LGHS & Union Bus Survey Report

Methodology

Response Gathering

This survey was conducted at two middle schools, Fisher Middle and Union Middle, and one high school, LGHS. These are the three Los Gatos schools with bus stops closer than half a mile. Elementary schools are excluded under the assumption that these kids will not be potential riders due to safety concerns. Both surveys were addressed towards students, and we requested schools to publicize them towards the student body and not the parents.

Fisher was unwilling to publicize the survey, and so we received only 2 responses from their students. Union asked their students to fill out the survey during class time, and so we received 705 responses from them, about 70% of the student body. Based on this difference we decided to remove Fisher's responses and refer to the Middle School Bus Survey as the 'Union Bus Survey'. All responses from Union were collected in mid-January.

LGHS publicized the survey via the Principal's Newsletter, posters, and posts on Parentsquare. Some teachers also volunteered to give out the surveys during class time. The survey therefore collected 197 responses (a little less than 10% of the student body), with an unknown but possibly significant percentage of responses from parents. Very few responses were collected from seniors - about 14, or 7% of all responses - so numbers from this group are likely largely inaccurate.

Survey Composition

Respondents were first asked basic information such as their grade, then how they got to school. Those who walk or bike were sent immediately to the end of the survey. Those who drive, carpool, or take the bus were asked whether they were aware of the bus system. If they were not, they were asked about their interest in a bus program. If they were aware of the system, they were asked a series of questions about their thoughts on the bus system. One of these questions, regarding respondents' issues with the bus system, is multiple choice. The other, regarding their 'proposed improvements', is single choice. Both of these groups were then asked questions about their timing and location preferences for a bus program.

Note: Due to a mistake in the Union survey, some people who indicated they had not known about the existence of the bus system answer questions on their issues with it. These responses have been discounted from the graphs and tables you see below.

Results Analysis

Results from the survey were broken down based on grade, knowledge of the closest bus stop, and other factors, as detailed in the tables and graphs of this report. Some ‘other’ responses were re-categorized if they were similar to given response options, explaining any discrepancy between data seen in the ‘results’ section of the associated google form and the results published here. All unadulterated responses can be found in this table (link here). Emails and other sensitive information are hidden.

Results

Low Awareness of the Bus System

At LGHS, 44.3% of respondents were unaware that a bus system exists in Los Gatos. At Los Gatos, people seemed more aware of the bus system in higher grades. Anecdotally, I can say that the bus is not well advertised at school, so this increased awareness likely comes from the increased proactivity in determining transit methods, increased familiarity with the downtown area, and decreased assistance from parents among older students. Of those students aware of the bus program, 61% knew the closest stop to their house. This also suggests more proactivity in finding information about the bus program, as this student-specific information would not be gleaned through school programs.

At Union Middle, among driving students, 56.3% of students were bus unaware, and only about 11% knew the closest bus stop to their house. This number was largely constant throughout all grades, with a slight increase among 8th grade students. This suggests that existing programs designed to inform middle school students of transit options do not include, or do not highlight, Los Gatos bus programs, so students do not gain this information as they progress through the system. Likely, the simple act of informing these students would increase ridership, as students would be empowered to pursue the option of the bus.

Likely, the amount of people unaware of the bus program at the middle school is slightly inflated. Parents likely make most transit decisions for their children, and so may already have considered and decided against the bus without their child's knowledge. If this survey were to be conducted again, I would address it to parents. However, the student is still a piece of this chain, and outreach to them has the potential to reach their parents and influence those parents' decisions.

Low Interest

The largest difference between LGHS and Union students is in their interest in taking the bus. 38.4% of LGHS students reported they had 'no interest' in taking the bus in the single-choice question on proposed improvements to the program[1]. 81.9% of Union students reported the same[2].

Answers from Union students did not really differ with grade, nor with whether kids knew the closest bus stop to their house. LGHS students tended to be less likely to take the bus as grade increased. Likely, this is because many older students can drive and are therefore apathetic about public transit.

For the same reason as with knowledge of the transit system, the answers of Union students must be taken with a grain of salt. Some of these students may also be swayed if educated about the bus program or given encouragement from parents.

This metric does indicate that larger capital programs may be fiscally irresponsible at Union in particular. However, education is still worthwhile, and could increase the efficacy of future investments.

Another interesting question was posed to students unaware of the bus program, as to whether they would take a bus if a practical program (that stops nearby and arrives at school at a reasonable time) was provided. LGHS students tended to have more definitive Yes or No answers, while Union students reported much more 'Maybe' answers - about 44%. This further suggests that education and encouragement in younger student populations has a high chance of success.

High Interest in Improvements to Timing & Arrival Location

[1] See Table 3 and Chart 3

[2] See Table 4 and Chart 4

Combined, about 13% of Union students suggested that the improvements most likely to encourage them to ride the bus were either better arrival times at school or home or stops closer to their homes – essentially, VTA schedule improvements[3]. 42.5% of LGHS students said the same[4]. 12% among Union students unaware of the bus program said definitively that they would take the bus if these conditions were met. 17.2% of LGHS students said the same. So improvements to the VTA schedule would be significantly more impactful for LGHS students, but still worthwhile for Union.

Some of those who responded that they wished the bus arrived at their house at a better time are likely less promising candidates for ridership, as their issue is based on both arrival time at school, which can be more easily changed, and travel time, which is harder to change.

Data was also collected for how early people are willing to get to school, and how late they are willing to stay. These times, and averages, are listed in the attached tables. Note that those who actually listed timing as their desired improvement are willing to wait at least 20 minutes on average both in the mornings and afternoons. However, this means 50% of them leave in that period. If buses arrive within 10 minutes, at least 80% will ride it[5]. This suggests that even small improvements to bus arrival times can have a great impact on ridership if advertised correctly.

Low Interest in Free Bus Passes

About 11% of LGHS students reported that free bus passes are the improvement that would most encourage them to take the bus[6]. 2.6% of Union students stated the same[7].

Solutions & Key Takeaways

Education

[3] See Table 4 & Chart 4

[4] See Table 3 & Chart 3

[5] See Tables 5-8

[6] See Table 3 & Chart 3

[7] See Table 4 & Chart 4

The Youth Commission has brainstormed two main ways to increase awareness of the bus program:

1. Instruction on buses can be included in existing curriculums, such as SR2S curriculum. This is in line with existing SR2S goals on decreasing traffic and emissions in town. It also promises to reach a broader audience of students who do not live close enough to their schools to walk or bike. Further, kids concerned with the safety of walking or biking may be willing to take public transit, as survey results indicate that few students are concerned about the safety of public buses in town.
    1. VTA officials can help provide these presentations. As students provide a large portion of their ridership in many areas, they have great interest in advertising to this population.
    2. VTA has a program through which classes can take field trips via public transit for free[8]. Schools could be encouraged to find ways to combine their field trips with education about public transit. Although students would not be required to sign up for Clipper Cards in this program, it would increase their awareness of the bus program and encourage them to find out more on their own time.
        1. One weakness to this plan is the infrequency of field trips at middle and high schools.
    3. Students can be given the chance to sign up for a Clipper Card at presentations, as well as mobile applications associated with realtime VTA updates. This decreases the inconvenience of signing up for public transit and empowers kids to access that transit easily at any time.
2. Clipper Cards can be linked to Student IDs. This would automatically give kids easy access to public transit, and make awareness of the existence of the bus system widespread. However, VTA's scanning system, configured to scan Clipper Cards and some credit cards, may not have the hardware necessary to scan barcodes, and it may be impractical to equip 27 line buses with this hardware due to bus changes. Another option in this case could be to just sign students up for digital ClipperCards.
    1. To be clear, Youth Commission has yet to talk to VTA about the plausibility of any of these ideas. For now, this is a brainstorm.

Free Bus Passes

[8] VTA's Class Pass Program

This section evaluates several suggestions proposed by the June 2025 VTA Bus Pass Ad-Hoc in their report on subsidized bus passes for LGHS students[9]. This report recommended a 6-month pilot program where the town would buy SmartPasses - VTA's low-cost annual pass for institutions - for LGHS students.

Such a program could have many positive effects beyond simply removing cost barriers to students - for example, the presence of free bus passes and the necessary advertising to students of this program would motivate those students to find out more about the bus program, which in itself could hugely increase ridership.

11% of LGHS respondents indicated that the improvement most likely to encourage them to ride is free or subsidized passes[10]. This equates to 4% of the total respondents of the survey. Meanwhile, 2.3% of respondents to the later LGHS Transit Survey indicated that they take the bus, so data suggests 6.3% of respondents total could benefit from subsidized passes. Based on margin of error[11], population size, and the $35 cost of monthly passes[12] from VTA, the cost of buying monthly passes to the town would be anywhere from $22,830 and $78,458. This does not include staff members who may take public transit. The cost of Smart Passes for all LGHS students and staff would be $41,080 a year[13]. So the Town is unlikely to hugely 'overpay' for its Smart Passes, especially given the 6-month trial window during which the efficacy of the program can be evaluated. In fact, it could save students up to $37,000 a year, while creating 76 new riders.

This assumes that all people who listed cost as their main improvement would definitely take the bus. This is not an entirely accurate assumption. Many students may still be uninterested in riding the bus, for whatever reason, or may simply not live within range. 25.2% of people in town live beyond an 0.5 mile walk from a bus stop[14], and many more could be unwilling to walk even this far, especially when carrying heavy items such as instruments or sports equipment. On the other hand, some parents may be willing to drive their kids to a bus stop if it is significantly closer than the school. VTA also provides bike racks on its buses for bikers.

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[9] VBPAC Report

[10] See Table 3 & Chart 3

[11] The margin of error for this calculation, with 95% confidence, based on population size (1,914 students) and survey size (197 people), is 3.46%.

[12] The cost of a Monthly Pass for Youth (5-18)

[13] Based on the VBPAC study

[14] Based on our traffic model

Additionally, as previously stated, educating the populace could increase ridership on its own. Further, greater ridership likely encourages ridership in and of itself, as people make the switch because friends or family have done it and because they feel safer on a bus with more people. So overall, the Traffic Safety Ad-Hoc believes that a bus pass pilot program is worth a try.

