Costs shown include ROW costs, based on $0.50 per square foot or $21,780 per acre
Source: Segment improvement cost per linear foot from Table 16 in Appendix; intersection costs per leg from Table 17 in Appendix; signal costs from LSA.

Excluded Costs

The costs included in the fee calculations are less than the total costs of the needed improvements. As noted above, only certain cost components will be included in the fee calculations, and those costs will be based be based on standardized costs that will likely understate the actual costs of improvements. In addition, any portions of project costs that are attributable to remedying existing deficiencies or accommodating future pass-through traffic that is unrelated to development in the unincorporated area are excluded from the fee calculations.

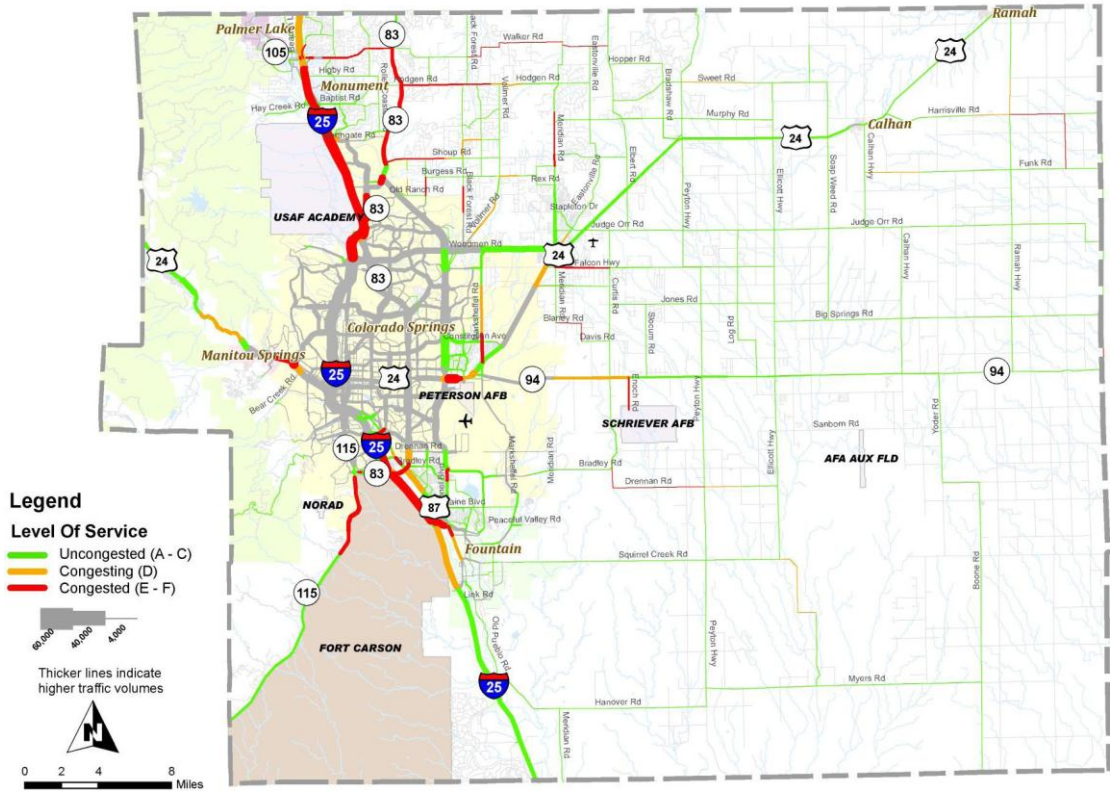
Travel Demand Model

One of the key technical tools in preparing the 2040 MTCP is the travel demand forecasting model. The model predicts future travel patterns and volumes based on travel demand (i.e., trip-making) generated by socioeconomic data (e.g., households and employment). The resulting travel is assigned to the roadway network to produce future traffic volumes on each roadway segment.

The 2005/2035 regional travel model of the Pikes Peak Area Council of Governments (PPACG) was refined for this purpose. PPACG has prepared 2035 socioeconomic forecasts as input to the regional model. Modification to the 2035 socioeconomic data and corresponding traffic analysis zone adjustments in the unincorporated areas of El Paso County were proposed, based on input from developers and land owners, comments from El Paso County's Development Services Department, the County's land use maps, information from available development sketch plans, results from the recent small area studies and comments from the public. These proposed modifications were coordinated with PPACG, which requires that the adjusted 2035 data match the original county-wide controls.

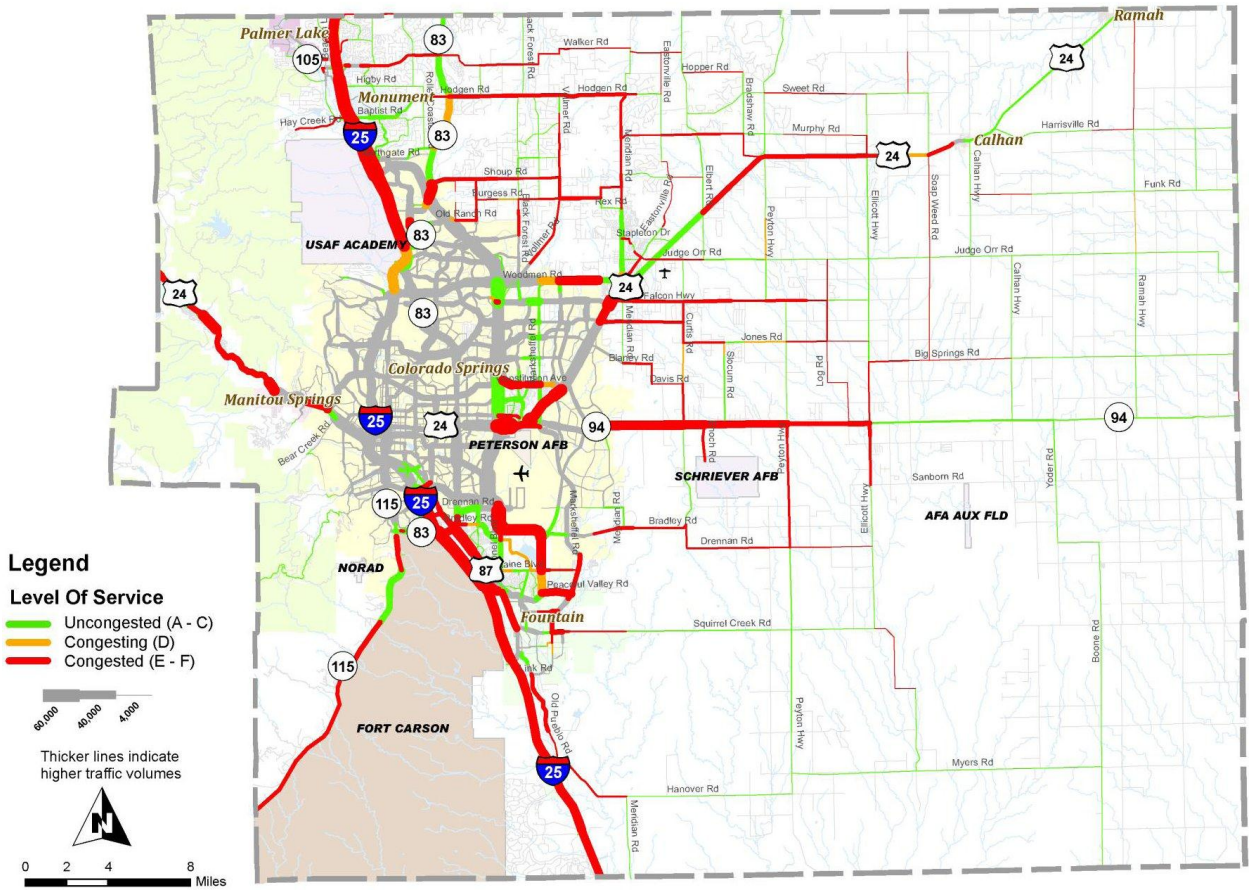
Using the model, analysis was performed to determine where future traffic volumes will exceed available roadway capacity, and several alternative transportation improvements were tested to evaluate the benefits of adding roadway capacity. Modeling of the existing major road network, including improvements that have committed funding but are not yet completed, reveals the existence of some existing capacity deficiencies. These are illustrated in Figure 4.

Figure 4. Existing Deficiencies, 2010



Modeling of future 2040 volumes based on the socioeconomic forecasts reveals a substantial increase in congestion in the absence of additional road improvements. The future levels of service are illustrated in Figure 5.

Figure 5. Future Deficiencies without Improvements, 2040



COST PER TRIP

Using a planned-based methodology as described in the previous section, the portion of the total cost of planned improvements needed over the planning horizon (2010-2040) that is attributable to growth within the unincorporated county is divided by the total trip ends that will be generated by new development in the unincorporated county in order to determine the cost per trip.

The costs that are attributable to new development in the unincorporated area exclude (1) costs attributed to existing deficiencies, and (2) costs attributable to pass-through traffic. The methodologies used to exclude these non-growth-related costs are described below.

Existing deficiency costs were identified for projects where existing traffic volumes exceed existing roadway capacities. The deficiency is determined to be a percentage of the project cost, based on the following formula: (2010 volume – 2010 capacity) / (2040 volume – 2010 capacity).

Finally, some costs are attributable to growth in trips that is unrelated to new development in the unincorporated area. Modeling was performed to determine the number of existing and future trips that are "pass-through" – that is, they do not have an origin or destination in the unincorporated area. The percentage of project costs attributable to pass-through traffic was based on the following formula: (2040 pass-through trips – 2010 pass-through trips) / (2040 total trips – 2010 total trips).

Planned Improvement Costs

Based on the modeling described in the previous section, as well as public and stakeholder input, a set of roadway improvement projects was identified as necessary to accommodate anticipated growth over the 2010-2040 planning horizon. The location of the improvements is illustrated in Figure 6.

