Downtown East Valley

Capitol Expressway Light Rail

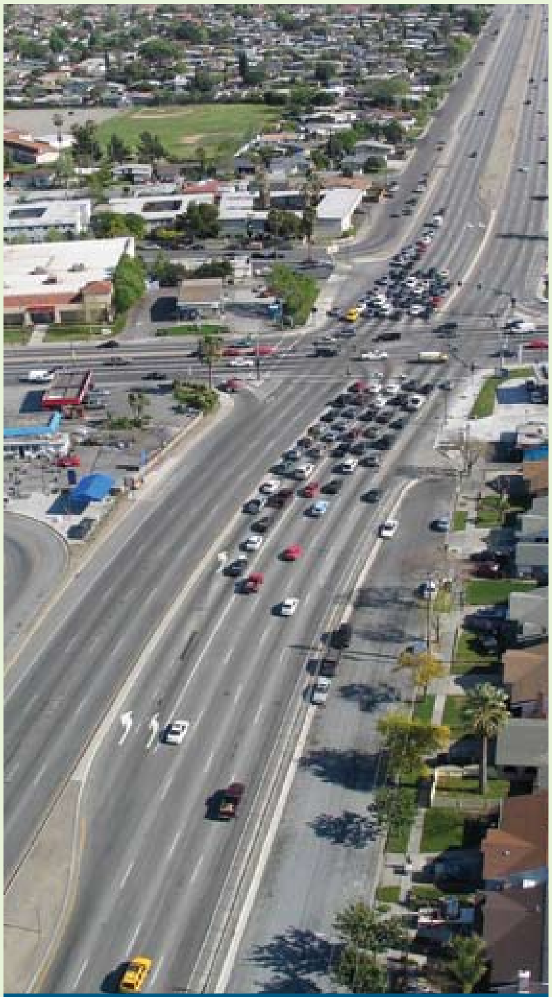
DOWNTOWN • EAST VALLEY

Final Supplemental Environmental Impact Report

Volume II

Draft Supplemental Environmental Impact Report Appendices

State Clearinghouse #2001092014



Existing Story Road

Proposed Story Road Light Rail Station

April 2007

SANTA CLARA Valley Transportation Authority

Capitol Expressway Light Rail Project

Draft
Supplemental Environmental Impact Report

Volume II of II

State Clearinghouse #2001092014

Prepared by:

Santa Clara Valley Transportation Authority
Environmental Planning
3331 North First Street, Building B
San Jose, CA 95134-1927

Contact:

Thomas W. Fitzwater, Environmental Resources Planning Manager
Phone: (408) 321-5789
Email: CELR.SEIR@vta.org

January 2007

Contents

Appendix A

Notice of Preparation and Public Scoping with Comments Received

SANTA CLARA
Valley Transportation Authority

NOTICE OF PREPARATION

August 18, 2006

To:
State Clearinghouse
1400 Tenth Street
Sacramento, CA 94814

From:
Santa Clara Valley Transportation Authority
Environmental Planning
3331 N. First Street, Building B
San Jose, CA 95134-1927

SUBJECT: **Notice of Preparation of Draft Supplemental Environmental Impact Report**

The Santa Clara Valley Transportation Authority (VTA) will be the Lead Agency and will prepare a Draft Supplemental Environmental Impact Report (Draft SEIR) for the Capitol Expressway Light Rail Project. The Draft SEIR will supplement the Final Environmental Impact Report (FEIR) that was certified by the VTA Board of Directors in May 2005 (SCH 2001092014). We request the views of your agency as to the scope and content of the environmental information. which is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency may need to use the FEIR and SEIR prepared by our agency when considering permits or other approvals for the Capitol Expressway Light Rail Project.

The location, description, and potential environmental effects of the project are contained in the attached materials. A copy of the Initial Study is not attached.

Due to the time limits mandated by State law, your response must be sent at the earliest possible date, **but no later than 30 days after receipt of this notice**.

Please send your response to Thomas W. Fitzwater, Environmental Resources Planning Manager, at the address shown above. We request that the name for a contact person in your agency be provided with your response.

Project Title: Downtown East Valley Improvement Plan – Capitol Expressway Light Rail Project (Formerly Named Capitol Expressway Corridor)

Project Applicant, if any: Santa Clara Valley Transportation Authority

Date: 8/21/2006 **Signature**: [signature]

Name: Thomas W. Fitzwater, AICP
Title: Environmental Resources Planning Manager
Telephone: (408) 321-5789

Reference: California Code of Regulations, Title 14, (CEQA Guidelines) Section 15082(a), 15103, 153

Attachment to the Notice of Preparation for the
Draft Supplemental Environmental Impact Report
Capitol Expressway Light Rail Project

Introduction

In May 2005, the Santa Clara Valley Transportation Authority certified the Final Environmental Impact Report (FEIR) and approved the Capitol Expressway Light Rail Project (CELR). CELR is a 3.1 mile extension of light rail along Capitol Expressway in the City of San Jose from the existing Alum Rock Station to Eastridge Mall in its initial phase and to Nieman Boulevard in a future phase.

The FEIR was based on conceptual designs for CELR. Following project approval, work began on Preliminary Engineering (PE), which advanced designs to a greater level of detail. During PE, changes to the project were proposed to respond to the requirements of the City of San Jose, Santa Clara County, and other agencies. In addition, other changes were proposed to reduce costs, improve operations, minimize right-of-way requirements, and reduce environmental concerns.

Because of the nature of the design changes, VTA determined that additional environmental review would be required and that a Supplemental Environmental Impact Report (SEIR) was the appropriate level of documentation. An SEIR is prepared only if minor additions or changes would be necessary to make the previous EIR adequately apply to the changed situation. According to Section 15163(b) of the California Environmental Quality Act (CEQA) Guidelines, the SEIR need contain only the information necessary to make the previous FEIR adequate for the project as revised.

Project Location

The approved project is located along Capitol Expressway between Capitol Avenue and Nieman Boulevard in the City of San Jose in the County of Santa Clara. A map of the project alignment is attached as Exhibit 1.

Description of the Project Changes

The proposed project changes are detailed in Exhibit 2. The major changes include the following:

- Changes in right-of-way requirements near Capitol Avenue, Story Road, Ocala Avenue, and Eastridge Mall
- Station design changes at Story Road, Ocala Avenue, and Eastridge Mall

- Shift in the location of the electrical transmission poles between Cunningham Avenue and Quimby Road
- Change from a depressed to an elevated structure at Tully Road

Changes to the future phase of the project between Eastridge Mall and Nieman Boulevard will be addressed at a later time in a separate EIR.

Proposed Scope and Content of the SEIR

Based on the project changes, VTA is proposing to focus the SEIR on the following areas of potential effects:

- Transportation
- Biological Resources
- Land Use
- Noise and Vibration
- Utilities
- Visual Quality
- Water Quality
- Construction Impacts

To ensure that the significant environmental issues are discussed and reasonable alternatives and mitigation measures are considered, comments and suggestions are invited from all interested parties on the scope and content of the SEIR. Comments or questions on the SEIR should be directed to VTA as noted below.

Scoping Meeting

VTA will hold a public scoping meeting to receive comments on the scope and content of the SEIR. The meeting will begin with an opportunity to review project-related displays and follow with staff presentations on the project history, changes to the project, and the environmental process. The meeting will conclude with a public comment period. Details of the scoping meeting are as follows:

Wednesday, September 6, 2006
6:30pm to 8:30pm (Staff Presentation begins at 7:00pm)
Hank Lopez Community Center
1694 Adrian Way
(Cross-street: Ocala Avenue between Capitol Expressway and King Road)
San José, CA

This location is served by VTA Bus Lines 70 and 74.

The building used for the scoping meeting is accessible to persons with disabilities. Any individual that requires special assistance to participate in the scoping meeting, should contact VTA Customer Service five days prior to the meeting at (408) 321-2300 or email *community.outreach@vta.org*

Comment Due Date

Written scoping comments must be received by **Monday, September 25, 2006** and should be sent to:

Mail: Thomas W. Fitzwater, Environmental Resources Planning Manager
VTA Environmental Planning
3331 North First Street, Building B
San José, CA 95134-1927

E-mail: CELR.SEIR@vta.org

Fax: (408) 321-5787

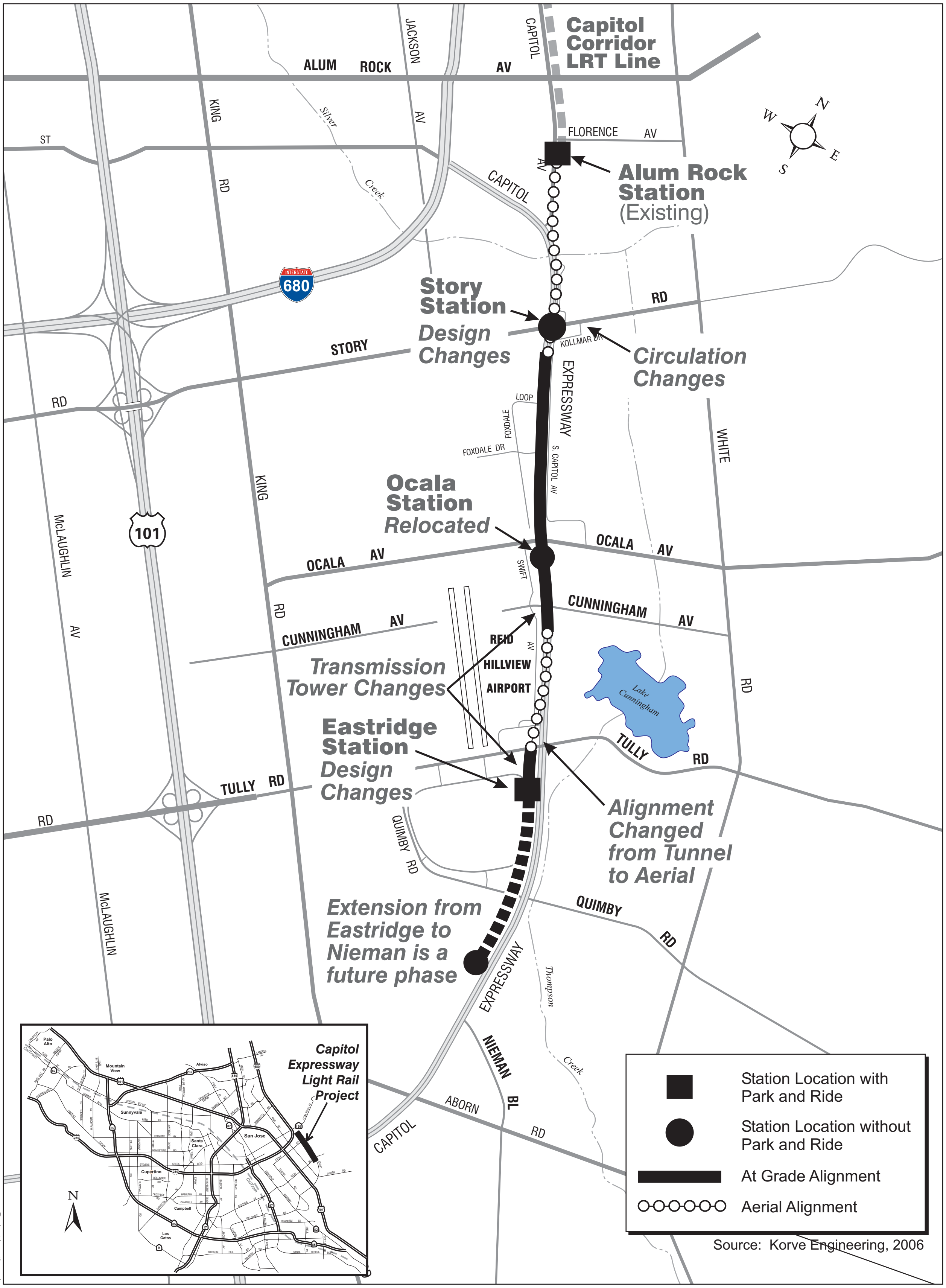
Hearing Impaired (TDD only): (408) 321-2330

For further information regarding the environmental process, please contact VTA Environmental Planning at (408) 321-5789.

Issued on: August 23, 2006

Signature: [signature]
Thomas W. Fitzwater, AICP
Environmental Resources Planning Manager

Exhibit 1



Capitol Expressway Light Rail
PROJECT LOCATION

Exhibit 2

Capitol Expressway Light Rail Project
Proposed Project Changes

Location	Proposed Design Change
Capitol Avenue South of Highwood Drive	Alignment changes allowed the project to avoid a full take of 4 houses on the east side of Capitol Avenue. Since the project's effect on these properties was not evaluated in the Final EIR, the SEIR will identify any significant impacts and mitigation measures.
Story Road (N)	Because of lower pedestrian activity in the northern half of this intersection, VTA is proposing to remove two pedestrian overcrossings to the Story Road Station. Access to the station will be provided by signalized crosswalks or pedestrian overcrossings south of Story Road. This change will reduce the right-of-way requirements at the northeast and northwest corners of Capitol Expressway and Story Road.
Story Road (SE)	VTA is proposing to remove the Story Road Drop-Off Facility, which included short-term parking spaces for passenger loading and unloading. This change will reduce the right-of-way requirements at the southeast corner of Capitol Expressway and Story Road, which previously included one full take of a business.
Story Road (SE)	Access to 2710 Kollmar Drive from E. Capitol Avenue was modified to provide better access to parking spaces for this apartment building.
Ocala Avenue (N)	Alignment changes allowed the project to minimize the full take of 1 house to a sliver take. It is anticipated that the effect of the project on this property will be similar to adjacent properties, where no significant impacts were identified.
Ocala Avenue (S)	To improve pedestrian access from Ocala Avenue, VTA is proposing to relocate the station immediately south of Ocala Avenue with a pedestrian walkway connecting the station to Cunningham Avenue. Since this change is slightly different from the station options reviewed in the Draft EIR, the SEIR will identify any new significant impacts and mitigation measures.
Cunningham to South of Tully Road	Because of changes to the light rail alignment in this area, VTA is generally proposing to relocate the electrical transmission poles from the west side to the east side of Capitol Expressway with median locations under consideration south of Tully Road. The SEIR will evaluate the significance of this change on the new locations for the poles and identify any mitigation measures.
Tully Road	Value engineering identified significant cost savings by changing from a tunnel to an aerial structure at Tully Road. This option was reviewed in the Draft EIR and no significant impacts were identified.
Eastridge Mall	To provide operational flexibility, VTA is proposing to reconfigure the station, transit center, and park-and-ride lot to accommodate an additional platform and tail tracks. This reconfiguration will involve relocating the Eastridge Access Road to the south and acquiring additional right-of-way. The SEIR will evaluate the significance of this change and identify any mitigation measures.
Eastridge Mall to Nieman Boulevard	This SEIR will not evaluate changes to the Nieman Extension, which will be reviewed at a later date in a separate SEIR

VALLEY TRANSPORTATION AUTHORITY

DOWNTOWN-EAST VALLEY
ENVIRONMENTAL SCOPING
MEETING FOR THE
SUPPLEMENTAL ENVIRONMENTAL
IMPACT REPORT.

VTA PUBLIC HEARING

Date: Wednesday, September 6, 2006

Time: 7 p.m.

Location: HANK LOPEZ COMMUNITY CENTER
1694 Adrian Way
San Jose, California

Reported by: Howard Schroeder, CSR
License Number 1123

#24692

A P P E A R A N C E S:

BRANDI HALL: VTA Public Communications Specialist Moderator

TOM FITZWATER: VTA Environmental Resources Planning Manager

KEN RONNE: VTA Design and Construction Manager

Reported by: ADVANTAGE REPORTING SERVICES
HOWARD SCHROEDER, CSR 1123
1083 Lincoln Avenue
San Jose, CA 95125
(408) 920-0222

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P R O C E E D I N G S

MS. HALL: All right. If I can have everybody seated, we're going to get started.

I want to welcome everybody tonight to the Environmental Scoping Meeting for the Supplemental Environmental Impact Report for the Corridor Lightrail Project.

I know it's a mouthful and we will get into necessarily what that means. Tonight's scoping meeting is for a chance to learn a little bit better, look and see what the changes have been since the Environmental Impact Report was done, and give you a chance to comment and ask questions. And you can dive into what we're trying to present to you here tonight.

So before I introduce staff, I just wanted to say, my name is Brandi Hall. And I will be moderating the meeting.

And if you look behind you, we have bathrooms, if you need to use those, down to the left there. We have some goodies on the table. Water, sodas, some snacks provided by VTA staff, Kristin Dorscorski. Thank you for providing that.

We also have here tonight Councilwoman

Mia Esparza. She's here in front. So she's happy to speak with any of you after our presentation.

And just quickly here I'm going to introduce these gentlmen before our presentation. And basically the format of this meeting is to listen to the presentation and upon -- you know, once we conclude the presentation, you should receive some green comment cards here on the table. If you don't, I can pass them out to you. Questions and comments should be written down on the cards. And after the presentation we'll give you a chance to speak or ask questions in our public comment period.

We also have a stenographer, Howard, here to make sure all those comments are recorded.

So without further introduction I want to start by saying, welcome. And we're going to have Tom Fitzwater, who is our Environmental Resources Planning Manager, describe what the scoping meeting is about.

And then we'll have Ken Ronsse, who is our VTA Design and Construction Manager, describe the project, the changes that have occurred. And then Tom will come back and talk a little bit more about the environmental process.

Thank you.

MR. FITZWATER: Good evening. What I'm going to do is talk a little bit about the background of how we got where we are today and then talk a little bit about the environmental scoping process.

Back in November 7th of the year 2000 the Santa Clara County voters approved a one-half cent sales tax for 30 years to fund a variety of projects, and Capitol Expressway was one of those projects that was listed. So we have an obligation to analyze that project and deliver it, if possible.

In September of 2001, VTA initiated the environmental process. And this is where we start analyzing the various impacts that might result if the project was to go forward.

In May of 2005, the VTA Board of Directors certified what's called the Final Environmental Impact Report And that basically analyzed the environmental impacts from a project that went about 3.1 miles that Kendall will talk about in a few moments.

And they actually approved the project. We have copies of that document here if you want to look at it. Why are we here?

OK. Next one.

MS. HALL: There you go.

MR. FITZWATER: OK. I may be asked why are we doing environmental studies again? What happens after we finish the Final Environmental Impact Report?

The engineers go back and analyze the project again. They do more detailed level of analysis and in some cases come up with design changes that improve the project or actually reduce the costs of the project.

So we're here to analyze those changes to see what kind of environmental impacts might result from those changes and to mitigate those impacts, if possible. And then actually propose those project changes to our VTA Board of Directors for their consideration.

The supplemental EIR that we're going to be preparing is very similar to the draft EIR that we prepared several years ago. And so we have to go through the full environmental process of having a scoping meeting, preparing a draft document for public circulation, preparing a final document before the thing goes to our board for their consideration.

What is scoping? Scoping is a requirement of the California Environmental Quality Act. And that's why we were preparing the Environmental Impact Report, the process -- the process of determining the focus, and content environmental document.

And it's an opportunity for the public to have early understanding of the project and voice their concerns and issues that they want addressed in the document to ensure we don't overlook any item that you expect to be addressed.

It's important to note that this is very early in the process. And it does not result in ultimate decision or selection of alternative. We're just at the point right now presenting to you what the project features are. And we will be analyzing a variety of topical areas, including noise, traffic, visual, air quality and on and on.

But we're not at that point yet. We're just very early in the process. And that is why we are here tonight to voice our concerns.

With that, I will turn it over to Ken.

MR. RONSSE: Thank you.

Welcome. I'm going to go over the

project and over the three components I would like to address tonight. One is what is included in the group project. Tom mentioned there is an approved EIR which is included in that project.

Why are we even doing the project at all? What have been the project design changes that Tom alluded that should be considered.

So starting with the proposed project probably makes sense for us for us to orient ourselves in line with our overall transit system. This is the lightrail map. Because all our current lightrail line, this portion right here is the extension we're talking about tonight. It's called the Capitol Expressway Lightrail project. It's really an extension of our recently opened Tasman East and Capitol lines.

I guess if you were to put it in grand fashion, we will extend the lightrail from the existing station here at Alum Rock into a straight line. It's hard to believe it, but Capitol Avenue and Capitol Expressway already extend to here. So this project will continue our lightrail line to Capitol. It's a 3.1 lightrail extension.

It will transition the eight-lane expressway to a six-lane Multi-modal we call urban

Boulevard. And that is important because that is one of the project features we are going to be transitioning the current 8-lane expressway to a 6-lane Multi-modal Urban Boulevard to a true Multi-modal services with busses, lightrail, bicycles, pedestrians. All of our transit uses will be supported with this project.

The alignment will include both Median and Side-running track with also aerial structure. And so a lot of variety of alignment description, we will talk about and it will be implemented in two phases: An Eastridge segment and a Nieman segment.

So you will see tonight a lot of focus on the Eastridge changes, because that's the first segment. The second phase will be in the future so we're not going to be talking about a lot of those items, because they are not going to be part of this document.

So the project alignment will be median running with aerial structure from existing Alum Rock station through Story Road, so it will come up out of the Median running at-grade alignment where the current station is, rise up over the Capitol Expressway into the Capitol Expressway.

Well, the guideway, if you tour any of our current system, the guideway is much like you see in Milpitas section between 88O and the Great Mall. There's an aerial station at Story.

There's a Median running grade alignment from Story to Tully. So we go from aerial to downgrade. The reason we are at aerial is to, as individual travel impacts at Capitol, there is not (inaudible) south so we're back to grade again.

We'll continue at grade through Ocala and Cunningham. As we approach Tully we will begin transitioning to a side running alignment. And to do that, we will grade separate through Tully because there's significant traffic impacts on Tully.

And our goal is to get to an at-grade station at Eastridge.

The approved project also has an at-grade station at Nieman with side rail alignment for Eastridge and Nieman.

So why build the project at all? We have to go back. Why build the project? I don't know. Tell you in a second.

It will improve the public transit service. As I said it will transition eight lanes to a Multi-modal Urban Boulevard. That's important for the region. It will enhance the regional traffic connectivity, expand mobility options with continuous sidewalks with landscape buffers between the sidewalks with connections to pathways and improvements of other paths and walkways for the corridors.

It will improve regional air quality, accommodate future travel demand and will support local economic/land use plans and goals.

So what are the project changes? What I'm going to do is transition from north to south and highlight what we have determined to be the most significant changes. And there is four or five so we'll highlight those tonight.

The current environmental documents have the Capitol Avenue/Capitol Expressway station, full acquisition of four properties in the new proposition for the Supplemental Environmental Impact Report we have identified.

We don't need, we believe, to take those properties. The properties that we're talking about are these four right here in the original concept. In the conceptual engineering this curve that would allow access into the home was impacted by the structure that's since been refined. And that's since the structure has been moved west allowing that curve to remain there, with the access to remain.

So the supplemental environmental document will include those four homes remaining.

The next significant change is at Story Road, the aerial station. The current plan has four pedestrian overcrossings and a drop-off facility. The new plan has only two pedestrian overcrossings and no drop-off facility.

So the original plan had an aerial station at Story. Elevated station with an overcrossing on both sides. You can go up an elevator and cross over the Median and up to the station. A substantial amount of structure, a substantial amount of cost, and not justified by the amount of patronage.

So what we've determined, this really is a better solution for the community at large, that the station was shifted north to allow a better connection to the Story intersection.

We have brought the overcrossing down to a location that no longer requires the full acquisition of the adjacent gas station. It's still requires elimination of a driveway but no longer the full acquisition of a gas station. And it eliminates the need for the overcrossings on the northside.

The next major change is at the Ocala station. Currently the station is in between Ocala and Cunningham, pretty well centrally located.

The new proposal is to move the station closer to Ocala. As you can see that this Ocala station is in between Ocala intersection and Cunningham. It's access was originally proposed to be pedestrian overcrossing.

So you have a ramp that would rise up parallel to the expressway, cross over the expressway and drop down into the station.

Based on revised pedestrian circulation analysis we have determined that the majority of the patrons are going to come from the north Ocala area. So we have shifted the station north, modified some of the roadway geometry to support that shift. We have introduced walkways into the Median instead of pedestrian overcrossings. So they still have access from both Ocala and Cunningham.

But pedestrian overcrossings are no longer needed to go up an over crossing and go back. We will have added great connection stations to this.

The overcrossing also has some significant changes. The environmental document currently has the transition from the Median to side running by way of the tunnel. And that tunnel is open, cut on the ends, and it's called cutting cover. Meaning cut a hole around, that goes to the facility. And you can cover it up on the top.

When we did our analysis through preliminary design, we realized that it wasn't sufficient. It's really hard to build it and maintain traffic. Trying to build a hole in the ground to cover it up was nearly impossible. We discovered that was going to be a major challenge for us in this area.

Also the groundwater table is very, very high. And potential for contaminant material tunnels are risky in those environments. So what we have decided to do is to advance an aerial guide way, much like what we're talking about for the Story location.

So what our current plan is to do so to have the center platform center running alignment transitioned like the current group plan to side running, but to use an aerial guided with columns and at selected locations out of the roadway, that will allow the brim to go over the roadway instead and then to transition sooner, so that we're straighter across Tully to minimize traffic impacts during construction and to allow us to transition down to the at grade station at Eastridge.

Our last significant impact we'd like to highlight tonight is the orientation of the layout of the Eastridge transit center. The original plan had a single platform station at Eastridge. We're now proposing a double platform.

So by single platform, what we mean is this lightrail platform certainly is at grade. It's adjacent to what will be a reconfigured transit center for bus, and our lightrail park.

We've discovered during preliminary design that did not allow any flexibility for us. We now have a 42-mile system, add these three miles onto that system along the stretch of Tasman, East Capitol, no flexibility.

What we have determined, we really need a double platform configuration with three tracks. This allows us to change the way we operate our system, both for now and in the future.

So this double track or triple track, double platform station allows much better service for all of our operations. And it allows a direct opportunity if lightrail is selected alternative along Santa Clara.

So this design here addresses needs that were not previously identified during the preliminary engineering phase.

So that wraps up what we would identify as the five main changes advanced from preliminary design. And Tom is going to walk us through how that gets advanced into the environmental report process.

MR. FITZWATER: We are in the process of preparing what is called a Supplemental Environmental Impact Report. I mentioned previously we had a Final Environmental Impact Report that has analyzed the impacts from the project that was approved, you know, back a year ago. Now we're doing a supplemental to analyze these additional impacts that would occur if the

proposed changes are carried forward.
So a part of that involves gathering public input like we're doing tonight. People also have an opportunity to send us e-mails or letters with their comments and what they want addressed in the environmental document.
We would be coordinating with federal, state and local agencies to make sure we meet their requirements if the project goes forward. And all of this information gets compiled.
So it's presented to our decision-makers in the Final Supplemental Environmental Impact Report so they can evaluate these changes and decide which ones to carry forward.
Right now we're very early in the process. We just started. The notice of preparation went out a few weeks ago. This public meeting tonight we have, we will accept comments up to September 25th. And so we're here at the point where we want to learn what your concerns are.
We will be preparing a draft environmental document that would be available for your review. Any comments that we receive on that draft we're required to respond to. So there has

to be a formal written response. It will be enclosed in the Final Supplemental Environmental Impact Report.

There will be a public hearing where people can voice their concerns. And that will be sometime early next year.

And then we're going to get to a point basically where this project will go before the VTA Board of Directors for their consideration on first, we adequately addressed the environmental issues, and second, whether they will adopt any of these proposed changes.

Some of the key environmental issues that will be addressed in the document are noise and vibration. We already know those are concerns and they have been concerns in the past.

Land use impacts, we talked about the four homes that were originally going to be impacted directly by the takes. And now we will be able to design a project so we avoid those visual impacts if we have an aerial structure. And there's changes in those aerial structures. We need to analyze the visual impacts to the community. And of course any traffic and circulation impacts that result from proposed changes.

So our overall schedule, we're in the scoping process right now, which is August-September activity. We will be in the public review and public hearing process for the draft Supplemental Environmental Impact Report in January and February. And right now those are target dates.

And then once we receive the public comments and are able to prepare responses to those comments, it will be compiled into what's called a Final Supplemental Environmental Impact Report. And that will go to our VTA Board of Directors for their consideration. And then their consideration on what elements of these proposed changes are part of the project. And right now that's targeted for early May at the VTA Board of Directors meeting.

With that, we'll give it back to Brandi Hall.

MS. HALL: So that's the group presentation. And we're going to start our public comment now.

I didn't receive any cards so far, but I will now. Are you going to want to go on record and speak?

MR. GARCIA: Sure.

MS. HALL: So if I could, I guess, kind of stand here.

MR. GARCIA: My name is Richard Garcia. I am on the other side of Capitol. And I just noticed that there's a lot of people that travel illegally straight across to the other side of the expressway.

I would imagine they do the same thing to try to get on the lightrail system. I just want to make sure that there's a safety barrier placed. This summer this one person was trying to get across and got hit right in front of my house here.

Just that consideration.

MS. HALL: All right. Thank you.

MR. ASHWORTH: My name is Stewart Ashworth. And maybe along the lines -- I'm sorry.

MR. GARCIA: Richard.

MR. ASHWORTH: Along the lines what Richard is saying, this corner at Ocala and Capitol, you know, there's a lot of kids from this side of the road that go to school over at Ocala Junior High. And, you know, 7:30, 8:30 in the morning, there's literally hundreds of kids headed that way. 2:30, 3:30 in the afternoon, there's kids headed this way.

Now I can appreciate that we got traffic lights right now to control the auto traffic. But in addition to rail traffic now, I think that adds a whole different level of safety concerns about how much foot traffic we got going across the road.

And I think this particular situation here really would warrant at least some kind of idea of an overhead pedestrian crossing. I think that would be a legitimate safety concern for the number of kids that we got crossing that road so many times a day.

And I don't see anything here in this plan that even takes that into account. Just my thinking.

MS. HALL: All right. Thank you for your comments. Anyone else?

MR. HILDRED: My name is Larry Hildred. And I want to address what's on Capitol and Story in East San Jose. And none of those projections that you have over there showed any businesses that's going to be affected by it.

Are there any businesses that's going to be affected by it?

MR. RONSSE: Yes. Looking back, as a matter of fact, the business, we can show it on the other map. There is a business which is the Barbecue Shop.

MR. HILDRED: That's me.

MR. RONSSE: That will be required to be relocated, full acquisition, because the current roadway doesn't allow any turning movements for emergency vehicles. And the City of San Jose has determined that's a requirement. And we have agreed to include that in our project by using what we call a three-point turn in that area.

I can show you the details on the map.

MR. HILDRED: What kind of effect the relocation would have, because it's not -- it's two businesses there. There's a salon that is right next to where my business is at. And we've been there for over five years.

So if there has to be some kind of transition, it's going to take a little while for a transition. So what time frame do you have?

MR. RONSSE: I would suggest you place the comment -- this being a scoping meeting, it's not intended to address the acquisition process. But there will be a regular acquisition process that will be advanced and used. And we can follow up with your comment to tell you what the details are.

MR. HILDRED: So how do I file that comment?

MR. RONSSE: You are on the record now. And also fill out a green form, it would even be better, so we can get back to you in response to that as well.

MR. HILDRED: What's the time? I wouldn't -- what I'm saying is, if five months from now you come to me and say this business is going, you know, its acquisition had -- it's already bought by someone, by you guys, then how would our business be affected by that?.

I mean, we would have to relocate, no doubt. But we do get some kind of assistance from the VTA on relocation, customer base, you know, what's the process?

MR. RONSSE: I think the most complete fashion would be for us to give you a complete answer in response to your question.

MS. HALL: Larry, let's get those on the

record, and then we will certainly talk with you after the public comment period.

Thank you. We got that on the record. And let you keep this, so make sure. Because I know we talked about this this past weekend. So --

MS. DeANGELO: My name is Dorothy DeAngelo. And I live at 1336 South Capitol Avenue, right on the other side of that fence.

What I'm concerned about that fence don't stop nobody now. And you're planning to take it down. I'm going to have cars on my front lawn, which I have now occasionally. But something needs to be done about that fence.

You're going to put trees in there. Trees ain't going to help. The kids go to Ryan School. They jump that fence. That fence is not holding those kids back.

You can check with the City to find out how many times the trucks are coming out there to repair that fence. So take that into consideration. Something needs to be done safety-wise for the people on the other side of that fence.

Thank you.

MS. HALL: Thank you.

NICK: I noticed that in the design --

MS. HALL: May we have your name?

NICK: Nick. I noticed on the design, in the modified design for the Eastridge lightrail station, you did not mark the pedestrian crossings. Pedestrian crossings are in the original REIR. But they are not -- I don't see them on the picture on the supplemental. It would be important to find that out.

Also, I don't think it would be good to limit pedestrian access at a transit center. If you want to increase multi-level at this facility where there's lots of, you know, lots of people transferring between buses and would be the lightrail, if lightrail came in. So it would be good if we are aware where the pedestrian access way is. And the public could take a closer look at, you know, what we need and may have concerns about. I don't see where the pedestrians crossings are on the -- on the design right now. So, yeah.

MS. HALL: All right. Thank you.

JOSEPHINE: My name is Josephine. So you're saying the EIR, this doesn't mean -- it's not concrete, this doesn't mean they are not going to take the four houses on Capitol? In the beginning, what he stated in the very beginning; is that correct or not?

MR. FITZWATER: Yeah. I can answer that right now. The VTA board has adopted a plan to take the four houses. What we're proposing that the VTA board adopt is not to take the four houses.

JOSEPHINE: Oh. OK. But you're not sure that they were not going to?

MR. FITZWATER: We're not sure they're not going to until we go to them in May of next year with the staff's recommendation.

Right now it's the staff's recommendation not to take the four houses.

JOSEPHINE: OK. Thank you.

MS. HALL: Thank you.

Anyone else that would like to make a couple of comments to go on the record?

JOSEPHINE: I have another.

MS. HALL: Sure.

JOSEPHINE: Being that they don't take the four houses, how will this affect with the street noise, dust, pollution from the

construction later on when the process is on?.
And due to the relocation, I am sure of the PG&E and all that, the electricity and the gas and all the fumes. How is that going to affect my family and where is this, the storage and electricity box located at?
MS. HALL: Thank you.
And again, some of those questions may be answered through our staff here. So if you want to stick around after this presentation, please do. And we'll have staff here to discuss more particulars with you.
So if there are no other comments that you would like to go on record? OK.
And at any time you do have, you know, questions, you need to get ahold of any of the VTA staff. Well, let me give you my information.
Brandi Hall. You can call me at Community Outreach. Here we go. That's the number. That's the e-mail. And then I can -- I can direct you to the appropriate staff for specific questions.
In the previous slide we had here, if you need to submit further comments to the Environmental Planning Department, you can do that

until September 25th. And you can direct it to Tom Fitzwater at that mailing location, or e-mail or fax it over, these comment cards.

So I would like to thank you for coming. And again, the VTA staff will be around to answer any of your questions.

Thank you.

(Whereupon, the hearing was concluded at 7:33 p.m.)

--o0o--

I, HOWARD SCHROEDER, do hereby certify:

That said hearing was taken down by me in shorthand to the best of my ability, considering the difficulty in hearing, at the time and place therein named, and thereafter reduced to computerized transcription under my direction.

And I hereby certify the foregoing transcript is a full, true and correct transcript of my shorthand notes so taken.

I further certify that I am not interested in the outcome of this hearing.

Dated:_______________ ___________________________
HOWARD SCHROEDER, CSR #1123

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION, AND HOUSING AGENCY ARNOLD SCHWARZENEGGER, GOVERNOR

DEPARTMENT OF TRANSPORTATION
P. O. BOX 23660
OAKLAND, CA 94623-0660
(510) 286-5505
(800) 735-2929 TTY

Flex your power!
Be energy efficient!

August 28, 2006

SCL-General
SCL000136
SCH 2001092014

Mr. Tom Fitzwater
Santa Clara Valley Transportation Authority
3331 North First Street, Building B
San José, CA 95134

Dear Mr. Fitzwater:

Capitol Expressway Corridor – Notice of Preparation (NOP)

Thank you for continuing to include the California Department of Transportation (Department) in the environmental review process for the proposed project. We have reviewed the NOP and have the following comments to offer:

We look forward to reviewing the Draft Supplemental Environmental Impact Report. We do expect to receive a copy from the State Clearinghouse, but in order to expedite our review, in advance please send two copies to:

José L. Olveda
Office of Transit and Community Planning
Department of Transportation, District 4
P.O. Box 23660
Oakland, CA 94623-0660

Should you require further information or have any questions regarding this letter, please call José L. Olveda of my staff at (510) 286-5535.

Sincerely,

Timothy C. Sable

TIMOTHY C. SABLE
District Branch Chief
IGR/CEQA

c: Scott Morgan (State Clearinghouse)

 c: TSable/ JOlveda/ File/ Chron File

DEPARTMENT OF TRANSPORTATION
DIVISION OF AERONAUTICS – M.S.#40
1120 N STREET
P. O. BOX 942873
SACRAMENTO, CA 94273-0001
PHONE (916) 654-4959
FAX (916) 653-9531
TTY (916) 651-6827

Flex your power!
Be energy efficient!

September 6, 2006

Mr. Thomas Fitzwater
Santa Clara Valley Transportation Authority
3331 N. First Street, Building B
San Jose, CA 95134

Dear Mr. Fitzwater:

Re: Santa Clara Valley Transportation Authority's Notice of Preparation of a Draft Supplemental Environmental Impact Report for the Capitol Expressway Corridor; SCH# 2001092014

The California Department of Transportation (Caltrans), Division of Aeronautics (Division), reviewed the above-referenced document with respect to airport-related noise and safety impacts and regional aviation land use planning issues pursuant to the California Environmental Quality Act (CEQA). The Division has technical expertise in the areas of airport operations safety, noise and airport land use compatibility. We are a funding agency for airport projects and we have permit authority for public and special use airports and heliports. The Division comment on the earlier Draft Environmental Impact Report (EIR) in a letter dated June 8, 2004. The following comments are offered with respect to the proposed changes to the original project.

The Santa Clara Valley Transportation Authority (VTA) certified the Final EIR on May 2005 but has issued the Supplemental EIR to address several changes to the original project, which include:

- Changes in right-of-way requirements near Capitol Avenue, Story Road, Ocala Avenue and Eastridge mall
- Station design changes at Story Road, Ocala Avenue and Eastridge Mall
- Shift in the location of the electrical transmission poles between Cunningham Avenue and Quimby Road
- Change from a depressed to an elevated structure at Tully Road

Reid-Hillview Airport is located adjacent to the portion of the Capitol Expressway Corridor between Ocala Avenue and Quimby Road.

Public Utilities Code, Section 21659, "Hazards Near Airports Prohibited" prohibits structural hazards near airports. Structures should not be at a height that will result in penetration of the airport imaginary surfaces. Certain aspects of the proposal may require submission of a Notice of Proposed Construction or Alteration (Form 7460-1) to the Federal Aviation Administration (FAA) in accordance with Title 14 of the Code of Federal Regulations (CFR) Part 77 entitled "Objects Affecting Navigable Airspace". Additional information regarding Part 77 is available on-line at https://oeaaa.faa.gov/oeaaaEXT/portal.jsp.

The proposal must also be consistent with the Santa Clara County Airport Land Use Commission's (ALUC) "Land Use Plan for Areas Surrounding Santa Clara County Airport". The proposal should also be submitted to the ALUC for a consistency determination. In addition, the proposal should also be coordinated with airport staff to ensure that the proposal will be compatible with future as well as existing airport operations.

In accordance with CEQA, Public Resources Code 21096, the Department's Airport Land Use Planning Handbook (Handbook) must also be utilized as a resource in the preparation of environmental documents for projects within airport land use compatibility plan boundaries or if such a plan has not been adopted, within two nautical miles of an airport. The Handbook is published on-line at http://www.dot.ca.gov/hq/planning/aeronaut/.