Improvements to VTA Scheduling

As discussed in the results section, both LGHS and Union students indicated a strong interest in improvements to VTA bus routes and times. Currently, VTA buses arrive at stops every 30 minutes. Oftentimes, however, these stops are ill-aligned with school bell schedules. For an anecdotal example, the Westbound stop at Main Street & Pleasant Street, near LGHS, consistently arrives at 8:30, though scheduled for 8:17. Similarly, the eastbound stop at Los Gatos Boulevard & Nino Avenue, near Fisher, is scheduled for 8:22 but likely arrives around 8:32.[15]

For the most part, data indicates that VTA buses run approximately to schedule. But schedules themselves are also often misaligned. For example, the eastbound stop at Union Avenue and Los Gatos-Almaden arrives exactly two minutes before Union's late bell[16].

Several other examples of misaligned stops exist, as well as examples of communities and potential student ridership missed by the bus route. So the Traffic Safety Ad-Hoc has decided to provide a more in-depth analysis of both factors by working with partners from computer science programs at LG to create a modeling program for Route 27's stops and travel times as well as associated costs and benefits to the public. We are using this program to create a different route and schedule, designed to optimally align with the location of school-aged kids as well as school bell schedules. We intend to discuss these results with VTA before the end of May. We also hope to use the cost-benefit analysis to provide outreach to the town about the impact of local public transit. The program and associated discussion can be found in this agenda item's other attachments or on this website created for purposes of public outreach.

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[15] SF Bay's Open Transit Data has data on real stop times for hundreds of transit lines. This assumption uses data on the stop time from observations in February 2023, compared to schedule at that time. The same delay is then applied to the current schedule.

[16] VTA Route 27 Schedule - Union & LG-Almaden

Graphs and Tables

Chart 1:

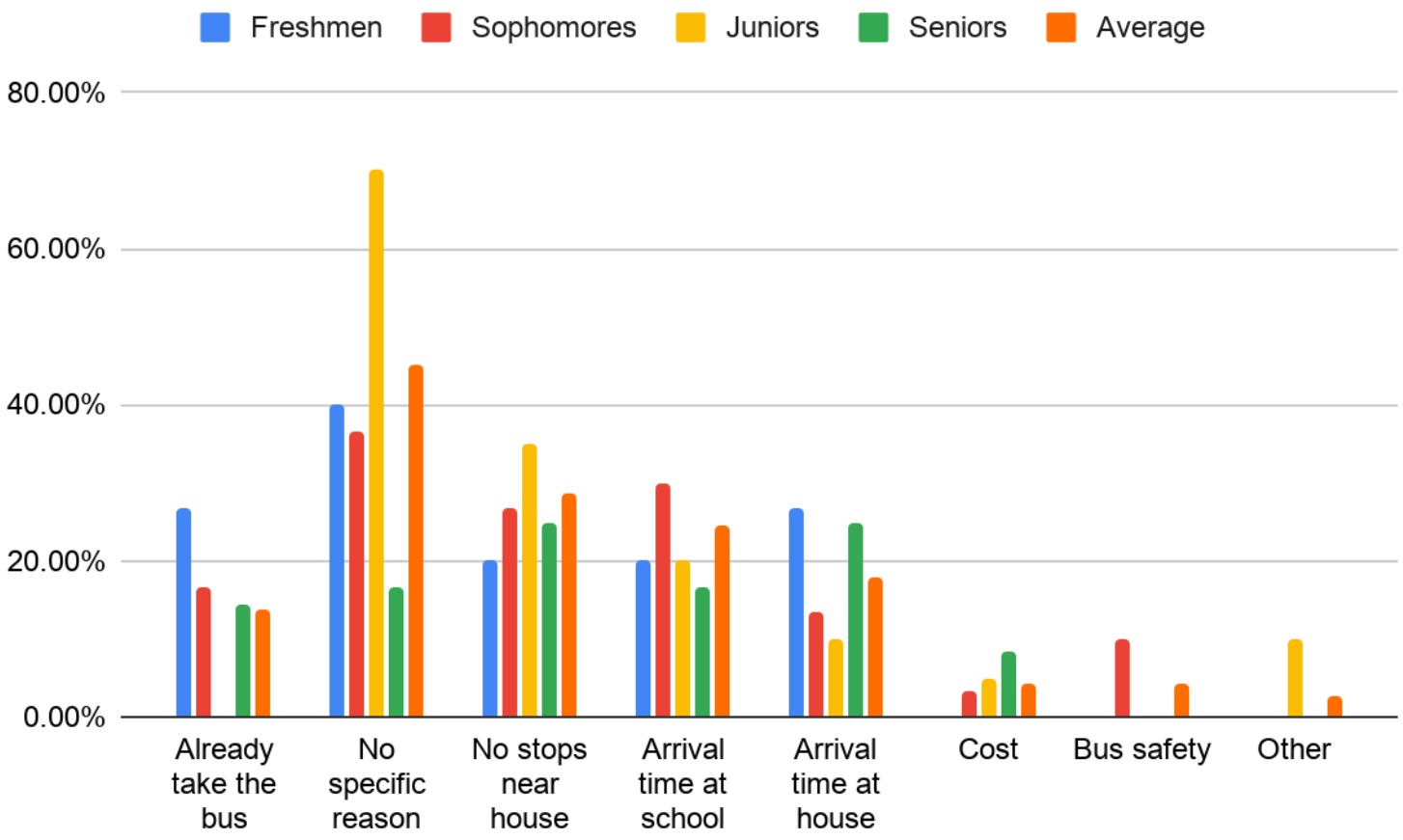


Table 1:

By Grade

	Already take the bus	No specific reason	No stops near house	Arrival time at school	Arrival time at house	Cost	Bus safety	Other
Freshmen	26.67%	40.00%	20.00%	20.00%	26.67%	0.00%	0.00%	0.00%
Sophomores	16.67%	36.67%	26.67%	30.00%	13.33%	3.33%	10.00%	0.00%
Juniors	0.00%	70.00%	35.00%	20.00%	10.00%	5.00%	0.00%	10.00%

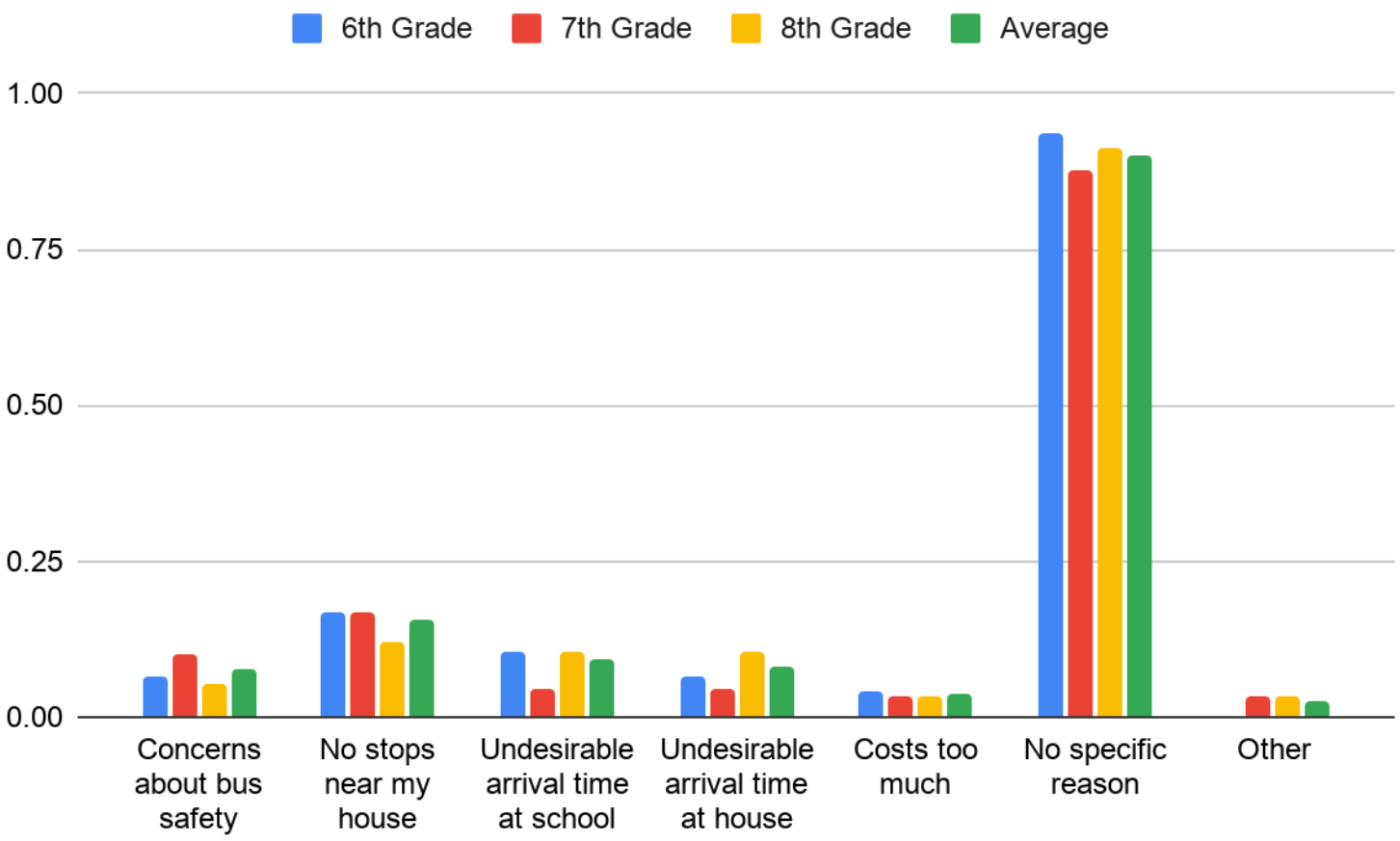
Seniors	14.29%	16.67%	25.00%	16.67%	25.00%	8.33%	0.00%	0.00%
Average	13.70%	45.21%	28.77%	24.66%	17.81%	4.11%	4.11%	2.74%

What issues prevent you from taking the bus more often? - Union

Table 2:

Grade	Concerns about bus safety	No stops near my house	Undesirable arrival time at	Undesirable arrival time at	Costs too much	No specific reason	Other
6th	6.40%	17.00%	10.60%	6.40%	4.30%	94%	0.00%
7th	10.10%	16.90%	4.50%	4.50%	3.40%	88%	3.37%
8th	5%	12%	10%	10%	3%	91%	3.44%
Avera	7.70%	15.50%	9.30%	8.20%	3.60%	90.20%	2.60%

Chart 2:



Which improvement would encourage you to take the bus more often? - LGHS

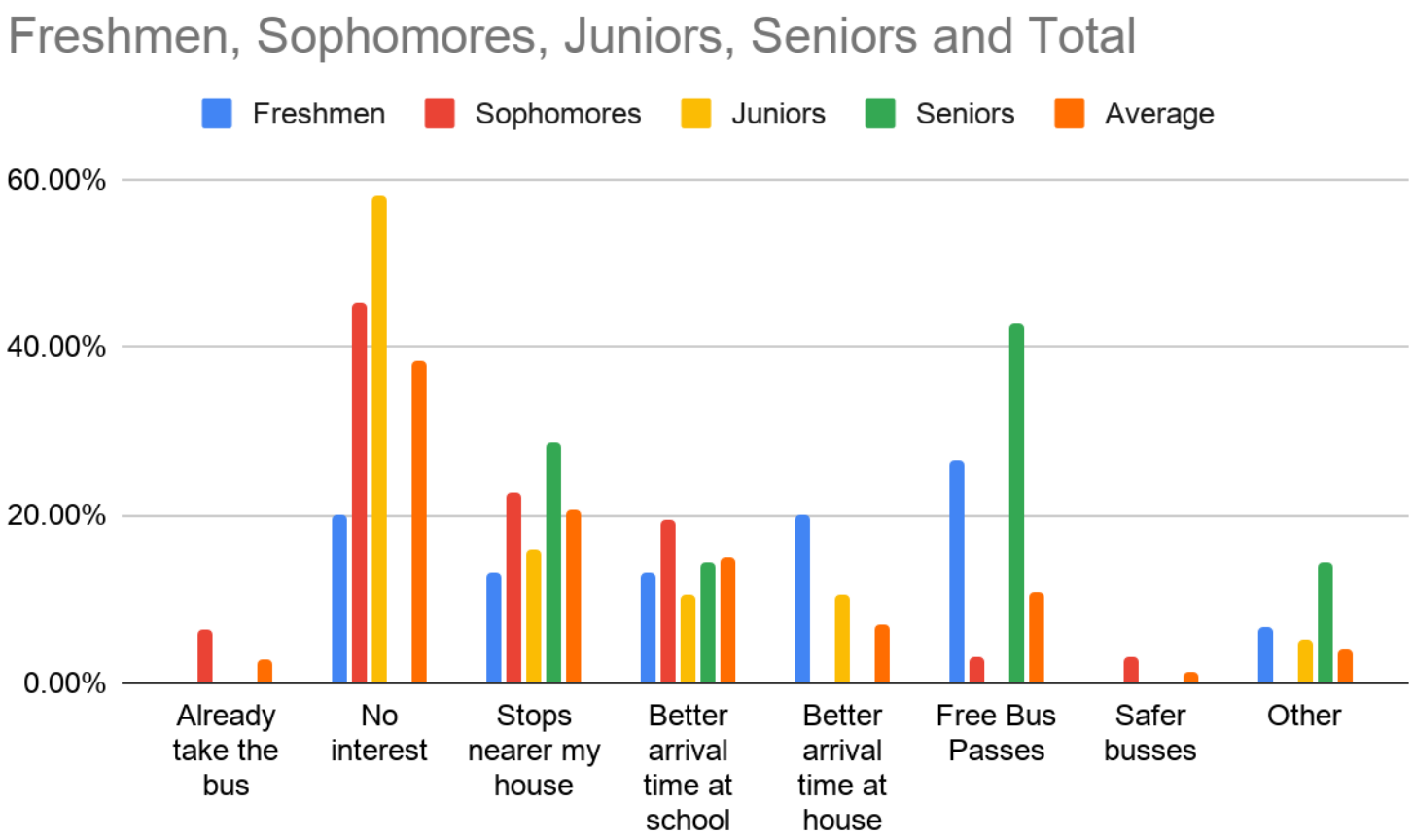
Table 3:

By Grade

	Already take the bus	No interest	Stops nearer my house	Better arrival time at school	Better arrival time at house	Free Bus Passes	Safer busses	Other
Freshmen	0.00%	20.00%	13.33%	13.33%	20.00%	26.67%	0.00%	6.67%

Sophomores	6.45%	45.16%	22.58%	19.35%	0.00%	3.23%	3.23%	0.00%
Juniors	0.00%	57.89%	15.79%	10.53%	10.53%	0.00%	0.00%	5.26%
Seniors	0.00%	0.00%	28.57%	14.29%	0.00%	42.86%	0.00%	14.29%
Average	2.74%	38.36%	20.55%	15.07%	6.85%	10.96%	1.37%	4.11%

Chart 3:

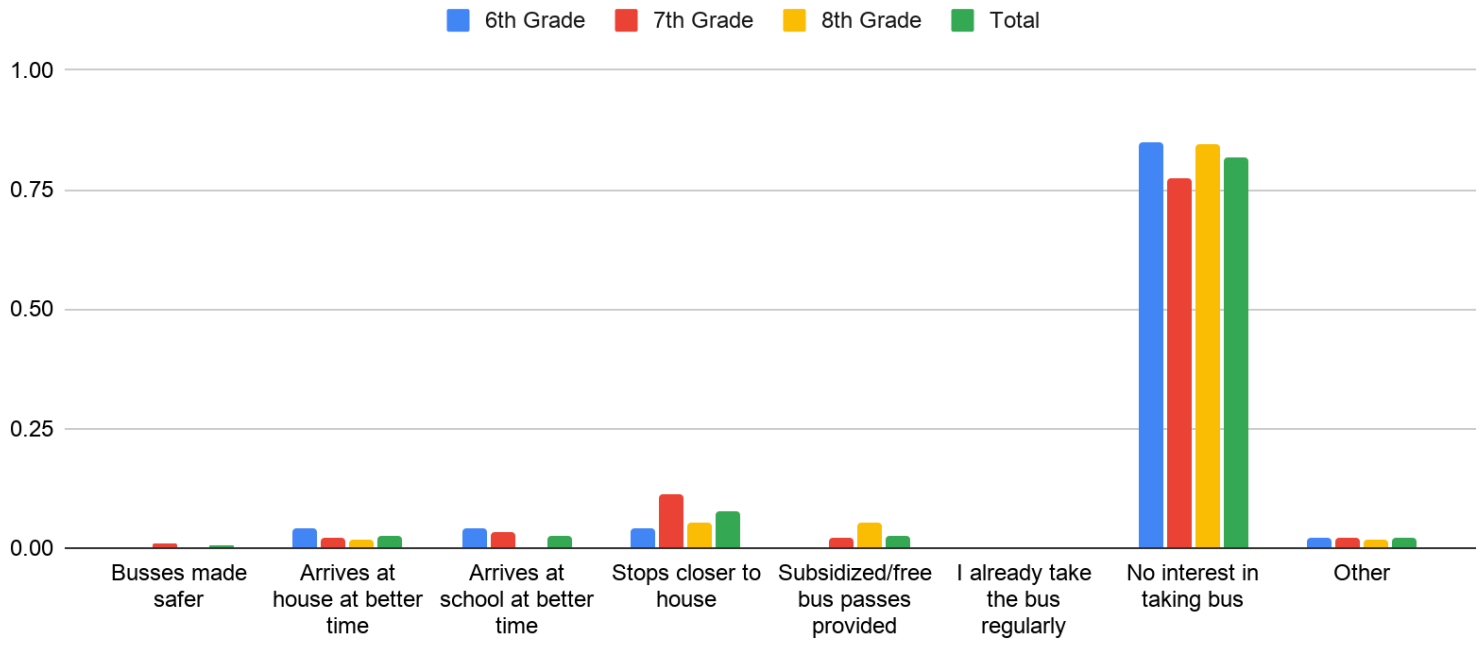


Which improvement would encourage you to take the bus more often? - Union

Table 4:

Grade	Busses made safer	Arrives at house at better	Arrives at school at better	Stops closer to	Subsidized/ free bus passes	I already take the bus	No interest in taking bus	Other
6th	0	4.30%	4.30%	4.30%	0	0	85.10%	2.10%
7th	1.10%	2.20%	3.40%	11.20%	2.20%	0	77.50%	2.20%
8th	0	1.80%	0	5.20%	5.20%	0	85%	1.80%
Total	0.52%	2.59%	2.59%	7.77%	2.59%	0.00%	81.87%	2.07%

Chart 4:



How early would you be willing to be dropped off at school? - LGHS

Table 5:

	5 mins	10 mins	20 mins	30 mins	45 mins	1hr	Average Wait Time
Freshmen	11.54%	15.38%	26.92%	34.62%	11.54%	0.00%	23 minutes
Sophomores	9.76%	24.39%	24.39%	29.27%	4.88%	7.32%	23 minutes

Juniors	14.81%	25.93%	22.22%	18.52%	7.41%	11.11%	23 minutes
Seniors	0.00%	11.11%	44.44%	22.22%	0.00%	22.22%	30 minutes
Listed time as an issue	0.00%	22.22%	44.44%	27.78%	5.56%	0.00%	22 minutes
Total	10.68%	21.36%	26.21%	27.18%	6.80%	7.77%	24 minutes

How early would you be willing to be dropped off at school? - Union

Table 6:

	5 minutes	10 minutes	20 minutes	30 minutes	45 minutes	1hr	Average Wait
6th	10.53%	39.47%	28.95%	13.16%	7.89%	0.00%	18
7th	20.00%	40.00%	30.77%	3.08%	4.62%	1.54%	15
8th	12.50%	0.00%	21.88%	15.63%	3.13%	21.88%	27
Listed time as an issue	12.00%	28.00%	28.00%	16.00%	12.00%	4.00%	22
Total	15.67%	36.57%	28.36%	8.96%	5.22%	5.97%	19