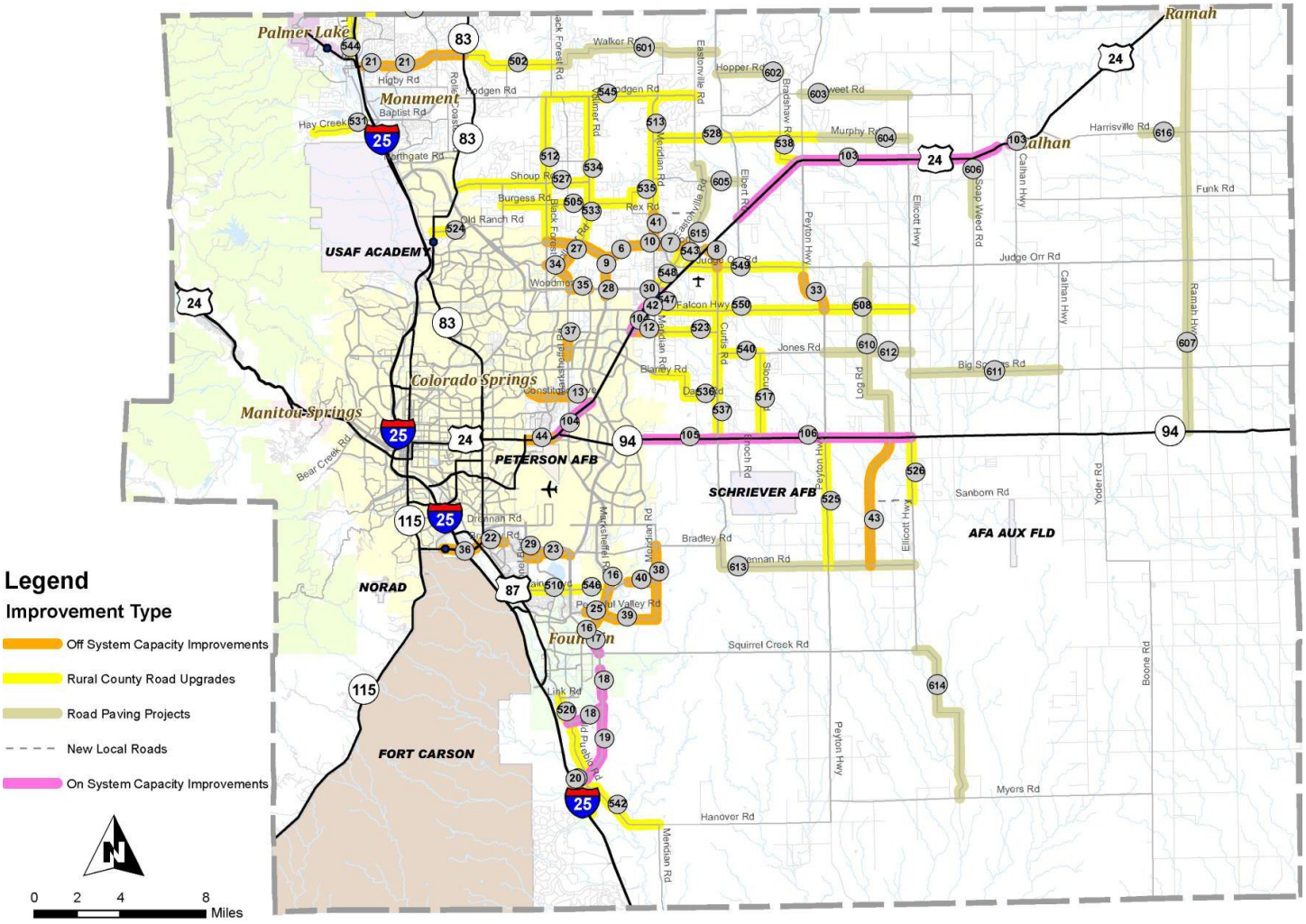
The costs of the planned improvements are summarized in Table 3, based on detailed information for each improvement included in the Appendix. Intersection and signal costs are included, and non-growth-related costs (deficiencies and pass-through traffic) are excluded.

Table 3. Summary of Planned Improvement Costs

Improvement Type	Miles	Segment Cost	Intersect./ Signals	Less Deficiencies	Less Through Trips	Net Program Costs
County Arterials	48.93	$114,355,577	$10,703,762	-$1,193,583	-$11,091,944	$112,773,812
County Rural Road Upgrades	123.56	$123,562,144	$0	$0	-$3,064,205	$120,497,939
County Rural Road Paving	87.97	$26,391,224	$0	-$580,663	-$640,004	$25,170,557
Subtotal, County Road Projects	260.46	$264,308,945	$10,703,762	-$1,774,246	-$14,796,153	$258,442,308
State Road Projects	41.28	$98,924,265	$6,377,331	$0	-$14,680,044	$90,621,552
Total Planned Improvements	301.74	$363,233,210	$17,081,093	-$1,774,246	-$29,476,197	$349,063,860
Old Reimbursements (Falcon Fee)						$661,000
Total Improvement Costs						$349,724,860

Source: Appendix (miles from Table 18 and costs from Table 20); outstanding reimbursement credits for Falcon area from El Paso County.

Figure 6. Planned Improvements



New Trips

With a plan-based methodology, the total cost of planned improvements attributed to growth over the planning horizon is divided by new trips anticipated to occur over the same time period. Since costs attributed to pass-through traffic have been excluded from the program costs, only new trips generated by development in the unincorporated area are considered. Each trip has two trip ends – an origin and a destination. While this report sometimes uses the term "trips," generally what is meant by that is trip ends. The trip generation data provided by the Institute for Transportation Engineers *Trip Generation* manual are trip ends. Trips with both an origin and destination in the unincorporated area have two trip ends in the unincorporated area, while other types of trips related to development in the unincorporated area only have one trip in the unincorporated area. The new trip ends that will be generated by development in the unincorporated area over the 2010-2040 period total 1,150,682, as shown in Table 4. However, some of those trips will be generated by development in the Woodmen Road, Central Marksheffel, Constitution and Baptist Road improvement districts, which will be partially exempted from the fee program they are already

contributing a share of road improvement costs through district assessments or taxes for major road improvements constructed by the districts. Deducting future trips from these districts results in 1,053,878 net new trips.

Table 4. Growth in Trips, 2010-2040

		Trip Ends/	2010		2040		Growth	
From	To	Trip	Trips	Trip Ends	Trips	Trip Ends	Trips	Trip Ends
Unincorp	Unincorp	2	290,118	580,236	645,553	1,291,106	355,435	710,870
Unincorp	Incorp	1	216,450	216,450	423,031	423,031	206,581	206,581
Unincorp	Teller	1	3,268	3,268	7,045	7,045	3,777	3,777
Unincorp	External	1	8,857	8,857	17,037	17,037	8,180	8,180
Incorp	Unincorp	1	217,450	217,450	426,798	426,798	209,348	209,348
Teller	Unincorp	1	3,252	3,252	6,998	6,998	3,746	3,746
External	Unincorp	1	8,857	8,857	17,037	17,037	8,180	8,180
Total Unincorporated Area			748,252	1,038,370	1,543,499	2,189,052	795,247	1,150,682
– New Trip Ends from Exempted Existing Public Improvement Districts								-96,804
Net New Trip Ends, 2010-2040								1,053,878

Source: LSA Associates, data from Major Transportation Corridors Plan analysis, March 15, 2011; new trip ends from partially-exempted Woodmen, Central Marksheffel, Constitution and Baptist Public Improvement Districts provided by LSA on September 4, 2012.

Cost per Trip

Dividing total growth-related costs by the growth in trip ends from new development in the unincorporated area yields a cost of $331.85 per trip end, as shown in Table 5. In addition, the steering committee agreed that a 5% contingency should be added to program costs to address unexpected situations as well as the difference between fee program unit costs and actual costs that will be incurred by the County in constructing improvements where no developer is available to make a needed improvement. With the addition of those contingency costs, the total cost per trip is $348.44.

Table 5. Cost per Trip

Total Growth-Related Costs, 2010-2040	$349,724,860
÷ Total New Trip Ends, 2010-2040	1,053,878
Cost per Trip End	$331.85
Plus 5% Contingency for Actual County Costs	$16.59
Total Cost per Trip End	$348.44

Source: Total costs from Table 3; new trip ends from Table 4; contingencies added based on recommendations of steering committee.

REVENUE CREDITS

As discussed in the legal framework section, credit against the road impact fees should be provided for future revenue that will be generated by new development and used to help pay for outstanding debt on existing facilities or to remedy existing capacity deficiencies. In addition, credit can be provided for future dedicated funding or anticipated outside funding that can be used to fund roadway capacity improvements. These are referred to as "revenue credits," and are the focus of this section.

Credits or reimbursements should also be provided to those who construct eligible improvements that are included in the list of planned improvements on which the fees are based. These are referred to as "developer credits," and are calculated on a case-by-case basis.

El Paso County has not historically used bonding to pay for roadway improvements, and does not have any outstanding debt from past roadway improvements. No outside funding is anticipated to be available to help fund the improvements identified in this report. The sales tax revenue from the county-wide Pikes Peak Rural Transportation Authority is used by the County to fund some major road capacity improvements, but those funded projects have been removed from the fee program.

It should be noted that costs attributable to remedying existing capacity deficiencies have been excluded from the fee calculations. However, a credit for deficiencies is still required, because new development will help fund the deficiency correction. A relatively simple approach to calculating an appropriate credit is to divide the total cost of existing deficiencies by the number of existing trips to determine a credit per trip. This puts new development on equal footing with existing development. Since virtually all of the County's funding sources that could be used to remedy existing deficiencies are county-wide, the deficiency cost will be divided by existing county-wide trip ends. These are summarized in Table 6.

Table 6. County-Wide Trips, 2010

		Trip Ends/	2010	
From	To	Trip	Trips	Trip Ends
Unincorp	Unincorp	2	290,118	580,236
Unincorp	Incorp	2	216,450	432,900
Unincorp	Teller	2	3,268	6,536
Unincorp	External	1	8,857	8,857
Incorp	Unincorp	2	217,450	434,900
Teller	Unincorp	2	3,252	6,504
External	Unincorp	1	8,857	8,857
Incorp	Incorp	2	1,671,738	3,343,476
Incorp	Teller	2	6,864	13,728
Teller	Incorp	2	6,772	13,544
Incorp	External	1	28,304	28,304
External	Incorp	1	28,304	28,304
Total County-Wide Trip Ends, 2010				4,906,146

Source: LSA Associates, data from Major Transportation Corridors Plan analysis, March 15, 2011.

Dividing the total cost to remedy existing deficiencies by total existing trip ends in El Paso County yields a deficiency credit of $0.36 per trip end.

Table 7. Deficiency Credit per Trip

Corridor	From	To	Program Cost	% Defic.	Deficiency Cost
Grinnell Blvd	Bradley Rd	Powers Blvd	$1,573,753	75.8%	$1,193,583
Walker Rd	Black Forest Rd	Elbert Rd	$2,585,028	13.6%	$352,163
Drennan Rd	Curtis Rd	Ellicott Hwy	$3,034,141	0.8%	$24,925
Harrisville Rd	Blasingame Rd	Ramah Hwy	$602,027	33.8%	$203,575
Total Deficiency Cost					$1,774,246
÷ Total County Trip Ends, 2010					4,906,146
Deficiency Credit per Trip					$0.36

Source: Program costs and deficiency percentages from Table 19 and Table 20 in the Appendix; total county trip ends from Table 6.

Subtracting the deficiency credit from the cost per trip end results in a net cost of $348 per trip end, as shown in Table 8.

Table 8. Net Cost per Trip

sts	
Cost per Trip End	$348.44
– Deficiency Credit per Trip End	-$0.36
Net Cost per Trip End	$348.08

Source: Cost per trip end from Table 5; deficiency credit from Table 7.

TRAVEL DEMAND

In order to determine road impact fees for particular land use categories, the travel demand associated with a unit of development (dwelling unit, 1,000 square feet of nonresidential development, etc.) must be determined. For the purpose of this study, travel demand is expressed in terms of daily trip ends, adjusted to account for pass-by and diverted-linked trips, as well as average trip length by trip purpose. Trip characteristics are drawn from national data, and calibrated to ensure that they reflect local travel demand.

Land Use Categories

The current interim fee schedule lists 34 nonresidential land use categories, and the fees vary enormously. The interim fees for retail/commercial uses, for example, range from $266 per 1,000 sq. ft. for a furniture store to $17,141 per 1,000 sq. ft. for a fast food restaurant.

An alternative approach would be to drastically simplify the fee schedule, reducing the listings in the fee schedule to a few, broadly-defined categories. This approach would eliminate the very high fees for uses like banks, restaurants, gas stations and convenience stores, vastly simplify fee administration (it would be very simple to identify the appropriate category in most cases), and avoid issues when uses of existing commercial buildings change, as they often do. This approach is reasonable, since impact fees are designed to mitigate long-term average impacts, not to predict short-term impacts on nearby facilities (the appropriate focus of traffic studies). Most uses occur in shopping centers, and the trip rates for shopping centers include a broad mix of uses (ITE notes that some of the studies include trips generated by out-parcels, which are often occupied by high-traffic uses such as gas stations and fast food restaurants).

The proposed approach utilizes the following land use categories: single-family detached, multi-family, hotel/motel, general commercial, convenience commercial, office, public/institutional, industrial, warehouse and mini-warehouse. The convenience commercial category consists of fast food restaurants, gas stations and convenience markets. The public/institutional category includes uses such as schools, churches, nursing homes and hospitals.

The current land use categories from the interim fees are compared to the recommended categories in Table 9 below. The total number of categories would shrink from 36 to 10.