Aviation plays a significant role in California's transportation system. This role includes the movement of people and goods within and beyond our State's network of over 250 airports. Aviation contributes nearly 9% of both total State employment (1.7 million jobs) and total State output ($110.7 billion) annually. These benefits were identified in a study entitled "Aviation in California: Benefits to Our Economy and Way of Life," and available at http://www.dot.ca.gov/hq/planning/aeronaut/. Among other things, aviation improves mobility, generates tax revenue, saves lives through emergency response, medical and fire fighting services, annually transports air cargo valued at over $170 billion and generates over $14 billion in tourist dollars, which in turn improves our economy and quality-of-life.

The protection of airports from incompatible land use encroachment is vital to California's economic future. Reid-Hillview Airport is an economic asset that should be protected through effective airport land use compatibility planning and awareness. Although the need for compatible and safe land uses near airports in California is both a local and a State issue, airport staff, airport land use commissions and airport land use compatibility plans are key to protecting an airport and the people residing and working in the vicinity of an airport. Consideration given to the issue of compatible land uses in the vicinity of an airport should help to relieve future conflicts between airports and their neighbors.

These comments reflect the areas of concern to the Division of Aeronautics with respect to airport-related noise and safety impacts and regional airport land use planning issues. We advise you to contact our District 4 Office in Oakland at (510) 286-4444 concerning surface transportation issues.

Thank you for the opportunity to review and comment on this proposal. If you have any questions, please call me at (916) 654-5314.

Sincerely,

Sandy Hesnard

SANDY HESNARD
Aviation Environmental Specialist

c: State Clearinghouse, Santa Clara County ALUC, Santa Clara County Airports/Reid-Hillview

Comment Card

Downtown East Valley Improvement Plan

SANTA CLARA
Valley Transportation Authority
3331 N. First Street, San Jose, CA 95134-1927
(408) 321-7575 TDD: (408) 321-2330
Fax: (408) 321-7576
community.outreach@vta.org

Please print clearly

Name: Dorothy D'Angelo Date: Sept 6, 06

Address: 1336 So Capitol Ave

City, State, Zip: San Jose Calif

Home Phone: (408) 251-3261 Work Phone: ( ) N.A.

E-mail: N.A. Company: N.A.

I would like to make the following comments:

We need a sound wall between Story and Ocala. Trees are not going to stop pedestrians from crossing or cars coming through the chain like link fence down near.

Thank you
Dorothy D'Angelo

Comments can be e-mailed to: **community.outreach@vta.org**

Comment Card

Downtown East Valley Improvement Plan

SANTA CLARA
Valley Transportation Authority
3331 N. First Street, San Jose, CA 95134-1927
(408) 321-7575 TDD: (408) 321-2330
Fax: (408) 321-7576
community.outreach@vta.org

Please print clearly

Name: RICARDO GARCIA Date: 9/6/2007

Address: 2717 COVENTRY DR.

City, State, Zip: SAN JOSE, CA 95127

Home Phone: (408) 910-5835 Work Phone: (650) 968-1213 X677

E-mail: riccgarcia@earthlink.net Company: Saint Francis H.S.

I would like to make the following comments:

I LIVE ALONG SIDE CAPITOL EXPWY. BETWEEN STORY RD. AND OCALA RD. PLEASE CONSIDER ILLEGAL PEDESTRIANS TRAVELING ACROSS CAPITOL EXPWY TO ACCESS THE OCALA STATIONS AND OTHERS ALONG THIS EXPANTION

Comments can be e-mailed to: **community.outreach@vta.org**

Comment Card

Downtown East Valley Improvement Plan

SANTA CLARA
Valley Transportation Authority
3331 N. First Street, San Jose, CA 95134-1927
(408) 321-7575 TDD: (408) 321-2330
Fax: (408) 321-7576
community.outreach@vta.org

Please print clearly

Name: LARRY Hildreth Date: 9-6-06

Address: 1091 South Capitol AVE

City, State, Zip: SAN JOSE CALIF 95116

Home Phone: (408) 926-2829 Work Phone: (408) 929-7849

E-mail:

Company:

I would like to make the following comments:

I own TEXAS SMOKE HOUSE BBQ. 1091 South CApitol AVE. The Light RAIL extension will Be AQuiring The property That I LEASE. WE will Have to Relocate. I Do Not Have the ResourSES to ReLocate. I Do Not Have the Finance to Re Locate without Assitance. I Have Employee's That work For The Business. WE ARE A SMALL Business.

Comments can be e-mailed to: **community.outreach@vta.org**

County of Santa Clara

Roads and Airports Department

101 Skyport Drive
San Jose, California 95110-1302
(408) 573-2400

September 7, 2006

Mr. Thomas W. Fitzwater
Environmental Resources Planning Manger
VTA Environmental Planning
3331 North First Street, Building B
San Jose, CA 95134-1927

Subject: Notice of Preparation of Draft Supplemental Environmental Impact Report
Downtown East Valley Improvement Plan - Capitol Expressway Light Rail Project

Dear Mr. Fitzwater,

Your August 18, 2006 Notice along with the attachment for the subject project have been reviewed. Our comments are as follows:

1. Please provide a new Draft Supplemental Impact Report for our review.

2. Relative to the two alternatives proposed for pedestrian crossings at Story Road and Capitol Expressway, there should be a pedestrian over crossing rather than at grade pedestrian crossing at this intersection. Our experience indicates that currently there is a heavy pedestrian use of this intersection, contrary to the statement on Page 5 of 5.

3. Because of the proposed changes to Aerial Alignment between Alum Rock Station and Story Road, and between Cunningham Avenue and Tully Road it makes sense to make the section along the expressway between Story Road and Cunningham to be an aerial alignment too. This proposal will be consistent with the other design proposed on this segment and may not need additional right of way, also possibly eliminates the need for removing the HOV lanes.

If you have any questions, please contact me at 573-2464.

Sincerely,

Raluca Nitescu
Project Engineer

Cc: MLG, SK, WRL, File

7-007

9-18-2006

Via Fax 408 321 5787 # pages 2
Attn: Thomas W. Fitzwater ERPM
VTA Env Planning 3331 N 1st Bldg B
San Jose CA 95134-1927

Project Title Downtown East Valley Imp Plan - Cap Expy LR Proj (Frmly Cap Expy Corr)

Comments - First, I continue my opposition to expanding Light Rail on the Capitol Expy - it will be another money drain and is not a high volume route.

As to the Proposed Project Changes -

< Story Rd (N). Unless a major increase in crossing times is allowed for pedestrians you will see an increase in pedestrian injuries and/or death. Have timing lights set for a parent w/ a stroller and a walking toddler or an adult w/ bad knees. Of course even with longer lights cars will still jump lights or stop into crosswalks. If there is a demand for this LR station then the safety afforded by ped overcrossings would be justified.

< Story Rd (SE) Again, if there is a demand for LR in this area you have to make it accessible. A Dropoff facility allows for bad weather commuters to continue to use LR. A Dropoff allows physically challenged riders to be dropped off close in - esp if the overcrossings are gone.

pg 2

< Tully Rd. **TOTALLY** oppose an aerial structure. A look at the map shows there is an AIRPORT next to station for small craft. It doesn't take much to see that in bad weather or with a pilot not familiar w/ Reid Hillview landing strips the pilot could see the LR structure as an airport strip or landing aid. The plane would then land on a train.

I hope that this isn't a back door way to close Reid Hillview. From the map enclosed it appears the landing strips run parallel to LR so it is not a stretch to see that a pilot could misjudge what the LR track lights or train lights indicate. A major system like this should be built for maximum safety - aerial structures maximize the maximum hazard.

Again, if this Rail line is built it should be done safely and should be accesible.

Thank you

L. Bertao
P.O Box 53755
SAN JOSE CA 95153-0755

Comment Card

Downtown East Valley Improvement Plan

SANTA CLARA
Valley Transportation Authority
3331 N. First Street, San Jose, CA 95134-1927
(408) 321-7575 TDD: (408) 321-2330
Fax: (408) 321-7576
community.outreach@vta.org

Please print clearly

Name: BILL CURRIE Date: 9/11/06

Address: 434 N. CANAL ST #7

City, State, Zip: SOUTH SAN FRANCISCO CA 94080

Home Phone: (415) 264-9645 Work Phone: (650) 952-6661

E-mail: bill@curriesauto.com Company: CURRIE'S AUTOMOTIVE, INC.

I would like to make the following comments:

REF: SOUTHEAST CORNER STORY @ CAPITAL EXPY.
THE PEDESTRIAN OVERCROSSING WILL GREATLY
IMPACT OUR COMPANY'S BUSINESS WITH THE
REMOVAL OF THE DRIVEWAY ACCESS OFF
CAPITAL EXPY. THE VALUATION OF THE EXISTING
PROPERTY WILL ALSO BE IMPACTED BY THE PROJECT.

OUR SERVICE STATION EMPLOYEES (EIGHT PEOPLE)
WHO WILL LOSE THEIR JOBS BECAUSE OF THIS
PROJECT SINCE A SERVICE STATION WILL NO
LONGER BE A VIABLE BUSINESS AT THE LOCATION.
HAVE ANYONE CONSIDERED THIS IMPACT WHICH
IS NOT ENVIRONMENTAL BUT HUMAN LIVELIHOOD!

Comments can be e-mailed to: **community.outreach@vta.org**

Comment Card

Downtown East Valley Improvement Plan

SANTA CLARA
Valley Transportation Authority
3331 N. First Street, San Jose, CA 95134-1927
(408) 321-7575 TDD: (408) 321-2330
Fax: (408) 321-7576
community.outreach@vta.org

Please print clearly

Name: GEORGE CURRIE Date: 9.14.2006

Address: 2710 STORY ROAD

City, State, Zip: SAN JOSE CA 95127

Home Phone: (650) 952 6661 Work Phone: (408) 729 5044

E-mail: GEORGE @ CURRIESAUTO.COM Company: CURRIE'S CHEVRON

I would like to make the following comments:

I AM ONE OF THE OWNERS OF THE CHEVRON GAS STATION AT THE ABOVE ADDRESS. VTA PLANS TO CLOSE OUR ONLY DRIVEWAY ON CAPITAL EXPRESSWAY. THE LOSS OF THIS ACCESS WILL PROBABLY REDUCE OUR BUSINESS BY 50%. SINCE THIS IS A SELF-SERVE GAS STATION, THERE ARE NO WAYS TO REDUCE OUR COSTS; THEY WILL REMAIN THE SAME WHILE OUR PROFIT WILL DECREASE BY 50%. WE WILL PROBABLY BE FORCED TO CLOSE OUR BUSINESS REMOVING ONE MORE GAS STATION FROM THE AREA AND THE LOSS OF TEN JOBS. FURTHERMORE, WE WILL HAVE TO REMOVE THE "IMPROVEMENTS" AT OUR COST WHICH WE WILL SEEK REIMBURSEMENT FOR FROM THE VTA. ADDITIONALLY, WE WILL SEEK THE LOSS OF FUTURE INCOME WE HAD EXPECTED OVER THE REMAINING TERM OF OUR GROUND LEASE AND FUTURE OPTIONS. THE PROPERTY WILL NO LONGER BE VIABLE AS A GAS STATION. THE PROPERTY OWNER WILL ALSO SEEK SIGNIFICANT LOSS OF INCOME AND VALUE FOR HIS REAL ESTATE

CITY OF
SAN JOSE
CAPITAL OF SILICON VALLEY

Department of Planning, Building and Code Enforcement
JOSEPH HORWEDEL, ACTING DIRECTOR

September 19, 2006

Mr. Thomas W. Fitzwater, Environmental Resources Planning Manager
Santa Clara Valley Transportation Authority
Environmental Planning
3331 N. First Street, Building B
San Jose, CA 95134-1927

SUBJECT: NOTICE OF PREPARATION (NOP) OF A DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT (SEIR) FOR CAPITOL EXPWY LIGHT RAIL PROJECT (FILE NO. OA06-011)

Dear Mr. Fitzwater:

The City of San Jose appreciates the opportunity to provide comments on the Notice of Preparation (NOP) of a Draft Supplemental Environmental Impact Report (SEIR) for the proposed VTA's Capitol Expressway Light Rail Project located along Capitol Expressway between Capitol Avenue and Nieman Boulevard in the City of San Jose. We understand that the Draft SEIR will supplement the Final EIR that was certified by the VTA Board of Directors in May 2005.

The City of San Jose offers the following comments, which if addressed in the SEIR, would better clarify a number of project issues of potential importance to San Jose residents:

<u>Proposed Change No. 1 – Capitol Ave. south of Highwood Dr.</u>

- Would there still be partial/sliver take of these properties?
- With the revised aerial alignment so close to four existing houses, the SEIR should address noise and vibration impacts
- The SEIR should address ingress/egress from Capitol Avenue and Capitol Expressway
- The SEIR should address Construction Impacts

<u>Proposed Change No. 2 – Story Road (N)</u>

- Is there any data to support the statement of "lower pedestrian activity in the northern half of this intersection"?
- If the north POC is removed, would it still require a full take of the existing BBQ/nail salon property at the NW corner next to the gas station?

Proposed Change No. 3 – Story Road (SE)

- Would the gas station at the SE corner lose its driveway on Capitol Expressway?
- Would the short-term parking spaces be simply removed, or relocated somewhere else?

Proposed Change No. 5 – Ocala Avenue (N)

- Need data to support.

Proposed Change No. 8 – Tully Road

- The SEIR should evaluate visual impacts
- The SEIR should address the Airport Safety Zone height restriction
- SEIR should evaluate the impact to existing MB dealership at NE corner and proposed auto dealership at SW corner.

Proposed Change No. 9 – Eastridge Mall

- Show ROW impact due to proposed expansion of station from a single- to double-platform one.
- Will there be elimination of more existing parking spaces for Eastridge Mall and the Dialysis Center?
- The SEIR should adequately address Noise Impacts
- SEIR should address the circulation of Eastridge traffic

The CSJ looks forward to reviewing the Draft SEIR for this important project when it becomes available for review. When available, please provide me with one hard copy of the complete Draft SEIR, including all technical reports that may be contained in one or more volumes of the document. Please also include your web link to the complete Draft SEIR, or an extra copy of the complete document on CD. You may send the document directly to my attention, since I will be coordinating with other CSJ departments in the review of the Draft SEIR.

Thank you again for the opportunity to comment on the NOP for this project. If you need to contact me, you may reach me directly at (408) 535-7815.

Sincerely,

Janis Moore
Planner II

Hurley, Kim

From: Theodore Hipol [thipol@valleywater.org]

Sent: Thursday, September 21, 2006 6:28 PM

To: CELR.SEIR

Cc: Theodore Hipol

Subject: CELR Comments on the SEIR(District File 28140)

Thomas W. Fitzwater,

The Santa Clara Valley Water District(District) has reviewed your Notice of Preparation (NOP) of a Draft Supplemental Environmental Impact Report (SEIR) for the Capitol Expressway Light Rail Project (CELR), and our general comments are as follows:

1. Exhibit 1 appears to be incorrect in representing the alignment of Lower Silver Creek along Lake Cunningham.
2. It appears that the project will cross over Silver Creek in two locations. In accordance with Ordinance 83-2, a District permit will be required for this work.
3. The District has no record of ever receiving a copy of the Final EIR. Please submit a copy for our records.

Please submit 2 copies of the SEIR when available for our review and comments.

Thanks,

Theo Hipol
408-265-2607 x2494

Comment Card

Downtown East Valley Improvement Plan

SANTA CLARA
Valley Transportation Authority
3331 N. First Street, San Jose, CA 95134-1927
(408) 321-7575 TDD: (408) 321-2330
Fax: (408) 321-7576
community.outreach@vta.org

Please print clearly

Name: Ted and Helen Johnson Date: September 22 '06
Address: 1871 Darwin Way
City, State, Zip: San José CA 95133
Home Phone: ( ) Work Phone: (408-210-5518
E-mail: tjhj12@sbcglobal.net ~~Company~~:

I ~~would like to~~ make the following comments:

We are happy to see that the Ocala station will be moved closer to Ocala than Cunningham.
But it would serve more people closer to their homes if the station could be moved to the other side (north) of Ocala.
Better yet, instead of spending millions of dollars on light rail that cannot change routes, why not just buy more buses and run them thru the neighborhoods where people live so they wouldn't have to walk a mile or two to a light rail station??? It would be cheaper too!!

Comments can be e-mailed to: **community.outreach@vta.org**

VEP Community Association

Representing More Than 2000 Families in the Blossom Valley Area of South San Jose Since 1969

September 22, 2006 Submitted Via Email

Thomas W. Fitzwater, Environmental Resources Planning Manager
VTA Environmental Planning
3331 North First Street, Building B
San Jose, CA 95134-1927

Subject: Capitol Expressway Light Rail Project Supplemental Environmental Impact Report

Dear Mr. Fitzwater, VTA Staff, and VTA Board of Directors:

Thank you for this opportunity to comment on the scope and content of the upcoming Draft Supplemental Environmental Impact Report for the Downtown East Valley Improvement Plan--Capitol Expressway Light Rail Project (the Capitol Expressway Corridor).

VEP Community Association requests that any and all mention of the section of Capitol Expressway from Neiman to State Route 87 be removed from the supplemental EIR and scope of the overall project EIR. We understand the recommended light rail solution in Volume II of the April 2005 Final EIR (Document #2001092014) does not include this section, but Volume I still shows the full corridor.

Funding for the "west reach" is so far in the future (beyond 10 to 20 years, if ever) that the current EIR will clearly be outdated by that time. Moreover, it would be unfair to continue to designate the "west reach" as a rail transit corridor, potentially granting generous density, parking, and traffic impact waivers to urban development projects along this corridor, when there is no guarantee that mitigating transit improvements will ever be built. It is also unfair to allow the distant potential of light rail in the "west reach" to impede much needed nearer-term Capitol Expressway road and landscaping improvements.

Our request is based upon your response to Comment P7-60 in Volume II of the Final Environmental Impact Report dated April 2005 (typical of many of the responses to VEP's specific questions), "At its meeting on August 5, 2004, the DTEV PAB deferred project level decisions, including design options and project phasing, on the Light Rail Alternative Phase 2 between Neiman Boulevard and SR 87 until land use and transportation decisions associated with the U.S. 101 Central Corridor Study and Evergreen Smart Growth Strategy have been further developed and approved. Therefore, the area referred to as "the west reach" is not part of the Recommended Light Rail Alternative."

In summary, we ask that any and all references to rail transit on Capitol Expressway between Neiman and Hwy 87 be removed from the EIR since its potential future existence there is purely speculative in terms of funding and probable technical infeasibility. Land use decisions for development along the "west reach" should not be based upon rail transit corridor designation. Nor should nearer-term road or landscaping improvements be impeded based on speculation that this may become a rail transit corridor in the future.

Sincerely yours,

Marilyn Rodgers, President
(408) 225-7553

cc: VTA Board of Directors, c/o Cindy Chavez, Chair; Santa Clara County Supervisor Don Gage; San Jose City Council Member Nancy Pyle; San Jose City Council, c/o Lee Price, City Clerk.

P.O. Box 18111 San Jose, CA 95158
E-Mail: vepca@vepca.org Website: www.vepca.org

Pacific Gas and Electric Company
245 Market Street
San Francisco, CA 94105
Mailing Address
Mail Code N10A
P.O. Box 770000
San Francisco, CA 94177
415/973-7000

September 29, 2006

Thomas W. Fitzwater, AICP
Environmental Resources Planning Manager
Santa Clara Valley Transportation Authority
3331 North Street, Bldg. B
San Jose, CA 95134 -1927

SUBJECT: Notice of Preparation of Draft Supplemental Environmental Impact Report
Project Title: Downtown East Valley Improvement Plan – Capitol Expressway Light Rail Project (formerly named Capitol Expressway Corridor)

Dear Mr. Fitzwater:

This letter is in response to the Santa Clara Valley Transportation Authority (VTA) Notice of Preparation of Draft Supplemental Environmental Impact Report (Draft SEIR) for the Downtown East Valley Improvement Plan – Capitol Expressway Light Rail Project (CELR).

The CELR project, as currently proposed by VTA, requires replacement or alteration of towers on Pacific Gas and Electric Company's (PG&E) Newark to Morgan Hill 115 kilovolt transmission line. The towers/tubular steel poles (TSP) which may be affected are numbered 103 through 111 (depending on the final alignment as determined by PG&E/VTA and final design by PG&E engineers). Based on the most recent information available at this time regarding the new alignment(s), Towers/TSP 103 through 105 will remain on the west side of the Capitol Expressway and Towers/TSP 106 through 108 will be moved to the east side of the Capitol Expressway. Alternative A would relocate towers/TSP 109 & 110 to the east side of Capital Expressway and on to the Santa Clara Valley Water District (SCVWD) property. Alternative B will relocate towers/TSP 109 & 110 to the median of Capitol Expressway. Tower/TSP 111 is located on the east side of Capitol Expressway.

In reviewing the existing plans, PG&E has identified the following requirements:

- Typical excavation requirements for each TSP will include trenches approximately 25'- 30' deep and approximately 6'- 8'wide to set the poles.
- Each TSP will also require an additional temporary work area of approximately 50 feet in diameter (beyond the trench excavation dimensions around each base) to allow room for the trucks and equipment necessary to perform the work.
- Although the exact height of the new TSP's cannot be calculated until final design has been completed, PG&E expects all of the affected poles to be approximately 8' to 10' taller than the existing towers. Our best estimate at this time indicates the TSP's will be approximately 110 feet tall after replacement/alteration.

- Temporary pull and tension sites measuring approximately 100 feet by 300 feet will be required at the north side of the northernmost TSP and at the south side of the southernmost TSP.

Information previously provided to VTA via letter dated July 13, 2006 (based on an alternatives exhibit provided to PG&E by John Beebe on June 20, 2006) includes the following specifics relative to each site:

- Tower #103: Is to remain in its current alignment. PG&E anticipates no direct impact to this tower at this time; however it will be reviewed in the Advanced Design. We anticipate no impact on maintenance or access to this tower.

- Proposed TSP #104: The existing tower is affected by both alternative alignments and requires PG&E to relocate this tower. The new pole will be approximately 10' taller than the existing structure. PG&E requires unencumbered access to the proposed TSP for maintenance. *NOTE: With the pole moving closer to the airport runway, VTA must secure FAA approval prior to construction.*

- Tower #105: This tower is to remain in its current alignment. However it will be impacted by the increased angle/tension created by rearrangement of towers 104 & 106. PG&E will review the impact on this tower during Advanced Design. We anticipate no impact on maintenance or access to this tower.

- Proposed TSP #106: The existing tower requires rearrangement for both proposed alignments. PG&E requires unencumbered access for maintenance. A pull out access area should be provided at minimum length of 200' and 12' wide on side of expressway with an access gate in fence. Another alternative to access may be from Raging Waters Park and adjoining parcels. This option may not be feasible if there is no road to access the new TSP.

- Proposed TSP #107: Same requirements as TSP #106.

- Proposed TSP #107A: Same requirements as TSP #106.

- Proposed TSP #108: A new TSP is needed for both alternative alignments. PG&E requires unencumbered access for maintenance. Proposed TSP is on existing right turn lane. PG&E requires VTA to build a protection for the TSP with a metal beam guard railing, or temporary K-rail, during construction and reconfiguration of the intersection. Depending on the final road alignment, PG&E may require permanent metal beam guard railing type for traffic protection. It is PG&E's expectation that VTA will install this protection as part of the project.

- Proposed TSP #109: A new TSP is needed for both alternative alignments. Alternative A locates the new TSP on SCVWD's property. Alternative B locates the new TSP on the median of Capitol Expressway. For Alternative A, PG&E will require access to the TSP through the SCVWD's existing access road, adjacent to the TSP. Another alternative may be by way of a 200' by 12' pull out lane along Capitol Expressway with an access gate in the fence. Alternative B will require a 200' by 12' pullout lane in the median for maintenance access. PG&E will require permanent metal beam guard railing type for traffic protection. It is PG&E's expectation VTA will install this protection as part of the project.

- Proposed TSP #110: Same requirements as TSP #109

- TSP #111: A new TSP is needed for both alternative alignments. PG&E requires access for routine maintenance; access could be a 200' by 12' pull out on side of road (with gate in fence) or access could be by way of SCVWD road adjacent to the TSP. *NOTE: VTA to determine if proximity of this TSP to the creek will require CDF&G or other work permits; if required, VTA to acquire all necessary permits for the new TSP.*

PLEASE NOTE: All figures contained in this letter are the best estimates PG&E can provide at this time based upon the information provided to us by VTA regarding project scope, but should be considered approximate until all final engineering has been completed.

Thank you for this opportunity to provide comments. If you have any questions, please contact me at (415) 973-5699.

Sincerely,

Daniela Caroselli

Daniela Caroselli
Land Planner

c: Christina Jaworski, VTA Senior Environmental Planner
Michael Lightstone, PG&E Senior Project Manager
Randy Kihara, PG&E Transmission Line Engineer

Appendix B

Description of Recommended Light Rail Alternative

(From Volume II of the Final EIR)

Chapter 2.0

Description of Recommended Light Rail Alternative

On August 5, 2004, the Downtown East Valley Policy Advisory Board (PAB) approved staff recommendations regarding preferred design options and phasing for the Capitol Expressway Corridor Light Rail Alternative based on conceptual engineering work, environmental technical studies, and public and policy-level input.

The Recommended Light Rail Alternative would extend 3.1 miles south from the terminus of the Capitol Avenue Light Rail Transit (LRT) Line at the existing Alum Rock Station to the proposed Nieman Boulevard Station. The Recommended Light Rail Alternative would include four new light rail stations, located near Story Road, Ocala/Cunningham Avenue, the Eastridge Transit Center, and Nieman Boulevard. The alignment of the Recommended Light Rail Alternative is shown in Figure 2-1. Table 2-1 indicates how the Recommended Light Rail Alternative will pass through each intersection along Capitol Expressway.

Table 2-1. Proposed Intersection Crossings of the LRT

	LRT At-Grade	LRT Elevated	LRT Depressed
1. Capitol Avenue		X	
2. Story Road		X	
3. Ocala Avenue	X		
4. Cunningham Avenue	X		
5. Tully Road			X
6. Eastridge Loop			X

Source: Santa Clara Valley Transportation Authority, 2004.

The Recommended Light Rail Alternative could be constructed in two phases: an initial phase terminating in the vicinity of the Eastridge Transit Center, and a subsequent phase terminating in the vicinity of Nieman Boulevard (Figure 2-1). The initial phase, or Minimum Operating Segment (MOS), is referred to in this chapter as MOS-Phase 1A. Under MOS-Phase 1A, light rail would be constructed between the Alum Rock Station and the Eastridge Transit Center, a distance of approximately 2.3 miles. MOS-Phase 1A includes new light rail stations at Story Road, in the vicinity of Ocala and Cunningham Avenues, and at the Eastridge Transit Center; an expanded park-and-ride facility would be constructed at the Eastridge Transit Center. Existing high-occupancy vehicle (HOV) lanes between Story Road and the Eastridge Transit Center would be removed under MOS-Phase 1A; no change to the existing HOV lanes south of the Eastridge Transit Center would occur under MOS-Phase 1A.

Light rail continuing from Eastridge Transit Center to Nieman Boulevard, a distance of approximately 0.8 mile, could be constructed in a subsequent phase, or included as one project with Phase 1A, and is referred to in this document as Phase 1B (Figure 2-1). Under Phase 1B, a new light rail station would be constructed north of Nieman Boulevard. Existing HOV lanes south of the Eastridge Transit Center to Nieman Boulevard would be removed under Phase 1B.

The environmental effects of the entire proposed alignment were analyzed in the draft environmental impact statement/environmental impact report (Draft EIS/EIR), which was released for public review on April 28, 2004.

The following sections describe the Recommended Light Rail Alternative urban design, alignment, stations, park-and-ride lots, and other facilities, which were selected by the Downtown East Valley PAB.

Urban Design

During the conceptual engineering phase, there was a consistent effort to incorporate attractive, urban design elements into the design of the Light Rail Alternative. These principles reflect policy guidance from the Downtown East Valley PAB. This section highlights the key urban design elements of the Recommended Light Rail Alternative. The design objectives for the Recommended Light Rail Alternative are noted in Table 2-2.

Urban Design Principles

- Transform the expressway from an auto-dominant corridor to a multi-modal boulevard.
- Introduce landscaping as a major element to enhance the visual appearance and spatial definition of the corridor.
- Establish pedestrian and bicycle linkages along and across the corridor to connect neighborhoods to activity centers.
- Design stations to facilitate safe and convenient pedestrian access, and to convey the personality and identity of adjacent neighborhoods.
- Introduce special treatments along the edges of the boulevard to reduce visual and noise impacts, and to create a more positive relationship with adjacent neighborhoods.

- Promote opportunities for transit-oriented development that will enhance ridership and the quality of life of the surrounding community.

Capitol Expressway as a Multi-Modal Boulevard

- The vision for the Capitol Expressway Corridor is a multi-modal boulevard, transforming the current "highway" environment into a street with cars, light rail, bicycles, and pedestrians.
- Light rail service will operate in its own semi-exclusive right-of-way and include four new stations near key residential, shopping, business, and recreational areas along Capitol Expressway.
- Light rail tracks will be at street level for the majority of the corridor, but tracks may be above or below the street level at a few locations (e.g., the Capitol Avenue/Capitol Expressway intersection; Story Road, and Tully Road).

The Recommended Light Rail Alternative will contribute to key neighborhood goals:

- **Improved Linkages:** Connections can be improved through a multi-purpose path and other opportunities along most of the corridor to implement a planned system of City of San Jose and Santa Clara County trails, connecting transit stations with adjacent neighborhoods, local and regional parks, and other amenities. Bicycles will also be accommodated on the expressway.
- **A Greener Street:** Adding landscaping will enhance the visual and spatial effect of the street and create a more hospitable environment, including planting trees along the boulevard and at some station platforms. Lighting will also be provided.

Stations as Neighborhood Gateways

The design of stations and their relationship with the adjacent neighborhoods is critical to promote a viable transit environment. Convenience, safety, and ease of access for residents and employees arriving by foot, bike, bus, or car are primary design objectives. Additionally, stations can create identities and gateways to communities and opportunities for neighborhood-serving retail uses and a mix of commercial, residential, recreational, and community-oriented activities.

Design Enhancements at Light Rail Stations

The Recommended Light Rail Alternative will also provide opportunities at the stations to incorporate art elements to enhance the visual appearance of the stations. Because the Light Rail Alternative is a project included in both Valley Transportation Plan (VTP) 2020 (Santa Clara Valley Transportation Authority 2000) and 2000 Measure A, it is eligible to be included in the Community Oriented Design Enhancements (CODE) Program. The goal of the program is to integrate high-quality design enhancements, designed by artists that reflect the identity of the communities and neighborhoods in which the stations are located.

To ensure the success of the program, citizens are involved early in selecting and designing CODE projects. Successful CODE elements build community pride and project support. During the conceptual engineering process for the Light Rail Alternative, many community members expressed interest in becoming involved in this effort. The budget for CODE improvements has been established at 2% of the construction costs for each project. Numerous examples of CODE Program elements have been incorporated into VTA's light rail stations.

Alignment Description

Detailed specifications of the Recommended Light Rail Alternative alignment are illustrated in the attachment included with this chapter. The alignment would operate in exclusive and semi-exclusive rights-of-way, and would include both grade-separated and at-grade intersection crossings. The alignment would operate primarily in the median of Capitol Expressway; however, one alignment section would deviate from the median to a side-running operation.

The Recommended Light Rail Alternative would be designed to reduce travel time, with signal priority at intersections and grade separation at congested intersections. Crossings at some major arterials would also be grade separated (either elevated or depressed) to further support higher-speed transit operations.

Construction of the light rail guideway and grade-separated structures under this alternative would alter the roadway geometry along some portions of Capitol Expressway. Perhaps the most dramatic change to the expressway would be the removal of existing HOV lanes between Capitol Avenue and Nieman Boulevard. Because the existing roadway width could accommodate light rail if the roadway configuration is modified, the HOV lanes would be removed to provide the additional right-of-way. This would minimize the need to acquire substantial additional property for the Recommended Light Rail Alternative and would be consistent with past policy decisions. Except for restriping and a slight reduction in lane width, only minimal modifications to the remaining traffic lanes would be required. Left turns and through movements would not be affected, and all three existing general purpose through traffic lanes in both directions would remain in place.

Under the Recommended Light Rail Alternative, the streetscape of Capitol Expressway would be redesigned to create an urban multi-modal boulevard. The project cross section shown in Figure 2-2 was developed as a result of extensive input from the community and incorporates many features from VTA's Community Design and Transportation Program. Pedestrian-friendly improvements, such as removing free-flowing right turn lanes to make pedestrian movements across the roadway shorter and easier, would be implemented at intersections. In addition, the design would incorporate trees along the light rail median and along the curb edge of the roadway. A multi-use linear path along Capitol Expressway is also proposed. The path would be approximately 16 feet wide and would include a 10-foot-wide pedestrian and bicycle pathway, landscaping, and replacement of existing soundwalls where necessary. To accommodate bicyclists to the greatest extent possible, curb lanes on both sides of Capitol Expressway will be 17–18 feet wide for the entire length to allow use of the shoulders by bicycles. There will also be periodic emergency pull-out areas for vehicles along Capitol Expressway.

The following sections describe the recommended vertical and horizontal alignments for each segment of the Recommended Light Rail Alternative. The segments are described by construction phase.

MOS-Phase 1A

Alum Rock Station to Story Road

The light rail alignment would begin at the existing Alum Rock Station on the Capitol Avenue LRT Line. In this section of the corridor, an aerial guideway would be constructed for the full distance from south of Alum Rock Station to south of Story Road. The guideway would be located in the median of Capitol Avenue, transition to the median of Capitol Expressway and would be approximately 4,000 feet long. At its northern end, the aerial structure would cross the northbound lanes of Capitol Avenue and Capitol Expressway and transition to an alignment in the median of Capitol Expressway. The light rail alignment would continue on the aerial structure over Story Road and resume a ground-level profile south of Story Road.

A kiss-and-ride lot for short-term parking to pick up and drop off passengers and two bus bays would be located on the southeast corner of the Capitol Avenue/Capitol Expressway intersection.

Story Road to Eastridge Transit Center

From south of Story Road, the alignment would be at grade through the Ocala Avenue and Cunningham Avenue intersections. Before the alignment reaches Tully Road, a tunnel would provide a grade-separated transition from the median-running configuration along Capitol Expressway to the side-running configuration of the new station at Eastridge Transit Center. The Tully Road tunnel would measure approximately 2,150 feet. In addition to removing light rail operations from the congested intersection of Tully Road, the grade separations in this area would serve to transition the light rail alignment between median- and side-running operations. The MOS-Phase 1A terminates at the Eastridge Transit Center.

Phase 1B

Eastridge Transit Center to Nieman Boulevard

Phase 1B starts south of the Eastridge Transit Center. The alignment would enter a retained cut section that would place the tracks onto a cut-and-cover tunnel carrying the light rail under the Eastridge Loop Road and Quimby Road. At this point, it would return to grade through another retained cut section south of Quimby Road, continuing at grade to the proposed Nieman Boulevard Station. The alignment would then terminate with a tail track section. This is the end of Phase 1B of the Recommended Light Rail Alternative.

Proposed Stations and Park-and-Ride Facilities

Four new light rail stations (Story Road, Ocala Avenue/Cunningham Avenue, the Eastridge Transit Center, and Nieman Boulevard) are included with the Recommended Light Rail Alternative between the northern terminus at the existing Alum Rock Station and the southern terminus at Nieman Boulevard. The stations would be located approximately 0.75 mile apart. The placement of the proposed stations was based primarily on VTA guidelines for station spacing, and the desire to place the stations at or near major intersections and near convenient transfer points. Two park-and-ride facilities (Alum Rock Station and Eastridge Transit Center) would also be located along the alignment. The following sections describe each station and park-and-ride facility along the alignment of the Light Rail Alternative. The proposed stations and park-and-ride options are shown in Figure 2-1.

Alum Rock Station

At its northern end, the Recommended Light Rail Alternative would connect to the existing light rail network at the Alum Rock Station on the Capitol Avenue LRT Line. The Capitol Avenue LRT Line would be through-routed with the Recommended Light Rail Alternative. No additional new improvements are anticipated at this station.

Story Road Station

The Recommended Light Rail Alternative includes a two-level station in the median of Story Road with a mezzanine level and an elevated center platform. The station would be centered over the Story Road/Capitol Expressway intersection. Passengers would access the station via pedestrian overcrossings. From the mezzanine level, an elevator or stairs would provide access to the station platform.

The traffic volumes and turning movements and the bus and pedestrian/bicycle activity at the Story Road intersection are significant. To support efficient connections to the Story Road Station and as part of the bus integration plan, additional bus and transit support facilities are included. The enhanced transit features will include a new bus bay for two buses on the south side of eastbound Story Road on the far side of the intersection and a small short-term kiss-and-ride lot in the southeast corner of the intersection. The lot could accommodate up to 10 automobiles and is located directly adjacent to the stairs and elevator accessing the pedestrian overcrossing on the south side of Story Road. A single parcel would be required for the kiss-and-ride lot. A pedestrian overcrossing would be located close to the intersection. There would be convenient access to the pedestrian overcrossing because it would be close to existing at-grade crosswalks.

Ocala Avenue/Cunningham Avenue Station

This station would be between Ocala and Cunningham Avenues, with a single center platform in the median and passenger access provided by pedestrian overcrossings, stairs, elevators, and ramps. A pedestrian connection will be provided to enhance the access between the station and the Ocala neighborhood, including pedestrian-scaled lighting, pedestrian path-finding symbols embedded in the pavement leading to the station entrances, and decorative fencing to direct pedestrians to safe crossing of Capitol Expressway.

Eastridge Transit Center

The Eastridge Transit Center is currently one of the busiest facilities in the VTA system, with significant bus transfer activity and a large park-and-ride lot. Most bus routes serving the Downtown East Valley area terminate at or pass through the center, which accommodates approximately 6,000 daily boardings and alightings.

The at-grade station would include a center platform adjacent to the proposed Eastridge Transit Center. Pedestrian access would be provided with pedestrian crossings from the proposed multi-use path that would be adjacent to Capitol Expressway.

The station design for the Eastridge Transit Center would require a reconfiguration of the existing bus transfer facilities to provide an efficient interface with the light rail alignment. Improvements include a modified access loop and bus bays for buses, an expanded park-and-ride lot, and the multi-use path traversing the eastern edge of the site. Between the Eastridge Transit Center and Nieman Boulevard, additional landscaping, lighting, and decorative paving would also be added to enhance the design elements of the center.

Nieman Boulevard Station

The at-grade station would be 1,000 feet north of Nieman Boulevard on the west side of the expressway. Passenger access would be provided via the proposed multi-use path along the west side of the alignment and pedestrian crossings of Capitol Expressway at Quimby Road and Nieman Boulevard.

Park-and-Ride Facilities

Two existing park-and-ride lots are located along the alignment: Alum Rock Station and Eastridge Transit Center. The existing Alum Rock Station park-and-ride facility has sufficient capacity to accommodate the projected demand from the Recommended Light Rail Alternative. The existing park-and-ride facilities at the Eastridge Transit Center would be reconfigured and expanded to provide 400 total spaces, with an initial phase of up to 266 spaces.

Support Systems

In addition to the primary alignment, stations, and park-and-ride facilities, the Recommended Light Rail Alternative would incorporate light rail support systems, including traction power and substations, overhead contact, communications, signaling, and gates. Opportunities for overnight vehicle storage facilities with light maintenance capabilities are also under consideration. These support systems are described in the following sections.

Traction Power System and Substations

A traction power system is a distribution system that converts high-voltage commercial electrical power received from substations to medium-voltage direct current (DC) and distributes it to the light rail vehicles via the overhead catenary or contact wire as they travel along the alignment. A traction power system consists of the power distribution mechanism and electrical substations.