How late would you be willing to be picked up from school? - LGHS

Table 7:

	5 mins	10 mins	20 mins	30 mins	45 mins	1hr	Average Wait Time
Freshmen	11.54%	26.92%	23.08%	19.23%	7.69%	11.54%	24 minutes
Sophomores	12.20%	34.15%	21.95%	2.44%	7.32%	21.95%	26 minutes
Juniors	14.81%	18.52%	18.52%	25.93%	3.70%	18.52%	27 minutes
Seniors	0.00%	0.00%	33.33%	44.44%	0.00%	22.22%	33 minutes
Listed time as an issue	11.11%	33.33%	11.11%	22.22%	5.56%	16.67%	25 minutes
Total	11.65%	25.24%	22.33%	16.50%	5.83%	18.45%	26 minutes

How late would you be willing to be picked up from school? - Union

Table 8:

	5	10	20	30	45	1hr	Average Wait
6th Grade	31.60%	50%	13%	2.60%	0	2.60%	12 minutes
7th Grade	36.92%	36.92%	12.31%	7.69%	0.00%	6.15%	14 minutes
8th Grade	37.50%	25.00%	15.63%	9.38%	0.00%	9.38%	16 minutes
Listed time as an	19.23%	38.46%	19.23%	7.69%	0.00%	15.38%	21 minutes
Total	35.82%	38.06%	13.43%	6.72%	0.00%	5.97%	14 minutes

Nicolle Burnham

From: Elijah Asheghian <elijah.asheghian@icloud.com>
Sent: Thursday, May 7, 2026 5:11 PM
To: Nicolle Burnham; Gary Heap
Subject: Re: Bus Survey
Attachments: LGHS & Union Bus Survey Report.pages; Route 27 Cost-Benefit Analysis.pdf; VTA Route Redesign.pdf

[EXTERNAL SENDER]

Hello,

I wanted to provide the written items for the bus survey. I've attached my report along with two other documents that show the Route 27 cost-benefit analysis and route redesign plan made by a peer with computer science experience. These last two documents are available also at this website, and I would encourage commissioners to look here as we will update the site regularly: https://lgthinktank.com/los-gatos-transit/analysis.html. However, we will do our presentation off of the PDFs below.

To that end, is it alright to present with a peer who is not a Youth Commissioner? I've had considerable help from programmers outside the Youth Commission in developing our traffic model and I think it would be valuable to the Commission to be able to ask them questions and hear their input on our program.

I also intend to provide a brief verbal report on the recent results of the LGHS Traffic Safety survey, if that is of interest to the commission and within the scope of this agenda item.

Thanks so much for setting this up. I'm looking forward to sharing Traffic Safety's work and some exciting next steps for public transit!

Eli

> On May 4, 2026, at 1:54 PM, Nicolle Burnham <NBurnham@losgatosca.gov> wrote:
>
> Great. Thank you. I won't be at that meeting. Gary will be the staff contact that day.
>
> ---
>
> **From:** Elijah Asheghian <elijah.asheghian@icloud.com>
> **Sent:** Monday, May 4, 2026 10:54 AM
> **To:** Nicolle Burnham <NBurnham@losgatosca.gov>
> **Cc:** Gary Heap <GHeap@losgatosca.gov>
> **Subject:** Re: Bus Survey
>
> [EXTERNAL SENDER]
>
> Hello Director Burnham,

Yes, there are written items associated with the bus survey. I am still putting them together but they will be ready by 5/7.

Thanks for reminding me.
Eli

> On May 4, 2026, at 10:47 AM, Nicolle Burnham <NBurnham@losgatosca.gov> wrote:
>
> Hi Eli –
> Do you have any written documents associated with the bus survey work? If so please provide them by 5/7 end of day (or by 8 AM on 5/8) so we can include them with the agenda. Otherwise I'll assume you will provide a verbal report.
>
> Thank you
>
> <image002.jpg>**Nicolle Burnham ● Director**
> Parks and Public Works ● 41 Miles Avenue, Los Gatos, CA 95030
> Desk: 408.399.5774 ● nburnham@losgatosca.gov
>
> www.losgatosca.gov ● https://www.facebook.com/losgatosca

PROJECT · LOS GATOS TRANSIT · FULL ANALYSIS

Los Gatos transit, by the numbers, and what to do about it.

This is the full cost-benefit dashboard behind the project summary. Sixteen districts, eight federally-recognized benefit categories, 20-year present value at the federally-prescribed discount rates. It's a lot, but every number links back to its source so you can audit it.

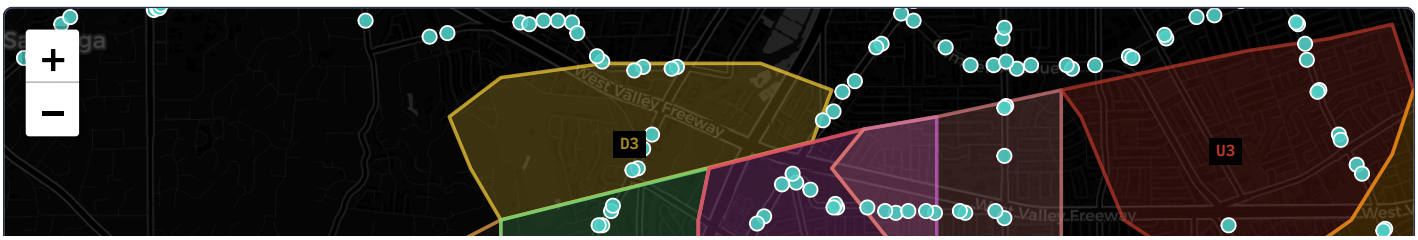
The headline: the *existing* Los Gatos transit network, flawed as it is, already returns **$1.71 in benefits per $1 spent** over 20 years at the OMB-recommended 3.5% discount rate. The numbers below are for the **current network**; a redesigned version (see Route redesign) is projected to do meaningfully better, and is the subject of the next phase of work.

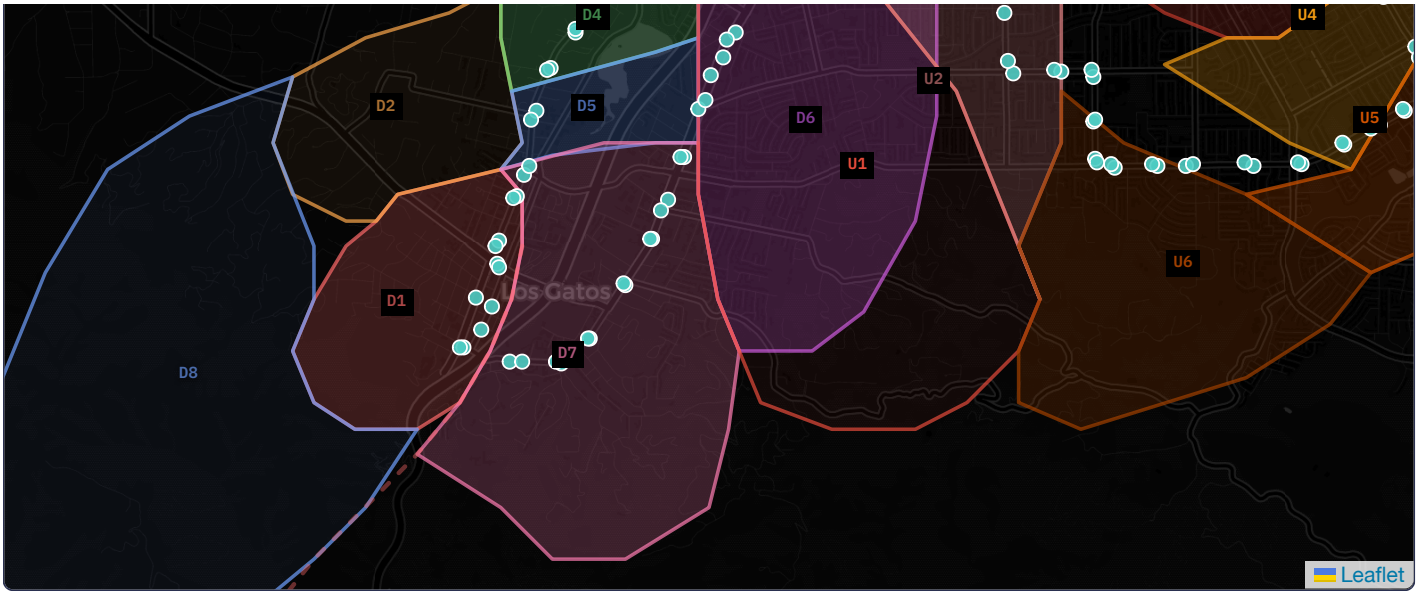
Reading note for transit-planning reviewers: every figure on this page, including the FTA Cost-Effectiveness Index ($/TSUB-hr) shown inside the "Present Value Analysis" breakdown, describes the **current network as it operates today**, not the optimised network. The current CEI rating reflects today's service pattern; the optimised redesign is evaluated on its own page.