Table 9. Current and Proposed Land Use Categories

Proposed Categories	Existing Land Use Categories
Single-Family Detached	Single-Family Detached
Multi-Family	Multi-Family
Hotel/Motel	Hotel Motel
General Commercial	Neighorhood Commercial (50,000 sf) Commercial/Retail (100,000 sf) Community Commercial (200,000 sf) Convenience Market Hardware/Paint Store Home Improvement Superstore Pharmacy Furniture Store Bank Quality Restaurant High-Turnover Restaurant Discount Superstore Supermarket Nursery - Garden Center Nursery - Wholesale Health Club Commercial - Mixed Use Golf Course
Convenience Commercial	Fast Food Restaurant Gasoline Service Station Convenience Market w/Gas
Office	Office Business Park
Public/Institutional	Elementary School Middle School High School Church Park/Open Space
Industrial/Manufacturing	Light Industrial Heavy Industrial Industrial Park
Warehouse	(no existing category)
Mini Warehouse	Mini Warehouse

Trip Characteristics

The travel demand generated by specific land use types in El Paso County is a product of four factors: 1) trip generation, 2) percent new trips, 3) average trip length and 4) a local adjustment factor to calibrate national travel characteristics to reflect local travel demand.

Trip Generation

Trip generation rates are based on information published in the most recent edition of the Institute of Transportation Engineers' (ITE) *Trip Generation* manual. Trip generation rates represent trip ends, or driveway crossings at the site of a land use. Thus, a single one-way trip from home to work counts as one trip end for the residence and one trip end for the work place, for a total of two trip ends.

New Trip Factor

Trip rates must be adjusted by a "new trip factor" to exclude pass-by and diverted-linked trips. This adjustment is intended to reduce the possibility of over-counting by only including primary trips generated by the development. Pass-by trips are those trips that are already on a particular route for a different purpose and simply stop at a development on that route. For example, a stop at a convenience store on the way home from the office is a pass-by trip for the convenience store. A pass by trip does not create an additional burden on the street system and therefore should not be counted in the assessment of impact fees. A diverted-linked trip is similar to a pass-by trip, but a diversion is made from the regular route to make an interim stop. The reduction for pass-by and diverted-linked trips was drawn from ITE and other published information.

The interim fees reduce the trip generation rates to account for pass-by trips, but make no such reduction for diverted-linked trips, because the data is less available than it is for pass-by trips for many land uses. Under the proposed consolidated schedule, however, data on diverted-linked trips are only needed for general and convenience commercial uses. Convenience commercial uses are discussed below. General commercial trip rates are based on shopping centers, and that data is quite robust. Of the 100 studies listed in the Institute of Transportation Engineers (ITE) *Trip Generation Handbook*, 2004, for shopping centers, 60 have information on both pass-by and diverted trips. The average new trip percentage is 42%, excluding all pass-by and diverted trips.

Average Trip Length

Average trip lengths are not used directly, but instead are used to develop trip length adjustment factors. The factors are multiplied by the trip rates to take into account the fact that trips for some land uses are shorter or longer than average. The trip length factors are derived from the U.S. Department of Transportation's 2009 National Household Travel Survey, using the following trip purposes (see Table 10).

Table 10. Land Use/Trip Purpose Matrix

Land Use Category	Trip Purpose
Single-Family	Single-Family
Multi-Family	Multi-Family
Hotel/Motel	Average
Commercial/Retail	Shopping
Office	Family/Personal
Public/Institutional	School/Church
Industrial	To or From Work
Warehouse	To or From Work
Mini Warehouse	Family/Personal

Convenience Commercial Category

The convenience commercial category requires some additional analysis. Average daily trip generation data per 1,000 square feet are available for the following three land use categories: Fast Food with Drive-Through (ITE 934), Convenience Market (Open 24 Hours) (ITE 851) and Convenience Market with Gasoline Pumps (ITE 853). Average daily trip generation data are also available per fueling position for Convenience Market with Gasoline Pumps (ITE 853), Gasoline/Service Station (ITE 944), and Gasoline/Service Station with Convenience Market (ITE 945). However, since convenience stores with and without gas pumps tend to have very similar trip generation, it would seem to make more sense to base the fees on building square footage.

Data on pass-by and diverted-linked trips are also available for the same three land use categories. Using the same procedure recommended for general commercial, the new trip percentage excludes both pass-by and diverted trips. The number of new trips that would be generated by each of these three land uses is shown in Table 11. Note that all three land uses have reasonably similar new trip generation. To be conservative, the fee will be based on the lowest of the three.

Table 11. Convenience Commercial Trip Generation Characteristics

ITE		Daily		New	No. of Studies	
Code	Land Use Description	Trip Rate	% New	Trips	Trips	% New
934	Fast Food w/Drive Thru (1,000 sf)	496.12	29.9%	148.34	21	7
853	Convenience Market w/Gasoline Pumps (1,000 sf)	845.60	16.2%	136.99	10	15
851	Convenience Market (Open 24 Hours) (1,000 sf)	737.99	23.9%	176.38	8	11

Source: Trips are average daily trips on a weekday from ITE, *Trip Generation*, 2008; percent new trips from ITE, *Trip Generation Handbook*, 2004 (excludes pass-by and ½ of diverted-linked trips)

While there are reasonably good national data on trip generation for these uses, there are limited data on average trip length. However, extensive studies have been done in Florida, and these are summarized in Table 12. Again, to be conservative, the shortest of these average trip lengths will be used.

Table 12. Convenience Commercial Trip Length Characteristics

ITE Code	Land Use Description	Avg. Trip Length (mi.)	No. of Studies
934	Fast Food w/Drive Thru	2.42	16
945	Service Station with Convenience Market	1.57	9
851	Convenience Market (Open 24 Hours)	1.52	9

Source: Tindale-Oliver & Associates, *Collier County Transportation Impact Fee Update*, February 2009.

Based on the foregoing, a "convenience commercial" use, defined as consisting of fast food restaurants with drive-through windows, convenience stores and gasoline service station (with or without convenience retail sales), could be added to the recommended travel demand schedule.

Travel Demand Schedule

The recommended travel demand schedule for the consolidated land use categories is based on national travel data, calibrated to local conditions. Average daily trip rates and the reduction for commercial retail uses to account for pass-by and diverted-linked trips are from the most recent Institute of Transportation Engineers (ITE) publications. Average trip lengths are from the National Household Travel Survey. The resulting "adjusted" trip rates are then calibrated against existing and modeled trips on the major roadway network (the calibration factor is described below). The recommended travel demand schedule is presented in Table 13.

Table 13. Recommended Travel Demand Schedule

Land Use	Unit	Trips	% New	Trip Length	Length Factor	Adj. Trips	Calibration Factor	Calibrated Trips
Single-Family	Dwelling	9.57	100%	9.16	0.99	9.47	0.95	9.00
Multi-Family	Dwelling	6.65	100%	8.30	0.89	5.92	0.95	5.62
Hotel/Motel	Room	6.90	100%	9.28	1.00	6.90	0.95	6.56
General Commercial	1,000 sf	42.94	42%	6.27	0.68	12.26	0.95	11.65
Convenience Comm.	1,000 sf	845.60	16%	1.52	0.16	21.65	0.95	20.57
Office	1,000 sf	11.01	100%	6.61	0.71	7.82	0.95	7.43
Public/Institutional	1,000 sf	9.11	100%	8.47	0.91	8.29	0.95	7.88
Industrial	1,000 sf	6.96	100%	11.98	1.29	8.98	0.95	8.53
Warehouse	1,000 sf	3.56	100%	11.98	1.29	4.59	0.95	4.36
Mini Warehouse	1,000 sf	2.50	100%	6.61	0.71	1.78	0.95	1.69

Source: Trips are average daily trips on a weekday from ITE, *Trip Generation*, 2008; percent new trips for shopping centers from ITE, *Trip Generation Handbook*, 2004 (excludes pass-by and diverted-linked trips); average trip lengths in miles from U.S. Department of Transportation, 2009 National Household Travel Survey; convenience commercial factors from Table 11 and Table 12; trip length factor is ratio of trip length to average trip length for all trip purposes (9.28 miles); adjusted trips is product of trips, percent new trips and trip length factor; calibration factor from Table 14; calibrated trips is product of adjusted trips and calibration factor.

Calibration Factor

To calibrate the travel demand schedule, the "expected" number of trips that would be generated using the adjusted trip rates and the 2010 and 2040 socioeconomic forecasts for the unincorporated area are compared to 2010 and 2040 modeled trips that are attributable to the unincorporated area (i.e., excluding trips that do not have an origin or destination in the unincorporated area). The results are summarized in Table 14. The first step is to convert retail, service and basic employees

to 1,000 sq. ft., using employee density factors. A weighted average of single-family detached and multi-family trip rates, based on 85% single-family and 15% multi-family, is used for the residential trip rate.[1] The retail/commercial rate is used for retail, office for service and the average of industrial and warehouse for basic.

The calibration factor is the ratio of modeled to expected trips. Calibration factors were developed for 2010, 2040 and new trips expected over the 2010-2040 period. For 2010 and 2040, expected trips derived from "adjusted" trip rates in the travel demand schedule under-predict modeled trips attributed to the unincorporated area. For new trips expected over the 2010-2040 period, the travel demand schedule over-predicts. Consequently, the 2010-2040 calibration factor is applied to the adjusted trips in the travel demand schedule, resulting in a 5% across-the-board reduction from the adjusted trip rates in Table 13.

Table 14. Calibration Factor

	Residential	Retail	Service	Basic	Total
2010 Units/Employees	61,938	9,383	31,113	12,060	na
2040 Units/Employees	146,119	20,603	75,508	29,303	na
New Units/Employees	84,181	11,220	44,395	17,243	na
Employees/1,000 sq. ft.	na	0.90	2.31	0.74	na
2010 Units/1,000 sq. ft.	61,938	10,426	13,469	16,297	na
2040 Units/1,000 sq. ft.	146,119	22,892	32,687	39,599	na
New Units/1,000 sq. ft.	84,181	12,466	19,218	23,302	na
Adjusted Trip Rates	8.94	12.26	7.82	6.79	na
Expected 2010 Trip Ends	553,726	127,823	105,328	110,657	897,534
Expected 2040 Trip Ends	1,306,304	280,656	255,612	268,877	2,111,449
Expected New Trip Ends	752,578	152,833	150,285	158,221	1,213,917
Modeled 2010 Trip Ends	na	na	na	na	1,038,369
Modeled 2040 Trip Ends	na	na	na	na	2,189,051
Modeled New Trip Ends	na	na	na	na	1,150,682
2010 Calibration Factor	na	na	na	na	1.16
2040 Calibration Factor	na	na	na	na	1.04
2010-2040 Calibration Factor	na	na	na	na	0.95