For the Recommended Light Rail Alternative, the traction power system would provide the potential for three-car light rail trains operating at speeds up to 55 miles per hour on 10-minute headways. The alignment would require a total of two traction power substations (TPSSs), in addition to one existing TPSS south of the Alum Rock Station near the park-and-ride lot. The TPSSs would be located approximately 5,900–7,600 feet apart. The final locations and placements of the TPSSs along the alignment would be determined during the preliminary engineering phase of the Recommended Light Rail Alternative. Locations for the new TPSS that are under consideration include the following:

- the southwest corner of the Capitol Expressway/Ocala Avenue intersection, and
- north of Quimby Road, on the west side of Capitol Expressway;

Electrical power would be supplied to the TPSS by an underground feeder from the electrical utility distribution system. Alternate TPSSs would be equipped with two primary feeders from the utility company and an automatic transfer switch to supply reliable power to the TPSS.

The TPSS would be contained in a prefabricated substation housing that is factory wired to accommodate internal components and built on a concrete foundation. The foundation would be equipped with embedded conduit to accommodate incoming alternating current primary power cables, control and communication cables, and the DC feeder cables to the overhead contact system (OCS).

The estimated size of the TPSS would be approximately 650–750 square feet in area and 12–15 feet in height. Parcels used as TPSS sites need to be large enough to provide for side clearance from passing trains and automobiles and to allow a service vehicle to park, unless convenient parking is available on an adjacent roadway.

Overhead Contact System

The OCS would be an auto-tensioned simple catenary consisting of a contact wire, a messenger wire, and counterweight terminations. This configuration represents the typical application for the VTA light rail system. The height of the contact wire would conform to the requirements of *VTA Light Rail Design Criteria Manual 2001 Edition* (Santa Clara Valley Transportation Authority 2001) and the California Public Utilities Commission's General Order 95 (California Public Utilities Commission 1941). All OCS poles, except counterweight poles, would be constructed as tubular, hollow, tapered, round poles made of rigid galvanized steel. Counterweight poles would be nontapered. The pole height would be adjusted to suit the contact wire height and would match the existing system as closely as possible. The OCS poles would be located between the tracks or on the outside of the tracks, depending on space restrictions. The final location of the OCS features would be determined during the preliminary engineering phase for the Recommended Light Rail Alternative.

Communications System

The communications equipment and design would be fully compatible with the communications system that serves VTA's existing light rail operations. A wayside cable system, fiber optic cable, and two-way radio system would link light rail stations and TPSSs with the existing Operations Control Center (OCC) by the use of supervisory control and data acquisition and remote terminal units. The communications system would consist of the following main components:

- a public address system with two-way voice announcement linking the OCC and the light rail stations;
- a two-way radio system with two-way voice announcement linking the OCC and light rail vehicles;
- a supervisory control and data acquisition system with the capability to monitor and control the TPSS switchgear functions from the OCC via the remote terminal units and wayside cable system;
- a pulse code modulation carrier system to provide for the multiplexing of voice and data channels between the OCC and locations along the corridor; and
- a cable transmission system designed to incorporate both the backbone communications distribution (fiber optics) and metallic distribution. Wayside cabling would utilize a combined systems duct installed continuously along the corridor.

Signaling and Gates System

The signal system for the Recommended Light Rail Alternative would be an extension of the existing light rail signal system and would be functionally compatible with the existing lines. The light rail signal system would include a wayside color light aspect with no cab signal and Automatic Block Signaling. (*Wayside color light* aspect refers to a signal at the side of the tracks indicating the next block is either clear or occupied.) The signal system would provide for a minimum train headway of 5 minutes, allowing a 5-minute safety factor over the proposed headway of 10 minutes. Generally, the alignment would not be gated. However, any side-running, at-grade alignment would likely require rail-crossing gates at the side-street crossings.

Vehicle Storage Facilities

The Recommended Light Rail Alternative includes an overnight storage facility. Heavy maintenance activities for vehicles used on this line would continue to be performed at the existing Younger Street facility. However, a new vehicle storage facility may provide VTA with the opportunity to deliver more-efficient service while saving “dead-heading” costs. The location of the light rail vehicle storage facility are under consideration is illustrated in Figure 2-1.

The site located on the southwest corner of Capitol Expressway and Quimby Road could accommodate up to 17 vehicles and includes a 6,700-square-foot building with approximately 32 automobile parking spaces to accommodate operators and supervisory personnel. The storage yard would be approximately 81,000 square feet. Automobile access would be provided from Quimby Road.

The storage facility would include LRT track, OCS, poles and overhead wires. The building would provide office space for supervisory personnel, operator reporting functions, and a break room. There would be storage for minor equipment such as mirrors, seat cushions, and wipers. The functions performed at this facility would be light rail vehicle storage and light maintenance such as interior cleaning of vehicles (vacuuming, window washing) and replacement of minor equipment (mirrors, seat cushions, wipers). No exterior washing or heavy maintenance would occur at this facility.

Recommended Operating Plan

The operating plan for the Recommended Light Rail Alternative is a two-car operation extension of the Capitol Avenue LRT Line that would continue initially to the Eastridge Transit Center and later extend to Nieman Boulevard.

Two operating scenarios are under consideration for the Recommended Light Rail Alternative. One scenario would provide light rail service from the existing

Alum Rock Station to the Eastridge Transit Center, resulting in a minimum operating segment of the alignment. Another would provide light rail service from the Alum Rock Station to the Nieman Boulevard Station.

The Recommended Light Rail Alternative would offer headways of 10 minutes between trains during weekday peak hours and 15-minute headways on weekends. The end-to-end travel time for the Light Rail Alternative would be approximately 7 minutes. For the segment of the alignment between the Alum Rock Station and Eastridge Transit Center, the estimated running time would be just over 5 minutes. Table 2-3 shows estimated travel times between stations along the light rail alignment.

Table 2-3. Estimated Travel Times between Stations, Recommended Light Rail Alternative

Proposed Station	Time between Stations (h:mm:ss)	Time from Alum Rock Station (h:mm:ss)
Alum Rock	0:00:00	0:00:00
Story Road	0:01:29	0:01:29
Ocala Avenue	0:01:42	0:03:11
Eastridge Transit Center	0:01:59	0:05:10
Nieman Boulevard	0:01:41	0:06:51

No additional vehicles would be necessary to serve Eastridge Transit Center and Nieman Boulevard Station under the recommended operating plan.

Construction Scenario

The Recommended Light Rail Alternative could be constructed and operated in two phases, as funding permits, with construction occurring over a period of approximately 3 – 4 years. MOS-Phase 1A would include the segment from the end of the Capitol Avenue LRT Line (Alum Rock Station) to the Eastridge Transit Center. Phase 1B would be the segment between the Eastridge Transit Center and the Nieman Boulevard Station. Construction of MOS-Phase 1A and Phase 1B depends on funding and policy-level decisions by the VTA Board of Directors regarding funding priorities. For the purposes of the environmental analysis, both phases of construction were evaluated.

At the height of construction, a number of construction employees and equipment would occupy portions of the street, including the median and parking lanes, at active construction locations. In the most active areas, construction activities would periodically reduce the capacity of Capitol Expressway from three lanes to two lanes in each direction during the mid-day off-peak periods; VTA would make every effort to keep all three lanes in each direction open during peak periods of travel. As a result, construction activity along the corridor would have transportation impacts such as reduced traffic flow and decreased level of service (LOS) at intersections, reduced availability of HOV lanes and on-street parking, and reduced ability to maintain transit schedules. Temporary construction easements would be used to facilitate traffic flow. VTA would coordinate the construction schedule to minimize adverse effects and would conduct public outreach throughout the process.

The proposed construction staging areas include sites at the Capitol Expressway/Ocala Avenue and the Capitol Expressway/Quimby Road intersections. At the Capitol Expressway/Ocala Avenue site, equipment would be staged in the ruderal field located at the southwest corner of the intersection. The land is currently owned by the Pacific Gas & Electric Company. The property located south of Quimby Road and west of Capitol Expressway is referred to as the "Arcadia" site. At this location, a temporary access road from Quimby Road to the staging area site would need to be constructed.

Major utilities that would potentially require relocation include five overhead electrical towers in the segment south of Ocala Avenue to the Eastridge Transit Center.

Project Funding

The total estimated capital cost to construct the Recommended Light Rail Alternative from the Alum Rock Station to Nieman Boulevard with the design options included in the Downtown East Valley Policy Advisory Board's preferred project is $430 million (in 2003 dollars). The funding is primarily from VTA Local Sales Tax 2000 Measure A funds. Further detail regarding the $430 million cost estimate is provided in Table 2-4.

Table 2-4. Estimated Project Costs for the Recommended Light Rail Alternative (in 2003 Dollars)

Project Costs	2003 Dollars (Millions)
Alum Rock to Eastridge	$291
Eastridge to Nieman	118
Storage Facility at Quimby	21
Total Project Cost	**$430**

Source: Santa Clara Valley Transportation Authority 2005.

The capital expenditure plan for design and construction is detailed in Table 2-5 according to the year of expenditure. As a result, costs and funding sources for each project segment and for the total project are higher than Table 2-4, which are given in 2003 dollars.

Appendix C

Story Road Light Rail Station Pedestrian Access White Paper (February 2006)

STORY ROAD LIGHT RAIL STATION
PEDESTRIAN ACCESS
WHITE PAPER

Introduction

The Capitol Light Rail Project proposes an elevated passenger station with a center platform at the Story Road intersection. The light rail alignment at Story Road will be elevated over the intersection to minimize traffic impacts. The station design concept is a center platform between the two directions of light rail movements. A mezzanine will be constructed approximately 10 feet below the platform. The mezzanine level will enable passengers to cross either direction of Capitol Expressway via the pedestrian overcrossings (POCs) and then proceed up to the center platform without crossing the light rail tracks. The poor level of service at Story Road requires that the crossing of the light rail tracks be on an aerial structure at this location.

Alternative Platform Access Features

Two station access alternatives were studied at Story Road. The first option had two sets of POCs, one set north and one set south of the Story Road intersection. The second option had only one set of POCs on one side of the intersection. The first option would provide a higher level of access to the station platform. However, this higher level of access would come at the price of additional right-of-way, construction, operation and maintenance costs. POCs on both sides of the intersection would require four overcrossing structures, one from each side of the expressway on each side of Story Road. Each overcrossing structure would require a set of stairs and an elevator to reach the POC. In addition to the overcrossings and access stairs, elevators would also be necessary from the mezzanine level to the platform. Under either option, stairs would be provided from both ends of the platform to the median of Capitol Expressway. For the option with only one set of POCs, the stairs at the opposite end of the platform would be for emergency use only. Table 1 summarizes the difference in construction items between the two alternatives. With one set of POCs, there would be two POC structures, four stairs, and three elevators. With two sets of POCs, there would be four POC structures, six stairs, and six elevators. Therefore, the single set of POCs would be much less costly to construct. The savings of a single set versus two sets of POCs is estimated at approximately $4 million. In addition to the construction cost savings for one set of POCs versus two, less maintenance costs would be incurred with fewer elevators to service and maintain.

Table 1
Story Road LRT Platform Access
Construction Elements

Alternative	No of POCs	No. of Stairs	No. of Elevators
One Set of POCs	2	4	3
Two Sets of POCs	4	6	6

Alternative Platform Access Efficiency

Two sets of POCs would allow access to the light rail platform from each intersection quadrant without crossing either Story Road or Capitol Expressway at-grade. With this option, all passengers could reach either the northbound or southbound platforms without crossing the street at-grade. The average access time to the platform from all quadrants of the intersection is estimated at 1.9 minutes. This total consists of the time to ascend the stairs on the side of the expressway, cross the POC, and ascend the stairs from the mezzanine to the platform.

A single set of POCs would be placed on one side of the intersection. All light rail passengers arriving at one side of the intersection would be required to cross Story Road to reach the access portals to light rail. Average walk time was calculated based on the single set of POCs located on the south side of the intersection. The average walk time would increase to approximately 2.5 minutes per passenger with this option. This total consists of the same components noted above for the two sets of POCs, plus the time to receive a "Walk" indication across Story Road and to traverse Story Road for patrons arriving to the immediate area on the north side of the intersection.

Pedestrian Data Collection

Extensive data collection was conducted as part of the pedestrian analysis for the Capitol Expressway Light Rail Project. Observers were positioned at each intersection and recorded the pedestrian access to the intersection at each quadrant. The travel patterns of existing pedestrians are expected to be proportionally similar to the travel patterns of light rail passengers. The pedestrian volumes were recorded for both the AM and PM peak hours. Off-peak pedestrian volumes are less, but would exhibit similar arrival paths. Table 2 shows the percentage of arrivals by peak hour to each of the intersection quadrants. During the AM peak hour, 37 percent of all pedestrians arriving at the intersection access either the northeast or northwest corner and 63 percent access either the southeast or southwest corner. During the PM peak hour, 32 percent of the pedestrians access on the north side and 68 percent on the south side.

Table 2
Story Road/Capitol Expressway
Pedestrian Access Paths

Intersection Quadrant	AM Peak Hour	PM Peak Hour
Northeast	22%	17%
Northwest	15%	15%
Total North Side	**37%**	**32%**
Southeast	48%	32%
Southwest	15%	36%
Total South Side	**63%**	**68%**

Light Rail Passenger Access

Light rail passenger projections (Year 2025) were estimated as part of the conceptual engineering process. Table 3 summarizes the light rail passenger activity by intersection quadrant. During the AM peak, 134 passengers would either board or alight from light rail at the Story Road station. Of this total, 83 passengers, or 62 percent, would be destined to the south side of the Story Road intersection. During the PM peak hour, 111 passengers would board or alight at Story Road, with 77 passengers, or 69 percent would to/from the south side of the intersection.

Table 3
Story Road/Capitol Expressway
Light Rail Passenger Access

Intersection Quadrant	AM Peak Hour	PM Peak Hour
Northeast	30	18
Northwest	21	16
Total North Side	**51**	**34**
Southeast	62	36
Southwest	21	41
Total South Side	**83**	**77**

Story Road Platform Access Recommendations

Based on the information developed during the preliminary design phase, VTA recommended to the Downtown/East Valley Policy Advisory Board that a single set of POCs be constructed at Story Road and that these POCs be located on the south side of the intersection. A single set of POCs would be considerably less expensive than providing elevated access on both sides of the intersection. Maintenance costs with fewer elevators would also be less. Right-of-way impacts would be significantly less.

A single set of POCs is best located on the south side of the intersection. Nearly two-thirds of the passengers will access the platform to and from the south. Overall passenger access time would be minimized with the single set of POCs located on the south, rather than the north side of the intersection.

Appendix D

Pedestrian Overcrossing Evaluation Ocala to Tully Area (June 2005)

Capitol Expressway Light Rail Project

FINAL REPORT
PEDESTRIAN OVERCROSSING EVALUATION
OCALA TO TULLY AREA

Valley Transit Consultants

Rajappan & Meyer Consulting Engineers, Inc.

Korve Engineering – HMH Engineers – Hatch Mott MacDonald
Biggs Cardosa Associates - Sasaki Associates – SBA Architects
Parikh Consultants

Dennis Struecker

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prepared by:

Korve Engineering

June 10, 2005

CAPITOL EXPRESSWAY LIGHT RAIL PROJECT

REPORT ABSTRACT FORM

Design Firm:	Korve Engineering, Inc.
Facility/Subject:	Capitol Expressway Light Rail Project
Component:	Traffic/Pedestrian Feature
Author(s):	Aleksandr Zabyshny
Title:	Pedestrian Overcrossing Evaluation Study Ocala to Tully Area

This report is an evaluation of pedestrian and bicycle facilities along Capitol Expressway between Ocala Avenue and Tully Road. The purpose of this evaluation is to establish the existing pedestrian and bicycle facilities, evaluate the additional facilities proposed as part of the Capitol Expressway Light Rail Project, and determine how additional facilities can be incorporated into the design process. Specifically, this analysis addresses the need for a pedestrian overcrossing of Capitol Expressway and the best location if the need is established.

Table of Contents

List of Figures

1.0 INTRODUCTION

This report is an evaluation of pedestrian and bicycle facilities along Capitol Expressway between Ocala Avenue and Tully Road. The purpose of this evaluation is to establish the existing pedestrian and bicycle facilities, evaluate the additional facilities proposed as part of the Capitol Expressway Light Rail Project, and determine how additional facilities can be incorporated into the design process. Specifically, this analysis addresses the need for a pedestrian overcrossing of Capitol Expressway and the best location if the need is established.

Figure 1 shows the study area for this analysis. Noted on Figure 1 are schools, parks, recreational destinations, and shopping areas that would attract pedestrian and bicycle travel. The key attractors are Lake Cunningham Park and the Raging Waters theme park, as well as the Eastridge Mall. Community facilities along Ocala Avenue are noted on Figure 1. The pedestrians crossing Capitol Expressway at Ocala Avenue are generated in part by the facilities. Figure 1 also shows existing and future pedestrian and bicycle facilities in the area. These facilities are discussed in detail in the following analysis.

2.0 PEDESTRIAN VOLUMES

2.1 Existing Volumes

Pedestrian activity along Capitol Expressway is fairly limited by the corridor's automobile-dominated nature. Foot travel along the corridor is restricted by discontinuous sidewalks and pedestrian crossings of the Expressway are limited to signalized intersections, often spaced over 1,200 meters (approximately 3,940 feet) apart. Signalize intersection spacing between Ocala Avenue and Tully Road is approximately 400 meters (approximately 1,310 feet) between Ocala and Cunningham and 850 meters (approximately 2,790 feet) between Cunningham and Tully.

North of Ocala Avenue an asphalt path exists between Story Road and Ocala Avenue on the west side of the Expressway. No other pedestrian facilities along Capitol Expressway exist in this area, except limited sidewalks in the immediate vicinity of the intersections.

As part of the preliminary engineering for the Capitol Expressway Light Rail Project, extensive pedestrian volume data were collected. Figure 2 shows the pedestrian crossings of the Expressway between Ocala Avenue and Tully Road. These crossing volumes represent pedestrian movements during the AM and PM peak hours. During the AM peak hour, a total of 73 pedestrians cross this section of the Expressway, over 60 percent of these crossing occurred at Ocala Avenue, about 30 percent occurred at Tully Road, and less than 10 percent occurred at Cunningham Avenue. During the PM peak hour, 57 pedestrians crossed the Expressway between Ocala Avenue and Tully Road. Again, over 60 percent of these crossing occurred at Ocala Avenue, 35 percent occurred at Tully Road, and less than 5 percent occurred at Cunningham Avenue.

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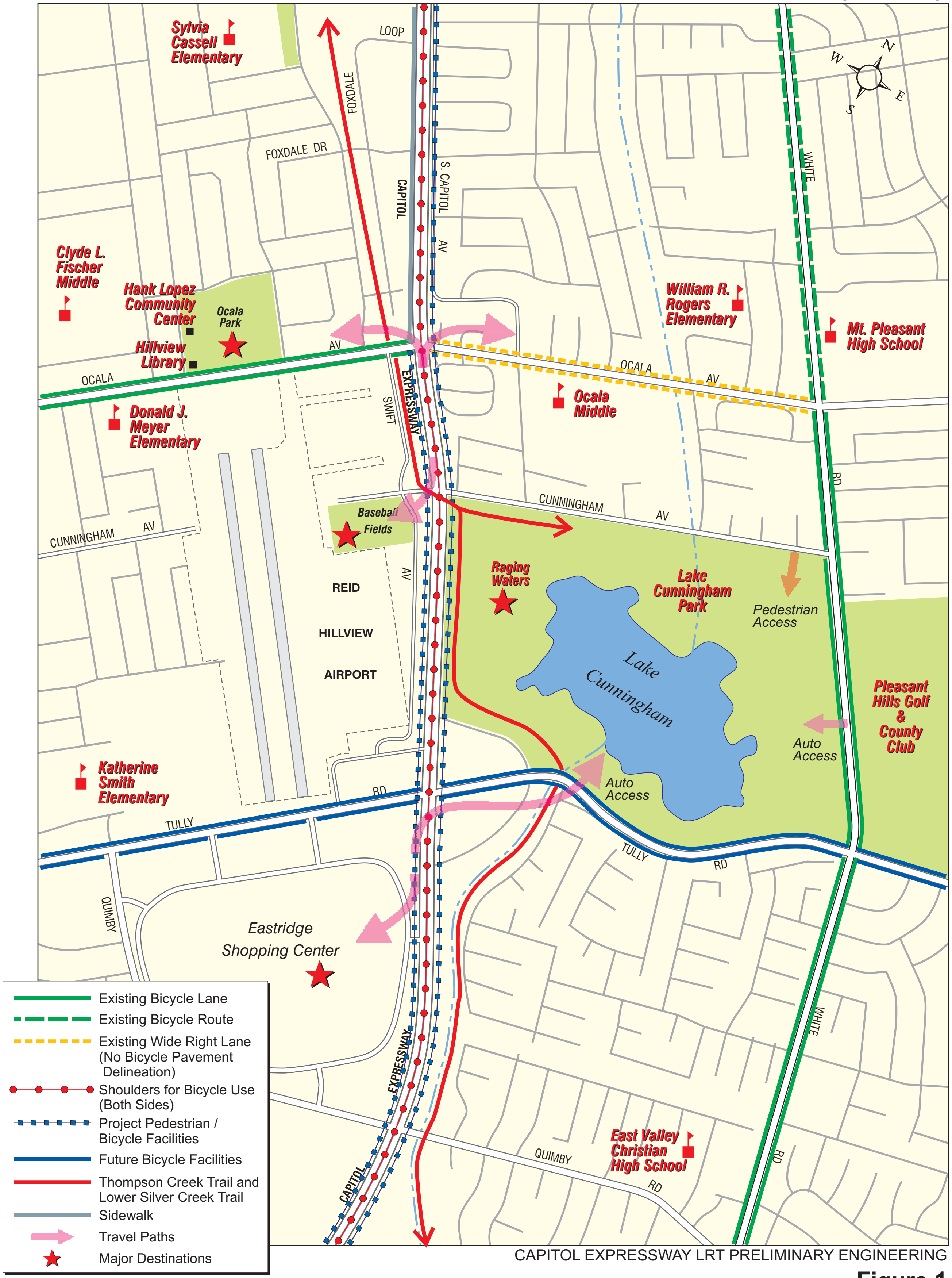

CAPITOL EXPRESSWAY LRT PRELIMINARY ENGINEERING

Figure 1

BICYCLE FACILITIES and COMMUNITY DESTINATIONS

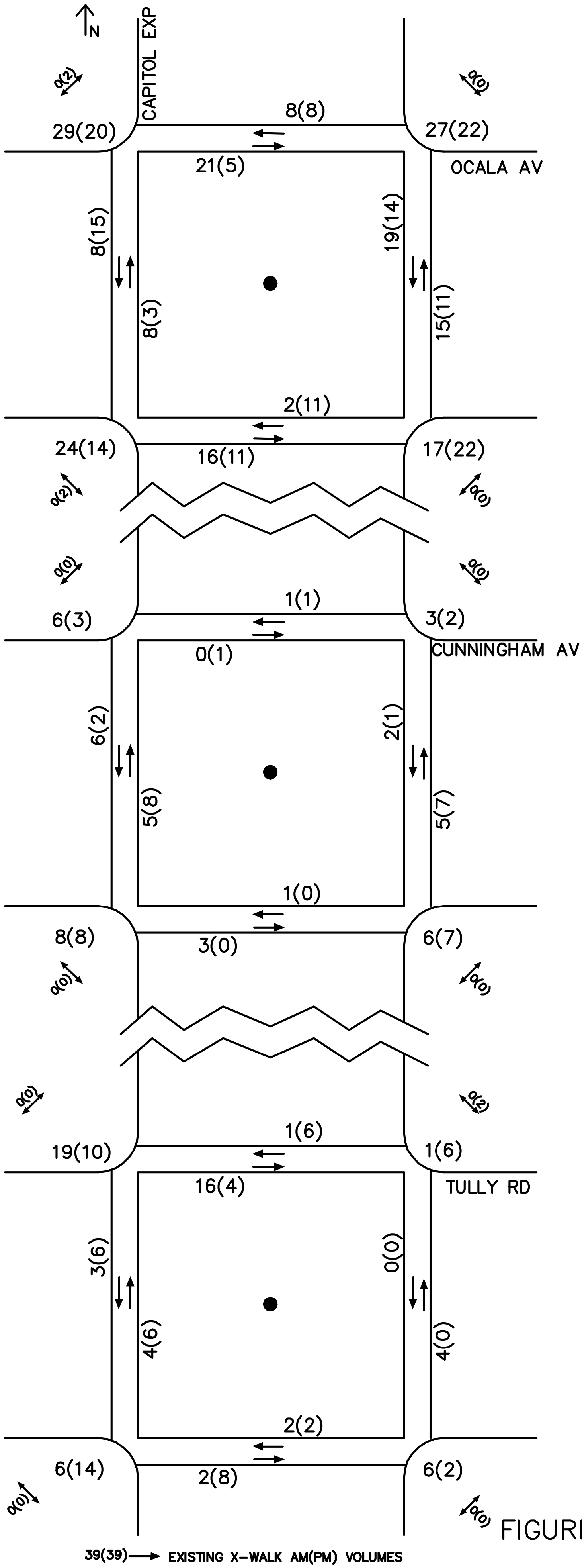

FIGURE 2: EXISTING AM(PM) HOURLY PED VOL

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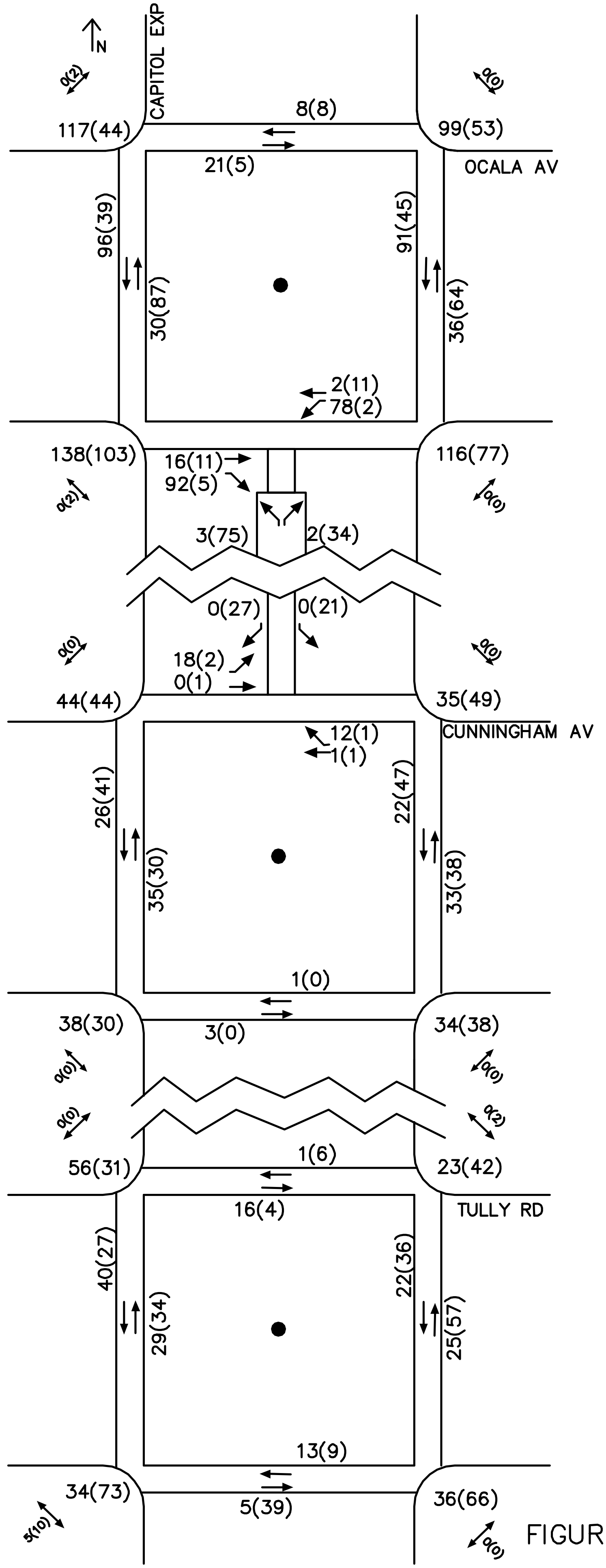

NOTE
ASSUMES 20(20) NEW PEDS FOR WESTSIDE AND 20(30) NEW PEDS FOR EASTSIDE IN EACH DIRECTION UTILIZING BIKE PED FACILITIES

39(39) → PEDESTRIAN AM(PM) VOLUMES

FIGURE 3: 2025 AM(PM) HOURLY PED VOL

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2.2 Future Volumes

Pedestrian activity along Capitol Expressway would increase as a result of the light rail project. The increase in activity would include both individuals accessing light rail and those utilizing the new pedestrian/bicycle facilities constructed by the light rail project. Figure 3 illustrates the pedestrian activity projected for 2025. The increase in pedestrian volumes crossing the Expressway would be mostly associated with access to the light rail platforms. However, there would be a projected increase in travel along the corridor. For example, the existing crossing of Cunningham Avenue on either side of the Expressway, as noted on Figure 2, is 18 persons in the AM peak and 18 in the PM peak. These volumes are projected to increase to 116 in the AM peak and 156 in the PM peak. Given that pedestrian and bicycle facilities are proposed for both sides of the Expressway, some of this increase in travel parallel to the corridor would cross the corridor at specific points. Within this area of the Expressway, crossings could occur at Tully, Cunningham, or Ocala, since parallel facilities would be available on both side of the corridor. The specific location of when someone would choose to cross the Expressway would depend on the availability of crosswalks, location of any pedestrian overcrossings, the current signal cycle phase when a pedestrian arrives at an intersection, and their ultimate destination.

3.0 IMPROVED PEDESTRIAN FACILITIES WITH CAPITOL LIGHT RAIL

The Capitol Expressway Light Rail Project would add significant pedestrian and bicycle facilities to the corridor. These facilities are noted on Figure 1. The pedestrian and bicycle facilities would involve both improvements to access and circulation, as well as safety enhancements. The streetscape concept envisioned for the corridor would transform Capitol Expressway from a single-purpose urban arterial to a multi-modal parkway boulevard. The modified Expressway would be designed as a pedestrian/bicycle friendly street featuring a continuous pedestrian/bicycle path along the east/south side of the roadway. The multi-use path would be a ribbon of greenway approximately 5 meters (16.5 feet) wide with a 3-meter (10-foot) pathway dedicated to pedestrians and bicyclists. It would link with other greenways in the East Valley area. In the vicinity of Ocala Avenue to Tully Road, the Capitol Light Rail Project would add a 3-meter (10-foot) wide pedestrian/bicycle path to each side of the Expressway. Also, the outside lane of the Expressway, in both the northbound and southbound directions, would be 5.1 meters (17 feet) wide. This width would provide experienced cyclists with sufficient room to travel along the Expressway with automobile traffic.

4.0 OTHER PROPOSED BICYCLE IMPROVEMENTS

In addition to the light rail project, additional improvements are proposed for the corridor to accommodate bicyclists and pedestrians. Figure 1 includes existing and planned bicycle and pedestrian trails in the area outside of those proposed as part of the light rail project. In early 2005, the City of San Jose finalized the Thompson Creek Trail Master Plan. That plan developed a schematic alignment for the Thompson Creek Trail. In general, the Thompson Creek Trail is aligned on the east side of Capitol Expressway from Aborn Road to Tully Road. In the vicinity of Quimby Road, the trail closely parallels the Expressway until just south of Tully Road where the alignment diagonals to the east behind the shopping center, as noted on Figure 1. The Thompson Creek Trail ends at Tully Road.

The City is also finalizing an alignment for the Lower Silver Creek Trail which would continue the Thompson Creek Trail to the north. This trail is also shown on Figure 1. From Tully, the trail would continue northward within Santa Clara County right-of-way adjacent to Lake Cunningham Park. At Cunningham Avenue, the alignment would branch eastward along Cunningham Avenue and also cross the Expressway to the west side. The trail would then continue north along the west side of the Expressway within the PG&E easement, crossing Ocala Avenue at the intersection, and then continuing north of Ocala Avenue, again within the PG&E alignment.

There are also existing on-street bicycle lanes and routes on Ocala Avenue and proposed bicycle lanes on Tully Road. These crossing facilities are illustrated on Figure 1 and would feed pedestrians and bicyclists to the Capitol Expressway corridor.

5.0 LIGHT RAIL PLATFORMS

Two light rail platforms would be constructed within the area shown on Figure 1. The Ocala/Cunningham platform would be located within the median of Capitol Expressway approximately 40 meters (130 feet) south of Ocala Avenue and approximately 230 meters (approximately 750 feet) north of Cunningham Avenue. The current access plans to the platform would be from walkways in the median from the south crosswalk at Ocala Avenue and from the north crosswalk at Cunningham Avenue. Light rail passengers would use the pedestrian traffic signals and crosswalks to cross half of the Expressway to reach the walkway to the platform.

The second light rail platform would be located at the Eastridge Transit Center. The light rail alignment at this location would be side-running on the west side of the Expressway. Access to the platform would be via the pedestrian /bicycle facility on the west side of the Expressway from the north and south.

Figure 1 shows travel paths from the light rail platforms to surrounding destination points.

6.0 MAJOR DESTINATION POINTS

There are four major destination points located on either side of Capitol Expressway. These destination points are illustrated on Figure 1 and are discussed below.

Reid Hillview Airport and the Baseball Fields – Access into Reid Hillview Airport is via Cunningham Avenue. Immediately south of Cunningham are the existing Little League Baseball fields. The baseball fields attract pedestrian and bicycle travel. While the existing airport does not current attract a significant amount of pedestrian and bicycle traffic, the additional development proposed along Capitol Expressway as part of the Airport Master Plan would be expected to attract more pedestrian and bicycle traffic.

Raging Waters and Lake Cunningham Park – There is one designated pedestrian/bicycle access to Lake Cunningham Park. This access is located on Cunningham Avenue immediately west of White Road. Access to the pedestrian/bicycle entrance is only from the street, there are no sidewalks to the White Road intersection. There are two vehicle access points to the park, one on Tully Road and one on White Road. Access to Lake Cunningham Park is shown on Figure 1. Neither of the vehicular access points have sidewalks that would encourage pedestrian access. The park itself has an interior loop road that circles the entire park and connects all access points. The major attraction within the park is Raging

Waters located toward the west side. The current configuration of the access and the location of Raging Waters do not encourage access via pedestrian and bicycle modes.

Eastridge Shopping Center – Eastridge is a major attractor of pedestrian and bicycle traffic, both to the Mall and to the Transit Center. Pedestrians and bicyclists from the east side of the Expressway currently use the Tully Road intersection to cross to Eastridge. The bicycle/pedestrian trail proposed as part of the light rail project will significantly improve pedestrian and bicycle access to the Mall and Transit Center.

Destinations Along Ocala Avenue – As illustrated by the current pedestrian counts, the greatest amount of pedestrian traffic that crosses the Expressway in this vicinity is at Ocala Avenue. The schools, community center, library, and commercial establishments located along Ocala Avenue create a pedestrian travel corridor that would continue into the future. The light rail project would increase the level of pedestrian activity on the Ocala Avenue corridor crossing the Expressway.

7.0 PEDESTRIAN TRAVEL TIMES

The travel time for pedestrians will influence the travel route a pedestrian selects. Several pedestrian travels times from the two light rail platforms were checked to determine the expected path to the four major destinations in the area. Travel paths are illustrated on Figure 1. Pedestrians destined to Ocala Avenue would disembark at the Ocala/Cunningham platform and walk north to Ocala Avenue. Pedestrians destined to Reid Hillview Airport and the baseball fields would also use the Ocala/Cunningham platform. Pedestrian destined to the Eastridge Mall would use the Eastridge platform.

Pedestrians destined to Lake Cunningham Park and Raging Waters may use either Ocala/Cunningham or Eastridge, depending on their specific destination. The following walk times have been calculated to determine the optimal routes. The walk times include wait time to cross Capitol Expressway and other streets at-grade with the traffic signal.

- From Ocala/Cunningham station to pedestrian entrance on Cunningham – 19.9 minutes
- From Ocala/Cunningham station to entrance on Tully – 24.2 minutes
- From Eastridge station to entrance on Tully – 14.1 minutes

Clearly, the access time to Lake Cunningham Park would be faster using the Eastridge station rather than the Ocala/Cunningham station. Additionally, the major attraction within the park, Raging Waters, is closer to the Tully Road entrance than the pedestrian entrance off Cunningham Avenue.

8.0 POTENTIAL LOCATION OF PEDESTRIAN OVERCROSSING

A pedestrian overcrossing requires an area to access the structure. The access can either be via stairs and elevators or through ramps that are ADA compatible. A larger area is needed for ramps, but they are less expensive to install and considerably less expensive to maintain when compared to elevators. The southwest corner of the Ocala Avenue intersection has space for a pedestrian overcrossing touchdown, but a complementary space is not available in the southeast quadrant without acquiring existing homes.

The south side of the Cunningham intersection has an area on both sides of the expressway where touchdown facilities can be constructed. It would be possible to construct a pedestrian overcrossing across the south side of the Cunningham Avenue intersection.

Another location for a pedestrian overcrossing would be on the north side of Cunningham Avenue. The vacant area in front of Reid Hillview Airport would provide space for the touchdown area on the west side of the Expressway. On the east side of the Expressway an area would be created by the light rail project that could also serve as the touchdown area. The light rail project must realign the Expressway through this section and a landscape area would be created on the east side of the Expressway, just north of Cunningham Avenue. The touchdown area could be incorporated into this newly created space.

9.0 PEDESTRIAN OVERCROSSING TRAVEL TIME

The construction of a pedestrian overcrossing across Capitol Expressway on the north side of the Cunningham Avenue intersection would enable access to the Ocala/Cunningham light rail platform to be incorporated into the design. The currently proposed design for access to the platform from Cunningham Avenue would be via a walkway from the north crosswalk. Access to the light rail platform from the overcrossing would replace the at-grade access since there would not be sufficient space between the tracks for both.

Travel times were calculated to access the platform via the current design using the crosswalk and using a potential overcrossing. The following are the walk times from either side of the Expressway at Cunningham to the center of the light rail platform.

- At-grade access – 5.5 minutes
- Pedestrian overcrossing access – 5.0 minutes

10.0 FINDINGS AND RECOMMENDATIONS

10.1 Findings

The current pedestrian and bicycle facilities along Capitol Expressway and crossing Capitol Expressway are limited. However, the combined efforts of VTA and the City of San Jose would greatly improve pedestrian travel along and across the Expressway. Pedestrian and bicycle origins and destinations are both along and across the corridor. Therefore, facilities that accommodate both types of movement would be necessary.

Light rail patrons can access the LRT system safely and conveniently at Ocala/Cunningham without a pedestrian overcrossing. The analysis shows that the time savings with a pedestrian overcrossing would not be significantly better than without. .

The at-grade intersections at Ocala Avenue and Cunningham Avenue provide for safe access to the light rail platform. The construction of light rail in the median of the expressway would act as a barrier between intersections. Pedestrians would be forced to cross at the signalized intersections. The traffic signals would be timed to allow pedestrian to safely reach the median to access light rail or to cross the entire street. Pedestrian push button activation of the signals would enable disembarking passengers to receive a walk indication to reach the side of the expressway. Other pedestrian enhancements would be incorporated into the project such as countdown timers to inform pedestrians of the time remaining to complete their crossing.

Station access for Ocala/Cunningham and for Eastridge would be connected to the surrounding pathways, both those that would be constructed by VTA and those that would be constructed by others. These pathways in turn would connect the light rail system to the surrounding origins and destinations noted on Figure 1. Light rail passengers destined for Lake Cunningham Park and Raging Waters would most likely use the Eastridge station rather than the Ocala/Cunningham station. The walk time to the pedestrian entrance off Cunningham Avenue from the Ocala/Cunningham station would be greater than the walk time from the Eastridge platform to the entrance from Tully Road. Also, the primary destination within the park, Raging Waters, is much closer to the Tully Road entrance, further skewing the minimum walk time to the Eastridge platform..