▸ METHODOLOGY CORRECTIONS & FEDERAL-GUIDANCE UPDATES APPLIED

DISTRICT MAP + TRANSIT

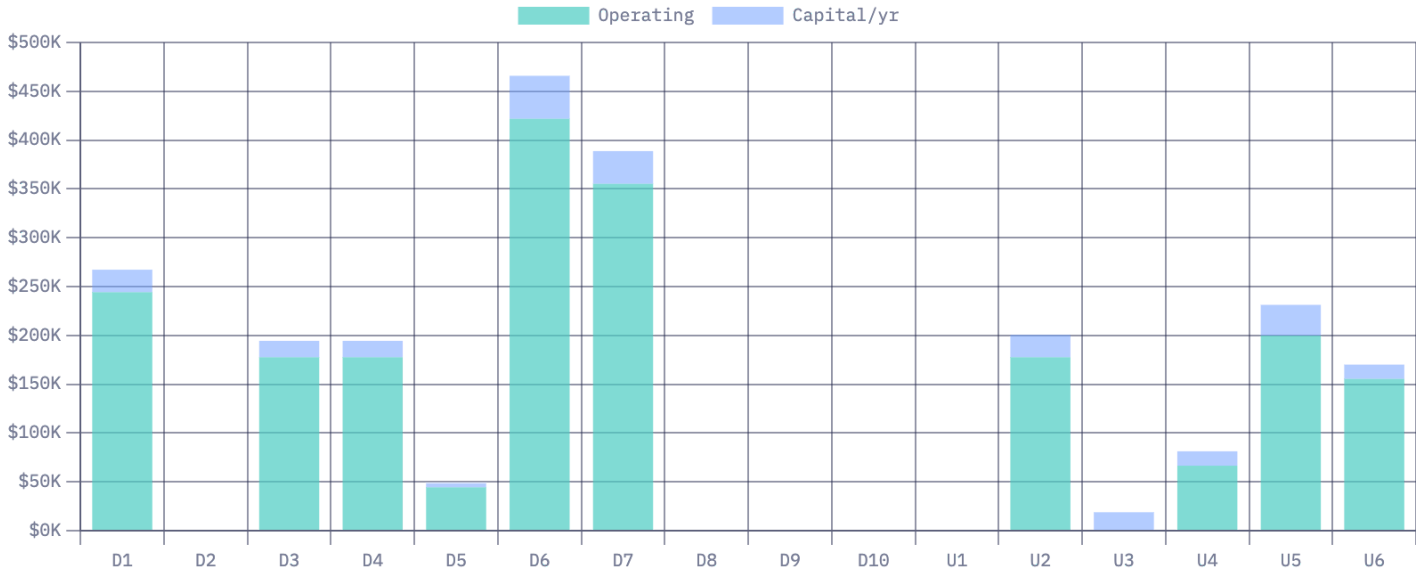
Click any district to see its profile. Teal pins = Route 27 stops. Red = Route 76 (discontinued in 2010). Orange = Highway 17 Express.





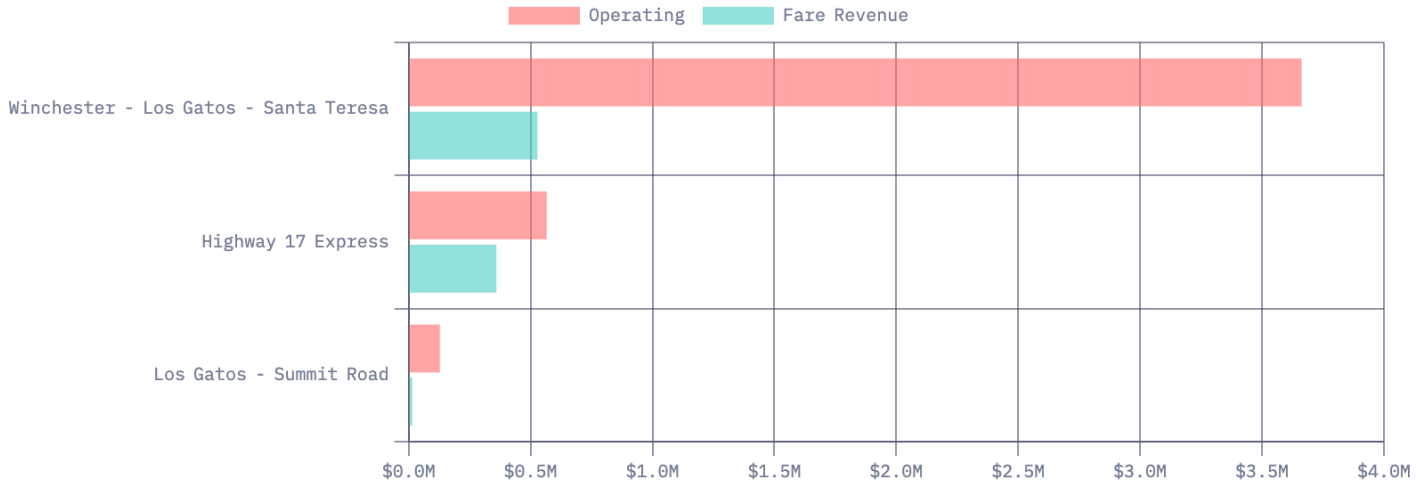
ANNUAL COST BY DISTRICT

How much each district costs to serve per year. A $0 bar means there is no transit service in that district at all, that is the coverage gap.



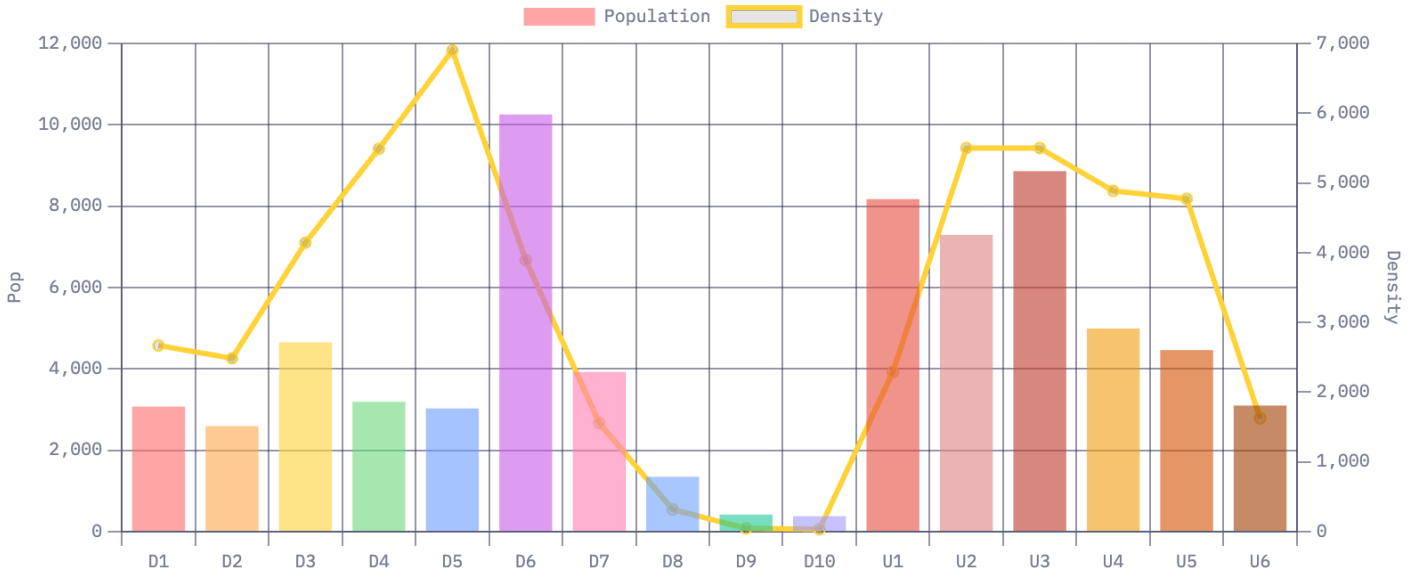
ROUTE FINANCIALS

What each route costs to run versus the fares it brings in. Most US transit systems run a deficit by design, the public benefit is what justifies the gap.



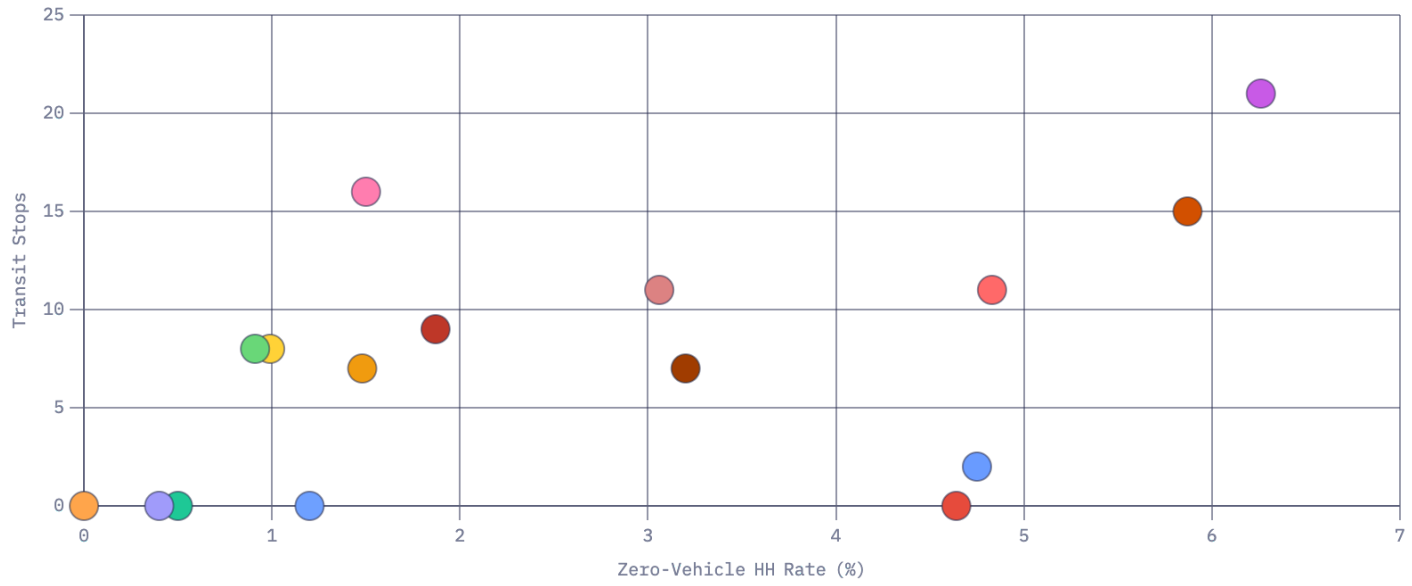
POPULATION + DENSITY

Bars show how many people live in each district; the line shows how dense it is. Density drives whether transit can work.