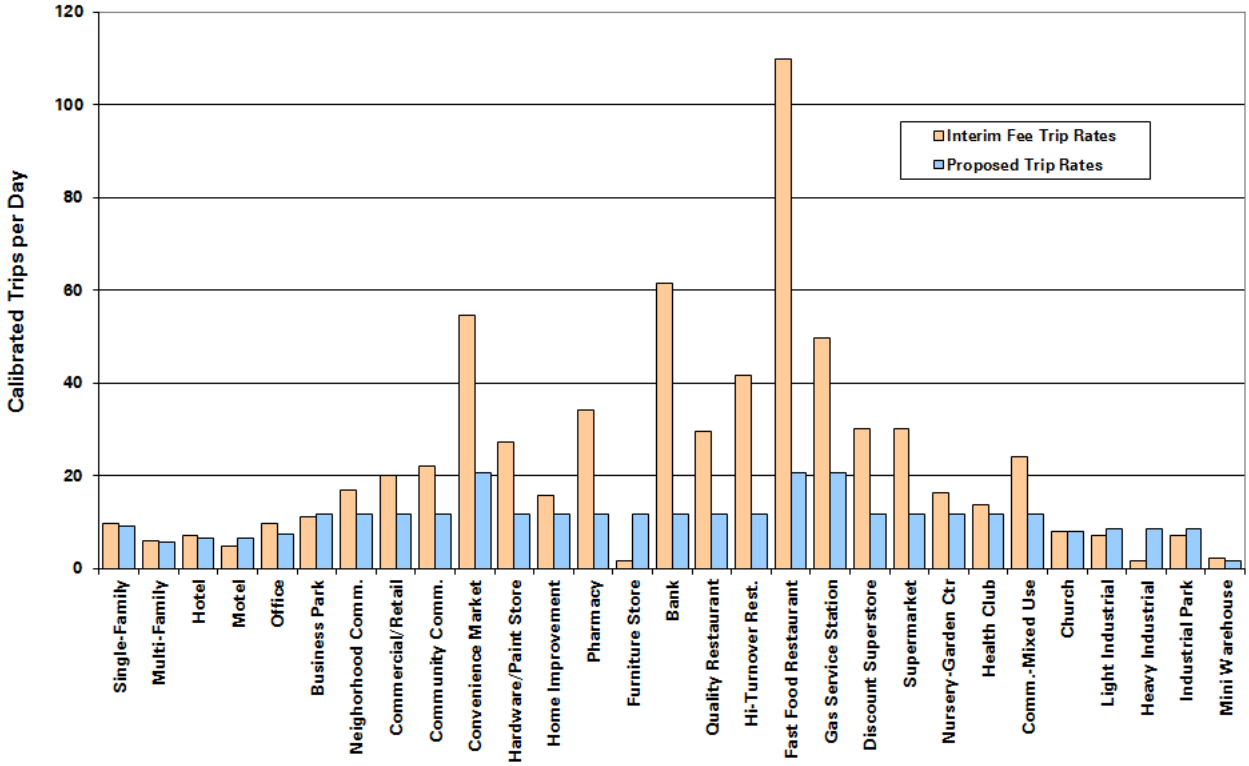
Source: 2010 and 2040 residential units and employees from LSA Associates, "Control Totals for 2040 and 2060 Socioeconomic Forecasts," March 14, 2011; employees per 1,000 sq. ft. from U.S. Department of Energy, *Commercial Buildings Energy Consumption Survey*, 2003 (retail includes mall and non-mall, basic is average of industrial and warehouse); adjusted trip rates from Table 13 (residential is weighted 85% single-family detached and 15% multi-family, basic is average of industrial and warehouse); expected trips is product of units/1,000 sq. ft. and adjusted trip rates; modeled trips from LSA Associates, "2040 Major Transportation Corridors Plan Modeled Trips and Trip Ends," March 14, 2011; calibration factor is ratio of modeled to expected trips.

[1] The *El Paso County Policy Plan* indicates that, 11.4% of housing in the unincorporated area was multi-family in 1995. The 2000 Census reveals that 14.2% of housing in the unincorporated area was multi-family. Fifteen percent was chosen as a reasonable estimate of multi-family housing in 2010, and the same estimate was used for 2040.

Comparative Travel Demand

When the land use categories are consolidated and the commercial trips are reduced by the recommended factor to account for both pass-by and diverted trips, and then calibrated for future conditions, the trip rates used in the interim fee change as shown in Figure 7 (residential trip rates are per dwelling, hotel/motel per room, others per 1,000 sq. ft.).

Figure 7. Comparison of Interim and Proposed Trip Rates



FEE SCHEDULE

The road impact fees for the recommended land use categories calculated in this study are presented in Table 15. The impact fee calculation for each land use category is the product of daily trip ends per development unit and the net cost per trip end.

Table 15. Road Impact Fee Schedule

Land Use	Unit	Trips	Net Cost per Trip	Fee per Unit
Single-Family	Dwelling	9.00	$348	$3,132
Multi-Family	Dwelling	5.62	$348	$1,956
Hotel/Motel	Room	6.56	$348	$2,283
General Commercial	1,000 sf	11.65	$348	$4,054
Convenience Comm.	1,000 sf	20.57	$348	$7,158
Office	1,000 sf	7.43	$348	$2,586
Public/Institutional	1,000 sf	7.88	$348	$2,742
Industrial	1,000 sf	8.53	$348	$2,968
Warehouse	1,000 sf	4.36	$348	$1,517
Mini Warehouse	1,000 sf	1.69	$348	$588

Source: Trips per unit are calibrated trips from Table 13; net cost per trip (rounded to nearest dollar) from Table 8.

Table 16. Standardized Unit Costs – Segments

Component	Unit	Quantity	Unit Cost	Cost	Source and Notes
BASE ROAD, Urban Residential Collector					**EPC Engineering Criteria Manual Figure 2-15**
Asphalt	ft.	36	$3.11	$112.00	Assumed 7" depth and $4/sq. yd.-in.
Curb	ea.	2	$12.00	$24.00	Machine pour, Type 1, prep. and backfill @ $12
Earthwork	cy.	0.926	$2.00	$1.85	Used $2/cu. yd. and .5 ft. of cut/fill times 50 ft.
Subtotal				$137.85	
Const. Mgmt.		6%		$8.27	Includes engineering, surveying, soils work
R.O.W.	ft.	60	$0.50	$30.00	Used $21,780/acre based on EPC school/park f
Total				**$176.12**	
Rural Minor Collector					**EPC Engineering Criteria Manual Figure 2-7**
Asphalt	ft.	32	$2.67	$85.33	Assumed 6" depth and $4/sq. yd.-in.
Shoulder	ea.	2	$12.00	$24.00	Gravel, 6' each side equivalent, $12/ft
Earthwork	cy.	1.204	$2.00	$2.41	Used $2/cu. yd. and .5 ft. of cut/fill times 65 ft.
Subtotal				$111.74	
Const. Mgmt.		6%		$6.70	Includes engineering, surveying, soils work
R.O.W.	ft.	80	$0.50	$40.00	Used $21,780/acre based on EPC school/park f
Total				**$158.45**	
Rural Minor Arterial					**EPC Engineering Criteria Manual Figure 2-5**
Asphalt	ft.	40	$3.11	$124.44	Assumed 7" depth and $4/sq. yd.-in.
Shoulder	ea.	2	$12.00	$24.00	Gravel, 6' each side equivalent
Earthwork	cy.	1.574	$2.00	$3.15	$2/cu. yd. and .5 ft. of cut/fill times 85 ft.
Subtotal				$151.59	
Const. Mgmt.		6%		$9.10	Includes engineering, surveying, soils work
R.O.W.	ft.	100	$0.50	$50.00	$21,780/acre based on EPC school/park fee
Total				**$210.69**	
Urban Non-residential Collector					**EPC Engineering Criteria Manual Figure 2-14**
Asphalt	ft.	48	$3.11	$149.33	Assumed 7" depth and $4/sq. yd.-in.
Shoulder	ea.	2	$12.00	$24.00	Machine pour, Type 1, prep. and backfill
Earthwork	cy.	1.204	$2.00	$2.41	$2/cu. yd. and .5 ft. of cut/fill times 65 ft.
Subtotal				$175.74	
Const. Mgmt.		6%		$10.54	Includes engineering, surveying, soils work
R.O.W.	ft.	80	$0.50	$40.00	$21,780/acre based on EPC school/park fee
Total				**$226.29**	
Urban Minor Arterial					**EPC Engineering Criteria Manual Figure 2-13**
Asphalt	ft.	62	$3.56	$220.44	Assumed 8" depth and $4/sq. yd.-in.
Shoulder	ea.	2	$12.00	$24.00	Machine pour, Type 1, prep. and backfill
Earthwork	cy.	1.574	$2.00	$3.15	$2/cu. yd. and .5 ft. of cut/fill times 85 ft.
Subtotal				$247.59	
Const. Mgmt.		6%		$14.86	Includes engineering, surveying, soils work
R.O.W.	ft.	100	$0.50	$50.00	$21,780/acre based on EPC school/park fee
Total				**$312.45**	

Table 16. Continued

Component	Unit	Quantity	Unit Cost	Cost	Source and Notes
Urban Principal Arterial (4 lanes)					**EPC Engineering Criteria Manual Figure 2-12**
Asphalt	ft.	72	$4.00	$288.00	Assumed 9" depth and $4/sq. yd.-in.
Shoulder	ea.	4	$18.50	$74.00	Type 1 curb with 2 4' aprons @ $3.25/s.f.
Earthwork	cy.	2.130	$2.00	$4.26	$2/cu. yd. and .5 ft. of cut/fill times 115 ft.
Subtotal				$366.26	
Const. Mgmt.		6%		$21.98	Includes engineering, surveying, soils work
R.O.W.	ft.	130	$0.50	$65.00	$21,780/acre based on EPC school/park fee
Total				**$453.23**	
Urban Principal Arterial (6 lanes)					**EPC Engineering Criteria Manual Figure 2-11**
Asphalt	ft.	96	$4.44	$426.67	Assumed 10" depth and $4/sq. yd.-in.
Shoulder	ea.	4	$18.50	$74.00	Type 1 curb with 2 4' aprons @ $3.25/s.f.
Earthwork	cy.	2.685	$2.00	$5.37	$2/cu. yd. and .5 ft. of cut/fill times 145 ft.
Subtotal				$506.04	
Const. Mgmt.		6%		$30.36	Includes engineering, surveying, soils work
R.O.W.	ft.	160	$0.50	$80.00	$21,780/acre based on EPC school/park fee
Total				**$616.40**	
Urban Expressway (4 lanes)					**EPC Engineering Criteria Manual Figure 2-10**
Asphalt	ft.	72	$4.44	$320.00	Assumed 10" depth and $4/sq. yd.-in.
Shoulder	ea.	4	$18.50	$74.00	Type 1 curb with 2 4' aprons @ $3.25/s.f.
Earthwork	cy.	2.315	$2.00	$4.63	$2/cu. yd. and .5 ft. of cut/fill times 125 ft.
Subtotal				$398.63	
Const. Mgmt.		6%		$23.92	Includes engineering, surveying, soils work
R.O.W.	ft.	140	$0.50	$70.00	$21,780/acre based on EPC school/park fee
Total				**$492.55**	
Urban Expressway (6 lanes)					**EPC Engineering Criteria Manual Figure 2-9**
Asphalt	ft.	96	$4.44	$426.67	Assumed 10" depth and $4/sq. yd.-in.
Shoulder	ea.	4	$18.50	$74.00	Type 1 curb with 2 4' aprons @ $3.25/s.f.
Earthwork	cy.	2.7	$2.00	$5.37	$2/cu. yd. and .5 ft. of cut/fill times 145 ft.
Subtotal				$506.04	
Const. Mgmt.		6%		$30.36	Includes engineering, surveying, soils work
R.O.W.	ft.	160	$0.50	$80.00	$21,780/acre based on EPC school/park fee
Total				**$616.40**	
Rural Principal Arterial (4 lane)					**EPC Engineering Criteria Manual Figure 2-4**
Asphalt	ft.	76	$3.78	$287.11	Assumed 8.5" depth and $4/sq. yd.-in.
Shoulder	ea.	4	$10.00	$40.00	4' X 10" shoulder tapered to nothing @ 4'
Earthwork	cy.	2.685	$2.00	$5.37	$2/cu. yd. and .5 ft. of cut/fill times 145 ft.
Subtotal				$332.48	
Const. Mgmt.		6%		$19.95	Includes engineering, surveying, soils work
R.O.W.	ft.	180	$0.50	$90.00	$21,780/acre based on EPC school/park fee
Total				**$442.43**	