Between 70 and 80 percent of the light rail passengers would use the Ocala Avenue entrance/exit for the Ocala/Cunningham platform and the remainder would use the Cunningham Avenue entrance/exit, depending on the time of day. Therefore, a pedestrian overcrossing at Cunningham Avenue would not be significantly beneficial for light rail access. However, a connection from the overcrossing to the platform would decrease the access time by 0.5 minutes per passenger when compared to at-grade access. The time savings would be associated with not waiting for a pedestrian walk indication.

In the event that other stakeholders in the future elect to add a POC in the vicinity of Ocala/Cunningham for non-light rail use, the light rail project can be constructed to ensure that the opportunity would not be precluded.

10.2 Recommendations

VTA should proceed with the current design for at-grade access to the Ocala/Cunningham light rail station. At the same time, the light rail design should not preclude the future construction of a pedestrian overcrossing on the north side of Cunningham Avenue. The touchdown areas for the pedestrian overcrossing should be the landscape area on the east side of the Expressway created by the realignment of the roadway and the Reid Hillview Airport property on the west side of the Expressway.

Lake Cunningham Park and Raging Waters should be encouraged to add an entrance to the park in the northwest corner in conjunction with the pedestrian overcrossing.

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Appendix E

Transportation Study for the Supplemental Environmental Impact Report (October 2006)

Capitol Expressway Light Rail

Transportation Study for the
Supplemental Environmental Impact Report
Phase 1A Project

Valley Transit Consultants

Rajappan & Meyer Consulting Engineers, Inc.
Korve Engineering – HMH Engineers – Hatch Mott MacDonald
Biggs Cardosa Associates - Sasaki Asociates – SBA Architects
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prepared by:

Korve Engineering

October 2006

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION

The Santa Clara Valley Transportation Authority (VTA) proposes to extend light rail transit service in the Downtown/East Valley corridor. The Proposed Project is an extension of light rail transit along Capitol Expressway, between Capitol Avenue and the Eastridge Transit Center. This report provides an evaluation of traffic and transportation issues related to the Proposed Project. This report summarizes the existing transportation conditions along Capitol Expressway and outlines the impacts of the Proposed Project on the local and regional transportation network. The report addresses roadway, automobile traffic, transit (including bus, light rail and commuter rail), pedestrians, bicycle facilities, goods movement, parking, and community access.

1.1 Project Overview & Alignment

The proposed LRT line is a 2.4 mile extension of the Tasman East/Capitol Light Rail Line, recently constructed. The extension begins on Capitol Avenue at Wilbur Avenue, enters Capitol Expressway at Capitol Avenue, and continues along the remaining portion of Capitol Expressway to a terminus at the Eastridge Mall vicinity. Figure 1-1 shows the location of the Project and the proposed stations.

The Proposed Project would add three new stations along its length as noted on Figure 1-1. Transfers between Guadalupe/Tasman East and Vasona/Tasman West can occur at any station platform between downtown and Tasman Drive. Figure 1-2 presents a schematic view of the LRT operations and the respective existing segments and segments under development. The figure shows the LRT extension to Campbell along the former Union Pacific Railroad (UPRR) Vasona Industrial Lead and is referred to as the Vasona Light Rail Line. Also noted on Figure 1-2 is the extension of the Tasman East/Capitol Avenue Light Rail Line along Capitol Avenue to the Alum Rock Station. The Capitol Expressway Light Rail Line would operate as a continuous route from Santa Teresa to Eastridge at the build-out of the Project. Figure 1-2 also illustrates a future transit connection from downtown to the East Valley along Santa Clara Street and Alum Rock Avenue. This alignment is being evaluated in a separate study.

Light rail trains would generally operate in the median of Capitol Expressway with a dual track configuration, although at the southern end of the line, the alignment transitions to the side of the corridor for a limited distance. Three vehicle travel lanes would be provided on each side of the trackway. At intersections, turning lanes would accommodate access to side streets. A combination two-way multi-use path would be provided on one side of the Expressway and a sidewalk on the opposite side from the Alum Rock Station to the Eastridge Station.

Travel time from the Alum Rock Station to the Eastridge Station would be approximately 5.30 minutes. The light rail extension would be fully accessible in accordance with the Americans with Disabilities Act (ADA).

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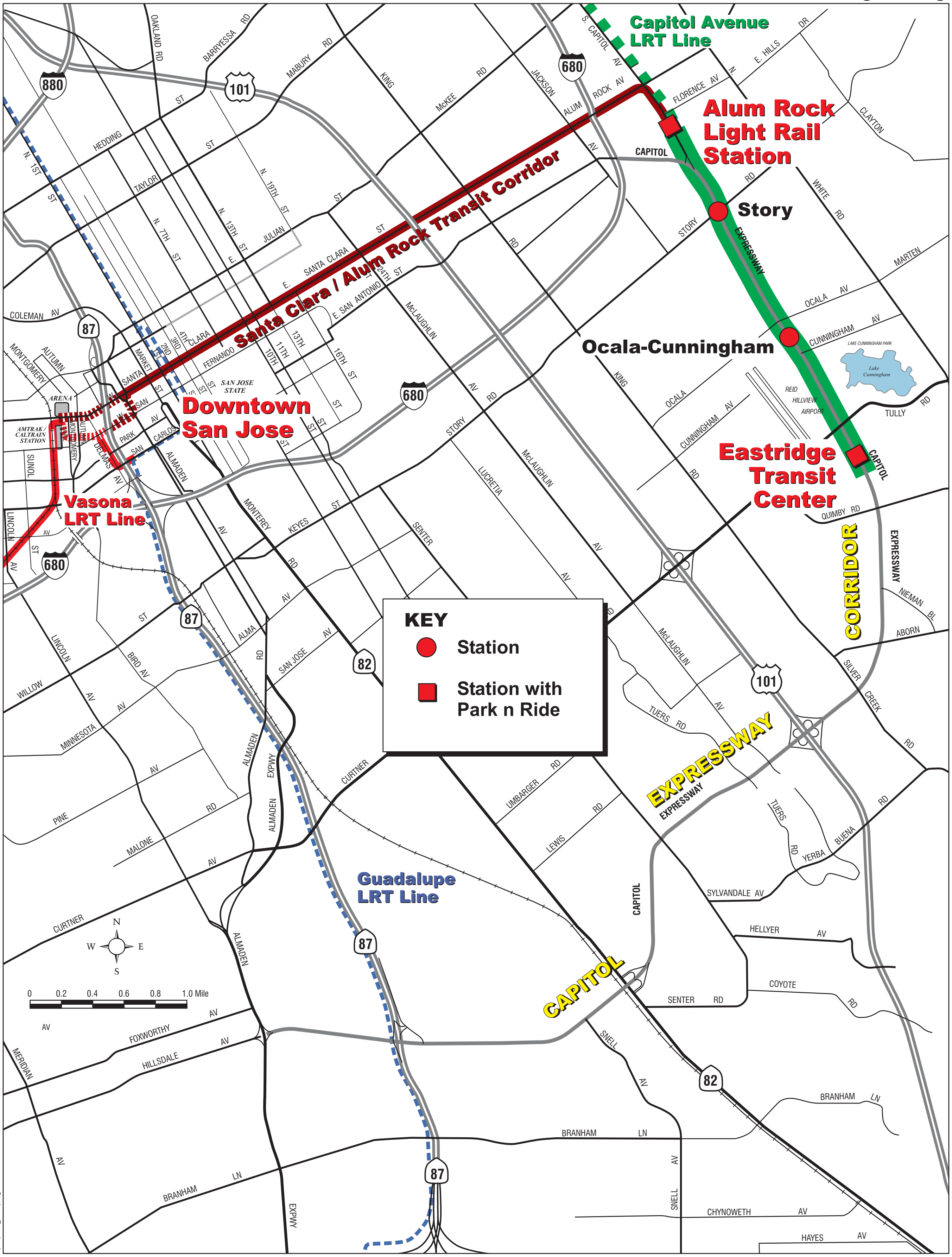
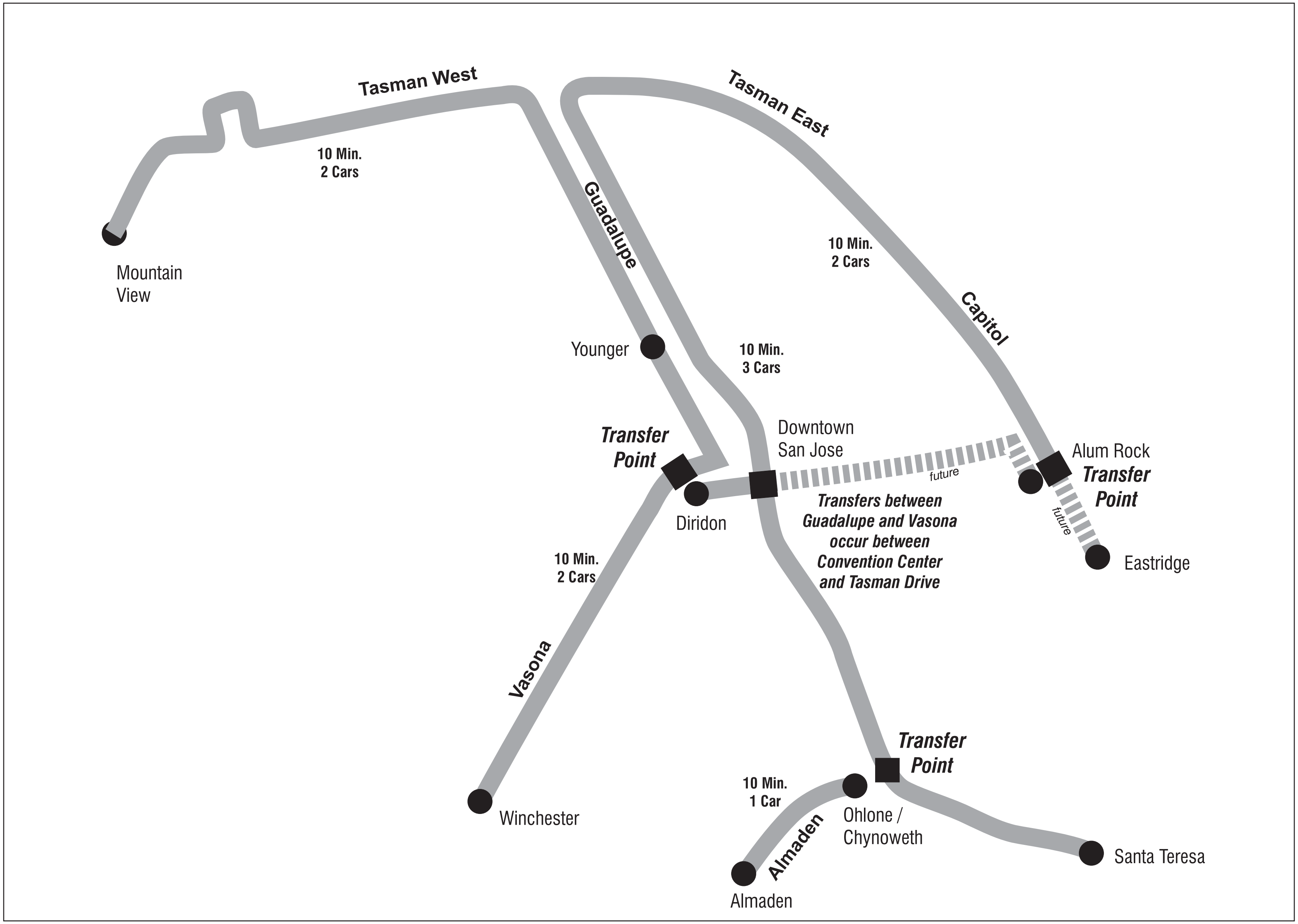


DOWNTOWN EAST VALLEY CAPITOL EIR

Figure 1-1

PROPOSED STATION LOCATIONS



Korve Engineering, Inc.
Manuel Padron & Associates

DOWNTOWN EAST VALLEY CAPITOL EIR

Figure 1-2

SCHEMATIC LRT OPERATING PLAN

1.2 Stations & Parking

Three stations are proposed for the Capitol Expressway Light Rail Corridor, with each station named for the nearest major cross street on Capitol Expressway. Table 1-1 lists the proposed stations and locations. All proposed stations are center platform configurations. Park-and-ride facilities currently exist at Alum Rock and Eastridge. The Alum Rock park-and-ride would be maintained in its present configuration and the Eastridge park-and-ride would be enhanced to serve demand.

Table 1-1 Proposed Capitol Expressway Light Rail Corridor Stations

Station	Park-and-Ride	Platform Type	Comments
Story	No	Center (elevated)	The station platform is elevated at this location, with pedestrian overcrossings accessing the platform.
Ocala	Yes	Center (at-grade)	The station platform is a center platform located between Ocala and Cunningham within the median.
Eastridge	Yes	Dual Center (at-grade)	The at-grade station platform would be on the west side of the Expressway. Park-and-ride will be available at this station.

1.3 Project Scheduling

A detailed funding plan for construction has not been developed; therefore a complete construction schedule is not available at this time. The environmental review process is expected to be completed in mid 2007. Engineering design would commence concurrent with environmental review. Construction activities can typically begin approximately two years after completion of environmental review. Under any scenario, revenue service would not begin until 2012, or beyond.

1.4 Traffic Analysis Alternatives

This report provides an evaluation of traffic and transportation issues related to the proposed extension of the VTA light rail system along Capitol Expressway. This report outlines the impacts of the Proposed Project on the local and regional transportation network. The impacts of the Proposed Project were evaluated using the policy guidelines of the VTA's Congestion Management Program (CMP), and the City of San Jose.

The level of service methodology for the CMP is based on the 2000 Highway Capacity Manual (HCM) methodology. The 2000 HCM methodology uses an average control delay at a signalized intersection. The software associated with the level of service methodology is the version 7.5 of the TRAFFIX software package, the methodology in place when the draft EIR analysis was completed.

1.4.1 *Project Alternatives*

As part of VTA's planning process, the following alternatives were considered during Preliminary Environmental Scoping and Conceptual Engineering, but were rejected:

- Light Rail Alternative with Four Mixed Flow and Two HOV Lanes on Capitol Expressway between Capitol Avenue and US 101.
- Light Rail Alternative with Six Mixed Flow and Two HOV Lanes on Capitol Expressway between Capitol Avenue and US 101.

However, the FEIR in 2005 provided for a fourth lane in each direction at Tully Road.

As background to the genesis of these alternatives, it is important to take into account prior decisions made by the City of San Jose and the County of Santa Clara related to Capitol Expressway. In 1991, the San Jose City Council approved the Evergreen Specific Plan project and the Evergreen Development Policy. The Evergreen Specific Plan consisted of the construction of approximately 2,856 dwelling units, commercial uses, and associated infrastructure improvements on an 865-acre site. In addition, there were 1,353 residential units planned for the remainder of the Evergreen Area for which additional traffic capacity improvements would be required in order to comply with the Evergreen Development Policy.

The construction of this development in the Evergreen area was dependent on the implementation of transportation mitigation measures that were the subject of an EIR approved by the San Jose City Council in April 1994. These transportation mitigation measures, which included the construction of HOV (outside) lanes on Capitol Expressway from US-101 to I-680, provided the necessary traffic mitigation to allow development of up to 4,209 dwelling units in the Evergreen area. As it relates specifically to the Capitol Expressway, upon completion of the transportation mitigation measures, the Expressway would consist of three mixed flow and one HOV lane (outside) in both the northbound and southbound directions between US-101 and I-680 until such time as LRT was implemented.

In 1992, the County Board of Supervisors approved the City's request to be the lead agency for the preparation of the EIR for the Capitol Expressway improvements with the understanding that the City was proposing an interim eight-lane facility on Capitol Expressway by adding four additional lanes (two new mixed flow lanes and two new HOV/commuter lanes) between US 101 and I-680. At the time, it was acknowledged that the buildout proposed for Capitol Expressway (six mixed flow lanes plus two HOV lanes) would not allow sufficient room for the future LRT project within the existing right-of-way. However, it was also acknowledged that LRT service with 10-minute headways could provide approximately the same level of passenger throughput as a lane of traffic on Capitol Expressway. Thus, the EIR stated that "given support mechanisms to encourage passenger demand, the LRT could replace one travel lane in each direction while still maintaining adequate traffic levels of service on the expressway." The eight lane facility ultimately approved was to be designed in such a manner to provide for the future elimination of the two inside lanes and the installation of a potential double track light rail system (with stations) in the median while minimizing the need to reconstruct the remaining six lanes of the Expressway.

In the City's EIR, the construction of the LRT facility was considered as an alternative to the roadway improvements proposed by the Evergreen Specific Plan development. At the time, the LRT alternative was determined to be the environmentally superior alternative. However, it was also determined that private developers did not have the financial ability to substantially fund LRT as mitigation for their approved and pending Evergreen development projects. The City further stated in their EIR that it was not the objective of the proposed Evergreen Specific Plan project to provide transportation capacity that would exceed demand for traffic capacity generated by the Project. Therefore, the City approved the Project to include the construction of two additional general purpose and two HOV lanes. These mitigation improvements were constructed and have been operating since 1996. The approved Evergreen development is also nearing buildout.

This report analyzes the study intersection operations for the following traffic scenarios. The future year traffic projections were developed using the CMP travel forecasting model.

- Existing – Level of service based on existing traffic counts and existing intersection geometry. Existing conditions are those that occurred in 2000/01 and were revised in February 2005.

No Build

- 2010 No Build Alternative – Level of service based on 2010 projections without construction of the light rail project and with existing roadway geometry. The existing HOV lanes are assumed to remain.

- 2025 No Build Alternative – Level of service based on the 2025 projections without construction of the light rail project and with existing roadway geometry. The existing HOV lanes are assumed to remain.

Light Rail Alternative

- 2010 Light Rail Alternative – Level of service based on 2010 projections and with the construction of the light rail project. The roadway geometry from the 2010 No Build Alternative is assumed, except as modified because of the Light Rail Alternative and with the removal of the HOV lanes. The Light Rail Alternative assumes a terminus at Eastridge.

- 2025 Light Rail Alternative – Level of service based on 2025 projections and with the construction of the light rail project. The roadway geometry from the 2025 No Build Alternative is assumed, except as modified because of the Light Rail Alternative and with removal of the HOV lanes. The Light Rail Alternative assumes a terminus at Eastridge.

2.0 EXISTING CONDITIONS

This Section presents a summary of the existing transportation conditions in the study area. A description of the existing roadway network, public transit, bicycle, and pedestrian facilities, along with goods movement, parking, and community access are summarized in this section.

2.1 Roads & Highways

This section summarizes the existing traffic conditions in the study area, including existing roadway facilities, traffic volumes, intersection geometries, and operating conditions at key locations during the weekday AM and PM peak periods.

The study corridor can be regionally accessed by freeways, expressways, and arterials, as well as VTA transit buses and light rail. The study area is defined by the alignment of the proposed LRT service up to Eastridge Station. Freeways, local roadways, and intersections included in the study area are discussed below. The study intersections are illustrated in Figure 2-1. A total of 8 signalized intersections are included in the study area, representing nearly all of the signalized intersections along the corridor.

2.1.1 *Congestion Management Program (CMP) Network*

The Congestion Management Program (CMP) legislation requires the development of a County CMP roadway network. The CMP network consists of four types of facilities: freeways, county expressways, urban arterials, and rural highways. The County CMP network is monitored annually to determine conformance with CMP traffic level of service standards.

In the vicinity of the study area, the following roadways are contained within the County CMP roadway network (as defined by the *Congestion Management Program for Santa Clara County*, February 2001). The current operations of each facility as defined by the 2001 monitoring report are also summarized.

2.1.1.1 Freeways

US Highway 101 (US 101) is an 8-lane freeway, two of which are HOV lanes that travel in a north-south direction runs parallel to the study area. South of the study area, US 101 have one interchange at Capitol Expressway. The interchange is a full cloverleaf design with collector/distributor roadways between the Capitol Expressway ramps and the Yerba Buena ramps to the south. The on-ramps onto US 101 from Capitol Expressway are metered. US 101 is posted for 65 mph through the study area. Daily traffic volumes on US 101 range from 132,000 vehicles per day south of Capitol Expressway to 196,000 vehicles per day north of Capitol Expressway. The peak hour traffic volumes immediately north of Capitol Expressway are 14,200 vehicle per hour in the AM peak and 14,700 in the PM peak.

The 2001 Monitoring and Conformance Report for the Congestion Management Program indicates that during the AM peak hour, US 101 operates at level of service F in the northbound direction and level of service A in the southbound direction for the mixed

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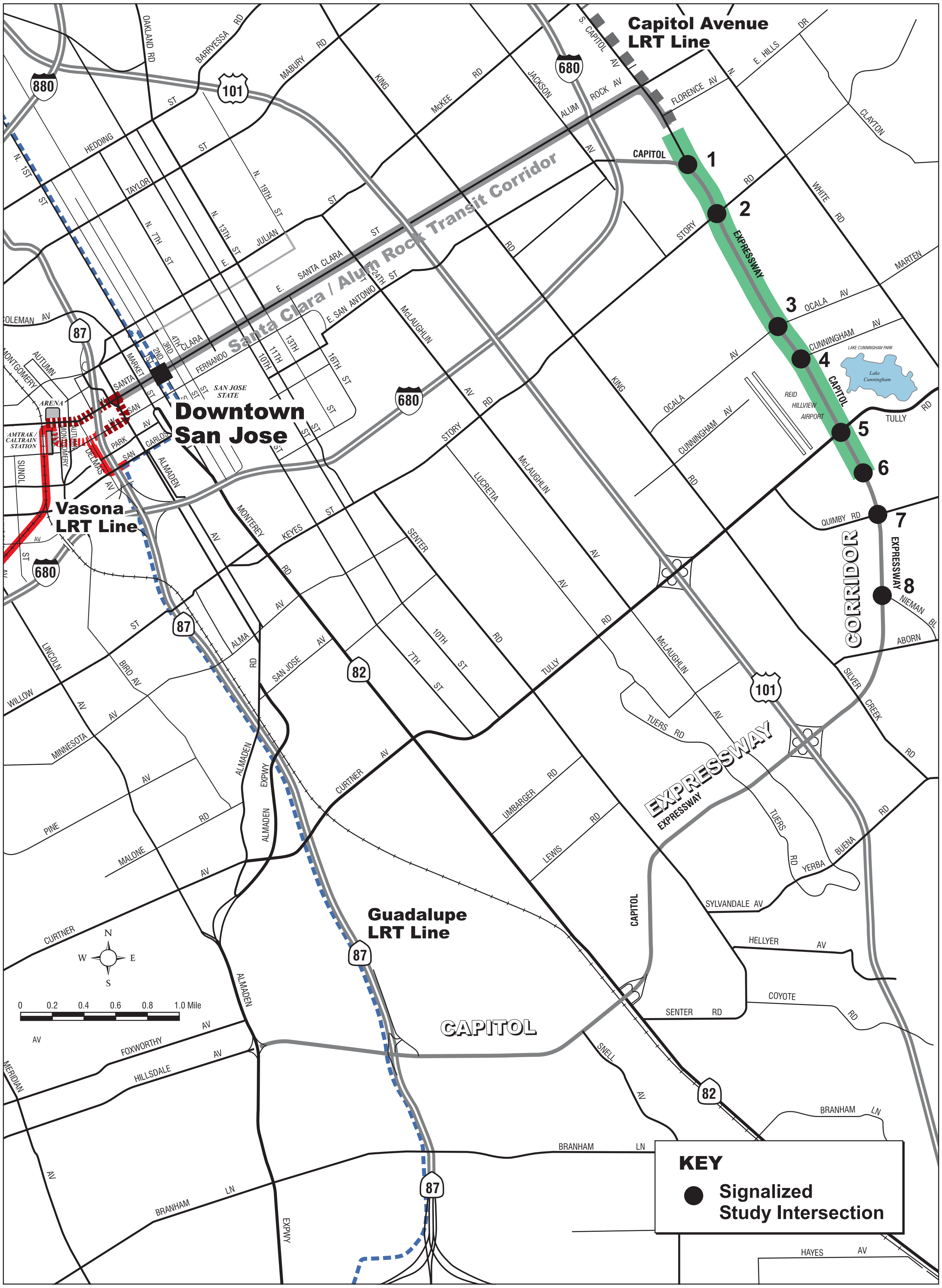

Signalized Ints.cdr

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DOWNTOWN EAST VALLEY CAPITOL EIR

Figure 2-1

SIGNALIZED INTERSECTIONS

flow lanes. The HOV lanes operate at level of service C in the northbound direction and level of service A in the southbound direction during the AM peak. During the PM peak hour, the northbound general purpose lanes operate at level of service A and the southbound general purpose lanes operate at level of service E. The HOV lanes operate at level of service A in both the northbound direction and southbound direction during the PM peak hour.

Interstate 680 (I-680) is an eight-lane freeway that travels in a north-south direction. The highest traffic volume along this freeway in the proximity of the Proposed Project occurs between McKee Road and Alum Rock Avenue. The Average Annual Daily Traffic (AADT) is 232,000 vehicles. There are ramps entering and exiting the study area at Alum Rock (State Highway 130) and from Capitol Expressway. I-680 is posted for 65 mph through the study area.

The 2001 CMP Monitoring Report notes that I-680 operates at level of service F in both directions during the AM peak hour, with a total traffic volume of 10,980. This volume is well below the capacity of the roadway because traffic has reached a stop-and-go condition. During the PM peak hour, I-680 at Capitol Expressway operates at level of service A in the southbound direction and level of service B in the northbound direction. The total hourly volume is 16,000.

2.1.1.2 Other State Highways

Alum Rock Avenue is a four-lane arterial under the jurisdiction of Caltrans and designated as State Route (SR 130). It travels in an east-west direction through the northern part of the study area. Alum Rock is designated as an arterial west of I-680, connects with I-680 with a full freeway interchange and extends westward across US 101 where its name changes to Santa Clara Street. The street then becomes the major east-west arterial to enter the City of San Jose's Central Business District (CBD) from the east. East of I-680 Alum Rock is also designated as SR 130 as it extends further east to Mount Hamilton Road in the foothill area of eastern San Jose. The posted speed limit is 35 mph.

2.1.1.3 Expressways

Capitol Expressway is a limited access expressway that extends from its interchange with I-680 in the north end of the study area. The Capitol Expressway is a county owned and operated facility. Capitol Expressway is mostly three general purpose lanes in each direction with an HOV lane in the Project area as the outside fourth lane from near US 101 northward to I-680. On-street parking is not permitted along the expressway and no designated bicycle lanes exist in the Proposed Project area. The posted speed limit is 45 mph. Full-movement access is restricted to signalized intersections spaced from ¼ mile to over ¾ mile.

2.1.1.4 Arterials

The following arterials are owned and operated by the City of San Jose:

Capitol Avenue begins at an intersection with Capitol Expressway near the Proposed Project's northern end and extends north. There are two travel lanes in each direction. The Capitol Avenue Light Rail Project was recently constructed within the median of Capitol Avenue. Bicycle lanes are designated and signed in both directions for the length of Capitol Avenue. The posted speed limit is 35 mph. The intersection of Capitol Avenue with Capitol Expressway is a CMP intersection. The Congestion Management Agency monitors all CMP intersections on an annual basis for traffic operations during the PM peak hour. The 2001 monitoring report indicates that the intersection of Capitol Avenue with Capitol Expressway operates at level of service E+.

Story Road crosses Capitol Expressway just south of Capitol Avenue. Story Road is a 6-lane divided arterial west of Capitol Expressway with a posted speed of 35 mph. To the east of Capitol Expressway, Story Road is a 4-lane divided arterial, also with a posted speed of 35 mph. Story Road provides local east/west access in southeast San Jose as an extension of Keyes Street near US 101 to its terminus at Fleming Avenue. The Story Road/Capitol Expressway intersection is a CMP intersection. The 2001 monitoring report indicates the current operation is level of service F.

Ocala Avenue crosses Capitol Expressway south of Story Road. Ocala Avenue is a 4-lane, undivided roadway to the east of Capitol Expressway with a posted speed of 35 mph. Ocala Avenue becomes Marten Avenue at White Road. To the west of Capitol Expressway, Ocala Avenue has a single lane in each direction with a two-way left turn lane in the center. At the intersection with Capitol Expressway, Ocala widens to accommodate turning lanes. This portion of Ocala is also posted for 35 mph and extends to King Road. Ocala Avenue at Capitol Expressway is not a CMP intersection.

Cunningham Avenue provides access to Reid-Hillview Airport from Capitol Expressway and extends to White Road to the east along the northern boundaries of Lake Cunningham Park. This section of Cunningham Avenue is a single lane in each direction with a speed of 35 mph. Cunningham Avenue at Capitol Expressway is not a CMP intersection.

Tully Road is a principal arterial that runs generally east-west through the study area. On both sides of Capitol Expressway, Tully Road has three lanes in each direction separated by a raised median. The posted speed west of Capitol Expressway is 40 mph and the posted speed east of Capitol Expressway is 45 mph. Tully Road extends from the foothills on the east to Monterey Highway on the west where it becomes Curtner Avenue. The Tully Road/Capitol Expressway intersection is a CMP intersection. The 2001 monitoring report indicates the current operation is level of service D.

Quimby Road connects from Mount Hamilton Road (SR 130) in the foothills to Tully Road adjacent to the Eastridge Shopping Center. East of Capitol Expressway, Quimby Road has two travel lanes in each direction. At the intersection with Capitol

Expressway, the median is raised. Farther to the east the raised median is replaced by a two-way left turn lane. The posted speed is 40 mph. To the west of Capitol Expressway along the shopping center frontage, Quimby Road has two lanes in each direction, a raised median, and is posted for 35 mph. The Quimby Road/Capitol Expressway intersection is a CMP intersection. The 2001 monitoring report indicates the current operation is level of service E+.

Nieman Boulevard extends from a 'T' intersection at Capitol Expressway southeastward to Yerba Buena where it transitions into Silver Creek Valley Road. At Capitol Expressway, Nieman Boulevard provides one travel lane in each direction and a continuous left turn lane. Left turns from Nieman Boulevard to Capitol Expressway are not permitted. The posted speed limit is 35 mph. Nieman Boulevard/Capitol Expressway is not a CMP intersection.

As part of the data collection for the Project, photographs were taken of each leg of the study area intersections. Photographs of each approach leg of the study intersections are shown in the Appendix.

Table 2-1 shows the signalized intersections, the designation of each cross street according to the City's General Plan, the spacing of intersections in feet, and the average annual daily traffic volume (AADT). The spacing of the intersections along the expressway varies from 1400 feet to over 4000 feet.

Table 2-1 Signalized Intersection Cross Street Designation, Distances and AADTs

	Cross Street	Cross Street Designation[1,2]	Distance to Next Intersection[3] (southbound/westbound) (feet)	AADT (west/east or north/south) (vehicles/day)
1	Capitol Ave	Arterial	1,800	3,100 / 24,200
2	Story	Arterial	4,200	24,000 / 32,000
3	Ocala	Arterial	1,200	16,500 / 20,000
4	Cunningham	Local	2,700	4,000 / 2,300
5	Tully	Arterial	1,200	38,400 / 28,000
6	Eastridge	Local	1,600	9,100
7	Quimby	Arterial	2,800	30,200 / 30,100
8	Nieman	Major Collector	1,700	15,200 / 47,300

Source: City of San Jose, 2002
For this study, the Capitol Expressway corridor is considered to run north/south from Capitol Avenue to Nieman Boulevard.
1 Designations derived from the City of San Jose 2020 General Plan.
2 Where cross street designations differ, the separate West/East or North/South designations are shown.
3 Distances are rounded to the nearest 100 feet.

An arterial street accommodates major movements of traffic not served by expressways or freeways. The arterial street is designated mainly for the movement of through traffic, but also performs a secondary function of providing access to abutting properties.

A major collector street serves internal traffic movements within an area and connects the area with the major arterial system. It does not cater for long through trips but does provide access to abutting properties.

A local street has the primary function of providing access to immediately adjacent land.

2.2 Traffic Operations

2.2.1 *Existing Traffic Volumes*

Figure 2-2 shows the annual average daily traffic volumes on major streets within the study area. Within the study area, Capitol Expressway is noted as carrying 58,000 vehicles per day just west of US 101.

The analysis of existing traffic conditions focused on 8 intersections along Capitol Expressway. Peak hour traffic operations are a more accurate gauge of traffic congestion than daily traffic. Intersections were analyzed during the AM and PM peak hour to determine existing traffic operations.

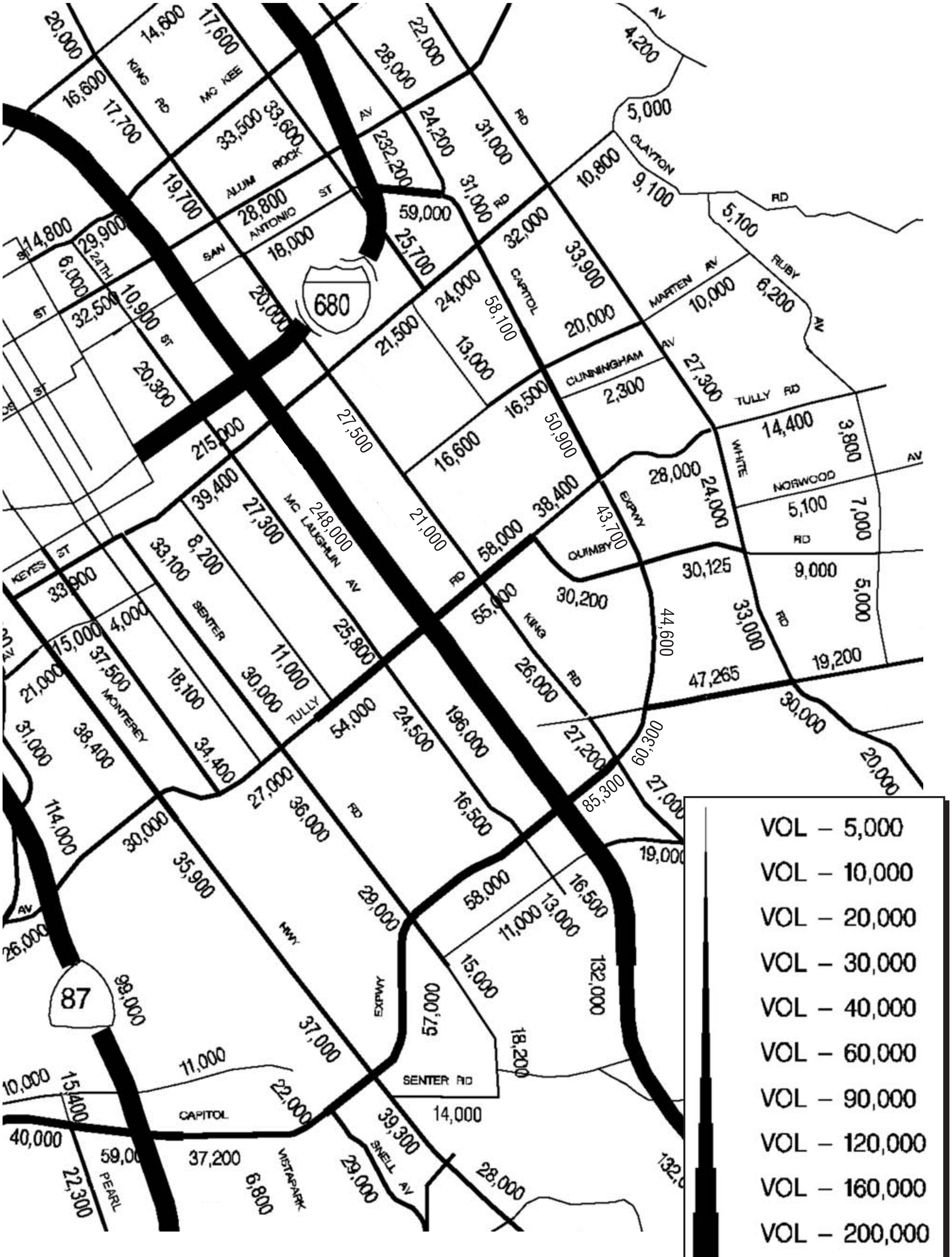
Table 2-2 notes the intersections included in the study area, the source of the traffic counts, and the original date of the counts. These traffic volumes were adjusted in February 2005. The Appendix shows the existing background data (traffic volumes and lane configurations) presented graphically.

Table 2-2 Traffic Count Sources & Dates

Cross Street		AM		PM	
		Count Source	Count Date	Count Source	Count Date
1	Capitol Ave	Korve Engineering	February 2005	Korve Engineering	February 2005
2	Story	Korve Engineering	February 2005	Korve Engineering	February 2005
3	Ocala	Korve Engineering	February 2005	Korve Engineering	February 2005
4	Cunningham	Korve Engineering	February 2005	Korve Engineering	February 2005
5	Tully	Korve Engineering	February 2005	Korve Engineering	February 2005
6	Eastridge	Korve Engineering	February 2005	Korve Engineering	February 2005
7	Quimby	Korve Engineering	February 2005	Korve Engineering	February 2005
8	Nieman	Korve Engineering	February 2005	Korve Engineering	February 2005

2.2.2 *Level of Service Analysis*

Consistent with the City of San Jose database, the intersections were analyzed based on the CMP *Traffic Level of Service Analysis Guidelines* (June 2003). The guidelines stipulate that analysts evaluate intersection levels of service using the TRAFFIX software program, the latest version 7.5 is utilized, which is based on the Highway Capacity Manual methodology and provides results similar to results from the 2000 Highway Capacity Manual & Software.



Daily Vols.cdr

SOURCE: City of San Jose Traffic Flow Map (2001)

Figure 2-2

2001 DAILY TRAFFIC VOLUMES

TRAFFIX estimates the operations of intersections and assigns a letter-grade level of service to the intersections based on the average control delay per vehicle.

For signalized intersections in an urban environment, an intersection that has an operational level of service D or better is generally considered to perform satisfactorily. A level of service E designation suggests that the intersection is unstable, teetering between successful operations and breakdown, with critical volumes approaching saturation. An intersection with a level of service F designation is considered to have failing operations and excessive delay due to overcapacity. Table 2-3 shows the average stopped delay thresholds associated with each level of service interval.

Table 2-3 CMP Level of Service Thresholds

LOS	Average Stopped Delay (seconds / vehicle)
A	0 to 5.0
B+	5.1 to 7.0
B	7.1 to 13.0
B-	13.1 to 15.0
C+	15.1 to 17.0
C	17.1 to 23.0
C-	23.1 to 25.0
D+	25.1 to 28.0
D	28.1 to 37.0
D-	37.1 to 40.0
E+	40.1 to 44.0
E	44.1 to 56.0
E-	56.1 to 60.0
F	Greater than 60.0

Source: Santa Clara Valley Transportation Authority Congestion Management Program, Transportation Impact Analysis Guidelines, May 1998.

2.2.3 *Existing Levels of Service*

Table 2-4 shows the calculated average stop delay and the resultant level of service classifications for each of the study intersections. A discussion of the findings of existing traffic operations for the corridor is presented below. Figure 2-3 shows the levels of service at each study intersection along the corridor. The Appendix includes detailed TRAFFIX printouts for each study intersection, and for convenience is combined with TRAFFIX printouts for future horizon years which will be discussed later in this report.

The intersections along Capitol Expressway vary between acceptable operations to intersections having unstable (level of service E) and failing (level of service F) levels of service. Generally, volumes are quite heavy along the main axis of Capitol Expressway and often along the cross-streets as well, resulting in diminished operational performance. Levels of service at Cunningham, Eastridge Loop and Nieman, are good because the cross street volumes are lower.