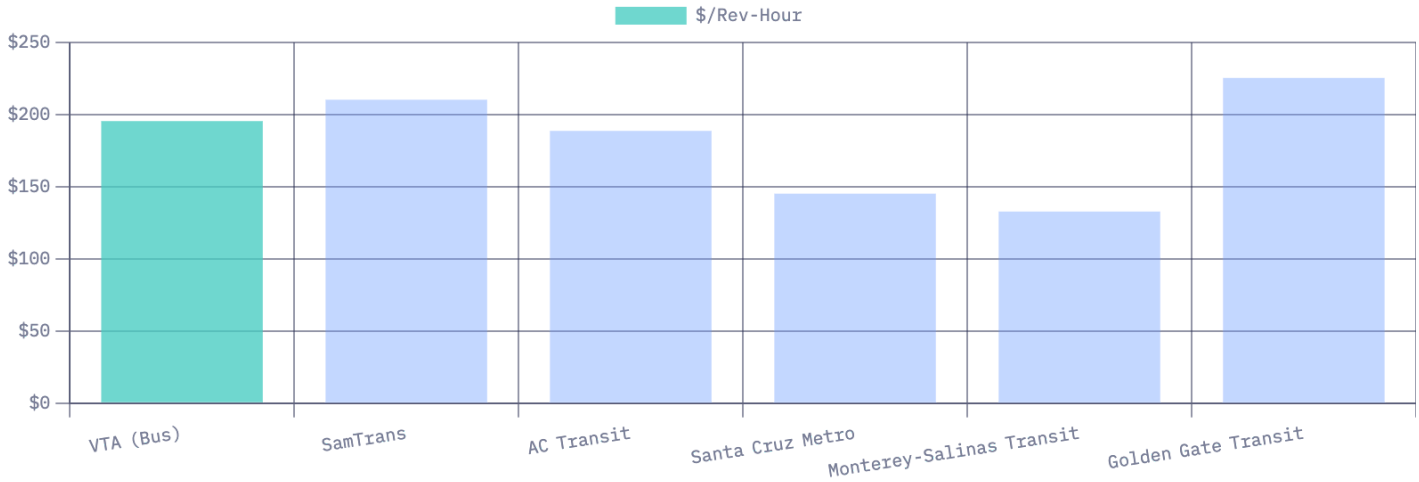
TRANSIT EQUITY

How many households have no car (vertical) versus how many bus stops they have (horizontal). Districts in the bottom-right have the most unmet need.



NTD PEER BENCHMARKS

How VTA's bus operating cost compares to other California transit agencies (per hour of service delivered).



PRESENT VALUE ANALYSIS

What this network costs to run versus what it returns over 20 years. Click any card for the breakdown by benefit category and discount rate.

Reading these cards: BCR > 1.0 = benefits exceed costs. The 3.5% rate is OMB's recommended rate for long-lived infrastructure. All costs are the study-area share of VTA route costs (not full system). Benefits use corrected SCC ($120/tCO₂) and include induced demand (8th category).

2.0% DISCOUNT RATE

BCR 1.73

Costs: $47.4M | Benefits: $81.7M

Net: $34.4M

3.5% DISCOUNT RATE

BCR 1.71

Costs: $41.4M | Benefits: $70.7M

Net: $29.3M

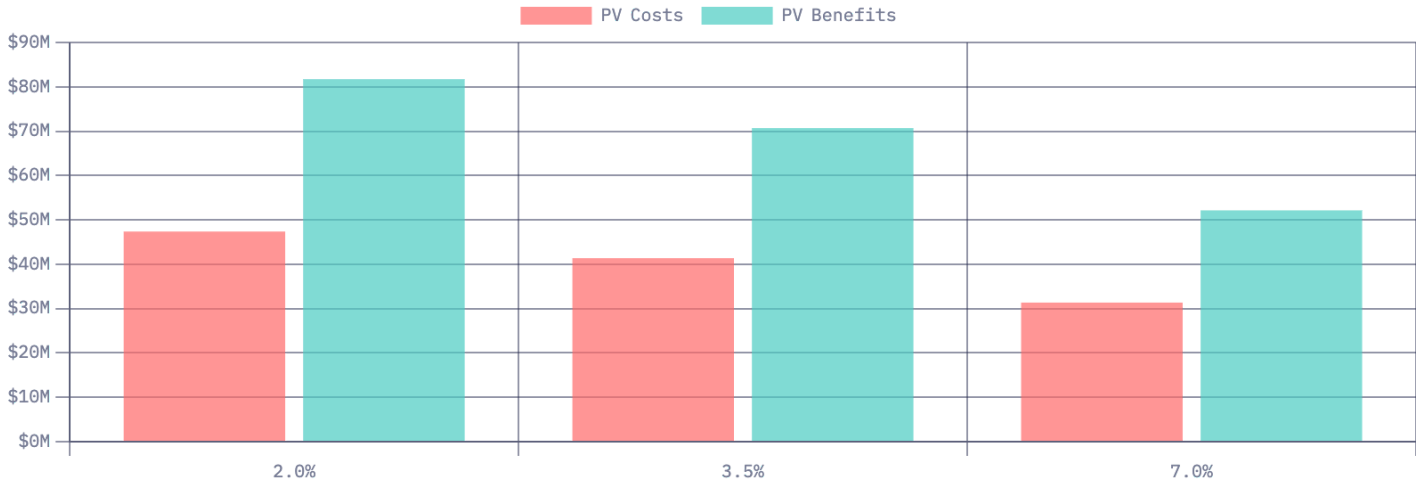
7.0% DISCOUNT RATE

BCR 1.66

Costs: $31.4M | Benefits: $52.1M

Net: $20.8M

Click for breakdown | Click for breakdown | Click for breakdown



ROUTE 76 RESTORATION SCENARIO

VTA Route 76, Downtown LG to Summit Road

$900K	$128K/yr	$113K/yr	$17.76	4 trips/day
Capital Investment	Operating Cost	Net Cost	Cost/Boarding	School Days (180/yr)

~40/day	12 mi	8 stops
Est. Boardings	Route Length	To Rehabilitate

Discontinued June 2010. Was the only transit to 95033 mountain communities (Summit Road, Loma Prieta, Skyland, about 8,000 residents). Maintained for LGHS student access. Bus stop signs still present. CBA Phase A3 will evaluate whether benefits justify the $113K/yr net cost.

BENEFIT CATEGORY REFERENCE

These are the eight ways transit creates economic value, each with a federally-defined methodology. Add them up over 20 years and compare to costs.

How the CBA works: For each year over 20 years, the model computes the economic value of benefits (right column) and compares them to the annual cost of running the transit service. Benefits and costs are discounted back to present value at OMB-prescribed rates (2%, 3.5%, 7%). The Benefit-Cost Ratio (BCR) is PV Benefits ÷ PV Costs. BCR > 1.0 means the service creates more economic value than it costs.

CATEGORY 1

Travel Time Savings

When a transit rider switches from driving, they save the productive value of reduced auto travel time. Transit in-vehicle time is valued at 60% of auto time (riders can read, work, or rest). VOT is split by trip purpose: personal trips = $17.80/hr, employer business trips =

CATEGORY 2

Vehicle Operating Cost Savings

Every auto trip replaced by transit avoids the marginal cost of operating a private vehicle: fuel, oil, tires, and maintenance. At $0.68/mile (AAA 2024 CA average) and 7.5-mile average trip, each diverted ride saves ~$5.10

$31.90/hr (25% of LG ridership estimated as work trips via ACS).

USDOT BCA Guidance 2024, Table 4 • OMB Circular A-94

in vehicle costs. Across tens of thousands of annual boardings this accumulates rapidly.

AAA "Your Driving Costs" 2024 • FTA CBA Guidelines

CATEGORY 3

Crash Reduction

Fewer miles driven means fewer crashes. Using Santa Clara County crash rates (~120 crashes/100M VMT, SWITRS 5-year average) and FHWA KABCO severity weights, each avoided VMT reduces expected crash costs. Fatal crashes are valued at $12.8M (USDOT VSL 2024). Even rare reductions in serious injury rates produce large economic benefits.

FHWA crash cost tables (2022 update) • SWITRS Santa Clara County

CATEGORY 4

Emission Reduction

Avoided auto VMT reduces CO_2, NOx, and PM2.5 emissions. CO_2 is valued at **$120/metric ton** per EPA 2022 regulatory guidance (3% rate), corrected from the prior $56/ton IWG value. This ~114% increase in the SCC substantially raises this benefit category. Criteria pollutant health damage valued via EPA BenMAP-CE.

EPA SC-CO_2 Comprehensive Update 2022 • EPA MOVES3.1 • BenMAP-CE

CATEGORY 5

Health Benefits (Active Transport)

Transit riders walk an average of 12 minutes per trip to and from stops (WHO HEAT default). This physical activity reduces mortality risk and healthcare costs at $0.16 per walking minute (CDC valuation of avoided sedentary-related costs). For a system with ~264K annual boardings this represents ~790K walking-hours per year of health benefit.

WHO HEAT v5.2 • CDC Physical Activity Economics 2023

CATEGORY 6

Reliability Benefits

Transit schedules are more predictable than driving on SR-17 and SR-85, where congestion variability can add 10-25% to travel time. Travelers value reliability at 80% of mean travel time savings (USDOT guidance). Observed schedule data shows average deviation of +2.2 minutes at LGHS stops, confirming real variability in this corridor.

USDOT BCA Guidance 2024, Section 5.3 • PeMS SR-17 observed data

CATEGORY 7

Option Value

Even non-riders benefit from transit availability. When a car breaks down, gas prices spike, or someone loses driving ability, transit provides a backup. This option value is estimated at $20-$40 per capita per year (mid-range of stated-preference studies). With ~68,000 residents in the service area, this is a significant base benefit that does not depend on ridership levels.

TCRP Report 78, Section 4.5 • Boardman et al. Ch. 6

CATEGORY 8, NEW

Induced Demand (Accessibility)

Not all transit riders would otherwise drive. An estimated 20% of riders are *induced*, they make trips that simply would not occur without transit: seniors without licenses, teens, zero-car households, and people making trips that aren't worth the parking cost. Their economic benefit is valued at 50% of the equivalent auto trip cost (consumer surplus triangle). This category is absent from analyses that assume all ridership is auto diversion.