Table 16. Continued

Component	Unit	Quantity	Unit Cost	Cost	Source and Notes
Rural Principal Arterial (6 lane)					**EPC Engineering Criteria Manual Figure 2-3**
Asphalt	ft.	112	$4.44	$497.78	Assumed 10" depth and $4/sq. yd.-in.
Shoulder	ea.	4	$10.00	$40.00	4' X 10" shoulder tapered to nothing @ 4'
Earthwork	cy.	3.519	$2.00	$7.04	$2/cu. yd. and .5 ft. of cut/fill times 190 ft.
Subtotal				$544.81	
Const. Mgmt.		6%		$32.69	Includes engineering, surveying, soils work
R.O.W.	ft.	210	$0.50	$105.00	$21,780/acre based on EPC school/park fee
Total				**$682.50**	
Rural Expressway (4 lane)					**EPC Engineering Criteria Manual Figure 2-2**
Asphalt	ft.	76	$4.00	$304.00	Assumed 9" depth and $4/sq. yd.-in.
Shoulder	ea.	4	$10.00	$40.00	4' X 10" shoulder tapered to nothing @ 4'
Earthwork	cy.	3.1	$2.00	$6.11	$2/cu. yd. and .5 ft. of cut/fill times 165 ft.
Subtotal				$350.11	
Const. Mgmt.		6%		$21.01	Includes engineering, surveying, soils work
R.O.W.	ft.	180	$0.50	$90.00	$21,780/acre based on EPC school/park fee
Total				**$461.12**	
Rural Expressway (6 lane)					**EPC Engineering Criteria Manual Figure 2-1**
Asphalt	ft.	112	$4.00	$448.00	Assumed 9" depth and $4/sq. yd.-in.
Shoulder	ea.	4	$10.00	$40.00	4' X 10" shoulder tapered to nothing @ 4'
Earthwork	cy.	3.519	$2.00	$7.04	$2/cu. yd. and .5 ft. of cut/fill times 190 ft.
Subtotal				$495.04	
Const. Mgmt.		6%		$29.70	Includes engineering, surveying, soils work
R.O.W.	ft.	210	$0.50	$105.00	$21,780/acre based on EPC school/park fee
Total				**$629.74**	
State Road, Type A (4 lane divided)					**CDOT Standard Plans Figure 4-1**
Asphalt	ft.	76	$3.78	$287.11	Assumed 8.5" depth and $4/sq. yd.-in.
Shoulder	ea.	0		$0.00	Not used by CDOT
Earthwork	cy.	2.7	$2.00	$5.40	$2/cu. yd. and .5 ft. of cut/fill times 145 ft.
Subtotal				$292.51	
Const. Mgmt.		6%		$17.55	Includes engineering, surveying, soils work
R.O.W.	ft.	180	$0.50	$90.00	$21,780/acre based on EPC school/park fee
Total				**$400.06**	
State Road, Type AA (6 lane divided)					**CDOT Standard Plans Figure 4-1**
Asphalt	ft.	112	$4.44	$497.78	Assumed 10" depth and $4/sq. yd.-in.
Shoulder	ea.	0		$0.00	Not used by CDOT
Earthwork	cy.	3.500	$2.00	$7.00	$2/cu. yd. and .5 ft. of cut/fill times 190ft.
Subtotal				$504.78	
Const. Mgmt.		6%		$30.29	Includes engineering, surveying, soils work
R.O.W.	ft.	210	$0.50	$105.00	$21,780/acre based on EPC school/park fee
Total				**$640.06**	

Source: LSA Associates, data from Major Transportation Corridors Plan analysis, February 28, 2011.

Figure 8. Intersection Diagrams

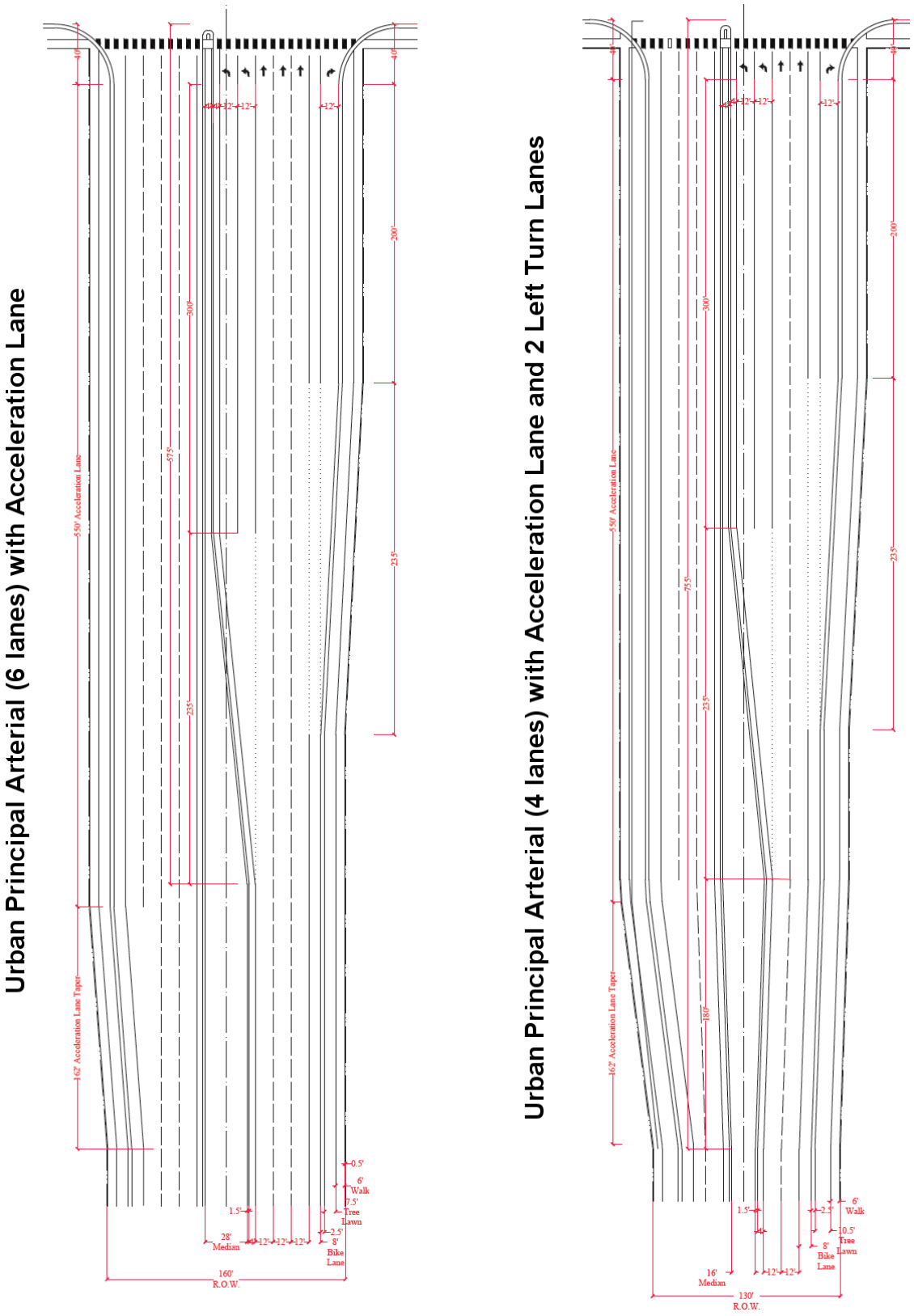
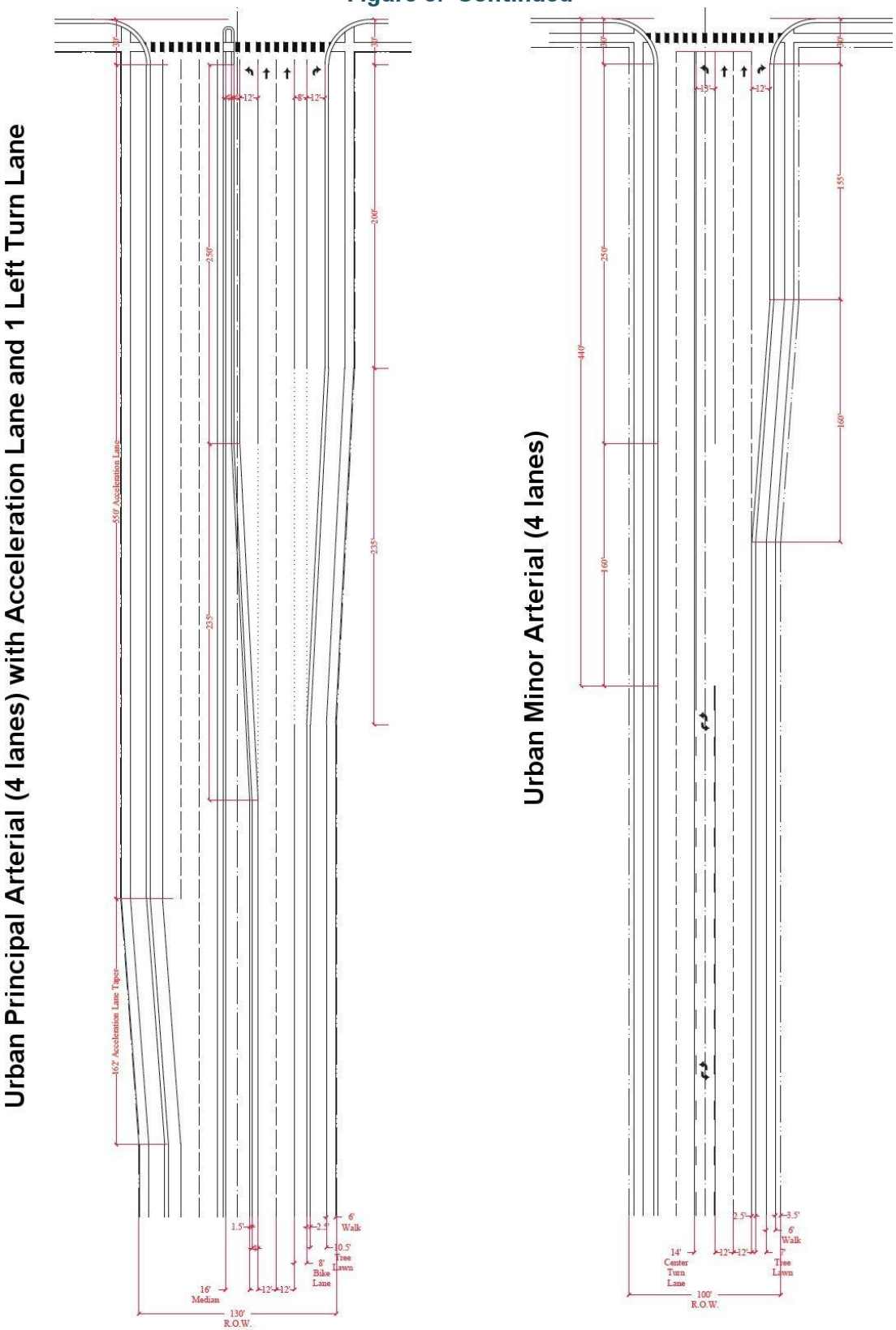


Figure 8. Continued



The standardized unit cost for intersections used in the fee calculations are shown in Table 17. These costs are per intersection leg. A standard four-way intersection will have four intersection legs.