Table 2-4 Existing Intersection Levels of Service

Existing Conditions		CMP?	AM			PM		
			Level of Service	Delay(s)	V/C	Level of Service	Delay(s)	V/C
1	Capitol	Yes	B-	13.2	0.832	C-	23.9	0.851
2	Story	Yes	F	94.4	0.944	F	61.0	1.061
3	Ocala	No	C-	25.0	0.784	D	29.3	0.762
4	Cunningham	No	B+	5.1	0.560	A	4.4	0.590
5	Tully	Yes	D	33.2	0.811	D	34.5	0.745
6	Eastridge	No	A	2.2	0.463	B	9.1	0.464
7	Quimby	Yes	E+	41.0	0.799	D-	38.0	0.670
8	Nieman	No	A	1.7	0.255	A	3.4	0.293

In the AM peak hour, the intersection at Story Road fails (level of service F). At Story Road the heavy southbound left turn volume (672 vph) combined with the heavy northbound through and left turn volumes (2645 vph and 435 vph, respectively) on Capitol Expressway cause the intersection to operate at level of service F in the AM peak. During the AM peak hour the Quimby Road intersection operates at level of service E.

In the PM peak hour, the intersection at Story Road also fails (level of service F). At Story Road, the heavy southbound through and left turn volumes (2697 vph and 850 vph, respectively) dominate the intersection. Table 2-5 presents the intersections along Capitol Expressway that currently operate at unstable or failing levels of service. It also summarizes which intersection movements likely contribute most to the poor operations. The rest of the intersections would operate at level of service D or better under existing conditions.

Table 2-5 Existing Unstable & Failing Intersections

Cross Street	Period		Comments
	AM	PM	
Story Road	Fails		Heavy SB left turn & NB through volumes in AM. Very heavy SB left turn & through volumes in PM.
Quimby Road	Unstable		Very heavy left turn movements. Very heavy NS through movements.

2.2.4 *Queuing Analysis*

The existing left turn queuing analysis was conducted at the major intersections along Capitol Expressway. Table 2-6 displays the summary of the existing left turn queuing conditions at the 8 study area intersections. The existing AM and PM peak hour left turn queues were calculated based on the existing left turn traffic volumes. Synchro 6 software package is used to estimate the queues and were compared to existing left-turn storage. The data in Table 2-6 indicate left turn storage bays that have the potential to overflow. An indication of over capacity does not necessarily imply that the lane will overflow since signal synchronization and progressions will tend to minimize queues.

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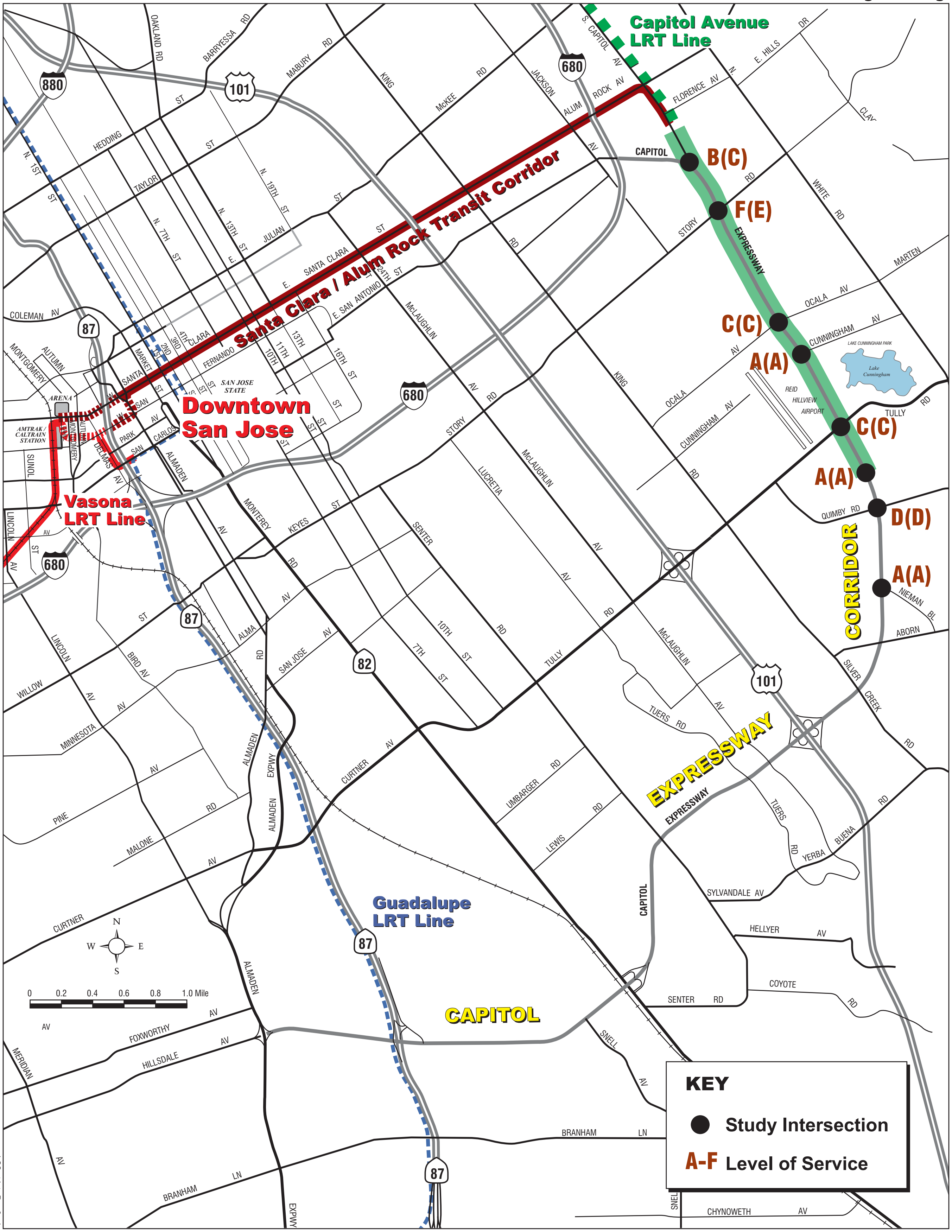

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Figure 2-3

2005 LEVELS OF SERVICE

AM (PM) Peak Hour

Currently, two left-turn pockets along Capitol Expressway experience queuing outside of the existing bays. The bays, noted by shading in Table 2-6, only include the southbound lanes: during both AM and PM peaks at the Story Road intersection and in the PM peak at the Tully Road intersection.

Table 2-6 Arterial Queuing Summary – Existing Conditions

No.	Intersection of Capitol Expy With:	Peak Period	Queue (m)				Storage (m)			
			EBL	WBL	NBL	SBL	EBL	WBL	NBL	SBL
1	Capitol Avenue	AM PM	25 32	63 111	6 7	63 100	18	137	79	102
2	Story Road	AM PM	50 44	130 147	66 30	180 147	53	91	99	130
3	Ocala Avenue	AM PM	46 56	70 90	34 59	69 69	61	46	99	114
4	Cunningham Avenue	AM PM	9 34	27 31	5 15	26 21	ST	ST	91	96
5	Tully Road	AM PM	72 75	48 69	28 16	37 189	84	61	99	114
6	Eastridge Loop	AM PM	9 35	N/A N/A	5 43	N/A N/A	38	N/A	91	N/A
7	Quimby Road	AM PM	27 41	156 65	33 63	66 105	56	58	91	110
8	Nieman Boulevard	AM PM	N/A N/A	N/A N/A	N/A N/A	22 80	N/A	N/A	N/A	107

Shaded cells show queue lengths that are larger than the corresponding storage capacities
The queue length and storage area shown are for each lane in a left-turn lane group
ST = shared with through
N/A = movement does not exist

2.2.5 *Travel Times*

Travel time surveys along the corridor were conducted during the AM and PM peak hours in December 2001 and April 2002. Three travel time runs in each direction were completed during the AM peak and six during the PM peak. The travel time runs were separated by direction and the times averaged.

Table 2-7 summarizes the travel times between three intersections along the corridor by direction for the peak hours. The travel times are also shown graphically on Figure 2-4 through Figure 2-7. Figure 2-4 shows the northbound AM travel time and Figure 2-5 shows the northbound PM travel time. Figures 2-6 and 2-7 show the southbound travel times for the AM and PM peak hours. For the segment between Wilbur and Ocala, the northbound speed is slower in the AM peak than the PM peak. In the southbound direction the travel speeds are comparable during both peak hours. Between Ocala and Eastridge the northbound travel speed is faster in the AM than the PM. The southbound travel speed is slower in the AM peak than the PM peak. Overall, the average travel speed along the corridor in both directions in both peak hours is in the low 20's mph.

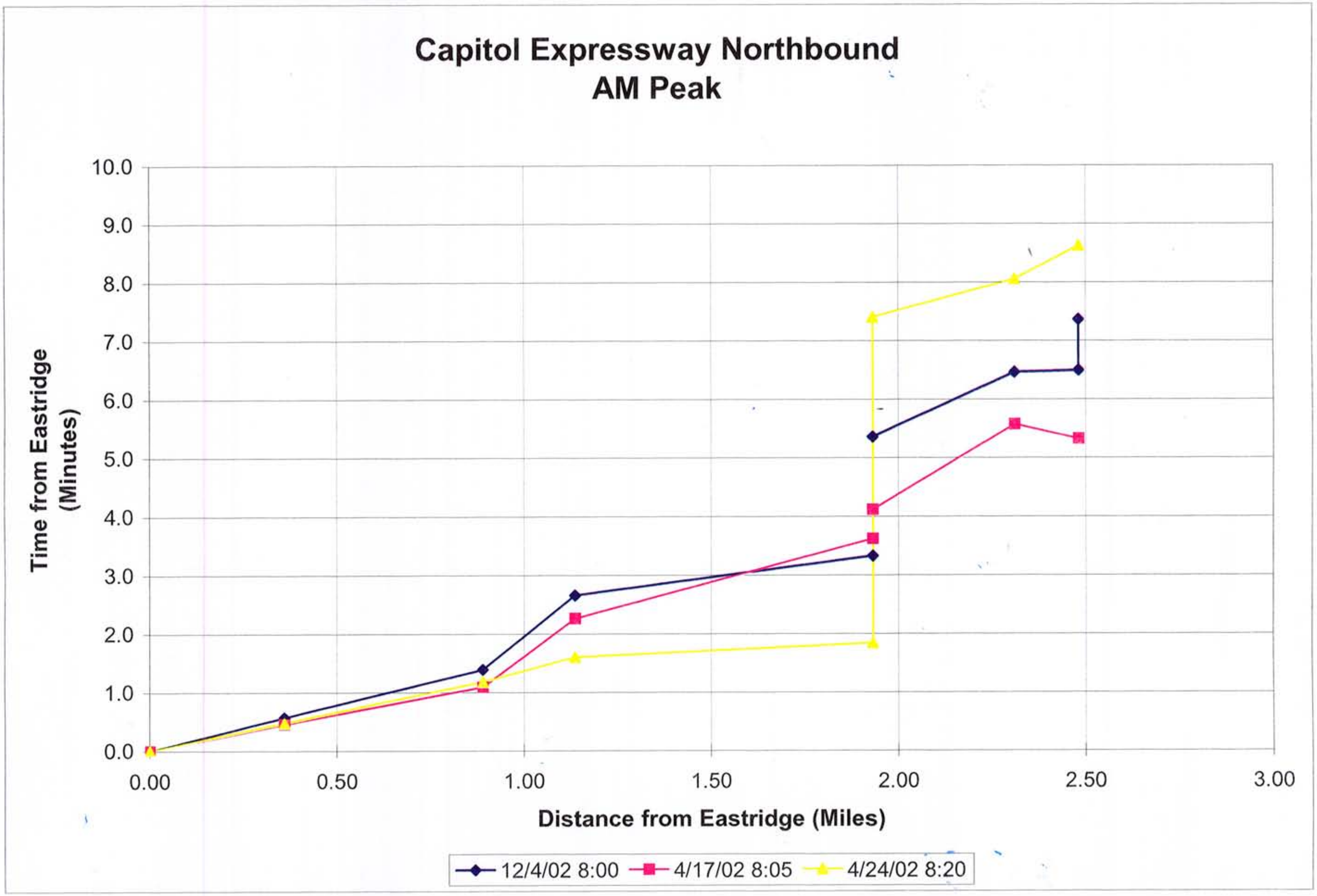

Figure 2-4
TRAVEL TIMES
Northbound AM

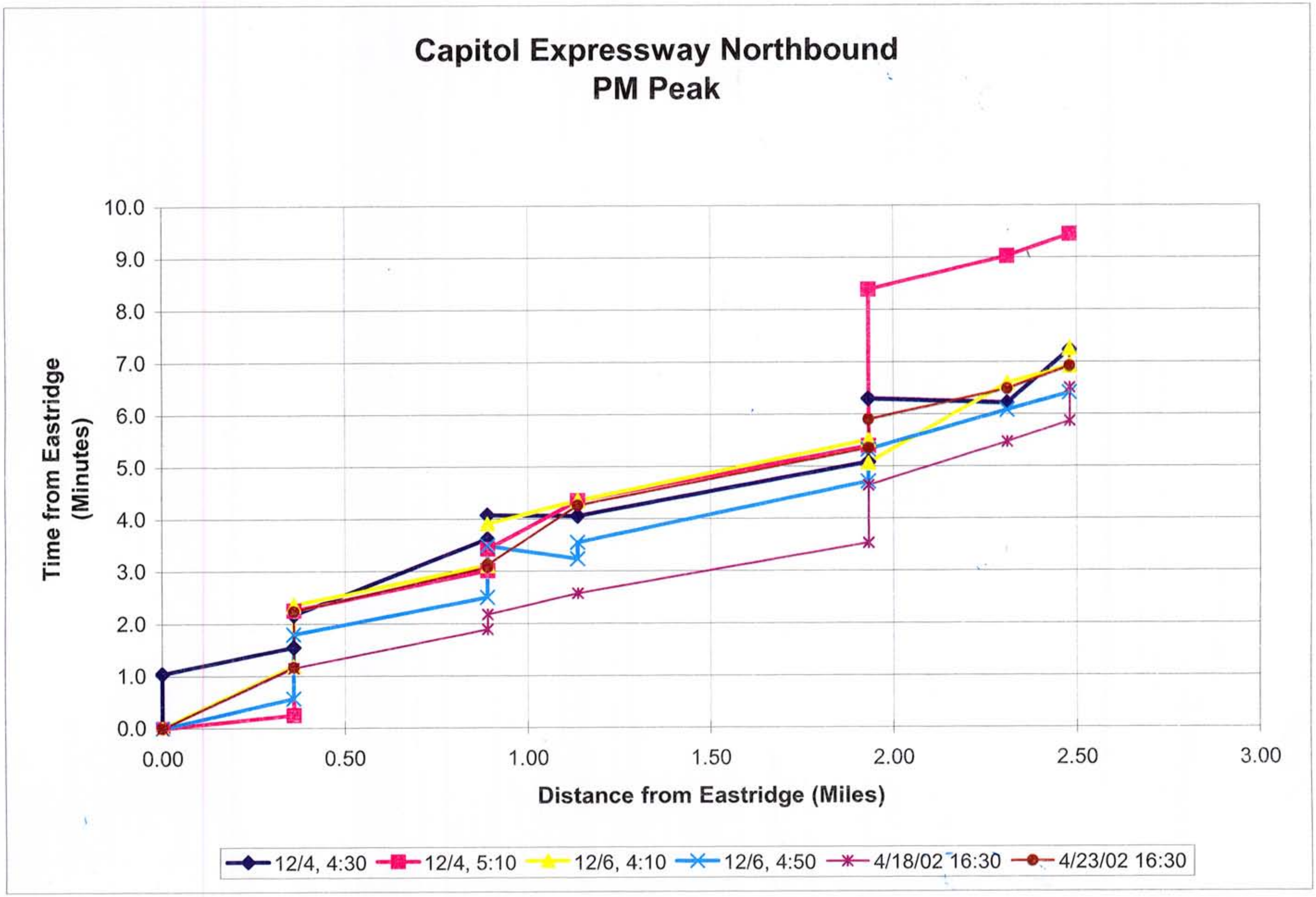

Figure 2-5
TRAVEL TIMES
Northbound PM

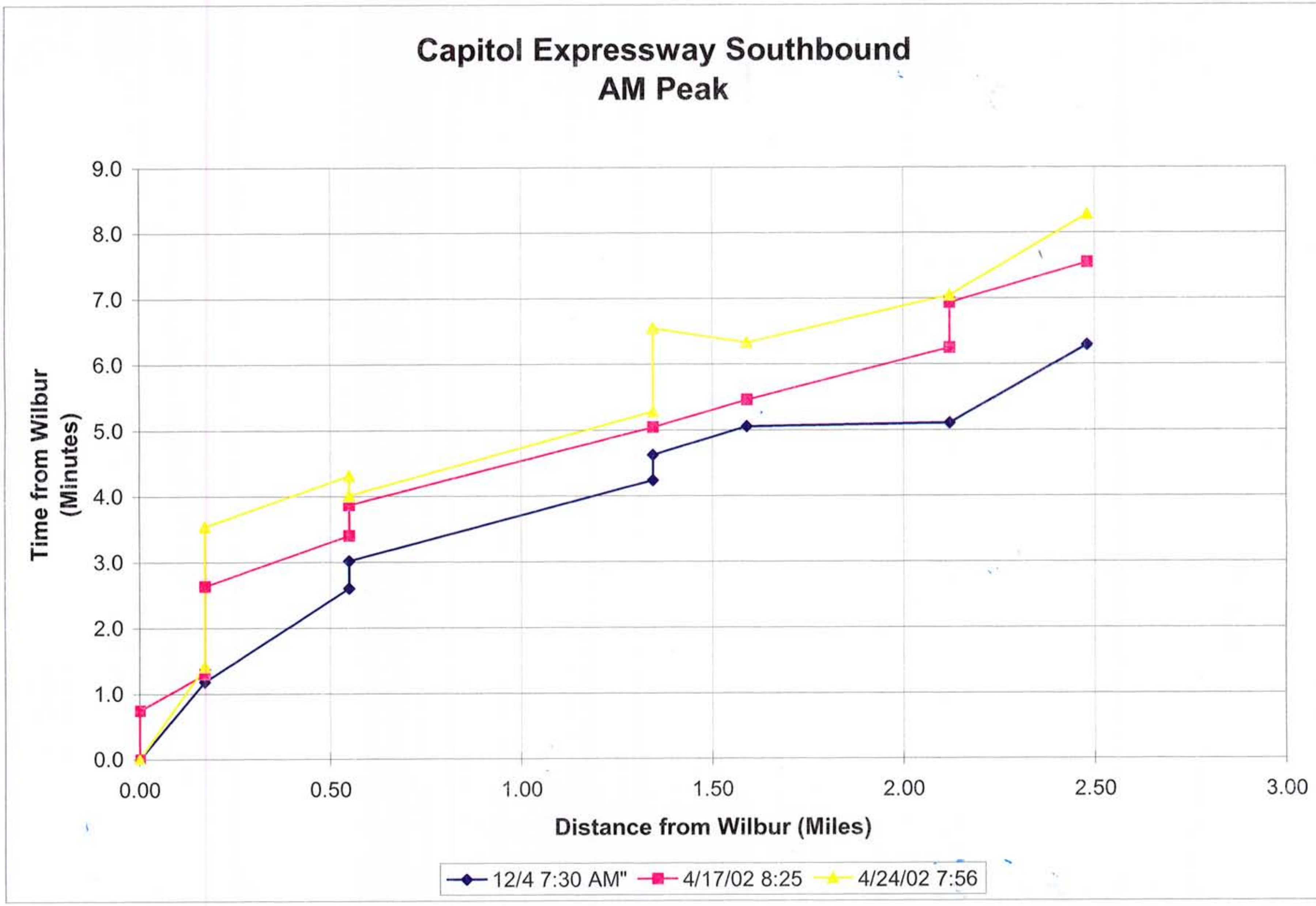

Figure 2-6
TRAVEL TIMES
Southbound AM

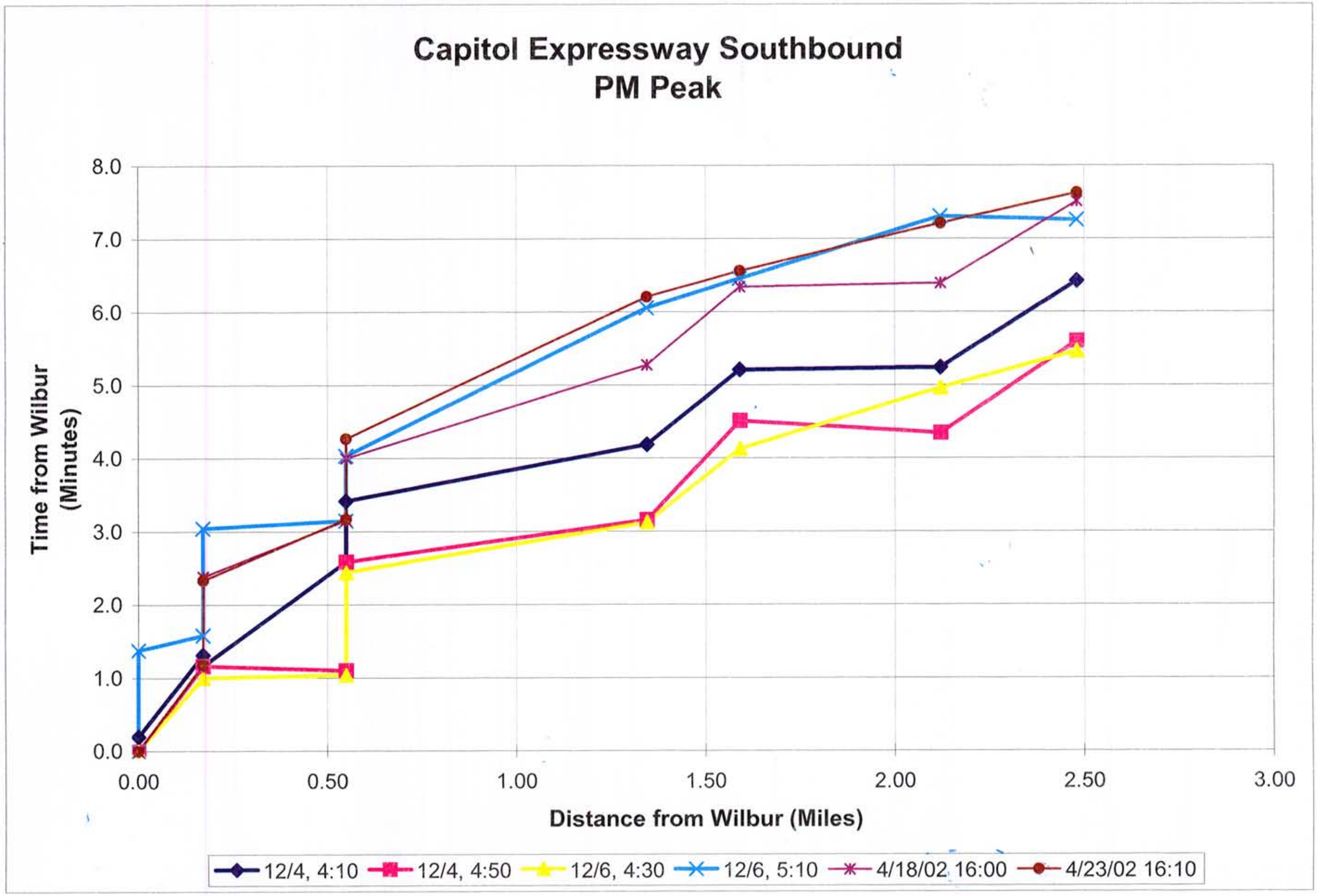

Figure 2-7
TRAVEL TIMES
Southbound PM

Table 2-7 Travel Times

Intersection	Distance (miles)	Traveling Northbound				Traveling Southbound			
		AM		PM		AM		PM	
		Travel time (min)	Speed (mph)	Travel time (min)	Speed (mph)	Travel time (min)	Speed (mph)	Travel time (min)	Speed (mph)
Between Wilbur & Ocala Rd	1.34	4.92	16.39	3.49	23.18	4.84	16.65	4.66	17.31
Between Ocala Rd & Eastridge	1.14	2.16	31.55	3.79	17.97	2.52	27.09	1.98	34.52
TOTAL	2.48	7.08	21.02	7.28	20.44	7.36	20.22	6.64	22.41

2.3 Transit Network

The transit network in the East Valley study area includes a variety of modes. The Santa Clara Valley Transportation Authority (VTA) operates regular, limited stop, and express bus lines as well as light rail service. It also participates in the operation of the Caltrain commuter rail service that links the South Bay, the Peninsula, and San Francisco.

2.3.1 *VTA Public Transit*

The VTA operates public transit services in Santa Clara County. These services include light rail transit on three lines and bus service on 77 routes. Existing transit operating characteristics are from a point in September 2001. The VTA would also operate the proposed Capitol Expressway light rail line.

Existing transit service in the East Valley is dominated by long-haul bus service. The VTA operates several bus routes on major cross-town streets, connecting the area to the rest of the region. As well, it operates some local services in the Evergreen neighborhoods. Connections within the system are focused on the Eastridge Transit Center, which currently serves 14 bus routes. The existing transit network is presented in Figure 2-8.

The majority of regular bus routes run weekdays from early in the morning (5:00 am to 6:00 am) until late in the evening (10:00 pm to midnight) and weekends from early in the morning until mid-evening (8:00 pm to 10:00 pm). Noteworthy exceptions to this rule include Line 68, which offers weekday service between downtown San Jose and Gilroy over extended hours, and Lines 37, 38, and 67, which all terminate service in the early evening (5:00 pm to 7:00 pm). Limited stop and express bus services operate only during the peak periods from Monday to Friday. Table 2-8 lists the bus lines that serve the East Valley study area along with their hours of operation and general headways.

The study area is served by several of the most heavily-used bus routes in the VTA system. Lines 22 (King Road to Santa Clara Street), 25 (Story Road), and 70 (Capitol Expressway and Jackson Avenue) each carry more than 7,000 passengers on an average weekday over the full length of their routes (not just the portions lying within the study area). Table 2-9 presents the average weekday ridership for the bus lines that serve the East Valley study area.

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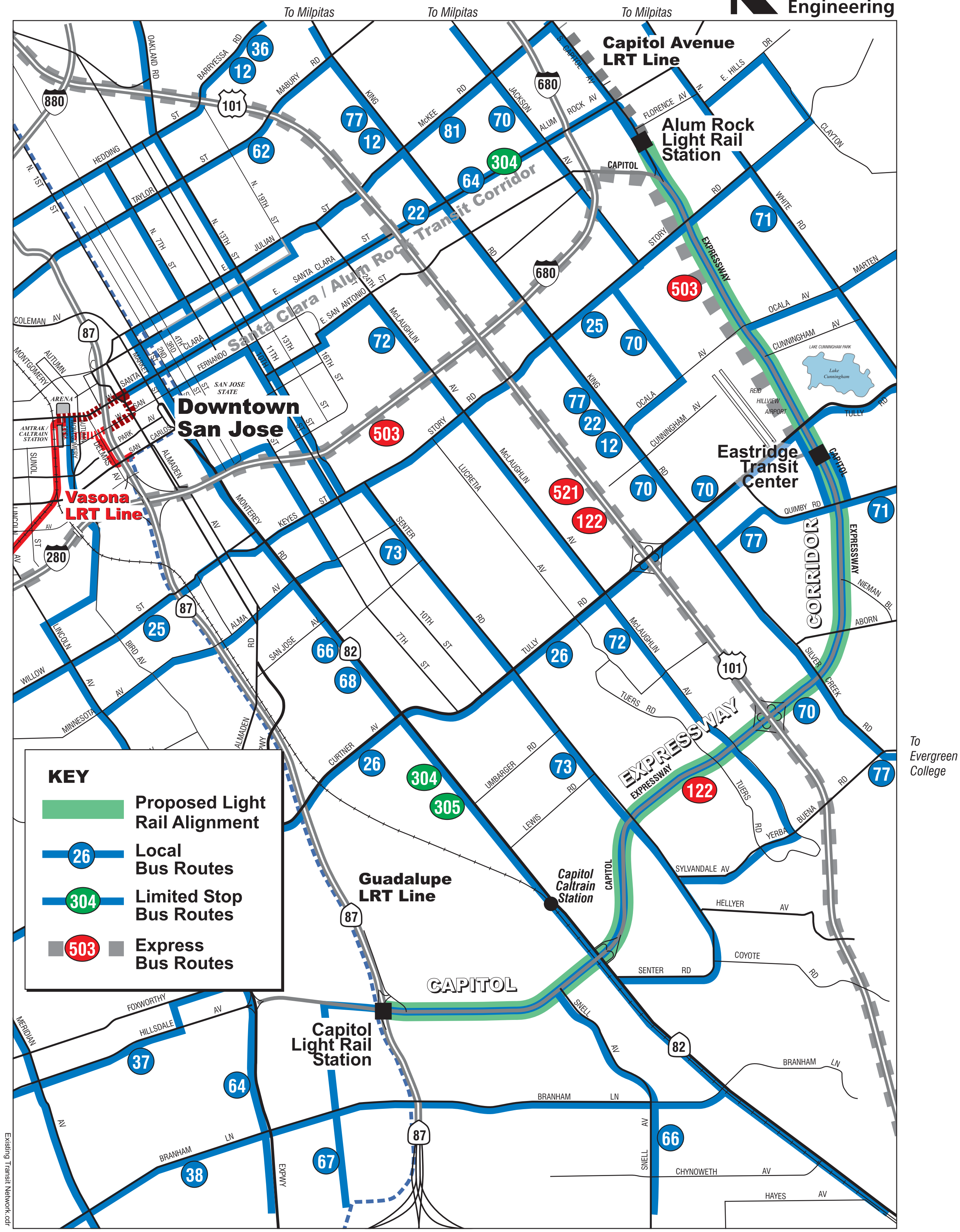

Existing Transit Network.cdr

July 2002

DOWNTOWN EAST VALLEY CAPITOL EIR

Figure 2-8

EXISTING TRANSIT NETWORK

Table 2-8 Bus Service Hours & Headways

Line	Description	Weekday Service				Weekend Hours of Operation
		Hours of Operation	Headways			
			Peak (5am – 9am 3pm – 6pm)	Midday (9am – 3pm)	Night (After 6pm)	
Local Routes						
22	Eastridge – Palo Alto/Menlo Park Caltrain Station	24 hours	10	10	10-60	24 hours
25	White & Story DeAnza College	5:00 am – Midnight	10-30	15-30	30-60	5:30 am – 11:30 pm
26	Eastridge Lockheed Martin	5:00 am – 11:30 pm	20	30	30-60	7:00 am – 9:30 pm
30	Eastridge	5:00 am – 10:30 pm	30	40	30-60	7:30 am– 8:30 pm
31	Eastridge Evergreen College	5:00 am – 10:00 pm	15-30	30	30	7:30 am – 6:30 pm
37	Monterey & Senter Camden & Union	6:00 am – 7:00 pm	30	60	-	9:00 am – 5:00 pm
38	Monterey & Senter Winchester & Knowles	6:00 am – 7:00 pm	30	60	-	9:30 am – 5:00 pm
39	Eastridge	5:30 am – 10:30 pm	20	30	30	6:00 am – 9:00 pm
66	Santa Teresa Hospital Milpitas	5:00 am – Midnight	15	30	30-60	5:30 am – 11:30 pm
67	Santa Teresa LR Station Capitol LR Station	6:00 am – 7:00 pm	30	45	-	8:30 am – 6:00 pm
68	San Jose Diridon Station Gilroy	4:30 am – 1:00 am	15	30	30-60	6:00 am – 12:30 am
70	Milpitas Capitol LR Station	5:00 am – 11:30 pm	15	15	20-60	6:30 am – 11:00 pm
71	Milpitas Eastridge	5:30 am – 11:00 pm	15	20	30-60	7:00 am – 9:00 pm
72	Downtown San Jose Santa Teresa LR Station	5:00 am – 10:30 pm	15-30	15-30	30-60	6:00 am – 8:30 pm
73	Downtown San Jose Snell & Capitol Expwy	5:00 am – 10:00 pm	15	20	30-60	7:00 am – 8:00 pm
74	Eastridge Baypointe LR Station	5:30 am – 10:30 pm	20	30	30-60	7:30 am –10:30 pm
77	Milpitas Evergreen College	5:30 am – 10:30 pm	15-30	30	30-60	7:00 am – 9:30 pm
Limited Stops & Express Routes						
122	South San Jose Lockheed Martin	6:00 am – 7:30 am 4:00 pm – 6:00 pm	30-60	-	-	-
300	East San Jose Palo Alto Caltrain Station	5:00 am – 7:30 pm	20-30	30	-	-
304	South San Jose Mountain View	5:30 am – 8:30 am 3:00 pm – 6:30 pm	15-30	-	-	-
305	South San Jose Mountain View	5:00 am – 8:00 am 3:00 pm – 6:00 pm	60	-	-	-
321	Eastridge Lockheed Martin	5:00 am – 7:30 am 2:30 pm – 5:30 pm	30-60	-	-	-
345	Eastridge Mountain View	6:00 am – 7:30 am 4:00 pm – 5:30 pm	60	-	-	-
503	Eastridge to Palo Alto	5:00 am – 8:00 am 2:30 pm – 6:00 pm	30-60	-	-	-

Source: VTA, 2002

Table 2-9 Average Weekday Bus Ridership by Route

Route	Daily Ridership	Route	Daily Ridership	Route	Daily Ridership	Route	Daily Ridership
22	24,700	38	620	71	4,360	300	1,390
25	9,330	39	820	72	4,620	304	500
26	4,960	66	7,740	73	3,410	305	200
30	290	67	690	74	2,070	321	160
31	800	68	7,820	77	3,190	345	60
37	470	70	9,670	122	60	503	160

Source: VTA Bus Operations Department, 2002
Daily ridership figures reflect activity on the full length of the routes, not just the portions of routes within the study area.

Table 2-10 Daily Passenger Activity at Major Intersections & Transit Centers

Major Intersection	# of Lines	Bus Stop				Total
		NB	SB	EB	WB	
Story	5	80	10	280	140	510
Ocala	6	10	10	0	0	20
Cunningham	6	10	10	0	0	20
Tully	7	0	0	0	0	0
Eastridge	*14*	-	-	-	-	*7,930*
Quimby	5	0	0	0	0	0
Nieman	2	10	10	0	0	20

Source: VTA Bus Operations Department, 2002
Transit centers are in *italics.*
Passenger activity includes both boardings and alightings.

Major intersections and transit centers are the principal locations where passengers may make connections between routes. It is at these locations that passenger activity (i.e., boardings and alightings) is focused. The Eastridge Transit Center has the highest levels of passenger activity in the study area with 7,930 daily boardings and alightings. The next highest level of passenger activity occurs at Story Road with 510 daily boardings and alightings. Table 2-10 summarizes the daily passenger activity for the major intersections and transit centers. The total passenger activity for these locations is presented graphically in Figure 2-9.

Transit passengers in the East Valley have access to the VTA light rail network via the Guadalupe Light Rail Line. Direct service is available at the Capitol Light Rail Station at the interchange of the Capitol Expressway and SR 87 (Guadalupe Parkway). East Valley passengers may also transfer from buses to the Guadalupe Light Rail Line at Tamien Station (Line 25) and Curtner Station (Line 26). The Guadalupe Light Rail Line operates 24 hours a day with daytime service available every 10 minutes. The hours of operation and headways are presented in Table 2-11 for the Guadalupe, Tasman, and Almaden Light Rail Lines.

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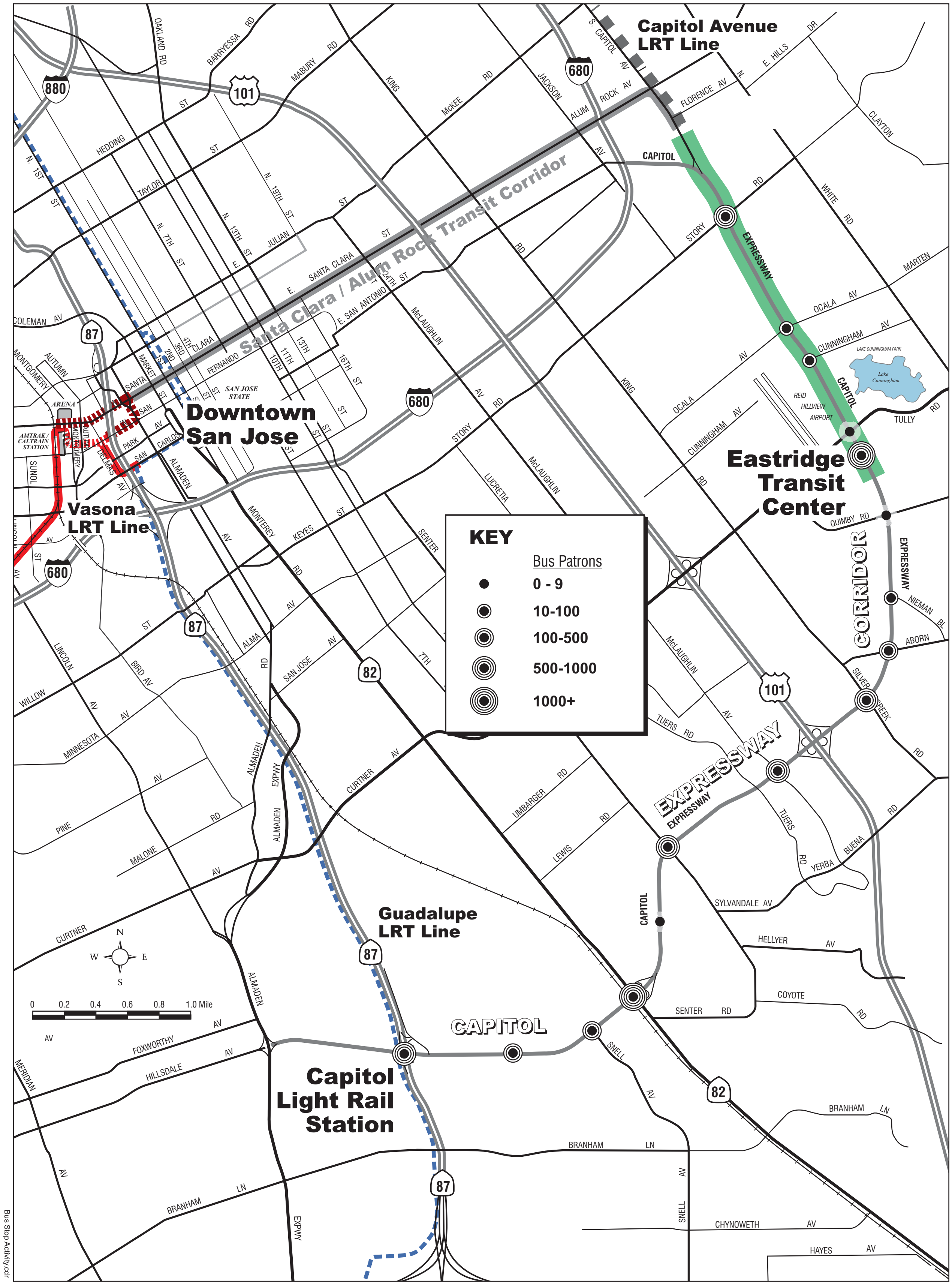

July 2002
Rev 6/13/03
Rev 7/11/06

DOWNTOWN EAST VALLEY CAPITOL EIR

Figure 2-9

DAILY BUS STOP ACTIVITY AT MAJOR INTERSECTIONS

Table 2-11 Light Rail Service Hours & Headways

Light Rail Line	Weekday Service				Weekend Hours of Operation
	Hours of Operation	Peak (5am – 9am 3pm – 6pm)	Midday (9am – 3pm)	Nights (After 6pm)	
Alum Rock – Santa Teresa	4:30 am to 2:00 am	15	15	15-60	4:30 am to 2:00 am
Mountain View – Winchester Avenue	5 am to midnight	15	30	15-60	5:30 am to midnight
Ohlone/Chynoweth – Almaden	5:30 am to 10:00 pm	15	15	15	7:00 am to 10:00 pm

Source: VTA, 2005

For both the bus and light rail operations in the system, the VTA offers an integrated fare structure. Riders pay the same fare to ride regular and limited stop buses as they do to ride light rail. The fare structure is based off of an adult single ride fare of $1.75 and a day pass fare of $5.25. Discounted fares are available to youth and senior riders, as well as to frequent system users through monthly and annual passes. Higher fares are charged for express bus lines to account for the higher level of service they provide; however, discount fares are also available for these lines. Table 2-12 lists the current fares charged by the VTA to passengers using the transit network. VTA is currently considering modifications to the fare structure.