TCRP Report 95, Ch. 1 • Boardman et al. Ch. 5 (demand curve CS triangle)

What is NOT counted here (conservative scope): Property value uplift near stops (+2% within 0.5mi, Optimistic scenario only) • Wider agglomeration/labor market effects • CEQA/environmental compliance value • Tax revenue impacts • School access value (Moderate/Optimistic scenarios only) • Route 76 restoration benefits (separate scenario analysis below)

FULL DISTRICT TABLE

ID	NAME	ZONE	POP	DENSITY	INCOME	ZV%	STOPS	OP COST	TOTAL/YR	CRASHES
D1	Downtown / Town Core	LGHS	3,074	2,669	$216,380	4.8%	11	$244,200	$267,276	14
D2	Vasona / Northwest	LGHS	2,594	2,486	$250,001	0.0%	0	$0	$0	15
D3	North Gateway	LGHS	4,652	4,143	$207,906	1.0%	8	$177,600	$194,383	12
D4	Northeast / Lark-85	LGHS	3,192	5,490	$207,074	0.9%	8	$177,600	$194,383	6
D5	Central East / Blossom-Lark	LGHS	3,029	6,900	$172,950	4.8%	2	$44,400	$48,596	16
D6	East Los Gatos / Belwood	LGHS	10,254	3,893	$192,905	6.3%	21	$421,800	$465,854	29
D7	South Hills / Shannon-Almond	LGHS	3,926	1,558	$176,123	1.5%	16	$355,200	$388,765	48
D8	West Foothills / SR-17 Approach	LGHS	1,350	319	$155,000	1.2%	0	$0	$0	1
D9	Lexington / SR-17 Mountain Corridor	LGHS	420	46	$180,000	0.5%	0	$0	$0	0
D10	Skyline / Summit Mountains	LGHS	380	34	$175,000	0.4%	0	$0	$0	0
U1	Alta Vista / LG West	UNION	8,174	2,293	$199,945	4.6%	0	$0	$0	0
U2	Noddin / Westhill	UNION	7,295	5,500	$197,804	3.1%	11	$177,600	$200,676	0
U3	Carlton / N. Camden	UNION	8,861	5,500	$157,512	1.9%	9	$0	$18,880	0

U4	Oster / Lencar	UNION	4,995	4,886	$145,168	1.5%	7	$66,600	$81,285	0
U5	Lietz / Dartmouth	UNION	4,463	4,773	$165,979	5.9%	15	$199,800	$231,267	0
U6	Guadalupe / S. Almaden	UNION	3,100	1,625	$105,000	3.2%	7	$155,400	$170,085	0

Glossary

Every acronym and key concept used in this analysis, with sources. Underlined terms in the page text show a definition on hover. Click any term to jump here.

ACS — American Community Survey

The U.S. Census Bureau's annual survey providing estimates of demographics, income, commute mode, and vehicle availability. The primary source of equity and demand data in this analysis. census.gov/acs.

BCR — Benefit-Cost Ratio

Present value of total benefits divided by present value of total costs. A BCR above 1.0 means the project's economic value exceeds its cost and is worth funding. See also: NPV, discount rate. USDOT BCA Guidance 2024.

BenMAP-CE — Environmental Benefits Mapping and Analysis Program

EPA's tool that translates changes in air pollutant concentrations to health outcomes and economic damages. Used for criteria pollutant benefits in Category 4. EPA BenMAP page.

CEI — Cost Effectiveness Index

Annual net project cost divided by annualized user benefits in TSUB-hours. The FTA CIG threshold is below $2 per TSUB-hr for Medium-High rating and below $4 for Medium. Required for federal Capital Investment Grant applications. FTA CIG Policy Guidance.

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The FTA's primary discretionary funding program for major transit projects, including New Starts, Small Starts, and Core Capacity. Applications require a Cost Effectiveness Index below FTA thresholds. transit.dot.gov/CIG.

Clarke-Wright — Clarke-Wright Savings Algorithm

A vehicle routing algorithm that builds efficient routes by merging individual trips wherever doing so saves distance. Used in Phase B to optimize the Route 27 stop sequence. TCRP Report 19.

EPA — U.S. Environmental Protection Agency

Federal agency responsible for environmental regulation. The EPA's 2022 Social Cost of Carbon update raised the value from $56 to $120 per metric ton of CO2, substantially increasing the emission-reduction benefit category in this analysis. EPA SC-GHG Report 2023.

FHWA — Federal Highway Administration

The U.S. DOT agency responsible for highway infrastructure. Publishes the KABCO crash cost tables used in the safety benefit calculation in Category 3. FHWA Crash Cost Tables.

FTA — Federal Transit Administration

The U.S. DOT agency that funds, regulates, and provides technical guidance for public transit. Administers the Capital Investment Grant program and publishes the cost-benefit analysis guidelines used throughout this analysis. transit.dot.gov.

FTA Circular 9040.1G

FTA's Formula Grants for Rural Areas program guidance circular. Sets minimum stop spacing, accessibility, and service standards for federally funded rural and suburban transit. Used as the baseline stop-spacing criterion in Phase B route optimization. Superseded by Circular 9040.1H (November 2024). Circular 9040.1H (Nov 2024).

GTFS — General Transit Feed Specification

The open standard format for transit schedules, including stops.txt, trips.txt, and stop_times.txt. This analysis ingests VTA's GTFS feed for stop locations, routes, and headways. gtfs.org.

KABCO — KABCO Crash Severity Scale

K = Fatal, A = Severe Injury, B = Moderate Injury, C = Minor Injury, O = Property Damage Only. Used by FHWA and SWITRS to weight crash costs in safety benefit calculations. FHWA Crash Costs for Highway Safety Analysis.

LGHS — Los Gatos High School

Los Gatos High School, a major trip generator in the study area and the anchor institution for school-trip demand modeling. Route 76 was maintained in part for LGHS student access before discontinuation in June 2010.

MOVES3.1 — Motor Vehicle Emission Simulator, version 3.1

EPA's emissions modeling tool. Used to estimate per-mile emission factors for CO2, NOx, and PM2.5 from avoided automobile trips in the emission-reduction benefit category. EPA MOVES page.

Mohring — Mohring (1972) Wait-Time Formula

An economic formula showing that the optimal transit frequency increases with ridership, because the cost of waiting is shared among more passengers. Used in Phase B to derive peak and off-peak headways from the demand model.

NPV — Net Present Value

The sum of all future cash flows (benefits minus costs) discounted to today's dollars. A positive NPV means the project produces a net economic gain over the analysis period. See also: BCR, discount rate, PV.

NTD — National Transit Database

The FTA's annual data collection from U.S. transit agencies covering ridership, costs, and service statistics. Used here for peer benchmarking of VTA operating costs against California peers. transit.dot.gov/ntd.

OMB — Office of Management and Budget

White House office that sets federal guidelines for budget analysis. OMB Circular A-94 prescribes the discount rates (2%, 3.5%, 7%) used in this dashboard for infrastructure cost-benefit analysis. OMB Circular A-94.

OMB Circular A-94

The federal guidelines for benefit-cost analysis of government programs. Prescribes the discount rates (2%, 3.5%, 7%) used in this dashboard. Required methodology for federal infrastructure investment analysis. OMB Circular A-94 (PDF).

PV — Present Value

The current worth of a future sum of money, discounted at a chosen rate to reflect the time value of money. See also: NPV, discount rate, BCR.

SCC — Social Cost of Carbon

The estimated economic damage caused by emitting one metric ton of CO2. The EPA SC-GHG Report (Dec 2023) sets SCC at $120 per ton at a 3% discount rate, up from the prior $56 per ton IWG value used in many older transit analyses. EPA SC-GHG Report (Dec 2023).

SWITRS — Statewide Integrated Traffic Records System

California's crash database maintained by the California Highway Patrol. Used to derive Santa Clara County crash rates (approximately 120 crashes per 100 million VMT) for Category 3 safety benefits. UC Berkeley TIMS.

TCRP — Transit Cooperative Research Program

A federally funded research program producing peer-reviewed transit planning guidance. TCRP Report 95 underpins the induced-demand category; Report 78 underpins option value

estimates; Report 19 provides route optimization methods. trb.org/TCRP.

TSUB — Transportation System User Benefit

The FTA metric for CIG cost effectiveness. Measures time saved by diverted auto users plus transit travel time for transit-dependent users, in hours per year. Used to compute the Cost Effectiveness Index. FTA CIG Policy Guidance.

USDOT — U.S. Department of Transportation

Sets federal cost-benefit analysis guidance values including Value of Time, Value of a Statistical Life, and discount rate recommendations used throughout this analysis. USDOT BCA Guidance 2024.

VMT — Vehicle Miles Traveled

The total miles driven by motor vehicles in a given area and period. Reducing VMT cuts emissions, crashes, and congestion. Emission factors come from MOVES3.1; crash costs are weighted using the KABCO scale.

VOT — Value of Time

The dollar value assigned to one hour of travel time, used to monetize travel time savings. USDOT BCA Guidance 2024 sets $17.80 per hour for personal trips and $31.90 per hour for employer business trips. USDOT BCA Guidance 2024.

VSL — Value of a Statistical Life

The dollar amount used in regulatory analysis to represent the economic cost of a fatality. USDOT 2024 sets VSL at $12.8 million per fatality, used in crash-reduction benefit calculations. USDOT VSL Guidance.

VTA — Santa Clara Valley Transportation Authority

The regional transit agency that operates bus and light-rail service in Santa Clara County, including Route 27 (Winchester to Los Gatos), the discontinued Route 76 (Los Gatos to Summit Road), and the Highway 17 Express. The primary operator studied in this cost-benefit analysis. vta.org.