Table 17. Standardized Unit Costs – Intersection Legs

Component	Unit	Quantity	Unit Cost	Cost	Source and Notes
Urban Minor Arterial					
Asphalt	cu. yards	752	$144.00	$108,302	Assumed 8" depth
Curb	linear feet	880	$12.00	$10,560	Machine pour, Type 1, prep. and backfill
Earthwork	cu. yards	771	$2.00	$1,542	Used 0.5 ft. of cut/fill times 85 ft.
Subtotal				$120,404	
Const. Mgmt.		6%		$7,224	Includes engineering, surveying, soils work
R.O.W.	sq. feet	47,180	$0.50	$23,590	Used $21,780/acre based on EPC school/park fe
Total Cost of Intersection Leg				$151,219	
– Base Cost	feet	440	$312.45	-$137,478	From Appendix A: Standardized Unit Costs
Additional Cost of Intersection Leg				**$13,741**	
Urban Principal Arterial (4 Lanes), 1 Left Turn Lane					
Asphalt	cu. yards	1,451	$144.00	$208,900	Assumed 8" depth
Curb	linear feet	2,060	$18.50	$38,110	Machine pour, Type 1, prep. and backfill
Earthwork	cu. yards	1,288	$2.00	$2,576	Used $2/cu. yd. and .5 ft. of cut/fill times 50 ft.
Subtotal				$249,586	
Const. Mgmt.		6%		$14,975	Includes engineering, surveying, soils work
R.O.W.	sq. feet	77,300	$0.50	$38,650	Used $21,780/acre based on EPC school/park fe
Total Cost of Intersection Leg				$303,211	
– Base Cost	feet	515	$453.23	-$233,413	From Appendix A: Standardized Unit Costs
Additional Cost of Intersection Leg				**$69,798**	
Urban Principal Arterial (4 Lanes), 2 Left Turn Lanes					
Asphalt	cu. yards	2,152	$144.00	$309,860	Assumed 8" depth
Curb	linear feet	3,020	$18.50	$55,870	Machine pour, Type 1, prep. and backfill
Earthwork	cu. yards	1,984	$2.00	$3,968	Used $2/cu. yd. and .5 ft. of cut/fill times 50 ft.
Subtotal				$369,698	
Const. Mgmt.		6%		$22,182	Includes engineering, surveying, soils work
R.O.W.	sq. feet	118,150	$0.50	$59,075	Used $21,780/acre based on EPC school/park fe
Total Cost of Intersection Leg				$450,955	
– Base Cost	feet	755	$453.23	-$342,189	From Appendix A: Standardized Unit Costs
Additional Cost of Intersection Leg				**$108,767**	
Urban Principal Arterial (6 Lanes)					
Asphalt	cu. yards	2,389	$144.00	$344,009	Assumed 8" depth
Curb	linear feet	2,300	$18.50	$42,550	Machine pour, Type 1, prep. and backfill
Earthwork	cu. yards	1,751	$2.00	$3,502	Used $2/cu. yd. and .5 ft. of cut/fill times 50 ft.
Subtotal				$390,061	
Const. Mgmt.		6%		$23,404	Includes engineering, surveying, soils work
R.O.W.	sq. feet	103,190	$0.50	$51,595	Used $21,780/acre based on EPC school/park fe
Total Cost of Intersection Leg				$465,060	
– Base Cost	feet	575	$616.40	-$354,430	From Appendix A: Standardized Unit Costs
Additional Cost of Intersection Leg				**$110,630**	

Source: LSA Associates, data from Major Transportation Corridors Plan analysis, February 28, 2011.

Table 18. Planned Improvement Descriptions and Traffic Volumes

				Lanes		Class		2010 Trips		LOS D	2040 Trips	
Corridor	From	To	Mi.	Ex	Fut	Ex	Fut	Total	Thru	Cap.	Total	Thru
Stapleton Rd	Black Forest Rd	Towner Ave	4.855	0	4	-	PA	0	0	0	25,035	178
Stapleton Rd	Meridian Ranch	Eastonville Rd	1.156	0	4	-	PA	0	0	0	9,289	149
Stapleton Rd	US-24	Judge Orr Rd	1.096	0	2	-	PA	0	0	0	6,902	0
Stapleton Rd	Towner Ave	Meridian Ranch	0.787	2	4	C	PA	4,577	92	9,500	18,759	174
Banning Lewis Py	Stapleton	Woodmen Rd	1.504	0	4	-	PA	0	0	0	21,011	0
Meridian Rd	Bradley Rd	Mesa Ridge Py	3.491	2	4	MA	MA	0	0	0	7,045	0
Gerrett Rd	US-24	Meridian Rd	1.083	2	4	MA	PA	4,590	0	12,600	17,975	0
Constitution Ave	Powers	US-24	2.467	4	6	PA	PA	15,813	3,531	28,400	40,738	13,389
Marksheffel Rd	N of Fontaine	Link Rd	2.738	2	4	MA	EX	7,893	2,567	12,600	23,123	6,251
Walker Rd	Woodmoor Rd	SH 83	2.990	2	4	MA	PA	8,844	132	12,600	16,756	308
Bradley Rd	Academy Rd	Hancock Expy	1.027	2	4	MA	PA	7,441	30	12,600	19,826	2,111
Bradley Rd	Grinnell Blvd	Powers Blvd	2.104	2	4	MA	PA	2,549	759	12,600	13,725	2,120
Woodmen	Marksheffel Rd	Mohawk Dr	0.880	4	6	EX	EX	33,575	602	36,920	47,903	9,337
Mesa Ridge Pkwy	Powers Blvd	Marksheffel Rd	0.742	0	4	-	PA	0	0	0	27,328	96
Vollmer Rd	Black Forest Rd	Stapleton Rd	1.600	2	4	MA	MA	6,374	0	12,600	17,319	7
Banning Lewis Py	Dublin Rd	Woodmen Rd	0.967	0	4	-	EX	0	0	0	22,555	0
Grinnell Blvd	Bradley Rd	Powers Blvd	0.594	2	4	MA	MA	17,504	4,980	12,600	19,066	6,760
Meridian Rd	US-24 Intersection Impvmt		0.396	2	4	MA	MA	15,579	38	12,600	15,400	0
Peaceful Valley	Marksheffel Rd	Meridian	2.565	0	2	-	MA	0	0	0	57	0
S-curve at Falcon	Falcon Hwy	Peyton Hwy	2.087	0	2	-	MA	0	0	0	2,011	33
Marksheffel Rd N	Woodmen Rd	Research Pky	1.699	0	4	-	PA	0	0	0	22,051	6,834
Fontaine Blvd	Marksheffel Rd	Terminus	1.100	0	4	-	PA	0	0	0	17,051	0
Fontaine Blvd	Terminus	Meridian Rd	1.172	0	4	-	PA	0	0	0	17,051	0
Academy Blvd	B-Street	US-85	1.500	0	4	-	PA	26,151	13,409	36,920	33,505	13,151
Meridian Rd	Stapleton Rd	Rex Rd	0.966	0	4	-	PA	11,992	0	12,600	18,532	0
Meridian Rd	US-24	Ex Meridian Rd	0.181	0	4	-	PA	0	0	0	5,279	0
Log Rd	State Hwy 94	Drennan Rd	6.021	0	4	-	PA	0	0	0	3,261	0
Marksheffel Rd	N of Carefree Cir	Stetson Hills	1.157	0	4	-	PA	14,540	5,822	15,800	8,017	2,354
Subtotal, County Arterials			48.925									
County Line Rd	I-25	SH 83	5.193	2	2	U	MA	3,451	688	6,000	13,104	1,583
Walker Rd	Steppler Rd	Black Forest Rd	4.368	2	2	U	C	1,251	13	6,000	6,204	71
Burgess Rd	Vollmer Rd	Rex Rd	6.031	2	2	U	C	2,742	0	6,000	8,136	71
Judge Orr Rd	US-24	Peyton Hwy	5.372	2	2	U	C	1,580	0	6,000	9,680	0
Falcon Hwy	Peyton Hwy	Ellicott Hwy	8.457	2	2	U	C	4,995	0	6,000	11,360	0
Fontaine Blvd	Powers Blvd	Marksheffel	0.684	2	2	U	C	1,541	0	6,000	13,210	0
Fontaine Blvd	Grinnell Blvd	Powers Blvd	1.959	2	2	U	C	5,457	773	6,000	12,933	2,362
Black Forest Rd	Shoup Rd	Wildridge Rd	7.586	2	2	U	C	3,997	57	6,000	6,417	360
Meridian Rd	Rex Rd	Hodgen Rd	5.613	2	2	MA	MA	5,999	168	6,000	10,942	185
Slocum Rd	Jones Rd	SH 94	3.983	2	2	U	C	1,326	0	6,000	5,175	0
Old Pubelo Rd	Link Rd	I-25	5.811	2	2	U	C	1,282	29	6,000	7,365	36
Garrett Rd	Meridian Rd	Curtis Rd	2.944	2	2	U	MA	1,652	0	6,000	11,291	0
Old Ranch Rd	SH 83	Otero Ave	0.593	2	2	U	MA	2,540	1,221	6,000	10,840	4,189
Peyton Hwy	State Hwy 94	Drennan Rd	5.992	2	2	U	MA	1,041	27	6,000	8,315	581
Ellicott Hwy	State Hwy 94	Sanborn Rd	2.972	2	2	U	MA	1,867	0	6,000	11,496	0
Shoup Rd	State Hwy 83	Vollmer Rd	6.126	2	2	U	MA	3,750	0	6,000	12,838	240
Murphy Rd	Meridian Rd	Peyton Hwy	7.898	2	2	U	MA	1,942	217	6,000	7,173	331
Hay Creek Rd	Tapadero Rd	Old Denver Rd	2.486	2	2	U	C	3,301	0	6,000	8,076	0
Vollmer Rd	Stapleton Rd	Burgess Rd	1.958	2	2	U	MA	4,836	0	6,000	14,683	22

Table 18. Continued

Corridor	From	To	Mi.	Lanes Ex	Lanes Fut	Class Ex	Class Fut	2010 Trips Total	2010 Trips Thru	LOS D Cap.	2040 Trips Total	2040 Trips Thru
Vollmer Rd	Burgess Rd	Hodgen Rd	5.020	2	2	U	MA	2,068	0	6,000	9,770	8
Ayer Rd	Burgess Rd	Meridian Rd	1.487	2	2	U	C	2,033	0	6,000	10,805	26
S Blaney/Davis	Curtis Rd	Meridian Rd	3.873	2	2	U	C	927	0	6,000	7,647	0
Curtis Rd	Judge Orr Rd	SH 94	8.024	2	2	U	PA	2,102	0	6,000	6,645	0
Bradshaw Rd	Murphy Rd	US-24	1.838	2	2	U	C	4,326	322	6,000	8,117	304
Jones Rd	Curtis Rd	Slocum Rd	1.995	2	2	U	MA	823	0	6,000	7,153	0
Meridian Rd	New connection	Falcon Hwy	0.270	2	2	U	PA	8,292	0	6,000	5,279	0
Hanover Rd	Meridian Rd	Old Pubelo Rd	4.185	2	2	U	C	895	32	6,000	6,254	49
Eastonville Rd	Snaffle Bit Rd	Stapleton Rd	0.675	2	2	U	MA	82	0	6,000	594	0
Beacon Lite Rd	SH 105	County Line Rd	2.076	2	2	U	C	2,822	0	6,000	7,191	0
Eastonville Rd	S of Stapleton	Woodmen Rd	1.379	2	2	U	C	4,089	0	6,000	6,304	0
Hodgen Rd	Black Forest Rd	Eastonville Rd	6.716	2	2	U	MA	4,117	241	6,000	13,702	285
Subtotal, Rural Road Upgrades			123.565									
Walker Rd	Black Forest Rd	Elbert Rd	8.616	2	2	D	C	965	19	500	3,915	195
Hopper Rd	Elbert Rd	Bradshaw Rd	2.896	2	2	D	C	388	0	500	2,606	170
Sweet Rd	Peyton Hwy	Ellicott Hwy	4.971	2	2	D	C	362	0	500	1,872	0
Murphy Rd	Wagon Trail	Ellicott Hwy	4.046	2	2	D	C	245	0	500	1,077	0
Latigo Blvd	Eastonville Rd	Elbert Rd	1.600	2	2	D	C	112	0	500	1,094	0
Soad Weed Rd	US-24	2 mi n JudgeOr	0.989	2	2	D	C	320	0	500	940	31
Ramah Hwy	US-24	SH 94	19.883	2	2	D	C	201	16	500	643	46
Log Rd	Judge Orr Rd	SH 94	8.946	2	2	D	C	282	0	500	4,246	12
Big Springs Rd	Ellicott Hwy	Calhan Hwy	6.894	2	2	D	C	169	0	500	2,081	15
Jones Rd	Peyton Hwy	Ellicott Hwy	3.997	2	2	D	C	18	0	500	3,744	0
Drennan Rd	Curtis Rd	Ellicott Hwy	10.113	2	2	D	MA	524	0	500	3,407	0
Ellicott Hwy	Squirrel Crk Rd	Myers Rd	8.678	2	2	D	C	316	0	500	870	0
Eastonville Rd	Stapleton Rd	N of Latigo Blvc	4.331	2	2	D	MA	208	0	500	2,152	0
Harrisville Rd	Blasingame Rd	Ramah Hwy	2.007	2	2	D	C	973	0	500	1,898	0
Subtotal, Rural Road Paving			87.968									
Subtotal, County Road Improvements			260.458									
US-24	Elbert Rd	Calhan Hwy	13.503	2	4	PA	PA	10,155	2,128	15,800	20,428	2,744
US-24	SH 94	Woodmen Rd	4.435	4	6	EX	EX	22,120	2,166	36,920	47,349	8,473
State Hwy 94	Marksheffel Rd	Slocum Rd	6.111	4	6	EX	EX	15,909	634	36,920	39,563	3,587
State Hwy 94	Slocum Rd	Ellicott Hwy	6.996	2	4	PA	PA	9,091	402	15,800	28,611	1,229
US-24	SH 94	Powers Blvd	1.400	2	4	PA	PA	28,597	6,188	36,920	49,297	16,483
Powers Blvd Ext S	Mesa Ridge Py	Squirrel Crk Rd	1.466	0	4	-	PA	6,260	1,979	0	38,464	4,762
Powers Blvd Ext S	Squirrel Crk Rd	New Powers Ex	3.253	0	2	-	PA	1,472	308	0	11,761	2,172
Powers Blvd Ext S	New Powers Ext	I-25	4.116	0	2	-	PA	3,260	673	0	16,013	3,041
Subtotal, State Roads			41.279									
Total, All Improvements			301.737									