Table 2-12 VTA Transit Fares

Fare Type	Adult	Youth (5-17)	Senior (65+)/Disabled
Single Ride	$1.75	$1.50	$0.75
Express Single Ride	$3.50	$1.50	$0.75
Day Pass	$5.25	$4.50	$2.25
Express Day Pass	$10.50	*	*
Day Pass Tokens (Pack of 5)	$23.60	$20.25	--
Monthly Flash Pass	$61.25	$49.00	$26.00
Express Monthly Flash Pass	$122.50	*	*
Annual Flash Pass	$674.00	$539.00	$286.00
Express Annual Flash Pass	$1,348.00	*	*

Source: VTA website (www.vta.org), July 2005
*Youth and Senior/Disabled Day Passes and Monthly Stickers are valid on all VTA Bus and Light Rail Services.

2.3.2 *Caltrain Service*

The Peninsula Corridor Joint Powers Board includes representatives from San Francisco, San Mateo, and Santa Clara Counties. It operates Caltrain commuter rail service along a 77-mile right-of-way between Gilroy and San Francisco. Service in the East Valley study area is operated by the VTA with the cooperation of the Union Pacific Railroad (UPRR), which owns the right-of-way between Gilroy and Tamien Station.

In the East Valley study area, Caltrain runs along the west side of Monterey Highway where it passes under Capitol Expressway. The Caltrain station nearest the Capitol Expressway Light Rail Extension Project is the Capitol Station, which is located approximately 2,000 feet north at the intersection of Fehren Avenue and Monterey Highway. Commuter rail service at this station is offered by four northbound trains in the morning and four southbound trains in the afternoon (Table 2-13). (The VTA is currently negotiating with the UPRR to increase the number of trains and to install service in the off-peak direction.) Travel from Capitol Station takes approximately 15 minutes to Downtown San Jose and 1 hour and 50 minutes to San Francisco.

Table 2-13 Weekday Caltrain Service at Capitol Station

Northbound (To San Jose & San Francisco)	Southbound (To Morgan Hill & Gilroy)
5:57 am	4:52 pm
6:37 am	5:50 pm
7:00 am	6:26 pm
7:42 am	6:48 pm

Source: Caltrain, 2002

2.4 Park & Ride Facilities

Two existing park-and-ride facilities lie adjacent to the proposed light rail line. Bus passengers at the Eastridge Transit Center are served by a facility with approximately 130 stalls, while a new park-and-ride lot with 105 stalls has been constructed at the Alum Rock Station to serve the recently construction Capitol Avenue light rail line.

Table 2-14 summarizes the details of the four facilities, while Figure 2-10 locates them graphically.

Table 2-14 Details of Existing Facilities

Location	Size (ft^2)	Capacity	Area per Stall (ft^2)	Current Peak Use
Alum Rock	45,000	105	425	50
Eastridge	61,200	133	460	20

2.5 Pedestrians & Bicycles

Pedestrian and bicycle activity on Capitol Expressway is fairly limited by the corridor's automobile-dominated nature. Foot-travel along the corridor is limited due to discontinuous sidewalks and pedestrian crossings only at signalized intersections. The lack of sidewalks is particularly acute on the northern segments of the corridor where the only sidewalks run short distances to link cross-streets with bus stops. Frontage roads do, however, offer sidewalks in sections from Capitol Avenue to Ocala Avenue. Available sidewalk facilities are presented in Figure 2-11.

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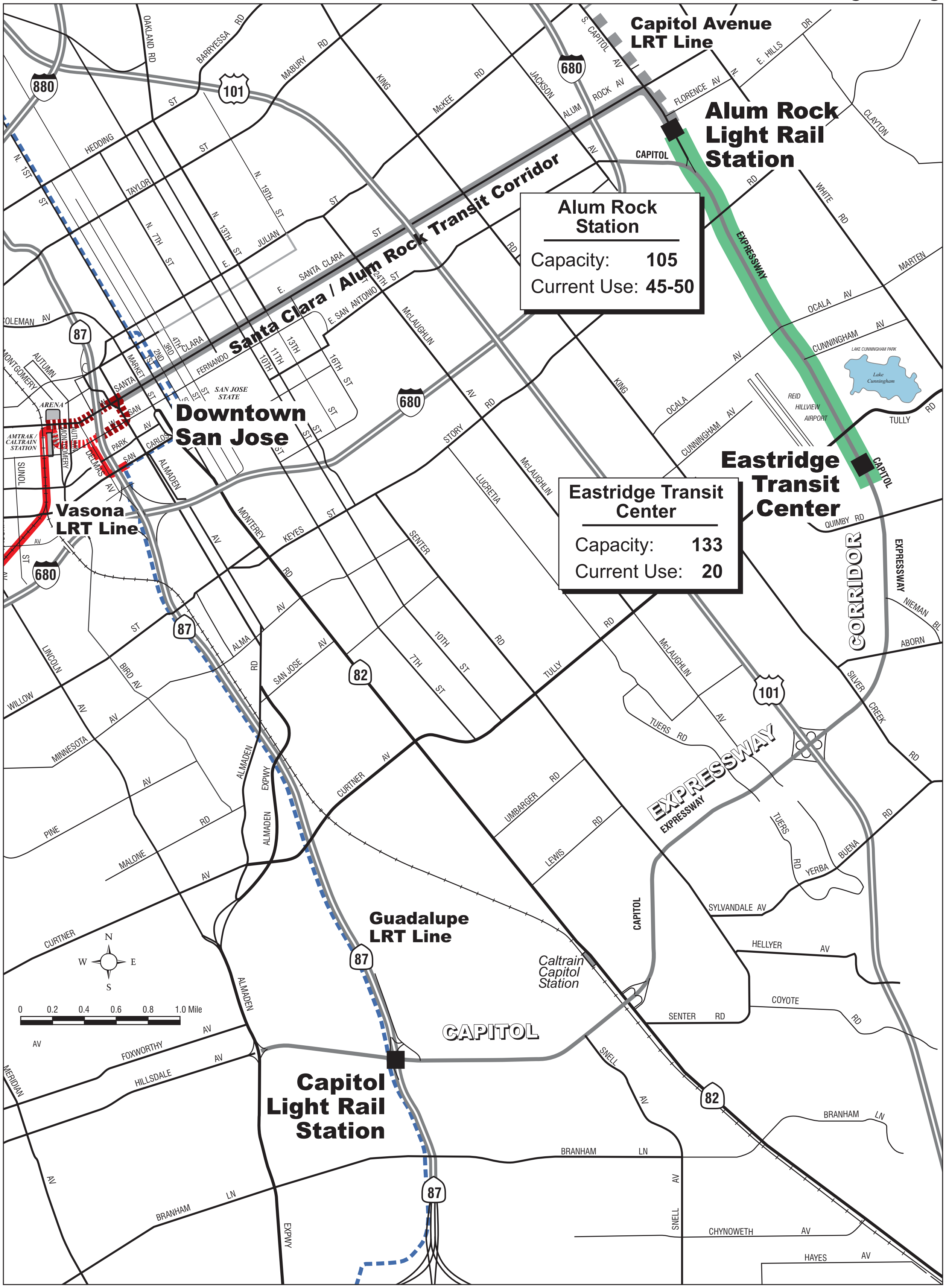

PnR Capacity.cdr

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Rev 6/13/03
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Figure 2-10

PARK AND RIDE CAPACITY AND CURRENT USE

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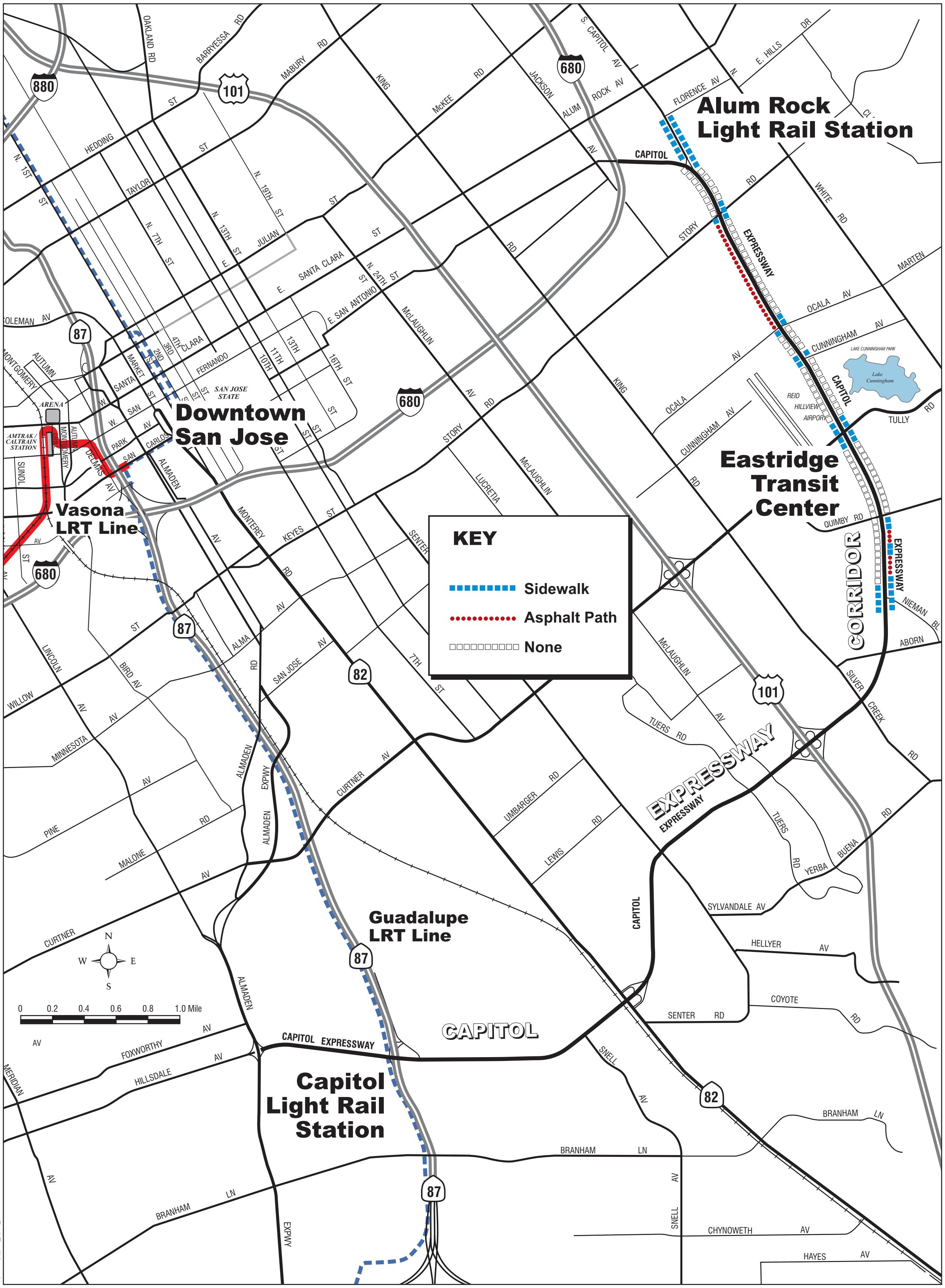

Ped Facilities.cdr

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Figure 2-11

PEDESTRIAN FACILITIES

The majority of signalized intersections along the corridor provide for pedestrian crosswalks, although not all approaches to an intersection may permit crossings. The intersections at Capitol Avenue and Nieman Boulevard prohibit pedestrian crossings on one intersection leg. The intersection at Eastridge Loop provides no crosswalks or signals for pedestrians in any direction. Table 2-15 and Figure 2-12 summarize the locations of crosswalks and pedestrian push buttons (PPB).

As might be expected in such an automobile-oriented environment, pedestrian crossings are relatively few. Pedestrian use is highest at Story Road where over 250 pedestrian crossings occur during each of the morning and afternoon peak hours. Other intersections with moderate crossing volumes (over 75 in a peak hour) include Ocala Avenue. Pedestrian counts at the signalized intersections are included in Table 2-16 and Table 2-17.

Bicyclists may use the shoulders along the expressway. Some major cross-streets offer bicycle routes or lanes (Ocala Avenue & Tully Road). Figure 2-13 illustrates the bicycle network of the City of San Jose.

Bicycle activity in the study area is low despite some bicycle routes available. Bicycle counts for the major intersections are included in Table 2-18 and Table 2-19.

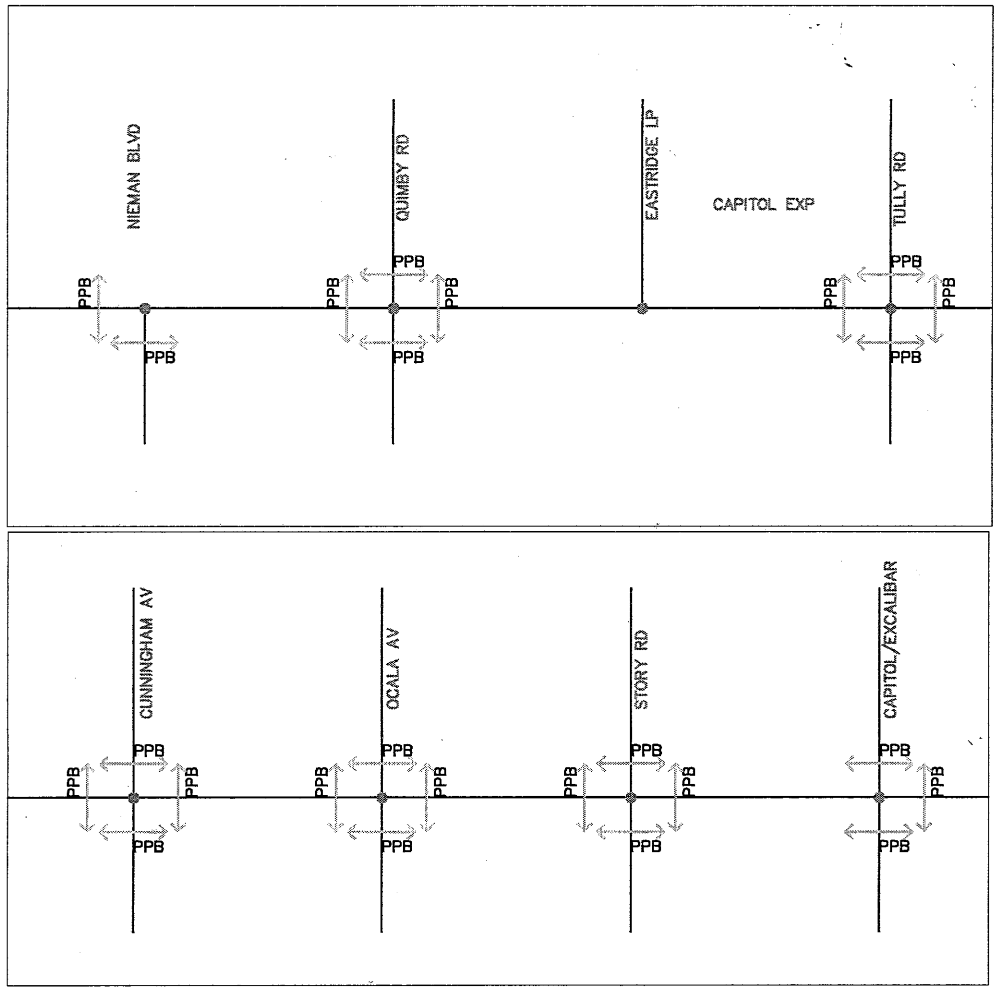
Table 2-15 Capitol Expressway Crosswalk Locations

Cross Street	Crossing Location at Intersection			
	North	**South**	**East**	**West**
Capitol	Yes	**No**	Yes	Yes
Story	Yes	Yes	Yes	Yes
Ocala	Yes	Yes	Yes	Yes
Cunningham	Yes	Yes	Yes	Yes
Tully	Yes	Yes	Yes	Yes
Eastridge[1]	**No**	**No**	N/A	**No**
Quimby	Yes	Yes	Yes	Yes
Nieman[1]	**No**	Yes	Yes	N/A

Notes: [1] Eastridge Loop and Nieman Boulevard meet Capitol Expressway in T-intersections.

2.6 Goods Movement

Capitol Expressway serves the movement of commercial goods into and through the East Valley. Capitol Expressway connects to three freeways (I-680, US 101, and SR 87) and Monterey Highway. The connectivity of the corridor to regional and intrastate facilities accentuates its function as a commercial route. The existing corridor provides for the free flow of commercial traffic except for delays caused by existing traffic congestion. Access into and out of commercial facilities along the corridor is provided by signalized intersections at full movement locations and by right turns only at other minor access points. The spacing of access along the corridor minimizes the need for extensive circulation by commercial traffic onto local streets not specifically designated for such purposes.



LEGEND

SIGNALIZED
PEDESTRIAN PUSH BUTTON — PPB
PEDESTRIAN CROSSWALK
SIGNALIZED INTERSECTIONS ARE FURNISHED WITH PEDESTRIAN SIGNAL HEADS FOR EACH CROSSWALK

Karve Engineering
1570 The Alameda, Suite 222
San Jose, CA 95126
(408) 286-2929

DESIGNED	CHECKED	DRAWN	CADD FILENAME
SMO	DS	SMO	CAP--PED

SANTA CLARA Valley Transportation Authority

CADD REVISION	PLOT DATE	SCALE
07/10/06	07/10/06	N.T.S

DOWNTOWN / EAST VALLEY LRT
PEDESTRIAN DATA
Figure 2-12
CAPITOL CORRIDOR

SHEET 1 OF 1

DRAWING NO. –

NO.	DATE	REVISIONS

Table 2-16 AM Pedestrian Counts

AM Peak	Capitol runs…		North X-walk			South X-walk			N-S	West X-walk			East X-walk			E-W	Grand
	NB/SB	EB/WB	WB	EB	Tot	WB	EB	Tot	Total	SB	NB	Tot	SB	NB	Tot	Total	Total
Wilbur	X		1	6	7	2	7	9	16	0	1	1	2	1	3	4	20
Lombard	X		1	3	4	2	0	2	6	0	2	2	0	0	0	2	8
Westboro	X		1	0	1	0	0	0	1	0	0	0	5	2	7	7	8
Capitol Ave		X	2	1	3	5	2	7	10	0	0	0	0	0	0	0	10
Story	X		51	49	100	46	39	85	185	35	15	50	7	13	20	70	255
Ocala	X		8	21	29	2	16	18	47	8	8	16	19	15	34	50	97
Cunningham	X		1	0	1	1	3	4	5	6	5	11	2	5	7	18	23
Tully	X		1	2	3	4	2	6	9	3	4	7	0	0	0	7	16
Eastridge	X		0	0	0	0	0	0	0	3	8	11	0	0	0	11	11
Quimby	X		8	12	20	0	2	2	22	8	3	11	6	2	8	19	41
Nieman	X		0	0	0	26	10	36	36	0	0	0	5	8	13	13	49

Table 2-17 PM Pedestrian Counts

PM Peak	Capitol runs…		North X-walk			South X-walk			N-S	West X-walk			East X-walk			E-W	Grand
	NB/SB	EB/WB	WB	EB	Tot	WB	EB	Tot	Total	SB	NB	Tot	SB	NB	Tot	Total	Total
Wilbur	X		7	1	8	3	2	5	13	1	0	1	4	5	9	10	23
Lombard	X		0	0	0	4	2	6	6	7	7	14	0	0	0	14	20
Westboro	X		3	1	4	8	3	11	15	0	0	0	6	5	11	11	26
Capitol Ave		X	1	2	3	6	6	12	15	0	0	0	0	0	0	0	15
Story	X		53	45	98	36	44	80	178	33	26	59	36	34	70	129	307
Ocala	X		8	5	13	11	11	22	35	15	3	18	14	11	25	43	78
Cunningham	X		1	1	2	0	0	0	2	2	8	10	1	7	8	18	20
Tully	X		2	4	6	4	3	7	13	6	6	12	0	0	0	12	25
Eastridge	X		0	0	0	0	0	0	0	8	10	18	0	0	0	18	18
Quimby	X		13	14	27	5	9	14	41	7	15	22	6	1	7	29	70
Nieman	X		0	0	0	8	10	18	18	0	0	0	14	13	27	27	45

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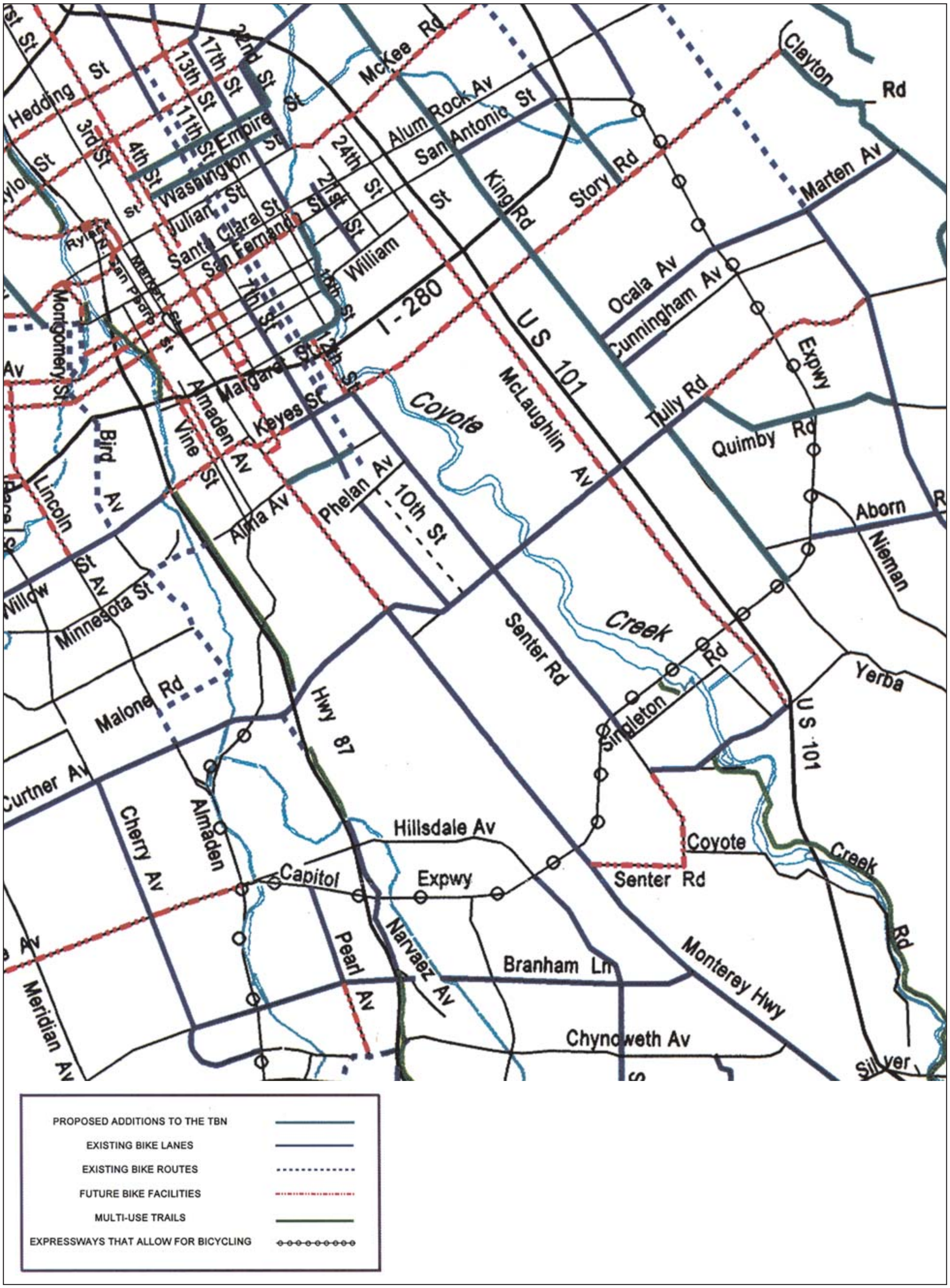

SJ Bike Network.cdr

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Figure 2-13

CITY OF SAN JOSE TRANSPORTATION BICYCLE NETWORK

2001-02 Planning Map

Table 2-18 Existing AM Bicycle Volumes

AM Peak	Capitol runs…		SB			SB Total	NB			NB Total	EB			EB Total	WB			WB Total	Total
	NB/SB	EB/WB	L	T	R		L	T	R		L	T	R		L	T	R		
Wilbur	X		4	4	0	8	0	1	2	3	0	2	0	2	0	1	0	1	14
Lombard	X		0	4	0	4	0	1	0	1	0	0	0	0	0	0	0	0	5
Westboro	X		0	3	0	3	0	5	5	10	0	0	0	0	0	0	0	0	13
Capitol Ave		X	1	0	0	1	0	0	0	0	0	0	0	0	0	1	2	3	4
Story	X		0	0	1	1	0	0	1	1	0	3	1	4	0	4	1	5	11
Ocala	X		1	0	0	1	0	1	2	3	0	8	0	8	0	8	1	9	21
Cunningham	X		0	1	0	1	0	2	5	7	0	0	0	0	1	0	0	1	9
Tully	X		0	2	1	3	0	3	1	4	0	1	0	1	0	9	0	9	17
Eastridge	X		0	3	0	3	0	1	0	1	0	0	0	0	0	0	0	0	4
Quimby	X		0	3	0	3	0	2	0	2	0	0	0	0	1	5	0	6	11
Nieman	X		0	2	0	2	0	4	0	4	0	0	0	0	0	0	0	0	6

Table 2-19 Existing PM Bicycle Volumes

PM Peak	Capitol runs…		SB			SB Total	NB			NB Total	EB			EB Total	WB			WB Total	Total
	NB / SB	EB / WB	L	T	R		L	T	R		L	T	R		L	T	R		
Wilbur	X		2	2	0	4	0	5	1	6	1	0	3	4	2	0	1	3	17
Lombard	X		0	1	0	1	0	6	0	6	0	0	0	0	0	0	0	0	7
Westboro	X		2	1	0	3	0	4	2	6	0	0	0	0	0	0	1	1	10
Capitol Ave		X	4	0	0	4	0	0	0	0	0	1	0	1	0	0	5	5	10
Story	X		0	3	2	5	3	2	1	6	0	5	2	7	2	1	0	3	21
Ocala	X		0	3	1	4	2	5	4	11	0	3	1	4	1	2	0	3	22
Cunningham	X		0	4	0	4	0	4	2	6	0	0	0	0	2	0	0	2	12
Tully	X		0	5	1	6	1	5	3	9	1	2	0	3	0	2	0	2	20
Eastridge	X		0	3	2	5	3	3	0	6	0	0	1	1	0	0	0	0	12
Quimby	X		0	5	1	6	3	1	3	7	0	1	0	1	0	2	1	3	17
Nieman	X		0	4	1	5	0	6	0	6	0	0	0	0	2	0	0	2	13

2.7 Parking

On-street parking is prohibited on Capitol Expressway. Along the light rail alignment, only the segment on Capitol Avenue south of Wilbur Avenue permits on-street parking. Park-and-ride facilities are discussed earlier in this report.

2.8 Community Access

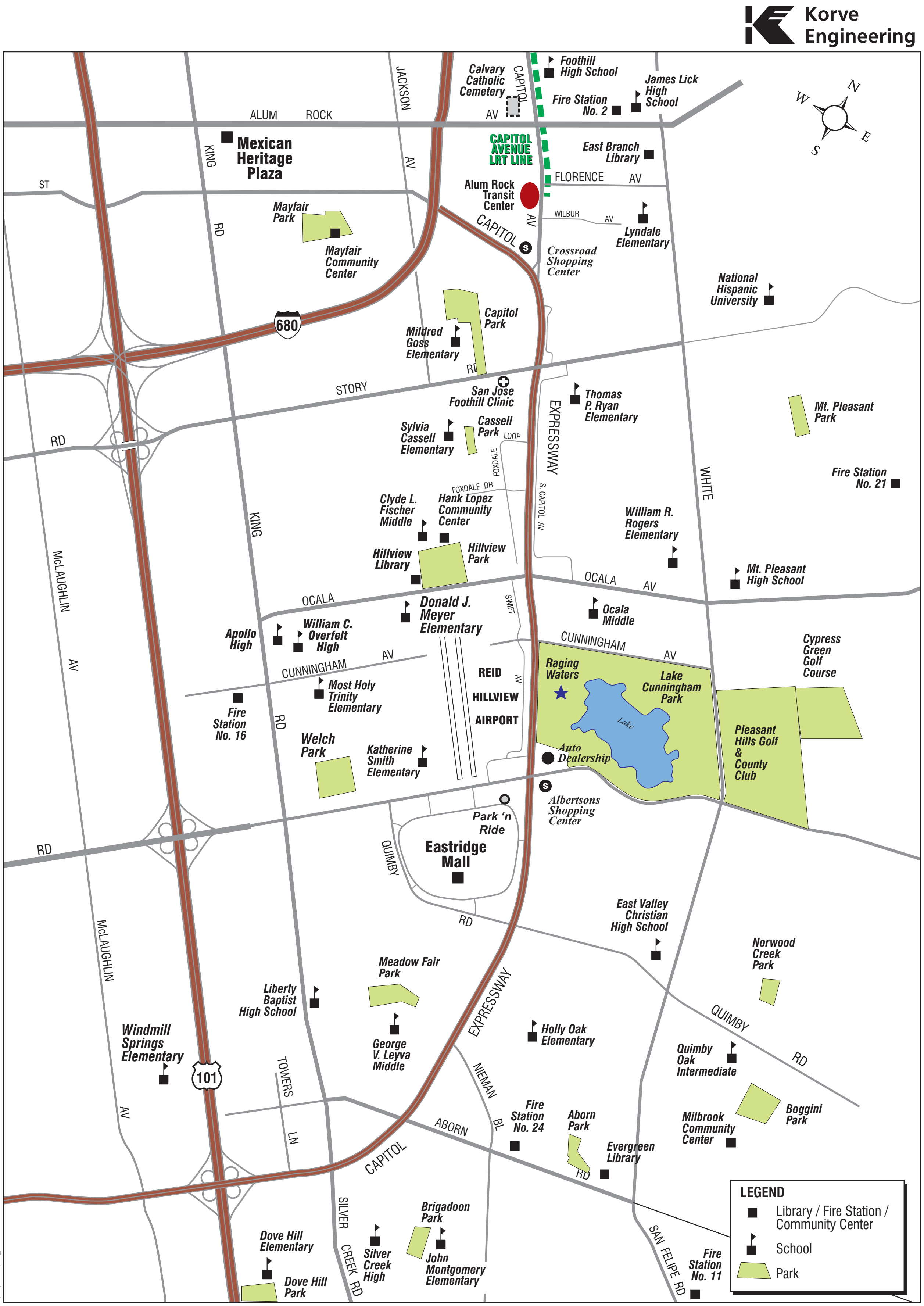
Capitol Expressway serves as the principal thoroughfare in the East Valley study area. As such, it links the various neighborhoods in the corridor and provides access for residents to the amenities and public buildings nearby. Schools, community centers, libraries, cemeteries, major parks, and fire stations are all important features in a community.

Table 2-20 lists the community features in the study area that are near Capitol Expressway. The table also provides the addresses, the nearest major intersections on Capitol Expressway, and the existing access to the features. Figure 2-14 presents the locations of the major community features.

Table 2-20 Community Features Inventory

Feature	Address (Nearest Major Cross Street)	Capitol Expressway Access
Elementary Schools		
Donald Meyer	1824 Daytona Drive (Ocala Avenue)	0.4 mile west on Ocala Avenue to Daytona Drive
Holly Oak	2995 Rossmore Way (White Road)	0.5 mile east of Capitol Expwy between Quimby & Aborn Roads; No direct access
Katherine Smith	2025 Clarice Drive (Tully Road)	0.5 mile west on Tully Road to Quimby Road to Clarice Drive
Lyndale	13901 Nordyke Drive (White Road)	0.4 mile east on Wilbur Avenue
Mildred Goss	2475 Van Winkle Lane (Story Road)	0.1 mile west on Story Road to Galahad to Van Winkle Lane
Most Holy Trinity	1940 Cunningham Avenue (King Road)	0.6 mile west on Ocala Avenue to Winter Park Way to Cunningham Avenue
Sylvia Cassell	1300 Tallahassee Drive (Story Road)	0.3 mile west of Capitol Expwy between Story Road & Ocala Avenue; No direct access
Thomas Ryan	1241 McGinness Avenue (Story Road)	0.2 mile east on Story Road to McGinness Avenue
William Rogers	2999 Ridgemont Drive (Ocala Avenue)	0.4 mile east on Ocala Avenue to Ridgemont Drive
Junior High / Intermediate / Middle Schools		
Clyde Fischer Middle	1720 Hopkins Drive (Ocala Avenue)	0.6 mile west on Ocala Avenue to Hopkins Drive
Ocala Middle	2800 Ocala Avenue (Capitol Expressway)	0.2 mile east on Ocala Avenue
High Schools		
Apollo High	1835 Cunningham Avenue (King Road)	0.5 mile west on Ocala Avenue to Winter Park Way

Feature	Address (Nearest Major Cross Street)	Capitol Expressway Access
Foothill High	230 Pala Drive (Capitol Avenue)	0.7 mile north on Capitol Avenue to Gay Avenue
James Lick High	57 North White Road (Alum Rock Avenue)	0.3 mile east on Alum Rock Avenue
Mount Pleasant High	1750 South White Road (Ocala Avenue)	0.6 mile east on Ocala Avenue to White Road
William C. Overfelt High	1835 Cunningham Avenue (King Road)	0.5 mile east on Ocala Avenue to Winter Park Way
Community Centers		
Hank Lopez	1694 Adrian Way (Ocala Avenue)	0.3 mile west on Ocala Avenue to Adrian Way
Libraries		
Alum Rock Branch	75 South White Road (Alum Rock Avenue)	0.4 mile east on Alum Rock Avenue to White Road
Hillview Branch	2255 Ocala Avenue (Capitol Expressway)	0.3 mile west on Ocala Avenue
Cemeteries		
Calvary Catholic	2655 Madden Avenue (Alum Rock Avenue)	0.6 mile north on Capitol Avenue to Madden Avenue
Major Parks		
Capitol	Bambi Lane (Capitol Expressway)	0.2 mile west on Bambi Lane
Hillview	2251 Ocala Avenue (Capitol Expressway)	0.3 mile west on Ocala Avenue
Lake Cunningham	2305 South White Road (Tully Road)	0.2 mile east on Tully Road
Meadowfair	Corda Drive (King Road)	0.3 mile west of Capitol Expwy between Quimby & Aborn Roads; No direct access
Welch	1900 Santiago Drive (Tully Road)	0.6 mile west on Tully Road to Brahms Drive
Fire Stations		
Station No. 2	2933 Alum Rock Avenue (White Road)	0.2 mile east on Alum Rock Avenue
Station No. 16	2001 South King Road (Cunningham Avenue)	0.9 mile west on Ocala Avenue to King Road
Station No. 21	1749 Mount Pleasant Road (Marten Avenue)	1.4 miles east on Ocala Avenue to Mount Pleasant Road
Station No. 24	2525 Aborn Road (Nieman Boulevard)	0.4 mile east on Aborn Road
Major Attractors		
Eastridge Shopping Center	1 Eastridge Center (Capitol Expressway)	At Eastridge Loop
National Hispanic University	14271 Story Road (White Road)	0.7 mile east on Story Road
Raging Waters	2333 South White Road (Tully Road)	0.2 mile east on Tully Road
Reid Hillview Airport	2350 Cunningham Avenue (Capitol Expressway)	0.2 mile west on Cunningham Avenue
Little League Baseball Fields	Capitol Expressway/ Cunningham Avenue	0.1 mile west on Airport access roadway



DOWNTOWN / EAST VALLEY CAPITOL EIR

Figure 2-14

EXISTING COMMUNITY FEATURES

3.0 FUTURE CONDITIONS

3.1 Objectives

The purpose of an assessment of the future traffic volumes along the corridor is to compare the future No-Build Alternative to the Light Rail Alternative. In this respect, the future transportation benefits and impacts of constructing the light rail line are identified. Where appropriate, mitigation measures are identified to improve traffic operations.

3.2 Future Alternatives

Two alternatives for light rail construction, including the No-Build and Light Rail construction, were analyzed for the corridor. Table 3-1 summarizes the alternatives for the Capitol Expressway LRT corridor analyzed in this study.

Table 3-1 Light Rail Corridor Alternatives

Description	LRT on Capitol Corridor
No-Build	None.
Light Rail	LRT from Alum Rock LRT Station to Eastridge Transit Center

Figure 3-1 to Figure 3-3 show the extent of light rail construction in the study area under each of the alternatives. Figure 3-1 illustrates the No-Build Alternative. In this scenario, the Capitol Avenue Light Rail would not be implemented on Capitol Expressway and the HOV lane would remain as existing. Figure 3-2 illustrates light rail along Capitol Expressway extended from the Alum Rock Station to Eastridge and the HOV lanes removed from Capitol Expressway. Figure 3-3 shows the Capitol Expressway Light Rail Project integrated with the bus network.

For the purposes of this analysis, the No-Build Alternative does not include any other transportation improvements to the Capitol Expressway Corridor. It is assumed that transit services offered by VTA within the corridor would continue at current levels, except for limited improvements in service frequency. The No-Build Alternative represents the conditions that would be reasonably expected to occur in the foreseeable future if none of the proposed alternatives were implemented.

3.2.1 *Light Rail Alternative*

The proposed Light Rail Alternative would extend 2.4 miles south and west from the existing terminus of the Capitol Avenue LRT Line at the Alum Rock Station to the Eastridge Transit Center.

The alignment would operate in exclusive and semi-exclusive rights-of-way and would include both grade-separated and at-grade intersection crossings. The alignment would operate primarily in the median of Capitol Expressway; however, some short alignment sections and options would deviate from the median.