WHO HEAT — WHO Health Economic Assessment Tool

World Health Organization tool that quantifies the mortality-reduction benefit of walking and cycling. Version 5.2 default: 12 walk-minutes per transit trip, valued at $0.16 per minute. Used for Health Benefits (Active Transport) in Category 5. WHO HEAT tool.

consumer surplus — Consumer Surplus

The economic benefit a consumer receives beyond what they pay. In transit cost-benefit analysis, induced riders gain a surplus equal to roughly 50% of the auto trip cost they would

have faced, because their willingness to pay is lower than that cost. Boardman et al., Ch. 3.

discount rate — Discount Rate

The annual rate used to convert future dollars into present-value dollars. Higher rates reduce the weight given to distant future benefits. OMB Circular A-94 prescribes 2%, 3.5%, and 7% for infrastructure cost-benefit sensitivity testing. OMB Circular A-94.

diversion rate — Diversion Rate

The share of transit riders who previously made the same trip by private automobile. Auto-diversion riders generate vehicle operating cost savings, time savings, crash reduction, and emission reduction benefits. The complementary share is induced demand.

headway — Headway

The time interval between consecutive transit vehicle departures on the same route. Shorter headways mean more frequent service. Headways in this analysis are computed using the Mohring (1972) wait-time formula calibrated to demand.

induced demand — Induced Demand

Trips that only happen because transit exists, riders who would not otherwise have made the trip by any mode. Estimated at 20% of boardings per TCRP Report 95. Valued via consumer surplus (50% of equivalent auto trip value) rather than auto diversion savings. TCRP Report 95.

option value — Option Value

The economic value that non-riders place on the mere availability of transit, as insurance against car breakdown, gas price spikes, or loss of driving ability. Estimated at $20 to $40 per capita per year from stated-preference surveys. TCRP Report 78.

walk-shed — Walk-Shed

The area reachable on foot within a given time (typically 5 to 10 minutes, or 0.25 to 0.5 miles) from a transit stop. A larger walk-shed means the stop serves more potential riders. Buffer standards follow FTA Circular 9040.1H. FTA Circular 9040.1H.

In progress, finalizing public dashboard

Route redesign, coming together.

The interactive route-redesign tool, corridor maps, candidate stops, headway scheduling, and ridership projections, is being finalized. The numbers it depends on are already published in the cost-benefit analysis. This page explains what is in it and what comes next.

Read the analysis now Back to project home

PHASE B RESULTS, ALREADY COMPUTED

What the optimization found

The Clarke-Wright routing algorithm and FTA Circular 9040.1G stop spacing standard have already been run. These numbers are from the pipeline output. The public-facing dashboard to present them is what remains.

13
New candidate stops identified on Route 27 corridor

117
Total stops in optimized network (existing + new)

1.71
BCR, Route 27 current network (20-yr, 3.5% discount)

~264K
Current annual boardings, Route 27

~317K
Projected annual boardings, optimized Route 27 (+20%)

<1.0
BCR, Route 76 restoration scenario — not yet sufficient to recommend

Clarke-Wright savings algorithm | FTA Circular 9040.1G spacing | Mohring (1972) headway formula | BCR per stop, OMB A-94 3.5%, 20 yr | GTFS output, 8 files | Public corridor map | Ridership projection display

What will be on this page

Estimated availability: the pipeline already generates the underlying data. What remains is the public-facing version readable without a transit-planning background. Contact elijah.asheghian@icloud.com to say what would be most useful to see first.

01

Redesigned Route 27 corridor

The optimized Route 27 spine with 13 new candidate stops placed by the model in neighborhoods that currently have no service. Each stop has a benefit-cost ratio under FTA Circular 9040.1G spacing rules. The highest-ranked are mapped first.

02

Schedule and headways

Frequency by time-of-day window using the Mohring (1972) wait-time formula, calibrated to the demand model. Includes peak and off-peak headways and the school-trip windows that drive Route 76 demand at LGHS.

03

Ridership projections

Daily boardings by route, derived from the Transit Demand Index (population

04

Route 76 restoration scenario

The standalone case for restoring service to the 95033 mountain

density, zero-vehicle households, transit commute share, income, age dependence, and employment) plus the student survey for school trips.

communities that lost their only transit link in 2010. Capital, operating cost, expected boardings, and the BCR comparison against doing nothing.

Route 76, the case for restoration

Route 76 ran from downtown Los Gatos to Summit Road in the 95033 zip code, serving roughly 8,000 mountain-community residents including students at LGHS. It was discontinued in June 2010. The bus stop signs are still standing.

The cost-benefit model has already evaluated the restoration scenario. The numbers below are from Phase A3 of the analysis.

$900K Capital investment to restore service	**$128K/yr** Annual operating cost	**$113K/yr** Net cost (operating minus fare revenue)	**$17.76** Cost per boarding
~40/day Estimated boardings on school days	**8** Stops to rehabilitate		

Note on cost per boarding: $17.76 per boarding is high relative to Route 27 ($9.77), but comparable to rural transit nationally (NTD peer average: $10 to $18). The mountain corridor has low density and long distances. The BCR evaluation under Phase A3 will determine whether social benefits justify the net cost. See BCR in the glossary.

Methods applied in Phase B

METHOD	WHAT IT DOES	STANDARD
Clarke-Wright	Builds efficient route sequences by merging trip pairs wherever the distance saving is positive. Applied to the 16-district origin-destination matrix.	TCRP Report 19
FTA 9040.1G spacing	Minimum and maximum stop spacing rules: quarter-mile in urban zones (D1 to D5, D7), half-mile in suburban zones. Candidate stops that violate spacing are rejected.	FTA Circular 9040.1G, now superseded by 9040.1H
Mohring headways	Derives optimal frequency from ridership demand. Higher demand justifies shorter headways because the wait-time cost is shared among more passengers.	Mohring (1972), Transport Economics
Stop BCR	Each new candidate stop is evaluated on a 20-year benefit-cost ratio using marginal walkshed population, estimated new boardings, and the USDOT BCA 2024 value per boarding.	USDOT BCA Guidance 2024, OMB Circular A-94
School constraints	Union Middle School (14:25 dismissal) and Dartmouth Middle School (15:55 dismissal) are hard constraints. The schedule must deliver a trip within 10 minutes of each dismissal window.	Student survey diversion rate, GTFS schedule
GTFS output	The pipeline writes a valid GTFS feed for the optimized network: stops.txt, trips.txt, stop_times.txt, routes.txt, calendar.txt, shapes.txt, agency.txt, feed_info.txt.	GTFS Schedule Reference v2.0

Model corrections applied

Four corrections from federal guidance updates are applied throughout this analysis. They differ from the defaults often seen in older transit reports.

- **Social Cost of Carbon raised from $56 to $120 per metric ton CO2.** Per EPA's 2022 regulatory update, which supersedes the older Interagency Working Group value. This roughly doubles the emission-reduction benefit category.
- **Value of Time split by trip purpose.** USDOT BCA Guidance 2024 Table 4: personal trips at $17.80 per hour, employer business trips at $31.90 per hour. Prior analyses used a flat $20.60 per hour for all trips.
- **Induced demand counted as an 8th benefit category.** Per TCRP Report 95, roughly 20% of riders are enabled by transit rather than diverted from auto trips. Older analyses miss this group entirely, which understates benefits.
- **FTA Cost Effectiveness Index reported for every scenario.** The CEI is the required metric for federal Capital Investment Grant applications. Reporting it allows direct comparison against funded projects elsewhere.

See all corrections in the full analysis

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OMB Circular A-94

The federal guidelines for benefit-cost analysis of government programs. Prescribes the discount rates (2%, 3.5%, 7%) used in this dashboard. Required methodology for federal infrastructure investment analysis. OMB Circular A-94 (PDF).

PV — Present Value

The current worth of a future sum of money, discounted at a chosen rate to reflect the time value of money. See also: NPV, discount rate, BCR.

SCC — Social Cost of Carbon

The estimated economic damage caused by emitting one metric ton of CO2. The EPA SC-GHG Report (Dec 2023) sets SCC at $120 per ton at a 3% discount rate, up from the prior $56 per ton IWG value used in many older transit analyses. EPA SC-GHG Report (Dec 2023).

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VSL — Value of a Statistical Life

The dollar amount used in regulatory analysis to represent the economic cost of a fatality. USDOT 2024 sets VSL at $12.8 million per fatality, used in crash-reduction benefit calculations. USDOT VSL Guidance.

VTA — Santa Clara Valley Transportation Authority

The regional transit agency that operates bus and light-rail service in Santa Clara County, including Route 27 (Winchester to Los Gatos), the discontinued Route 76 (Los Gatos to Summit Road), and the Highway 17 Express. The primary operator studied in this cost-benefit analysis. vta.org.

WHO HEAT — WHO Health Economic Assessment Tool

World Health Organization tool that quantifies the mortality-reduction benefit of walking and cycling. Version 5.2 default: 12 walk-minutes per transit trip, valued at $0.16 per minute. Used for Health Benefits (Active Transport) in Category 5. WHO HEAT tool.

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consumer surplus — Consumer Surplus

The economic benefit a consumer receives beyond what they pay. In transit cost-benefit analysis, induced riders gain a surplus equal to roughly 50% of the auto trip cost they would have faced, because their willingness to pay is lower than that cost. Boardman et al., Ch. 3.

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discount rate — Discount Rate

The annual rate used to convert future dollars into present-value dollars. Higher rates reduce the weight given to distant future benefits. OMB Circular A-94 prescribes 2%, 3.5%, and 7% for infrastructure cost-benefit sensitivity testing. OMB Circular A-94.

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diversion rate — Diversion Rate

The share of transit riders who previously made the same trip by private automobile. Auto-diversion riders generate vehicle operating cost savings, time savings, crash reduction, and emission reduction benefits. The complementary share is induced demand.

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headway — Headway

The time interval between consecutive transit vehicle departures on the same route. Shorter headways mean more frequent service. Headways in this analysis are computed using the Mohring (1972) wait-time formula calibrated to demand.

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induced demand — Induced Demand

Trips that only happen because transit exists, riders who would not otherwise have made the trip by any mode. Estimated at 20% of boardings per TCRP Report 95. Valued via consumer surplus (50% of equivalent auto trip value) rather than auto diversion savings. TCRP Report 95.

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option value — Option Value

The economic value that non-riders place on the mere availability of transit, as insurance against car breakdown, gas price spikes, or loss of driving ability. Estimated at $20 to $40 per capita per year from stated-preference surveys. TCRP Report 78.

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walk-shed — Walk-Shed

The area reachable on foot within a given time (typically 5 to 10 minutes, or 0.25 to 0.5 miles) from a transit stop. A larger walk-shed means the stop serves more potential riders. Buffer standards follow FTA Circular 9040.1H. FTA Circular 9040.1H.