Notes: Classifications are Expressway (EX), Principal Arterial (PA), Minor Arterial (MA), Collector (C), Unimproved (U) and Dirt (D).
Source: LSA Associates, data from Major Transportation Corridors Plan analysis, October 25, 2011.

Table 19. Planned Improvement Project Data

Corridor	From	To	Cost/ Lin. Foot	Intersections Cost/Leg	Legs	No. of Signals	% Defic.	% Thru
Stapleton Rd	Black Forest Rd	Towner Ave	$453.23	$108,767	4	1.00		0.7%
Stapleton Rd	Meridian Ranch	Eastonville Rd	$453.23	$108,767	2	0.25		1.6%
Stapleton Rd	US-24	Judge Orr Rd	$312.45	$0	2	1.25		0.0%
Stapleton Rd	Towner Ave	Meridian Ranch	$453.23	$108,767	2	0.50		0.6%
Banning Lewis Py	Stapleton	Woodmen Rd	$453.23	$108,767	2	0.50		0.0%
Meridian Rd	Bradley Rd	Mesa Ridge Py	$312.45	$13,741	6	2.00		0.0%
Gerrett Rd	US-24	Meridian Rd	$453.23	$108,767	2	0.25		0.0%
Constitution Ave	Powers	US-24	$616.40	$110,630	11	2.00		39.6%
Marksheffel Rd	N of Fontaine	Link Rd	$492.55	$108,767	5	0.75		24.2%
Walker Rd	Woodmoor Rd	SH 83	$453.23	$108,767	8	1.75		2.2%
Bradley Rd	Academy Rd	Hancock Expy	$453.23	$108,767	2	0.50		16.8%
Bradley Rd	Grinnell Blvd	Powers Blvd	$453.23	$108,767	2	0.50		12.2%
Woodmen	Marksheffel Rd	Mohawk Dr	$616.40	$110,630	2	0.50		61.0%
Mesa Ridge Pkwy	Powers Blvd	Marksheffel Rd	$453.23	$108,767	1	0.25		0.4%
Vollmer Rd	Black Forest Rd	Stapleton Rd	$453.23	$13,741	4	1.00		0.1%
Banning Lewis Py	Dublin Rd	Woodmen Rd	$492.55	$108,767	2	0.50		0.0%
Grinnell Blvd	Bradley Rd	Powers Blvd	$453.23	$13,741	2	0.50	75.8%	100.0%
Meridian Rd	US-24 Intersection Impvmt		$453.23	$108,767	0	0.00		0.0%
Peaceful Valley	Marksheffel Rd	Meridian	$312.45	$0	2	0.25		0.0%
S-curve at Falcon	Falcon Hwy	Peyton Hwy	$312.45	$0	1	0.00		1.6%
Marksheffel Rd N	Woodmen Rd	Research Pky	$453.23	$108,767	4	1.00		31.0%
Fontaine Blvd	Marksheffel Rd	Terminus	$453.23	$0	0	0.00		0.0%
Fontaine Blvd	Terminus	Meridian Rd	$453.23	$0	1	0.50		0.0%
Academy Blvd	B-Street	US-85	$616.40	$0	4	2.00		0.0%
Meridian Rd	Stapleton Rd	Rex Rd	$453.23	$0	3	0.00		0.0%
Meridian Rd	US-24	Ex Meridian Rd	$312.45	$0	0	0.00		0.0%
Log Rd	State Hwy 94	Drennan Rd	$312.45	$0	3	1.00		0.0%
Marksheffel Rd	N of Carefree Cir	Stetson Hills	$453.23	$108,767	4	0.25		0.0%
Subtotal, County Arterials					81	19.00		
County Line Rd	I-25	SH 83	$189.39	na	0	0.00		9.3%
Walker Rd	Steppler Rd	Black Forest Rd	$189.39	na	0	0.00		1.2%
Burgess Rd	Vollmer Rd	Rex Rd	$189.39	na	0	0.00		1.3%
Judge Orr Rd	US-24	Peyton Hwy	$189.39	na	0	0.00		0.0%
Falcon Hwy	Peyton Hwy	Ellicott Hwy	$189.39	na	0	0.00		0.0%
Fontaine Blvd	Powers Blvd	Marksheffel	$189.39	na	0	0.00		0.0%
Fontaine Blvd	Grinnell Blvd	Powers Blvd	$189.39	na	0	0.00		21.2%
Black Forest Rd	Shoup Rd	Wildridge Rd	$189.39	na	0	0.00		12.5%
Meridian Rd	Rex Rd	Hodgen Rd	$189.39	na	0	0.00		0.3%
Slocum Rd	Jones Rd	SH 94	$189.39	na	0	0.00		0.0%
Old Pubelo Rd	Link Rd	I-25	$189.39	na	0	0.00		0.1%
Garrett Rd	Meridian Rd	Curtis Rd	$189.39	na	0	0.00		0.0%
Old Ranch Rd	SH 83	Otero Ave	$189.39	na	0	0.00		35.8%
Peyton Hwy	State Hwy 94	Drennan Rd	$189.39	na	0	0.00		7.6%
Ellicott Hwy	State Hwy 94	Sanborn Rd	$189.39	na	0	0.00		0.0%
Shoup Rd	State Hwy 83	Vollmer Rd	$189.39	na	0	0.00		2.6%
Murphy Rd	Meridian Rd	Peyton Hwy	$189.39	na	0	0.00		2.2%
Hay Creek Rd	Tapadero Rd	Old Denver Rd	$189.39	na	0	0.00		0.0%
Vollmer Rd	Stapleton Rd	Burgess Rd	$189.39	na	0	0.00		0.2%

Table 19. Continued.

Corridor	From	To	Cost/ Lin. Foot	Intersections Cost/Leg	Legs	No. of Signals	% Defic.	% Thru
Vollmer Rd	Burgess Rd	Hodgen Rd	$189.39	na	0	0.00		0.1%
Ayer Rd	Burgess Rd	Meridian Rd	$189.39	na	0	0.00		0.3%
S Blaney/Davis	Curtis Rd	Meridian Rd	$189.39	na	0	0.00		0.0%
Curtis Rd	Judge Orr Rd	SH 94	$189.39	na	0	0.00		0.0%
Bradshaw Rd	Murphy Rd	US-24	$189.39	na	0	0.00		0.0%
Jones Rd	Curtis Rd	Slocum Rd	$189.39	na	0	0.00		0.0%
Meridian Rd	New connection	Falcon Hwy	$189.39	na	0	0.00		0.0%
Hanover Rd	Meridian Rd	Old Pubelo Rd	$189.39	na	0	0.00		0.3%
Eastonville Rd	Snaffle Bit Rd	Stapleton Rd	$189.39	na	0	0.00		0.0%
Beacon Lite Rd	SH 105	County Line Rd	$189.39	na	0	0.00		0.0%
Eastonville Rd	S of Stapleton	Woodmen Rd	$189.39	na	0	0.00		0.0%
Hodgen Rd	Black Forest Rd	Eastonville Rd	$189.39	na	0	0.00		0.5%
Subtotal, Rural Road Upgrades					0	0.00		
Walker Rd	Black Forest Rd	Elbert Rd	$56.82	na	0	0.00	13.6%	6.0%
Hopper Rd	Elbert Rd	Bradshaw Rd	$56.82	na	0	0.00		7.7%
Sweet Rd	Peyton Hwy	Ellicott Hwy	$56.82	na	0	0.00		0.0%
Murphy Rd	Wagon Trail	Ellicott Hwy	$56.82	na	0	0.00		0.0%
Latigo Blvd	Eastonville Rd	Elbert Rd	$56.82	na	0	0.00		0.0%
Soad Weed Rd	US-24	2 mi n JudgeOr	$56.82	na	0	0.00		5.1%
Ramah Hwy	US-24	SH 94	$56.82	na	0	0.00		6.7%
Log Rd	Judge Orr Rd	SH 94	$56.82	na	0	0.00		0.3%
Big Springs Rd	Ellicott Hwy	Calhan Hwy	$56.82	na	0	0.00		0.8%
Jones Rd	Peyton Hwy	Ellicott Hwy	$56.82	na	0	0.00		0.0%
Drennan Rd	Curtis Rd	Ellicott Hwy	$56.82	na	0	0.00	0.8%	0.0%
Ellicott Hwy	Squirrel Crk Rd	Myers Rd	$56.82	na	0	0.00		0.0%
Eastonville Rd	Stapleton Rd	N of Latigo Blvd	$56.82	na	0	0.00		0.0%
Harrisville Rd	Blasingame Rd	Ramah Hwy	$56.82	na	0	0.00	33.8%	0.0%
Subtotal, Rural Road Paving					0	0.00		
Subtotal, County Road Improvements					81	19.00		
US-24	Elbert Rd	Calhan Hwy	$400.06	$108,767	8	3.00		6.0%
US-24	SH 94	Woodmen Rd	$640.06	$110,630	8	1.50		25.0%
State Hwy 94	Marksheffel Rd	Slocum Rd	$640.06	$110,630	5	1.25		12.5%
State Hwy 94	Slocum Rd	Ellicott Hwy	$400.06	$108,767	5	0.50		4.2%
US-24	SH 94	Powers Blvd	$640.06	$108,767	6	1.50		49.7%
Powers Blvd Ext S	Mesa Ridge Py	Squirrel Crk Rd	$400.06	$108,767	4	1.00		8.6%
Powers Blvd Ext S	Squirrel Crk Rd	New Powers Ext	$312.45	$0	2	0.50		18.1%
Powers Blvd Ext S	New Powers Ext	I-25	$312.45	$0	3	0.50		18.6%
Subtotal, State Roads					41	9.75		
Total, All Improvements					122	28.75		

Source: Costs per linear foot from Table 16; costs per intersection leg from Table 17; number of needed legs and signals from LSA Associates, data from Major Transportation Corridors Plan analysis, October 25, 2011; percent deficiency and percent pass-through traffic based volume and capacity data from Table 18.