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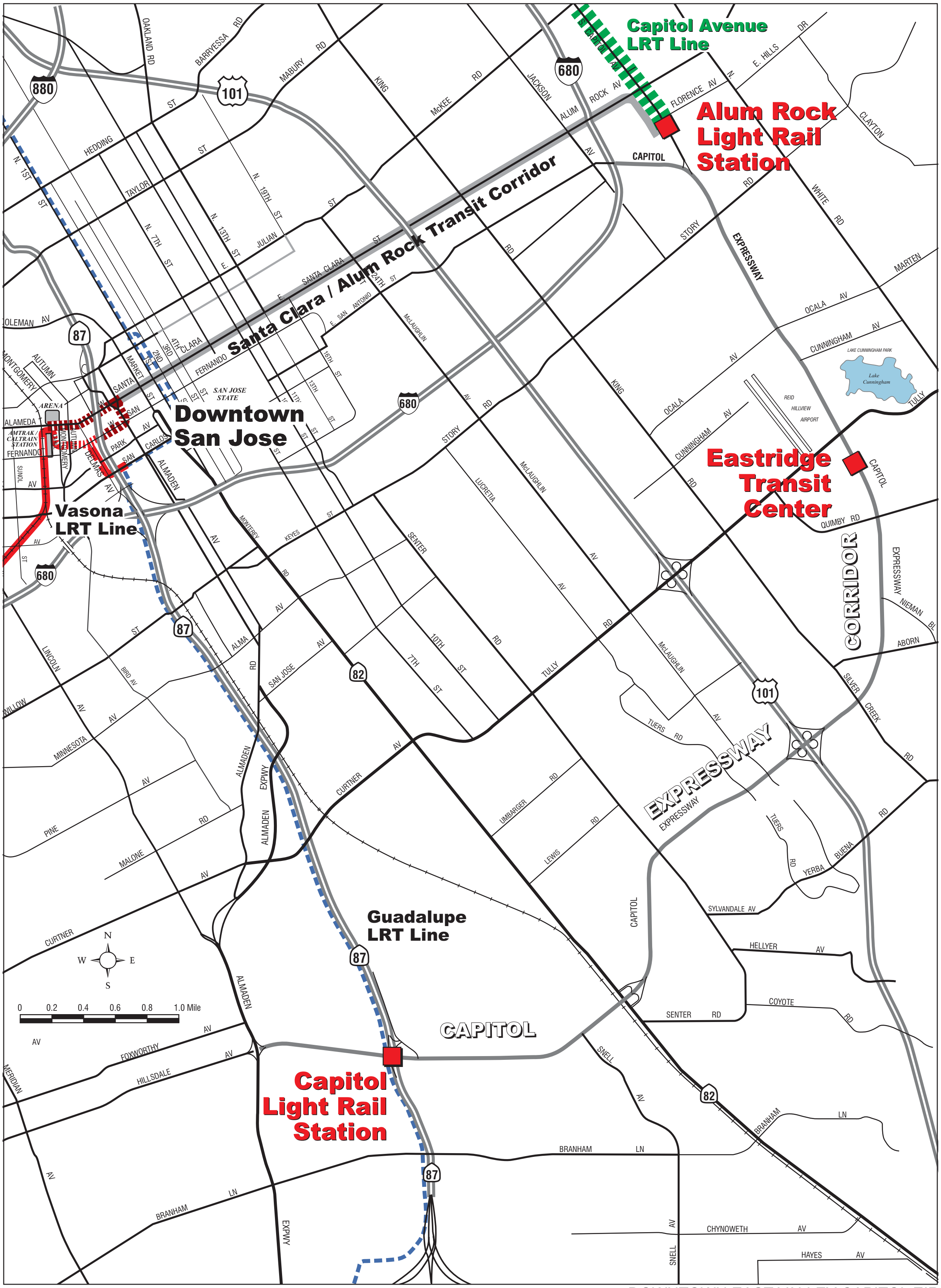

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Figure 3-1

NO BUILD ALTERNATIVE

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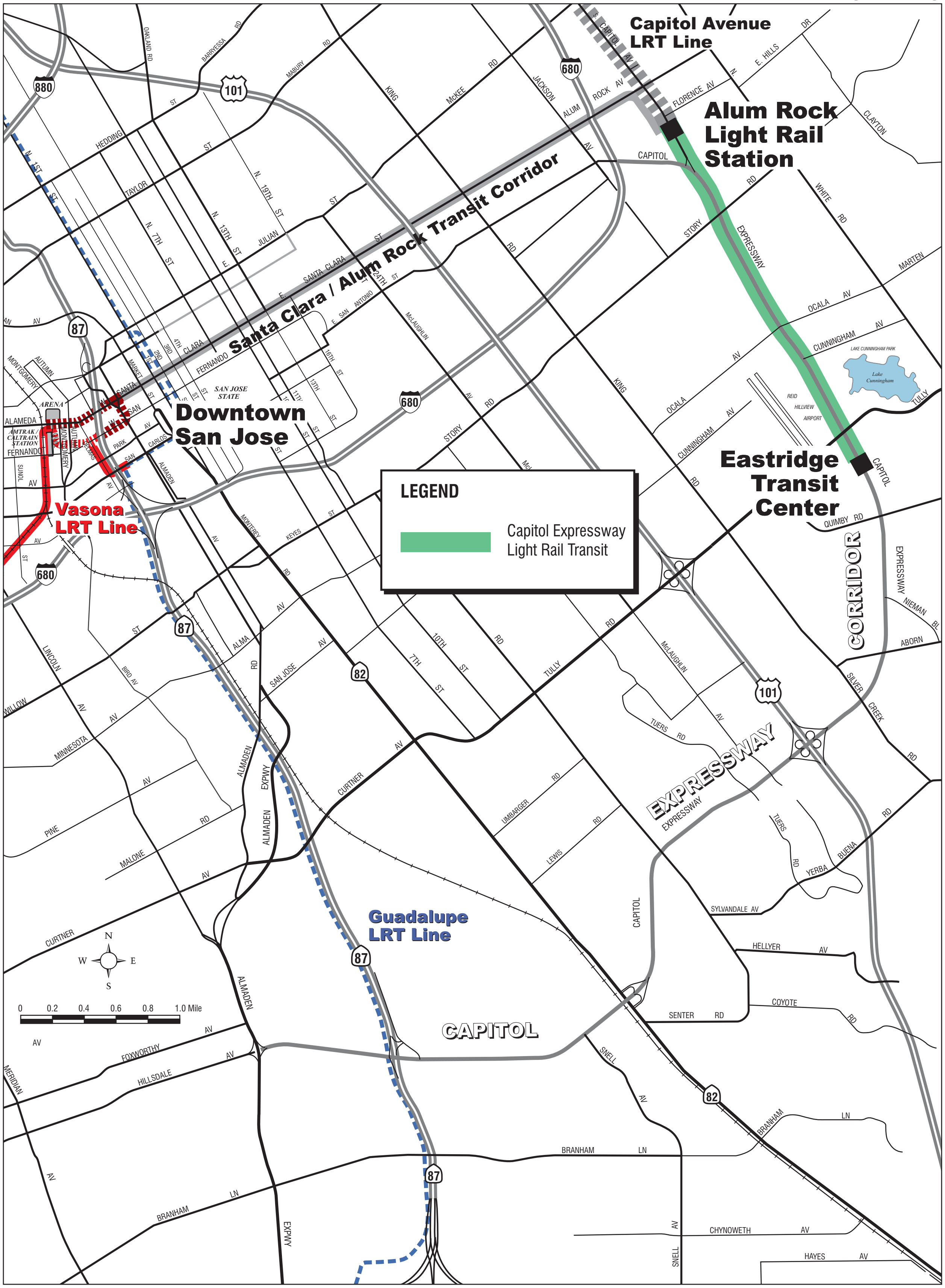

Light Rail Phase 1A.cdr

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Figure 3-2

LIGHT RAIL PHASE 1A: ALUM ROCK TO EASTRIDGE

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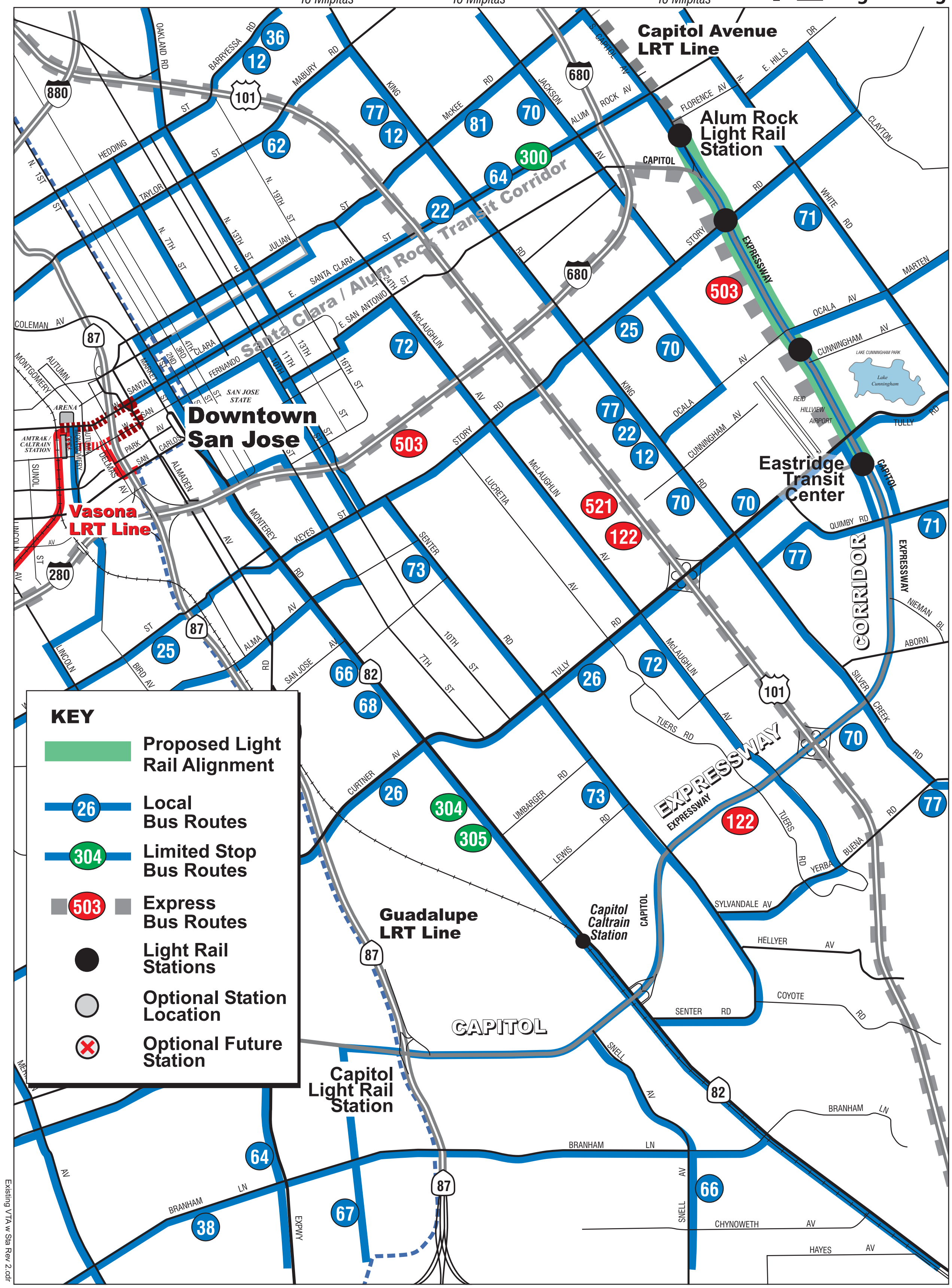

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Figure 3-3

EXISTING TRANSIT NETWORK and PROPOSED LIGHT RAIL STATIONS

The proposed Light Rail Alternative would be designed to reduce transit travel time with signal priority at intersections and grade separation at congested intersections. Crossings at expressways and some high-volume major arterials would be grade-separated (elevated) to allow higher-speed transit operations.

Construction of the light rail guideway and grade-separated structures under this alternative would alter the roadway geometry along some portions of Capitol Expressway. Perhaps the most dramatic design change to the expressway would be the removal of existing HOV lanes to provide the additional right-of-way to accommodate the light rail project.

3.2.2 *Person Through Volume on Capitol Expressway*

To construct light rail within the existing Capitol Expressway right-of-way, a lane of traffic must be removed between Capitol Avenue and US 101. The lane to be removed could either be the high occupancy vehicle lane in each direction or a general purpose lane (a lane open to any vehicle occupancy size). The analysis in this section illustrates the difference in total person through volume by removing an HOV lane versus removing a general purpose travel lane.

Table 3-2 illustrates the person through volume on Capitol Expressway at Story Road during the AM peak for two different scenarios. These scenarios are described below.

Table 3-2 Person through Volume on Capitol Expressway at Story Road

Configuration	Vol/Occ/Total	Northbound AM Peak			
		Solo Drivers	HOVs	Transit	Total Person Through Volume
Existing[1] 3 GPLs + 1 HOV	Volume Occupancy Total Persons	2,830 1.0 2,830	554 2.2 1220	2 15 30	4,080
3 GPLs + LRT To Eastridge	Volume Occupancy Total Persons	2,880[2] 1.2[3] 3,455	N/A	6 85 510[4]	3,965

Notes:
[1] Existing data from Capitol Expressway Study (Spring, 2003)
[2] Per lane capacity is 960 vehicles per lane or 80 seconds of green per 150 second cycle
[3] Weighted average occupancy assumes 80% of carpools remain from current observation
[4] Inbound AM loadings from Capitol Expressway LRT Study

EXISTING – 3 GENERAL PURPOSE LANES (GPLS) AND 1 HIGH OCCUPANCY VEHICLE LANE (HOV)

The existing condition is three general purpose lanes and one high occupancy vehicle lane. The volumes and occupancies for the existing condition were obtained from the Capitol Expressway Study (Spring 2003) prepared by the Santa Clara County Roads and Airports Department. The existing total person through volume is 4,080.

3 GENERAL PURPOSE LANES AND LIGHT RAIL TO EASTRIDGE

This scenario assumes the HOV lane is removed and light rail is constructed to Eastridge. The GPLs are assumed to have a capacity of 960 vehicles per lane. This assumes a saturation flow rate of 1,800 vehicles per lane per hour of green and a green phase for the northbound through of 80 seconds out of a 150-second cycle.

This alternative assumes that 80 percent of the existing carpools remain, since they can use other HOV lanes on the roadway network as part of their trip, or they are carpools of necessity. The resulting weighted average occupancy is 1.2 persons per vehicle, approximately the average occupancy throughout the region.

The AM peak hour northbound light rail ridership has previously been estimated at 510 per hour in 2010, or 85 passengers per 2-car train for a light rail project terminating at Eastridge. It should be noted that light rail could easily accommodate over 2,000 hourly passengers in a 2-car train with 10-minute headways.

The total person through volume for the Light Rail configuration is 3,965, or about a 3 percent reduction from existing through volume. (Please note that the light rail ridership projections are 2010 and not existing. Existing demand, if projected, would be slightly less.)

3.2.3 *Conclusion*

The existing roadway carries just under 4,100 persons per hour northbound on Capitol Expressway at Story Road in the AM peak hour. This section was selected as a typical portion of the expressway and similar volume characteristics would occur on other parts of the expressway. If light rail is constructed by replacing the HOV lane, the carrying capacity of the roadway stays near the existing volume (3,965 persons per hour).

3.3 Travel Times and Speeds on Capitol Expressway

The roadway and light rail travel times and speeds have been estimated for Capitol Expressway both with and without the light rail project. The travel times and speeds are summarized in Table 3-3.

The corridor has been separated into two segments. The first segment is from Wilbur to Ocala. The second segment is from Ocala to Eastridge. Travel times and speeds are noted for each segment, during each peak hour, and in each direction along the corridor. Total travel times and speeds are also noted on Table 3-3.

The top section of Table 3-3 indicates the existing travel times along the corridor. In the northbound direction during the AM peak hour, the total travel time is 7.08 minutes and in the southbound direction the total travel time is 7.36 minutes. During the PM peak hour, the northbound travel time is 7.28 minutes and the southbound travel time is 6.64 minutes.

The next section of Table 3-3 is the 2010 No Build condition. The roadway geometry is identical to the existing condition. The travel times are increased and the travel speeds are decreased over the existing conditions because of an increase in traffic volumes.

The next group of travel times and speeds represents the condition where the light rail project replaces the two HOV lanes. Generally, the travel times increase slightly and the travel speeds decrease slightly. Northbound in the PM peak hour, the travel time decreases with the Project. The decrease in travel times results from the light rail having priority over the traffic signals along the corridor which provides a benefit to through travel. In the case of northbound travel in the PM peak hour, the benefit of signal priority outweighs the loss of the HOV lane.

Table 3-3 Capitol Corridor Travel Time and Speed Data

Intersection	Distance (miles)	Traveling Northbound				Traveling Southbound			
		AM		PM		AM		PM	
		Travel Time (min)	Speed (mph)	Travel time (min)	Speed (mph)	Travel time (min)	Speed (mph)	Travel time (min)	Speed (mph)
Existing Conditions Roadway Travel Times and Speeds Existing Conditions									
Between Wilbur & Ocala Rd	1.34	4.92	16.39	3.49	23.18	4.84	16.65	4.66	17.31
Between Ocala Rd & Eastridge	1.14	2.16	31.55	3.79	17.97	2.52	27.09	1.98	34.52
TOTAL	2.48	7.08	21.02	7.28	20.44	7.36	20.22	6.64	22.41
Roadway Travel Times and Speeds 2010 No Build With HOV (3M1H)									
Between Wilbur & Ocala Rd	1.34	5.32	15.11	3.59	22.40	5.24	15.34	6.66	12.07
Between Ocala Rd & Eastridge	1.14	2.36	28.98	4.49	15.23	2.72	25.15	2.48	27.58
TOTAL	2.48	7.68	19.38	8.08	18.42	7.96	18.69	9.14	16.28
Roadway Travel Times and Speeds 2010 Full Build No HOV (3M + LRT)									
Between Wilbur & Ocala Rd	1.34	5.62	14.31	3.59	22.40	5.04	15.95	6.96	11.55
Between Ocala Rd & Eastridge	1.14	2.66	25.71	4.39	15.58	3.62	18.90	2.68	25.52
TOTAL	2.48	8.28	17.97	7.98	18.65	8.66	17.18	9.64	15.44
Roadway Travel Times and Speeds 2025 No Build With HOV (3M1H)									
Between Wilbur & Ocala Rd	1.34	5.92	13.58	3.79	21.21	5.24	15.34	6.86	11.72
Between Ocala Rd & Eastridge	1.14	2.86	23.92	4.49	15.23	3.62	18.90	3.28	20.85
TOTAL	2.48	8.78	16.95	8.28	17.97	8.86	16.79	10.14	14.67
Roadway Travel Times and Speeds 2025 Full Build No HOV (3M + LRT)									
Between Wilbur & Ocala Rd	1.34	6.72	11.96	5.19	15.49	5.04	15.95	7.76	10.36
Between Ocala Rd & Eastridge	1.14	3.86	17.72	4.49	15.23	3.62	18.90	3.28	20.85
TOTAL	2.48	10.58	14.06	9.68	15.37	8.66	17.18	11.04	13.48
Travel Times and Speeds LRT									
Between Wilbur & Ocala Rd	1.34	3.10	27.10	3.10	27.10	3.10	27.10	3.10	27.10
Between Ocala Rd & Eastridge	1.14	2.20	26.70	2.20	26.70	2.20	26.70	2.20	26.70
TOTAL	2.48	5.30	28.08	5.30	28.08	5.30	28.08	5.30	28.08

Notes: Parenthetical notations (e.g., 3M1H) indicates mix of lanes or facilities: M =Mixed-flow lanes; H=HOV/carpool lanes; LRT= light rail transit line

The next group of travel times and speeds are the 2025 No Build Condition. The roadway geometry is identical to the Existing Conditions with additional traffic representing the 2025 timeline. Overall, the travel speeds are slower and the travel times greater than for any of the 2010 scenarios.

The next group of travel times and speeds represents the 2025 condition with construction of the light rail project. Generally, the travel times increase over the 2025 No Project condition. The effect of light rail signal priority is evident for southbound travel in the AM peak hour where the travel times and speeds are similar for the 2025 No Project and 2025 With Project conditions.

The last group of travel times and speeds on Table 3-3 are for light rail. Light rail operates in semi-exclusive right-of-way and is only affected by automobile traffic at the intersections Light rail will have signal priority at the intersections and, therefore, travels faster than adjacent automobile traffic. Travel times for light trail will be consistent between 2010 and 2025.

3.4 CEQA Significance Thresholds

3.4.1 *Traffic Impact Significance Criteria*

The traffic impact significance criteria vary with jurisdiction and are detailed below. Table 3-4 summarizes the significance criteria for the Congestion Management Program, the City of San Jose, and VTA. It should be noted that the City's criteria apply to all intersections in San Jose, including CMP intersections.

3.5 Traffic Impacts

Four future scenarios are analyzed in this report. These scenarios are;

- 2010 volumes with HOV lanes
- 2010 volumes without HOV lane and project built from Wilbur to Eastridge
- 2025 volumes with HOV lanes
- 2025 volumes without HOV lane and project built from Wilbur to Eastridge

The traffic impacts of each scenario were assessed for the AM and PM peak hours for the 2010 and 2025 horizons. The following is a summary of the No Build and LRT Alternative.

There are few intersections that operate at congested levels indicated by levels of service E or F. During the AM peak hour in 2010, two intersections operate at level of service E or F for the No Build condition. The Story Road intersection operates at level of service F and the Quimby Road intersection operates at level of service E. During the PM peak hour four intersections operate at level of service E or F in 2010 for the No Build condition. The Capitol Avenue intersection operates at level of service E, as does the Tully Road intersection. The Story Road and the Quimby Road intersections operate at level of service F.

Table 3-4 Impact Significance Criteria

	Significance Criteria
TRAFFIC	
CMP	LOS declines from LOS E or better for 'No Project' condition to LOS F for 'With Project' condition; or, Critical movement delay increases by four seconds or more *and* volume-to-capacity ratio increases by 0.01 or more at intersections already operating at LOS F under background conditions.
City of San Jose	LOS declines from LOS D or better for 'No Project' condition to LOS E or F for 'With Project' condition; or, Critical movement delay increases by four seconds or more *and* volume-to-capacity ratio increases by 0.01 or more at intersections already operating at LOS E or F under background conditions.
VTA	Cause an intersection's LOS to deteriorate from LOS E (when compared to "No Project"); Cause an increase in the critical volume delay by four seconds or more *AND* increase the critical v/c ratio by 0.01 or more at an intersection already operating at LOS F under "No Project" conditions; Result in a change of two letter grades at an intersection operating at LOS A or B under "No Project" conditions; Add new trips totaling more than one percent of the freeway capacity if a freeway segment is already operating at LOS F Cause a substantial increase in regional vehicle miles traveled (VMT) or vehicle hours traveled (VHT); Cause a substantial diversion of traffic onto a residential street; and, Substantially disrupt traffic operations and/or substantially affect emergency vehicle response.
PARKING	
VTA	Parking Impacts are generally considered significant by VTA if the proposed project would result in: Loss of parking spaces such that the loss results in substantial adverse economic impacts to businesses in the area; A park-and-ride lot where demand is projected to be 105% or more of the lot's planned capacity.
PEDESTRIAN & BICYCLE ACCESSIBILITY	
VTA	Create particularly hazardous conditions for bicyclists or eliminate bicycle facilities, and adequate facilities do not remain to serve the community's needs Result in substantial overcrowding on public sidewalks, create hazardous conditions for pedestrians, or eliminate pedestrian access to adjoining areas.

Sources: CMP, City of San Jose, VTA
Note: City of San Jose and VTA draft criteria apply to all intersections in San Jose, including CMP intersections. Santa Clara County follows CMP criteria.

Additional congestion occurs for the 2010 Build condition. During the AM peak hour the Story Road intersection would continue to operate at level of service F and the Quimby Road intersection would continue to operate at level of service E for the Build condition. The Tully Road intersection would operate at level of service E

During the PM peak hour for the Build condition the Capitol Avenue and Ocala Avenue intersections operate at level of service E. The Story Road intersection, Tully Road intersection, and Quimby Road will operate at level of service F for the Build condition.

Similar traffic operations occur for 2025. In the AM peak hour for the No Build condition, the Story Road intersection operates at level of service F and the Tully Road intersection and Quimby Road intersection operate at level of service E. During the PM peak hour, the Capitol Avenue intersection, Story Road intersection, Tully Road intersection, and Quimby Road intersection operate at level of service F and the Ocala Avenue intersection operates at level of service E for the No Build condition.

For the Build condition for 2025 during the AM peak hour, the Story Road intersection and the Tully Road intersection operate at level of service F, while the Ocala Avenue intersection and the Quimby Road intersection operate at level of service E. During the PM peak hour for the 2025 Build condition level of service F occurs at the Capitol Avenue intersection, the Story Road intersection, the Tully Road intersection, and the Quimby Road intersection. Level of service E occurs at the Ocala Avenue intersection.

Traffic operations at congested levels for any alternative do not represent a significant impact requiring mitigation. Significant impacts are defined by the criteria established in Section 3.4. Traffic operations are defined by level of service (A through F) which are based on the average control delay for all vehicles traveling through an intersection. Level of service and the associated delay values were previously defined in Table 2-3. Traffic impacts also use volume-to-capacity ratios (V/C) to determine significant impacts. The V/C is a simple numeric value of the traffic volume through the intersection divided by the intersection capacity.

3.5.1 *2010*

Table 3-5 summarizes the 2010 AM peak hour traffic operational conditions for the No Build and the first phase of the LRT to Eastridge Alternative. Intersections that are significantly impacted are shaded in the table. Table 3-6 shows the PM peak hour traffic operational conditions for the same two alternatives. Again, the significantly impacted intersections are shaded. The future traffic volumes are illustrated graphically in the Appendix. The TRAFFIX levels of service summary sheets are contained in the Appendix.

Table 3-5 Intersection LOS, Delay and V/C – 2010 AM

2010 AM		CMP?	No Build Alternative			Light Rail to Eastridge		
			LOS	Delay (s)	V/C	LOS	Delay (s)	V/C
1	Capitol	Yes	D+	26.5	0.616	D+	25.9	0.675
2	Story	Yes	F	60.2	1.003	F	77.0	1.063
3	Ocala	No	D	38.2	0.810	D	36.8	0.867
4	Cunningham	No	B	7.0	0.692	B	8.2	0.762
5	Tully	Yes	D-	35.2	0.927	E+	40.8	0.983
6	Eastridge	No	A	4.4	0.569	A	5.0	0.631
7	Quimby	Yes	E	56.3	0.909	E-	58.7	0.960
8	Nieman	No	A	3.2	0.379	A	3.2	0.379

Shaded cells indicate significant impacts.

Table 3-6 Intersection LOS, Delay and V/C – 2010 PM

	2010 PM	CMP?	No Build Alternative			Light Rail to Eastridge		
			LOS	Delay (s)	V/C	LOS	Delay (s)	V/C
1	Capitol	Yes	E-	56.2	0.966	E-	56.8	1.060
2	Story	Yes	F	120.6	1.154	F	156.9	1.217
3	Ocala	No	D	36.4	0.928	E+	43.2	1.000
4	Cunningham	No	B	7.4	0.697	B	8.1	0.767
5	Tully	Yes	E-	57.5	0.850	F	62.2	0.824
6	Eastridge	No	B	8.7	0.559	B	9.2	0.614
7	Quimby	Yes	F	62.2	0.850	F	65.5	0.882
8	Nieman	No	B	8.4	0.499	B	8.4	0.499

- Shaded cells indicate significant impacts.

The first phase of the Project terminates at the Eastridge Transit Center. The expressway is assumed with three general purpose lanes in each direction with HOV lanes removed as a part of light rail project. Tables 3-5 and 3-6 indicate level of service, delay, and V/C assuming three travel lanes in each direction.

3.5.1.1 Light Rail Alternative -- Build to Eastridge

The Light Rail Alternative to Eastridge significantly impacts three intersections. The following is a summary of these impacts.

- Capitol Expressway/Story Road – This intersection is significantly impacted in both the AM or the PM peak hours by the Project. The level of service is F for both AM and PM peak hour and the delay values and volume to capacity ratios exceed the thresholds for an intersection already operating at level of service F. The significance criteria for CMP, the City of San Jose, and VTA are met.
- Capitol Expressway/Ocala Road – This intersection is significantly impacted in the PM peak hour by the Project. The level of service degrades from D to E. This exceeds the significance criteria for the City of San Jose.
- Capitol Expressway/Tully Road – This intersection is significantly impacted in the AM peak hour and the PM peak hour by the Project. The level of service degrades from D to E in the AM peak hour and from E to F in the PM peak hour exceeding the significance criteria for the City of San Jose, CMP and VTA.

3.5.2 *2025*

Table 3-7 summarizes the 2025 AM peak hour traffic operational conditions for the No Build and the Light Rail to Eastridge phase. Intersections that are significantly impacted are shaded in the table. Table 3-8 shows the PM peak hour traffic operational conditions for the same alternatives. Again, the significantly impacted intersections are shaded.

Table 3-7 Intersection LOS, Delay and V/C – 2025 AM

	2025 AM	CMP?	No Build Alternative			Light Rail to Eastridge		
			LOS	Delay (s)	V/C	LOS	Delay (s)	V/C
1	Capitol	Yes	D+	27.0	0.676	D+	26.7	0.740
2	Story	Yes	F	87.6	1.102	F	116.0	1.167
3	Ocala	No	D-	40.0	0.894	E	47.2	0.956
4	Cunningham	No	B	9.3	0.824	C+	18.0	0.908
5	Tully	Yes	E	52.9	1.052	F	70.9	1.120
6	Eastridge	No	B+	5.4	0.684	B+	6.7	0.758
7	Quimby	Yes	E-	57.2	0.973	E-	76.5	1.041
8	Nieman	No	A	3.5	0.433	A	3.5	0.433

Shaded cells indicate significant impacts.

Table 3-8 Intersection LOS, Delay and V/C – 2025 PM

	2025 PM	CMP?	No Build Alternative			Light Rail to Eastridge		
			LOS	Delay (s)	V/C	LOS	Delay (s)	V/C
1	Capitol	Yes	F	65.5	0.966	F	89.8	1.030
2	Story	Yes	F	169.2	1.272	F	231.2	1.339
3	Ocala	No	E	46.1	1.015	E-	57.9	1.091
4	Cunningham	No	B	7.8	0.764	B	9.2	0.841
5	Tully	Yes	F	90.4	0.979	F	107.9	1.009
6	Eastridge	No	B	9.8	0.632	B	10.5	0.732
7	Quimby	Yes	F	112.0	0.996	F	120.0	1.039
8	Nieman	No	B	9.0	0.569	B	9.0	0.569

Shaded cells indicate significant impacts.

3.5.2.1 Light Rail Alternative – Build to Eastridge

The Light Rail Alternative to Eastridge impacts five intersections, four during both peak hours and one during the PM peak hour. The following is a summary of these impacts:

- Capitol Expressway/Capitol Avenue – This intersection is impacted during the PM peak hour by the Project. The delay value and volume to capacity ratio are exceeded for an intersection already operating at level of service F. This exceeds the significance criteria for CMP, the City of San Jose, and VTA
- Capitol Expressway/Story Road – This intersection is significantly impacted in both the AM and PM peak hours by the Project. The level of service is F for both the AM and PM peak hours and the delay values and volume to capacity ratios exceed the thresholds for an intersection already operating at level of service F. The significance criteria for CMP, the City of San Jose, and VTA are met.
- Capitol Expressway/Ocala Road – This intersection is significantly impacted in both the AM and PM peak hours by the Project. During the AM peak hour level of service degrades from D to E. During the PM peak hour the delay value and volume to

capacity ratio exceeds the threshold for an intersection already operating at level of service E. The significance criteria for the City of San Jose are met.

- Capitol Expressway/Tully Road – This intersection is significantly impacted in both the AM and PM peak hours by the Project. The level of service delay and the volume to capacity ratio exceed the thresholds for an intersection already operating at level of service F. The significance criteria for the City of San Jose, CMP and VTA are met.

- Capitol Expressway/Quimby Road – This intersection is impacted during the AM and PM peak hours by the Project. The delay value and volume to capacity ratio are exceeded for an intersection already operating at level of service E or F. This exceeds the significance criteria for CMP, the City of San Jose, and VTA.

3.6 Transit Network

The more comprehensive and seamless a transit network is, the more success it is likely to achieve. Connections between different public transport modes and systems tend to attract more transit riders and bolster patronage for all connecting services. As such, the VTA emphasizes multi-modal public transport connections wherever those connections are feasible.

In the Capitol Expressway corridor, the future light rail line would connect with the East Valley bus services operated by the VTA. As well, Caltrain commuter rail service operated by the Joint Powers Board could connect with the light rail line through a new multi-modal facility at Monterey Highway.

3.6.1 *VTA Public Transit*

The connectivity of the transit network in the East Valley will depend upon strong linkages between the light rail line and the supporting bus services. Current bus service in the study area centers on Eastridge Transit Center for the terminus of most local and regional routes, with connections available here between most lines in the area. Figure 3-3 presents a map of the existing VTA bus network for the East Valley with the proposed light rail line and stations overlaid for reference.

Once light rail is constructed on Capitol Expressway, the VTA will have the opportunity to reorganize the structure of the area's bus lines to interface with the high level of transit service provided by the new fixed rail link. Specific future operating plans for bus lines will not be completed in the Conceptual Engineering phase of the Capitol Expressway Light Rail Project. Instead, they will be finalized closer to the time that the light rail line will go into operational service.

Certain possible route changes have been identified, however, in order to plan the size of transit facilities and complete the environmental studies. Specifically, the routes around Eastridge Transit Center have been reviewed to assess how many bus stalls could be needed at this facilities. Table 3-9 outlines potential actions that may be taken to reorganize the bus network.

Table 3-9 Potential Future Bus Integration Actions

Line	Proposed Action	Potential Impacts
12	Keep.	Meets LRT at Eastridge Station. Needs stop in Eastridge bus exchange.
22	Becomes BRT Line.	Meets LRT at Eastridge Station. Needs stop in Eastridge bus exchange. Articulated buses.
25	Keep.	Meets LRT at Story Station.
26	Keep.	Meets LRT at Eastridge Station. Needs stop in Eastridge bus exchange.
30	Revise circle route.	Meets LRT at Eastridge & Nieman Stations. Needs stop in Eastridge bus exchange.
31	Keep.	Meets LRT at Eastridge & Nieman Stations. Needs stop in Eastridge bus exchange.
39	Revise circle route.	Meets LRT at Eastridge & Ocala Stations. Needs stop in Eastridge bus exchange.
64	Part of Santa Clara/Alum Rock transit project.	Meets LRT at Alum Rock Station.
70	Remove detour to King Road. Run down Capitol Expwy. Terminate at Eastridge.	Meets LRT at Eastridge & Ocala Stations. Needs stop in Eastridge bus exchange. (Terminates at Eastridge only if LRT continues to Hwy 87.)
71	Reroute along Tully instead of Quimby.	Meets LRT at Eastridge Station. Needs stop in Eastridge bus exchange. Service on Quimby replaced by circle route(s).
72	Remove detour south of Capitol Expwy. Terminate at Monterey Station. Introduce new route for southern extension.	Meets LRT at McLaughlin, Senter & Monterey Stations. Needs stop in Monterey bus exchange. New route south of Monterey Station. New circulator route for neighborhood service.
74	Delete service.	Replaced by LRT service.
300	Part of (Santa Clara/Alum Rock transit project.	Meets LRT at Alum Rock Station.
321	Delete service.	Replaced by LRT service.
345	Delete service.	Replaced by LRT service.
503	Maintain.	Meets LRT at Story, Ocala & Eastridge Stations. Needs stop in Eastridge bus exchange.

Source: VTA and Korve Engineering, Inc., 2002

3.6.2

At Eastridge Transit Center, the majority of existing routes are assumed to still be operating when light rail service opens. However, the new light rail line will replace limited-stop services (Lines 321 and 345). With approximately nine bus lines using the facility (eight as a terminus), ten bus bays would be needed to provide a stall for each route, in each direction. Including two stalls for future expansion, the reconstructed bus loop should provide approximately 12 stalls for active buses in addition to layover areas for the eight terminating bus routes.

In the Eastridge Transit Center, some stalls would be required to be taken to accommodate articulated buses, since the Line 22 Bus Rapid Transit (BRT) may provide service to the exchanges. These stalls are included in the total stall estimates for each facility. Table 3-10 summarizes the requirements of the proposed Eastridge Transit Centers with the construction of light rail in the corridor. The existing transit center at Eastridge would be expanded.

3.6.3 *Caltrain Service*

Caltrain commuter rail service links Gilroy and San Francisco via San Jose, Palo Alto, and Redwood City. In the East Valley study area, Caltrain runs parallel to Monterey Highway. The closest Caltrain station to the Capitol Expressway corridor is located approximately 2,000 feet north at the intersection of Monterey Highway and Fehren Avenue. Bus connections would be used by passengers transferring between Capitol Light Rail and Caltrain.

Table 3-10 Proposed Transit Center Requirements

	Eastridge
Existing lines	14
Existing bus stalls *	10
Proposed Bus Stalls with light rail**	
For projected service	10
For light rail expansion	2
Layover spaces required ***	8
Total	20

Source: VTA and Korve Engineering, Inc., 2002
* Not all bus stalls are currently in use.
** Bus stall requirements include two stalls for each through route (one for each direction) and one stall for each terminating route. They do not include any shared bus stops which could reduce the number of total stalls needed.
*** Layover spaces have been estimated based on one space for each terminating route.

3.7 Park and Ride Facilities

Park-and-ride facilities will be available for use by Capitol Expressway light rail passengers. Two locations along the Capitol Expressway LRT Line already have park-and-ride facilities constructed next to them: Alum Rock Station and Eastridge Transit Center Station. For the lot at Alum Rock, no modification to the current configuration is anticipated. The facility at Eastridge Station would be redesigned and expanded to satisfy future demand with the light rail station construction. Table 3-11 provides information about the areas around the three park-and-ride lots.

Table 3-11 Proposed Park-and-Ride Sites and Estimated Demand and Capacity for the Light Rail Alternative

Proposed Station	Notes	Estimated Peak Park-and-Ride	
		Demand	Capacity
Alum Rock-Existing	The existing park-and-ride lot could support the Light Rail Alternative. No change in capacity (currently 105) is proposed. The total demand also includes park-and-ride spaces required to serve the Capitol Light Rail Line.	60 to 90	105[1]
Eastridge Transit Center	The Eastridge Transit Center park-and-ride could be expanded beyond its current capacity of 133 parking stalls to meet the peak demand of 550 parking spaces.	250 to 550	250 to 550

[1] Existing park-and-ride spaces
Source: Korve Engineering 2003

A range of park-and-ride demand is noted in Table 3-11 which is based on projected demand from 2010 to 2025. The modeling process used to estimate park-and-ride demand tends to over estimate the number of people arriving at a light rail station and parking their car for the day. Historically, VTA has found more individuals arrive by walking, being dropped off or transferring from a bus than estimated by the model, resulting in an overestimation of the park-and-ride demand. The park-and-ride demand projection included both parking spaces that will be occupied by a vehicle during the majority of the day, and also for kiss-and-ride drop-offs. Approximately five percent of the park-and-ride spaces will be designed and signed for kiss-and-ride.

The maximum peak demand for the Eastridge Transit Center park-and-ride would be in 2025 under the scenario where light rail is constructed only to Eastridge Transit Center. The demand could be 250 to 550 vehicles. Approximately 265 park-and-ride spaces are proposed to be incorporated into the Project through the addition of parking on existing VTA property and expansion of park-and-ride spaces onto Eastridge property. Because of the extensive bus access to the Eastridge Transit Center, the full demand for park-and-ride may not be realized, or not realized in the time periods indicated by the travel demand model. VTA will monitor park-and-ride demand at Eastridge and expand parking past the 265-space level if demand warrants.

The park-and-ride lots at Alum Rock Station is expected to have enough capacity to handle the estimated peak park-and-ride demand.

3.8 Pedestrians & Bicycles

The streetscape concept is intended to transform the Capitol Expressway from a single purpose limited access expressway to a multi-modal parkway boulevard. It will be designed as a pedestrian and bicycle-friendly ‘green’ street featuring a continuous multi-use path along the east/south side of the roadway to the Nieman Boulevard intersection. The frontage roads will be incorporated as an integral part of the overall right-of-way design to improve pedestrian and bicyclist transitions from existing residential neighborhoods to the boulevard.

The multi-use path will be a ribbon of greenway approximately 16-22 feet wide with a 10-foot pathway dedicated to pedestrians and bicyclists. It will link with other greenways in the East Valley study area. In particular, strong connections with Lake Cunningham Park and the Coyote Creek Park Chain trail are accommodated by the light rail project design. The trail would interface with cross-street sidewalks and bicycle facilities (where applicable) to permit penetration into residential neighborhoods and to support pedestrian and cyclist activity to and from the light rail stations.