Table 20. Planned Improvement Costs

Corridor	From	To	Segment Cost	Intersecs/ Signals	Less Deficiencies	Less Thru Trips	Total Net Cost
Stapleton Rd	Black Forest Rd	Towner Ave	$11,617,111	$685,068	$0	-$87,499	$12,214,680
Stapleton Rd	Meridian Ranch	Eastonville Rd	$2,767,532	$280,034	$0	-$49,023	$2,998,543
Stapleton Rd	US-24	Judge Orr Rd	$1,808,479	$312,500	$0	$0	$2,120,979
Stapleton Rd	Towner Ave	Meridian Ranch	$1,883,875	$342,534	$0	-$12,877	$2,213,532
Banning Lewis Py	Stapleton	Woodmen Rd	$3,599,096	$342,534	$0	$0	$3,941,630
Meridian Rd	Bradley Rd	Mesa Ridge Py	$5,758,696	$582,446	$0	$0	$6,341,142
Gerrett Rd	US-24	Meridian Rd	$2,591,666	$280,034	$0	$0	$2,871,700
Constitution Ave	Powers	US-24	$8,029,290	$1,716,930	$0	-$3,854,765	$5,891,455
Marksheffel Rd	N of Fontaine	Link Rd	$7,119,934	$731,335	$0	-$1,898,886	$5,952,383
Walker Rd	Woodmoor Rd	SH 83	$7,155,585	$1,307,636	$0	-$187,908	$8,275,313
Bradley Rd	Academy Rd	Hancock Expy	$2,457,873	$342,534	$0	-$470,618	$2,329,789
Bradley Rd	Grinnell Blvd	Powers Blvd	$5,036,159	$342,534	$0	-$654,792	$4,723,901
Woodmen	Marksheffel Rd	Mohawk Dr	$2,863,149	$346,260	$0	-$1,956,810	$1,252,599
Mesa Ridge Pkwy	Powers Blvd	Marksheffel Rd	$1,775,780	$171,267	$0	-$6,832	$1,940,215
Vollmer Rd	Black Forest Rd	Stapleton Rd	$3,828,923	$304,964	$0	-$2,794	$4,131,093
Banning Lewis Py	Dublin Rd	Woodmen Rd	$2,513,906	$342,534	$0	$0	$2,856,440
Grinnell Blvd	Bradley Rd	Powers Blvd	$1,421,271	$152,482	-$1,193,583	-$380,170	$0
Meridian Rd	US-24 Intersection Impvmt		$1,722,998	$0	$0	$0	$1,722,998
Peaceful Valley	Marksheffel Rd	Meridian	$4,231,744	$62,500	$0	$0	$4,294,244
S-curve at Falcon	Falcon Hwy	Peyton Hwy	$3,442,831	$0	$0	-$56,209	$3,386,622
Marksheffel Rd N	Woodmen Rd	Research Pky	$4,066,883	$685,068	$0	-$1,472,761	$3,279,190
Fontaine Blvd	Marksheffel Rd	Terminus	$4,145,339	$0	$0	$0	$4,145,339
Fontaine Blvd	Terminus	Meridian Rd	$2,804,834	$125,000	$0	$0	$2,929,834
Academy Blvd	B-Street	US-85	$6,406,053	$500,000	$0	$0	$6,906,053
Meridian Rd	Stapleton Rd	Rex Rd	$2,311,585	$0	$0	$0	$2,311,585
Meridian Rd	US-24	Ex Meridian Rd	$293,284	$0	$0	$0	$293,284
Log Rd	State Hwy 94	Drennan Rd	$9,932,947	$250,000	$0	$0	$10,182,947
Marksheffel Rd	N of Carefree Cir	Stetson Hills	$2,768,754	$497,568	$0	$0	$3,266,322
Subtotal, County Arterials			$114,355,577	$10,703,762	-$1,193,583	-$11,091,944	$112,773,812
County Line Rd	I-25	SH 83	$5,192,955	$0	$0	-$481,029	$4,711,926
Walker Rd	Steppler Rd	Black Forest Rd	$4,367,586	$0	$0	-$51,033	$4,316,553
Burgess Rd	Vollmer Rd	Rex Rd	$6,031,163	$0	$0	-$79,842	$5,951,321
Judge Orr Rd	US-24	Peyton Hwy	$5,371,537	$0	$0	$0	$5,371,537
Falcon Hwy	Peyton Hwy	Ellicott Hwy	$8,457,156	$0	$0	$0	$8,457,156
Fontaine Blvd	Powers Blvd	Marksheffel	$683,862	$0	$0	$0	$683,862
Fontaine Blvd	Grinnell Blvd	Powers Blvd	$1,958,650	$0	$0	-$416,183	$1,542,467
Black Forest Rd	Shoup Rd	Wildridge Rd	$7,585,896	$0	$0	-$948,670	$6,637,226
Meridian Rd	Rex Rd	Hodgen Rd	$5,613,093	$0	$0	-$18,959	$5,594,134
Slocum Rd	Jones Rd	SH 94	$3,983,281	$0	$0	$0	$3,983,281
Old Pubelo Rd	Link Rd	I-25	$5,810,715	$0	$0	-$6,916	$5,803,799
Garrett Rd	Meridian Rd	Curtis Rd	$2,943,454	$0	$0	$0	$2,943,454
Old Ranch Rd	SH 83	Otero Ave	$593,339	$0	$0	-$212,161	$381,178
Peyton Hwy	State Hwy 94	Drennan Rd	$5,992,223	$0	$0	-$456,265	$5,535,958
Ellicott Hwy	State Hwy 94	Sanborn Rd	$2,972,311	$0	$0	$0	$2,972,311
Shoup Rd	State Hwy 83	Vollmer Rd	$6,125,659	$0	$0	-$161,932	$5,963,727
Murphy Rd	Meridian Rd	Peyton Hwy	$7,897,800	$0	$0	-$172,188	$7,725,612
Hay Creek Rd	Tapadero Rd	Old Denver Rd	$2,485,661	$0	$0	$0	$2,485,661
Vollmer Rd	Stapleton Rd	Burgess Rd	$1,958,159	$0	$0	-$4,320	$1,953,839

Table 20. Continued

Corridor	From	To	Segment Cost	Intersecs/ Signals	Less Deficiencies	Less Thru Trips	Total Net Cost
Vollmer Rd	Burgess Rd	Hodgen Rd	$5,020,154	$0	$0	-$4,923	$5,015,231
Ayer Rd	Burgess Rd	Meridian Rd	$1,486,953	$0	$0	-$4,435	$1,482,518
S Blaney/Davis	Curtis Rd	Meridian Rd	$3,872,579	$0	$0	$0	$3,872,579
Curtis Rd	Judge Orr Rd	SH 94	$8,023,554	$0	$0	$0	$8,023,554
Bradshaw Rd	Murphy Rd	US-24	$1,838,301	$0	$0	$0	$1,838,301
Jones Rd	Curtis Rd	Slocum Rd	$1,994,464	$0	$0	$0	$1,994,464
Meridian Rd	New connection	Falcon Hwy	$270,387	$0	$0	$0	$270,387
Hanover Rd	Meridian Rd	Old Pubelo Rd	$4,185,263	$0	$0	-$13,964	$4,171,299
Eastonville Rd	Snaffle Bit Rd	Stapleton Rd	$675,198	$0	$0	$0	$675,198
Beacon Lite Rd	SH 105	County Line Rd	$2,075,652	$0	$0	$0	$2,075,652
Eastonville Rd	S of Stapleton	Woodmen Rd	$1,379,311	$0	$0	$0	$1,379,311
Hodgen Rd	Black Forest Rd	Eastonville Rd	$6,715,827	$0	$0	-$31,385	$6,684,442
Subtotal, Rural Road Upgrades			$123,562,144	$0	$0	-$3,064,205	$120,497,939
Walker Rd	Black Forest Rd	Elbert Rd	$2,585,028	$0	-$352,163	-$133,175	$2,099,690
Hopper Rd	Elbert Rd	Bradshaw Rd	$868,945	$0	$0	-$66,621	$802,324
Sweet Rd	Peyton Hwy	Ellicott Hwy	$1,491,212	$0	$0	$0	$1,491,212
Murphy Rd	Wagon Trail	Ellicott Hwy	$1,213,896	$0	$0	$0	$1,213,896
Latigo Blvd	Eastonville Rd	Elbert Rd	$480,153	$0	$0	$0	$480,153
Soad Weed Rd	US-24	2 mi n JudgeOr	$296,625	$0	$0	-$14,991	$281,634
Ramah Hwy	US-24	SH 94	$5,965,007	$0	$0	-$400,761	$5,564,246
Log Rd	Judge Orr Rd	SH 94	$2,684,000	$0	$0	-$8,044	$2,675,956
Big Springs Rd	Ellicott Hwy	Calhan Hwy	$2,068,390	$0	$0	-$16,412	$2,051,978
Jones Rd	Peyton Hwy	Ellicott Hwy	$1,198,990	$0	$0	$0	$1,198,990
Drennan Rd	Curtis Rd	Ellicott Hwy	$3,034,141	$0	-$24,925	$0	$3,009,216
Ellicott Hwy	Squirrel Crk Rd	Myers Rd	$2,603,599	$0	$0	$0	$2,603,599
Eastonville Rd	Stapleton Rd	N of Latigo Blvd	$1,299,211	$0	$0	$0	$1,299,211
Harrisville Rd	Blasingame Rd	Ramah Hwy	$602,027	$0	-$203,575	$0	$398,452
Subtotal, Rural Road Paving			$26,391,224	$0	-$580,663	-$640,004	$25,170,557
Subtotal, County Road Improvements			$264,308,945	$10,703,762	-$1,774,246	-$14,796,153	$258,442,308
US-24	Elbert Rd	Calhan Hwy	$28,522,339	$1,620,136	$0	-$1,808,012	$28,334,463
US-24	SH 94	Woodmen Rd	$14,986,883	$1,260,040	$0	-$4,061,516	$12,185,407
State Hwy 94	Marksheffel Rd	Slocum Rd	$20,653,038	$865,650	$0	-$2,685,918	$18,832,770
State Hwy 94	Slocum Rd	Ellicott Hwy	$14,777,732	$668,835	$0	-$654,388	$14,792,179
US-24	SH 94	Powers Blvd	$4,731,324	$1,027,602	$0	-$2,864,092	$2,894,834
Powers Blvd Ext S	Mesa Ridge Py	Squirrel Crk Rd	$3,096,558	$685,068	$0	-$326,877	$3,454,749
Powers Blvd Ext S	Squirrel Crk Rd	New Powers Ex	$5,366,191	$125,000	$0	-$995,160	$4,496,031
Powers Blvd Ext S	New Powers Ext	I-25	$6,790,200	$125,000	$0	-$1,284,081	$5,631,119
Subtotal, State Roads			$98,924,265	$6,377,331	$0	-$14,680,044	$90,621,552
Total, All Improvements			$363,233,210	$17,081,093	-$1,774,246	-$29,476,197	$349,063,860

Source: Segment cost based on segment length from Table 18 and cost per foot from Table 19 (Meridian Road/US 24 intersection improvement based on actual cost; Fontaine, Marksheffel-Terminus based on credit actually provided); intersection and signal cost is number of needed intersection legs times cost per leg from Table 19 plus number of signals from Table 19 times cost per signal from Table 2; pass-through and deficiency costs are based on total project cost (sum of segment and intersection/signal costs) and deficiency and pass-through percentages from Table 20.