The light rail project will maintain existing pedestrian intersection crossings. Where pedestrian crossings are permitted under existing conditions, those crossings would be possible in the future, although some crossings may be extended by a wider expressway cross-section. At all intersections along the at-grade portions of the light rail line, pedestrians crossing Capitol Expressway will walk across rail tracks. These crossings will have gates, fences, and/or signals as deemed necessary under the California Public Utilities Commission General Orders.

Additionally, pedestrian overcrossings have been included, or are options, for access to the aerial station at Story Road. These overcrossings would serve not only light rail passengers but also pedestrians seeking to avoid crossing the expressway at grade.

3.9 Goods Movement

The Project will not impact the movement of goods along the corridor. For a portion of the corridor the HOV lanes are being removed. However, the HOV lane is generally not used for the movement of goods. There is no change in access proposed for the corridor. All vehicle movements than can occur today will be allowed with construction of the Project.

3.10 Parking

The construction of the Capitol Expressway Light Rail Project will not change the parking conditions on Capitol Expressway. Currently, no parking is permitted on the expressway, and future conditions will not include parking on the facility. However, Capitol Avenue parking will be removed on both sides of the street from Wilbur Avenue to Capitol Expressway to enable construction of the light rail.

The Project does, however, reconfigure the frontage roads on the west side of Capitol Expressway from Excalibur to north of Story Road and on the east side from Mervyns Way to just north of Ocala Avenue. With the Project, the frontage roads will be narrowed and parking would only be allowed on one side.

Table 3-12 indicates the amount of existing parking use by segment along the frontage roads. The parking use is observed through field investigations at 4:30 AM. The land uses along the frontage roads are residential and the demand at 4:30 AM represents the maximum demand.

Also noted on Table 3-12 is the parking supply by segment. At one location, between Kollmar Drive and Sussex Drive, on the east side of Capitol Expressway, a total of 15 parked vehicles were observed. The Project will eliminate all parking in this segment and these vehicles will be displaced to adjacent streets where sufficient excess parking exists.

Table 3-12 Frontage Road Parking

Location	Current Use	Proposed Supply
Westside of Capitol Expressway between Excalibur and Story	31	34
Eastside of Capitol Expressway between Mervyns Way and Story	1	24
Eastside of Capitol Expressway between Kollmar Drive and Sussex Drive	15	0
Eastside of Capitol Expressway between Sussex Drive and Bristol	7	34
Eastside of Capitol Expressway between Bristol and Coventry	5	33
Eastside of Capitol between Coventry and Woodmoor	6	20
Eastside of Capitol between Woodmoor and North of Ocala	16	26

3.11 Community Access

The Capitol Expressway Light Rail Project will not impede any access that is currently offered from the expressway. All intersection movements that are possible before construction will be possible after the Project is implemented. And since light rail will operate in the median of the expressway, no right turn in/out access to commercial developments will be removed. Thus, all community features in the study area will have their access maintained.

The Project will, however, disrupt access along Capitol Avenue. Between Wilbur Avenue and Capitol Expressway, Westboro Drive (east of Capitol Avenue) will be converted to right in/out only due to the construction of the light rail. Westboro Drive has alternative access from within the neighborhood that motorists on southbound Capitol Avenue can access from Wilbur Avenue. Another minor change in local circulation occurs near the intersection of Capitol Expressway and Story Road. In the southeast quadrant of Capitol Expressway and Story Road, Capitol Avenue will be one-way, immediately north of Sussex Drive, in the southbound direction. Two-way circulation will be maintained on Capitol Avenue in front of the apartment complex. One-way flow will only occur in front of the duplex immediately north of Sussex Drive. Vehicles traveling south on Capitol Avenue from Kollmar Drive could either turn left onto Sussex Drive or could continue south on Capitol Avenue. Vehicles traveling north on Capitol Avenue would be required to turn right onto Sussex Drive. Vehicles traveling west on Sussex Drive will be required to turn left onto southbound Capitol Avenue, but will be prohibited from turning right onto northbound Capitol Avenue.

The Project will also lengthen some pedestrian crosswalks, and pedestrians that cross the expressway at the Ocala and Cunningham intersections will walk across rail tracks on panels. These conditions should affect only those pedestrians using the community features that are within walking distance of the expressway and light rail stations.

3.12 Intersection Queuing

Left-turn queuing analysis has been performed for the signalized intersections along the corridor. Queues at intersections were estimated using Synchro 6 software package and then compared to the corresponding left-turn storage. Table 3-13 summarizes the Projected queues for 2010 and Table 3-14 summarizes the Projected queues for 2025. The left turn bays that were found to exceed capacity in the existing scenario also exceed capacity in the future design years.

In 2010, two left-turn bays along Capitol Expressway are expected to have queues that spill into the through lanes, as noted by the shading in Table 3-13. All of the left-turn bays that would have queue lengths greater than the storage are in the southbound direction. The southbound left-turn storage would be exceeded at the Capitol Avenue and Tully Road intersections, in the PM peak period.

Table 3-13 Arterial Queuing Summary – 2010 With Project Conditions

No.	Intersection of Capitol Expy With:	Peak Period	Queue (m)				Storage (m)			
			EBL	WBL	NBL	SBL	EBL	WBL	NBL	SBL
1	Capitol Avenue	AM PM	25 36	67 120	6 10	73 118	18	137	80	102
2	Story Road	AM PM	54 47	144 162	62 30	204 148	53	91	159	236
3	Ocala Avenue	AM PM	41 89	87 116	58 160	114 115	61	46	202	174
4	Cunningham Avenue	AM PM	9 38	27 35	14 18	26 20	ST	ST	47	88
5	Tully Road	AM PM	102 88	56 84	20 17	41 216	84	61	101	116
6	Eastridge Loop	AM PM	10 41	N/A N/A	23 46	N/A N/A	38	N/A	54	N/A
7	Quimby Road	AM PM	35 45	220 81	44 77	86 126	56	58	111	152
8	Nieman Boulevard	AM PM	N/A N/A	N/A N/A	N/A N/A	17 86	N/A	N/A	N/A	107

Shaded cells show queue lengths that are larger than the corresponding storage capacities
The queue length and storage area shown are for each lane in a left-turn lane group
The storage space NB at Ocala, NB at Eastridge, and SB at Quimby have been modified to reflect the proposed design.
ST = shared with through
N/A = movement does not exist

In 2025, two left-turn bays along Capitol Expressway are expected to have queues that spill into the through lanes, as noted by the shading in Table 3-14. All of the left-turn bays with projected queue spillbacks are in the southbound direction. In the PM, the southbound left-turn storage would be exceeded at the Capitol Avenue and Tully Road intersections.

Intersections where the left turn bays are projected to exceed the storage capacity were compared to those intersections that are projected to have a significant impact for the Light Rail

Alternative. The only intersection that is projected to be significantly impacted by the Light Rail Alternative that also is projected to have an overflow of the left turn storage bays on Capitol Expressway is the southbound left turn at Tully Road. At Tully Road, light rail will be grade separated and the overflow of the left turn bay is not associated with the Proposed Project.

Table 3-14 Arterial Queuing Summary – 2025 With Project Conditions

No.	Intersection of Capitol Expy With:	Peak Period	Queue (m)				Storage (m)			
			EBL	WBL	NBL	SBL	EBL	WBL	NBL	SBL
1	Capitol Avenue	AM PM	29 38	73 123	6 7	81 137	18	137	80	102
2	Story Road	AM PM	63 52	150 178	52 32	223 236	53	91	159	236
3	Ocala Avenue	AM PM	55 104	92 127	49 195	120 174	61	46	202	174
4	Cunningham Avenue	AM PM	10 41	25 33	15 14	32 21	ST	ST	47	88
5	Tully Road	AM PM	114 134	59 88	20 17	47 229	84	61	101	116
6	Eastridge Loop	AM PM	11 43	N/A N/A	22 54	N/A N/A	38	N/A	54	N/A
7	Quimby Road	AM PM	40 52	227 93	42 93	94 152	56	58	111	152
8	Nieman Boulevard	AM PM	N/A N/A	N/A N/A	N/A N/A	18 87	N/A	N/A	N/A	107

Shaded cells show queue lengths that are larger than the corresponding storage capacities
The queue length and storage area shown are for each lane in a left-turn lane group
The storage space NB at Ocala, NB at Eastridge, and SB at Quimby have been modified to reflect the proposed design.
ST = shared with through
N/A = movement does not exist

3.13 Safety & Security

3.13.1 *Safety*

Passenger safety will be protected at each station by railings along the platform and fencing the alignment adjacent to the station, providing crosswalks or grade-separated pedestrian overcrossings to the station from the surrounding roadways, and by providing adequate pedestrian waiting areas at crossings. The light rail project will meet CPUC requirements for safety. Station access will be designed with at-grade crosswalks or grade separated pedestrian overcrossings. At station peripheries, guardrails and fencing will isolate trackways. Adequate pedestrian waiting areas will be provided at track crossings. At applicable locations, walkways will be designated within station areas to connect the light rail platform to the parking areas, bus stops and platforms, and automobile passenger pick-up and drop-off areas.

Pedestrian crosswalks along Capitol Expressway will be designed to provide suitable places of refuge for pedestrians where they cross the light rail trackway. Pedestrian signal activation push buttons will be included at all intersections and added to the medians at station platforms.

Along the expressway there are currently periodic pullouts for disabled vehicles. The Light Rail Alternative will eliminate vehicle refuge areas within the Project limits, however, a shoulder area will enable disabled vehicles to move to the side of the roadway.

3.13.2 *Security*

Station platforms will be designed and located to be visible from the adjacent roadways. All platforms and park-and-ride lots will be lighted in the evening and night-time hours to enhance security. VTA security will patrol all facilities on a regular basis to maintain passenger security.

3.14 Construction Effects

Construction of light rail transit on Capitol Expressway would take place over several years. At the height of construction, a number of construction employees and equipment would occupy portions of the street including the median at active construction locations. In the most active areas, construction would periodically reduce Capitol Expressway from six lanes to four lanes, two in each direction at various times during non peak hours. As a result, construction activity on Capitol Expressway would impact traffic and the LOS at intersections and the capability of transit service to adhere to the published schedules.

The construction schedule, mitigations of construction impacts and public outreach on the two segments would be coordinated by VTA throughout the process.

3.14.1 *Construction Effects on Traffic*

The construction of light rail line would be a continuous, year-round process with construction taking place at two to three mile segments at a time. However, the peak of daily construction activity in any one area would take place during the off-peak commute hours when the LOS on Capitol Expressway at most major intersections is at C or better. Reducing the effects of the Project construction on traffic would be achieved by means of four coordinated resources:

- VTA in concert with the City of San Jose would prepare a Construction Mitigation Traffic Management Plan that would be a part of the construction contract for the proposed Project.
- Based on the Traffic Management Plan, contractors would use flagmen and follow a daily construction schedule that would restore traffic capacity during peak periods on weekdays (the morning commute period is 6:00 to 9:00 AM and the evening commute period is 3:00 to 7:00 PM).
- VTA would oversee construction to assure all mitigation measures are met. VTA would establish a field office along the Project that would be open to the public during specific hours of the week.

Construction equipment traffic from the contractors would be controlled by flagmen and the procedures contained in the Traffic Management Plan. For example, the use of the median to store large pieces of equipment overnight would not be allowed. Traffic that may attempt to use neighborhood streets to avoid construction areas would be controlled by two characteristics of the roadway network adjacent to Capitol Expressway:

- First, while there are no efficient, directly parallel detours around Capitol Expressway, some arterials are capable of handling traffic diverted from Capitol Expressway. White Road, King Road and Tully Road will most likely handle the diverted traffic. Portable electronic variable message signs and other signage would be positioned at approaches to Capitol Expressway north and south of individual construction zones to warn motorists of construction ahead and direct traffic to use alternative routes where feasible. Flagmen would be at all major construction points to assist in the control of traffic and support the use of these roads as a detour.
- Second, there are very few paths of travel through neighborhood streets that offer parallel routes to Capitol Expressway. Therefore, neighborhood streets would be protected from being used as cut-through streets by motorists.

3.14.2 *Construction Effects on Transit*

Transit service on-time performance can be expected to drop slightly during the construction period. Since the construction period will be limited in duration, no specific mitigation measures are proposed. Alternative bus stops will be located temporarily whenever existing bus stops are disrupted by construction.

3.14.3 *Construction Effects on Pedestrians*

In areas along Capitol Expressway where sidewalks are replaced, alternative paths will be provided. If no sidewalk currently exists, replacement facilities during construction will not be provided. Signs would be posted to direct pedestrians to cross at intersections in order to proceed along Capitol Expressway and avoid the construction area.

3.14.4 *Construction Effects on Bicycles*

Currently, bicyclists are able to use the shoulders of the expressway as a bicycle lane. During construction of the light rail project, the shoulders would not be maintained to allow bicyclists to effectively use the corridor. Signs will be posted advising bicyclists to use alternative corridors during construction.

3.14.5 *Construction Effects on Residential Access and Parking*

Several residential properties along the corridor will be affected by construction activities. During short periods of time access may be restricted and parking eliminated. VTA will coordinate the construction activities with the home owners/tenants. Residents will be notified one month in advance of construction and provided with a detailed schedule. Any adjustments to the schedule will be conveyed to the residents upon determination of the need to adjust the schedule. The construction duration will be kept to a minimum.

3.14.6 *Construction Impacts on Business Access and Visibility*

Several businesses along the corridor will be temporarily affected by construction. During short periods of time, access may be restricted, however, access will also be provided. Property owners and businesses will be notified one month in advance of construction and provided with a detailed construction schedule. Changes to the construction schedule will be conveyed immediately. Construction duration will be kept to a minimum. Signage will be provided along Capitol Expressway indicating the business is open during construction and that access is available. Businesses shall be notified seven days in advance of any traffic circulation that may affect them.

4.0 PROJECT MITIGATION

4.1 Traffic Mitigation

The traffic mitigation discusses potential improvements to the roadway network that would alleviate any significant impacts caused by the light rail extension to the roadways and intersections along the corridor. The impacts and mitigation are separated into the two study years, 2010 and 2025. The No Build Alternative assumes that the HOV lanes remain and the Light Rail Alternative assumes that the HOV lanes are removed to provide sufficient width for the light rail trackway. The HOV lanes were constructed as temporary improvements until light rail was to be constructed in the corridor. The Evergreen Specific Plan EIR prepared in 1993 stated:

> "…*traffic mitigation improvements proposed as part of the Evergreen Specific Plan include adding additional lanes to a portion of Capitol Expressway that would use the median section of the right-of-way where a light rail line would be located. These lanes would be replaced by the light rail transit if the Capitol Corridor is implemented*."

While potential mitigation measures are identified below, it may not be desirable or feasible to actually construct these improvements. The City of San Jose's desired minimum overall performance for City streets during peak periods is level of service D. A proposed amendment to the City's 2020 General Plan states:

> "*Development projects …. should be required to provide appropriate mitigation measures if they have the potential to reduce the level of service to E or worse. These mitigation measures can include a combination of street improvements and/or improvements to transit, bicycle, or pedestrian facilities when the mitigation for vehicular traffic compromises community livability… [or] would result in an unacceptable impact on an affected neighborhood or City street*."

Mitigation measures are described below. The significant investment in improved transit service by VTA in this corridor will provide multi-modal benefits for the region. The decrease in traffic level of service at some intersections should be viewed as an opportunity to divert more people from their automobiles to transit. Additionally, the Project would improve bicycle and pedestrian travel along the corridor. This report compares the No Build analysis to the Light Rail Alternative. The No Build Alternative assumes the same geometry as existing, including the HOV lanes. The Light Rail Alternative assumes no HOV lanes and geometry changes needed to accommodate light rail.

4.1.1 *Light Rail Alternative Year 2010*

Two intersections would result in adverse traffic impacts in both the AM and PM peak hours and one intersection in the PM peak hour only. These intersections are discussed below.

4.1.1.1 Capitol Expressway/Story Road

The Capitol Expressway/Story Road intersection is projected to operate at level of service F, with or without Light Rail. Under the Light Rail Alternative, the delay value and V/C ratio for the intersection for the AM and PM peak hours would exceed the thresholds for an intersection that already operates at level of service F, resulting in an adverse effect.

A potential mitigation measure would be to replace the HOV lanes removed as part of the Project. Because the HOV lanes would be removed to provide space for the light rail trackway, right-of-way is not available for this mitigation and would need to be acquired from adjacent property. All four quadrants of the intersection would require right-of-way acquisitions that would result in displacements of commercial properties.

Another potential mitigation measure would grade separate the traffic movements with Capitol Expressway depressed and traveling under Story Road. To implement this mitigation, three to four residential properties on the northwest side and seven to ten residences on the southwest side would be displaced. The frontage roads on the northeast and southeast sides of the intersection would also be acquired to provide sufficient right-of-way, further impacting business and residential access.

Because the implementation of these mitigation measures would result in adverse residential property and construction-related traffic impacts for which no further mitigation is feasible, this impact is considered a substantially adverse effect for which there is no feasible mitigation.

Mitigation: There is no feasible mitigation for this effect.

4.1.1.2 Capitol Expressway/Ocala Avenue Intersection

The Capitol Expressway/Ocala Avenue intersection is projected to operate at level of service E in the PM peak hour for the 2010 Project conditions, degrading from level of service D. A change in level of service from D to E represents a significant adverse impact.

A potential mitigation measure would be to again replace the HOV lanes removed as part of the Project. Because the HOV lanes would be removed to provide space for the light rail trackway, right-of-way is not available for this mitigation and would need to be acquired from adjacent property. All four quadrants of the intersection would require right-of-way acquisitions that would result in displacements of residential property.

Because the implementation of this mitigation measure would result in adverse property and construction-related impacts for which no mitigation is feasible, this impact is considered a substantially adverse effect for which there is no feasible mitigation.

Mitigation: There is no feasible mitigation for this effect.

4.1.1.3 Capitol Expressway/Tully Road Intersection

The Capitol Expressway/Tully Road intersection is projected to operate at level of service E in the AM peak hour and level of service F for the PM peak hour for 2010 Project conditions. The project degrades level of service from D without the Project to E with the Project in the AM peak and from E to F in the PM peak.

A potential mitigation measure at this intersection would be to keep the fourth lane in each direction. Currently the fourth lane is an HOV lane which could be converted to a general purpose lane with the Project conditions. If the fourth general purpose lane is kept at this intersection the impact could be mitigated to D- with average delay of 38.2 during the AM peak hour and E- with 57.5 seconds of delay in the PM peak hour.

Mitigation: Maintain fourth through lane through the intersection.

4.1.2 *Light Rail Alternative 2025*

Traffic Impacts would result at five intersections with the Light Rail Alternative in 2025, four intersections during both peak hours and one in the PM peak hour only.

4.1.2.1 Capitol Expressway/Capitol Avenue Intersection

The Capitol Expressway/Capitol Avenue intersection is projected to operate at level of service F with and without the Project in the PM peak hour. The delay value and volume to capacity ratio increase to such a degree that an adverse effect occurs.

A potential mitigation measure would be to replace the HOV lanes removed as part of the Project. Because the HOV lanes would be removed to provide space for the light rail trackway, right-of-way is not available for this mitigation and would need to be acquired from adjacent property.

Mitigation: There is no feasible mitigation for this effect.

4.1.2.2 Capitol Expressway/Story Road Intersection

The Capitol Expressway/Story Road intersection is projected to operate at level of service F. Under the Light Rail in 2025, the delay value and V/C ratio for the intersection for the intersection for the AM and PM peak hour would exceed the thresholds for an intersection that already operates at level of service F, resulting in an adverse effect.

A potential mitigation measure would be to replace the HOV lanes removed as part of the Project. Because the HOV lanes would be removed to provide space for the light rail trackway, right-of-way is not available for this mitigation and would need to be acquired from adjacent property. All four quadrants of the intersection would require right-of-way acquisitions that would result in displacements of commercial properties.

Another potential mitigation measure would grade separate the traffic movements with Capitol Expressway depressed and traveling under Story Road. To implement this mitigation, three to four residential properties on the northwest side and seven to ten residences on the southwest side would be displaced. The frontage roads on the northeast and southeast sides of the intersection would also be acquired to provide sufficient right-of-way, further impacting business and residential access.

Because the implementation of these mitigation measures would result in adverse property and construction impacts for which no further mitigation is feasible, this impact is considered a substantially adverse effect for which there is no feasible mitigation.

Mitigation: There is no feasible mitigation for this effect.

4.1.2.3 Capitol Expressway/Ocala Avenue Intersection

The Capitol Expressway/Ocala Avenue intersection is projected to operate at level of service D in the AM peak hour and level of service E in the in the PM peak hour. Under the Light Rail alternative in 2025, level of service E is projected for both peak hours, resulting in an adverse impact.

A potential mitigation measure would be to replace the HOV lanes removed as part of the Project. Because the HOV lanes would be removed to provide space for the light rail trackway, right-of-way is not available for this mitigation and would need to be acquired from adjacent property. All four quadrants of the intersection would require right-of-way acquisition that would result in displacements of residential properties.

Because the implementation of the mitigation measure would result in adverse property and construction impacts for which no mitigation is feasible, this impact is considered a substantially adverse effect for which there is no feasible mitigation.

Mitigation: There is no feasible mitigation for this effect.

4.1.2.4 Capitol Expressway/Tully Road Intersection

The Capitol Expressway/Tully Road intersection is projected to operate at level of service E in the AM peak hour and level of service F in the PM peak hour for the No Project condition. The project degrades level of service from E without the Project to F with the Project in the AM peak and adds sufficient delay and volume to capacity ratio increase in the PM peak to cause a significant impact.

A potential mitigation measure at this intersection would be to keep the fourth lane in each direction. Currently the fourth lane is an HOV lane which could be converted to a general purpose lane with the Project conditions. If the fourth general purpose lane is kept at this intersection the impact could be mitigated to E with average delay of 52.9 during the AM peak hour and F with 90.4 seconds of delay in the PM peak hour.

Mitigation: Maintain fourth through lane through the intersection.

4.1.2.5 Capitol Expressway/Quimby Road Intersection

In the No Build condition, this intersection is projected to operate at level of service E in the AM peak hour and level of service F in the PM peak hour. Assuming three general purpose lanes in each direction with the Project, the average delay and volume to capacity ratio would increase causing a significant impact,

A potential mitigation measure at this intersection would be to keep the fourth lane in each direction. Currently the fourth lane is an HOV lane which could be converted to a general purpose lane with the Project conditions. If the fourth general purpose lane is kept at this intersection the impact would be mitigated back to the No Project condition.

Mitigation: Maintain fourth through lanes through the intersection.

4.2 Pedestrian and Bicycle Mitigation

There are no pedestrian or bicycle impacts caused by the Project, although no additional pedestrian facilities would be provided during construction. To the contrary, the Project improves pedestrian and bicycle movement along the corridor. The following are the pedestrian and bicycle improvements associated with the Project.

- A two-way pedestrian and bicycle facility is proposed along the east/south side of the corridor from the Alum Rock Station to the Nieman Boulevard intersection.
- A sidewalk is proposed on the west/north side of the corridor for its entire length.
- The Project would accommodate connections to pedestrian and bicycle facilities.
- All existing pedestrian crosswalks and pedestrian signal indications will be maintained.
- At one location, Story Road pedestrian overcrossings are proposed to serve both passengers accessing the light rail platform as well as pedestrian traffic crossing the expressway.
- Pedestrian push buttons will be added to all location with at-grade platforms to allow disembarking passengers to call the pedestrian signal phase.
- Pedestrian audible warning devices will be installed at all intersection with at-grade pedestrian access to the light rail platform.
- If the City of San Jose deems it necessary, pedestrian countdown heads indicating the remaining time for a pedestrian to cross an intersection could be incorporated into the signal system at all intersections with at-grade pedestrian access to the light rail platform.

4.3 Safety & Security Mitigation

There are no specific criteria for which to measure safety impacts and mitigation. The safety of the light rail corridor will be addressed in detail as the Project moves through the design and construction phases. A key part of the safety review will be the Diagnostic Field Review and

Evaluation conducted by VTA, the California Public Utilities Commission (CPUC), the City of San Jose, Santa Clara County and Caltrans. At that time a hazards analysis will be prepared. The hazards analysis will address protection of all forms of travel in and along the corridor, including automobiles, light rail vehicles, pedestrians, and bicyclists.

The Project will conform to CPUC General Order 143-B, along with any waivers approved by the CPUC. The alignment classification is semi-exclusive with a fenced right-of-way and at-grade crossings. According to Table 1 of G.O. 143-B, the speed between crossings is 45 mph without an automatic block signal system (ABS). At at-grade crossings the speed will be restricted to 35 mph without flashing lights and gates, unless a waiver is granted by CPUC. At this time, flashing lights and gates are not proposed by VTA. However, VTA may seek a waiver to allow light rail vehicles to travel at a speed equal to the posted speed of the expressway.

The Project will be designed and constructed to meet CPUC requirements. No other safety mitigation is necessary.

The signalized intersections along Capitol Expressway currently operate with leading left turn phases. VTA has found that with the current system lagging left turn phases reduce automobile/LRV conflicts. With leading lefts, left turning motorists on the street parallel to the tracks assume that their green phase follows the phase for cross traffic. If light rail arrives at that time and pre-empts the left turn and goes to the parallel through green, some left turning motorists proceed anyway and turn in front of the LRV. With lagging lefts, motorists become accustomed to following the through phase, resulting in fewer accidents. The signal phasing on Capitol Expressway should be modified to lagging lefts with the Project.

4.4 Park & Ride Mitigation

At this time, park-and-ride facilities are proposed at two existing facilities, the Alum Rock station in conjunction with the Capitol Avenue Light Rail Project, the Eastridge Transit Center in conjunction with the existing park-and-ride facilities.

The proposed park-and-ride demand at Eastridge is estimated at 250 to 550 spaces. Initially, 265 spaces are proposed to be provided at the Eastridge Transit Center on property currently owned by VTA and on property acquired from Eastridge. Park-and-ride capacity at the low end of the demand range is proposed because the travel demand model tends to overestimate park-and-ride demand and there is extensive bus service to the Eastridge Transit Center. VTA has found that most light rail passengers either walk to the station or transfer from buses. While 265 spaces is expected to serve the park-and-ride demand for many years, at some point in the future, demand may exceed supply. This is a potential significant impact.

Mitigation: VTA will monitor the park-and-ride demand at Eastridge. When demand exceeds supply on a consistent basis, VTA will provide additional parking spaces by acquiring additional property, constructing parking structures, or other arrangements at the Eastridge Mall.

4.4.1 *Alum Rock Station*

The park-and-ride facility proposed at the existing transit center has been sized to meet demand. At the Alum Rock station, the extension of light rail onto Capitol Expressway will reduce the demand since the Alum Rock station will no longer be an end-of-the-line facility. At this location parking supply will exceed demand.

4.4.2 *Eastridge Transit Center*

At the Eastridge Transit Center, the VTA existing park-and-ride facility will be reconfigured in conjunction with light rail and the redesign of the bus transfer facility. As part of this reconfiguration, parking to meet demand will be identified within the existing shopping center.

4.5 On-Street Parking

Currently, on-street parking is not permitted along Capitol Expressway. The Project will not remove any parking from the expressway near any businesses and therefore, there will not be an economic impact to any adjacent businesses resulting from a loss of on-street parking. The Project will, however, remove all on-street (residential) parking on the east side of Capitol Expressway along the Capitol Avenue frontage road between Kollmar Drive and Sussex Drive. The parking demand in this location is estimated at 15 spaces. Sufficient parking supply is available immediate south of Sussex Drive to accommodate the displaced vehicles. According to VTA criteria a significant parking impact does not occur.

4.6 Eastridge Mall Parking

The Project will remove approximately 265 existing Eastridge Mall parking spaces as a result of the reconstruction of the transit center and park-and-ride lot. These existing mall parking spaces are not usually used. Therefore, this impact is less than significant. Also, the Project will improve transit accessibility to the mall and reduce the level of auto access.

Appendix F

Supplemental Biological Investigations for Capitol Expressway Light Rail Project (November 2006)

Jones & Stokes

November 7, 2006

Santa Clara Valley Transportation Authority
ATTN: Christina Jaworski - Senior Environmental Planner
Environmental Resources Planning
3331 N. First Street, Bldg. B
San Jose, CA 95134

SUBJECT: Supplemental Biological Investigations for Capitol Expressway Light Rail Project (Contract Number S01071)

Christina,

Jones & Stokes has completed our review of changes that concern biological resources for the Capitol Expressway Light Rail Project. Our review includes changes in the project description and any new or revised information regarding biological resources within the project area that have occurred since publication of the FEIR/EIS. The format of the following analysis is done to mirror the analysis done in the FEIR/EIS and identify changes that impact each section of FEIR/EIS.

If you have any questions please call me at 408-434-2244 extension 2207.

Sincerely,

Matthew Jones
Project Manager

01277.01

BIOLOGICAL RESOURCES

Introduction and Methodology

The study area has changed substantially since the publication of the Final EIS/EIR. These changes have reduced the study area to the stretch of Capitol Expressway between the Alum Rock Light Rail Station at S. Capitol Avenue/Wilbur Avenue and Nieman Boulevard. The study area that was originally analyzed continued south to the Capitol Expressway Light Rail Station at Highway 87. This section describes the environmental setting for biological resources, the impacts on biological resources that would result from the proposed Capitol Expressway Light Rail project (project), and mitigation measures that remain relevant to reduce these impacts to a less-than-significant level.

Updated listing information was obtained from the USFWS, CNDDB and CNPS in October 2006. An additional field survey was conducted on October 19, 2006, to document any changes in biological conditions of the study area that may have occurred since the FEIS/FEIR was published. The purpose of the surveys was to assess whether the vegetation communities, jurisdictional waters of the United States including wetlands, wildlife corridors, and suitable habitat for special-status species that were outlined in the FEIS/FEIR were still accurate. Only the information that has changed since the publication of the FEIR/EIS is discussed below. If items from the original FEIR/EIS are not discussed it is because they have not changed.

Existing Conditions

Environmental Setting

<u>Vegetation and Wildlife Communities</u>

Biological communities identified in the FEIS/FEIR included Central Coast cottonwood-sycamore riparian forest, freshwater marsh, ruderal, and aquatic habitats. Impacts to Central Coast cottonwood-sycamore riparian forest, freshwater marsh and aquatic habitats occurred under the original design where the corridor crossed Coyote, Silver, and Canoas Creeks. The study area now only includes Silver Creek. Hence, impacts to these habitats are substantially reduced in comparison to the FEIS/FEIR.

The study area still includes a section of Thompson Creek that runs parallel to and east of Capitol Expressway between Tully Road and Cunningham Avenue. This section of creek contains freshwater marsh. The light rail corridor will be established on the opposite side of Capitol Expressway along this stretch and will not impact Thompson Creek. Additionally, PG&E towers in this area will be moved to accommodate the project and at least one of those towers could be placed between Capitol Expressway and Thompson Creek. However, it would be placed on an established Santa Clara Valley Water District access road, if approved, and no impacts to the creek are anticipated.

Seasonal and Freshwater Emergent Wetlands and Other Waters of the U.S.

The project analyzed in the FEIR/FEIS assumed placement of 0.0015 acre of fill in Coyote Creek to facilitate a proposed retrofit of the Capitol Expressway bridge. This is no longer part of this project.

There are no anticipated impacts to Waters of the U.S. as the result of this project.

Special-Status Species

Information provided by the USFWS, CDFG, CNPS and the CNDDB was used to determine which special-status plant and wildlife species had the potential to occur within or in the vicinity of the Capitol Expressway Light Rail corridor at the time of publication of the FEIS/FEIR. A current review of these sources in October 2006 (see Attachment A) revealed a number of small changes, which are documented below. No new species should be added, however some plant species should be removed. Additionally, there have been several changes in species' status since the original FEIR/EIS was published.

One general change that has happened since the FEIR/EIS was published is that the USFWS Sacramento Field office no longer maintains a Species of Concern list. The species that are designated federal Species of Concern (SC) in Tables E-1a and E-1b of the FEIR/EIS no longer hold that official designation. Several of these species are also listed as California Species of Special Concern (SSC) and that designation remains.

Plants

The changes to the project do not change any impact on special status plant species. There are a few changes to status or taxonomy as follows.

Taxonomic changes

Caper-fruited tropidocarpum (*Tropidocarpum capperideum*) was discovered in 2000, and its status has moved from presumed extinct (CNPS 1A) to rare, threatened and endangered (CNPS 1B). Robust spineflower (*Chorizanthe robusta*) should be listed as a variety (var. *robusta*).

Status Changes

Due to the reduction in size of the project, the following five special-status plants no longer have potential to occur in the project area and can be removed from Table E-1a:

Heartscale	Atriplex cordulata
Large-flowered fiddleneck	*Amsinckia grandiflora*
Big tarplant	*Blepharizonia plumos*a ssp. *plumosa*
South Bay clarkia	*Clarkia concinna* ssp. *autmixa*
Congdon's tarplant	*Hemizonia parryi* ssp. *congdonii*

Wildlife

Fish and Other Aquatic Wildlife Species

When the FEIR/EIS was published the California tiger salamander was a candidate for listing by the USFWS. In 2006 it is listed as threatened. All other fish and aquatic species maintain the same status as in the original Table E-1b.

Migratory Birds and Bats

California Clapper Rail and Peregrine Falcon. In the FEIR/EIS Table E-1b the California clapper rail was listed as state threatened. It is in fact state endangered. The peregrine falcon is not only State endangered but is also *Fully Protected* by the state of California.

Western Burrowing Owl. There continues to be a viable burrowing owl population at the Reid-Hillview Airport and on adjacent ruderal lands within the study area vicinity. The status of the species has not changed since publication of the FEIR/FEIS and the impacts and mitigation outlined for this species in the FEIR/FEIS would still be appropriate for this study area. Impact BIO-7 and Mitigation Measure BIO-7 still apply to the project.

Mammals

In the FEIR/EIS Table E-1b the saltmarsh harvest mouse was listed only as federally endangered. It is also State endangered and *Fully Protected* by the state of California.

Environmental Consequences and Mitigation Measures

Environmental Consequences and Mitigation Measures of the Light Rail Alternative

BIO-7: Permanent Loss of Biological Habitats and Disturbance to Inhabiting Species

The level of impact to natural communities will be greatly reduced mostly due to the reduction in size of the project corridor. Ruderal habitat will still be lost under the new proposed project. Ruderal habitat is not a sensitive habitat but it does provide suitable habitat for the western burrowing owl. Though the loss of ruderal habitat will be reduced the potential impacts to western burrowing owls remains the same as in the FEIR/FEIS. Impact BIO-7 and Mitigation Measure BIO-7 remain unchanged from the FEIR/FEIS.

BIO-8 Temporary Disturbance of Riparian Forest during Construction

The level of impact to natural communities will be greatly reduced mostly due to the reduction in size of the project corridor.

BIO-9 Placement of Fill within Open Waters of the United States and Aquatic and Bare Soil (Ruderal) Habitats under the Jurisdiction of the California Department of Fish and Game

This impact will no longer occur because the proposed corridor will no longer cross over Coyote Creek. Impact BIO-9 and Mitigation Measure BIO-9 no longer apply.

BIO-10 Temporary Degradation of Water Quality

This impact will no longer occur as it is outlined in the FEIR/FEIS because the proposed corridor does not cross Coyote or Canoas Creeks. The impact and Mitigation Measure BIO-10 should be implemented on any work that occurs on the banks of Thompson or Silver Creek.

BIO-11 Permanent Loss or Temporary Disturbance of Potential Habitat for California red-legged frog

The level of impact to natural communities will be greatly reduced mostly due to the reduction in size of the project corridor, resulting in corridor not crossing either Coyote or Canoas Creeks.

BIO-12 Permanent Loss of Aquatic, Temporary Disturbance of Riparian Habitat, and Temporary Disturbance of Southwestern Pond Turtle

The level of impact to natural communities will be greatly reduced mostly due to the reduction in size of the project corridor, resulting in corridor not crossing either Coyote or Canoas Creeks.

BIO-13 Temporary Disturbance of Steelhead and Chinook salmon in Coyote Creek

This impact is no longer relevant, as the project no longer crosses Coyote Creek.

BIO-14 Temporary Disturbance of Nesting Raptors during Construction

The proposed alignment is not adjacent to any suitable raptor nesting habitat so there is minimal chance that nesting raptors will be disturbed. Mitigation Measures BIO-14a and BIO-14b should still be implemented to ensure that raptors are not impacted by construction activities associated with this project.

BIO-15 Temporary Disturbance to Nesting Habitat for Migratory Birds, Including Swallows

The level of impact to natural communities will be greatly reduced mostly due to the reduction in size of the project corridor. However, Mitigation Measure BIO-15 should still be implemented to ensure that migratory birds are not impacted by construction activities associated with this project.

BIO-16 Temporary Disturbance to Roosting and Foraging Habitat for Special Status Bats

The level of impact to natural communities will be greatly reduced mostly due to the reduction in size of the project corridor. However, Mitigation Measure BIO-16 should still be implemented to ensure that special status bats are not impacted by construction activities associated with this project.

ATTACHMENT A

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825

November 7, 2006

Document Number: 061107094123

Troy Rahmig
Jones & Stokes
2841 Junction Avenue
#114
San Jose, CA 95134

Subject: Species List for Capitol Expressway Light Rail

Dear: Interested party

We are sending this official species list in response to your November 7, 2006 request for information about endangered and threatened species. The list covers the California counties and/or U.S. Geological Survey 7½ minute quad or quads you requested.

Our database was developed primarily to assist Federal agencies that are consulting with us. Therefore, our lists include all of the sensitive species that have been found in a certain area *and also ones that may be affected by projects in the area*. For example, a fish may be on the list for a quad if it lives somewhere downstream from that quad. Birds are included even if they only migrate through an area. In other words, we include all of the species we want people to consider when they do something that affects the environment.

Please read Important Information About Your Species List (below). It explains how we made the list and describes your responsibilities under the Endangered Species Act.

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be February 05, 2007.

Please contact us if your project may affect endangered or threatened species or if you have any questions about the attached list or your responsibilities under the Endangered Species Act. A list of Endangered Species Program contacts can be found at www.fws.gov/sacramento/es/branches.htm.

Endangered Species Division

TAKE PRIDE IN AMERICA

Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the Counties and/or U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 061107094123
Database Last Updated: October 27, 2006

Species of Concern - The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. See www.fws.gov/sacramento/es/spp_concern.htm for more information and links to these sensitive species lists.

Red-Legged Frog Critical Habitat - The Service has designated final critical habitat for the California red-legged frog. The designation became final on May 15, 2006. See our map index.

Species

Listed Species

Invertebrates

Branchinecta conservatio
Conservancy fairy shrimp (E)

Euphydryas editha bayensis
bay checkerspot butterfly (T)
Critical habitat, bay checkerspot butterfly (X)

Lepidurus packardi
Critical habitat, vernal pool tadpole shrimp (X)
vernal pool tadpole shrimp (E)

Fish

Eucyclogobius newberryi
tidewater goby (E)

Hypomesus transpacificus
delta smelt (T)

Oncorhynchus kisutch
coho salmon - central CA coast (E) (NMFS)

Oncorhynchus mykiss
Central California Coastal steelhead (T) (NMFS)
Central Valley steelhead (T) (NMFS)
Critical habitat, Central California coastal steelhead (X) (NMFS)

Oncorhynchus tshawytscha
Central Valley spring-run chinook salmon (T) (NMFS)
winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Ambystoma californiense
California tiger salamander, central population (T)

Critical habitat, CA tiger salamander, central population (X)

Rana aurora draytonii
California red-legged frog (T)
Critical habitat, California red-legged frog (X)

Reptiles

Masticophis lateralis euryxanthus
Alameda whipsnake [=striped racer] (T)
Critical habitat, Alameda whipsnake (X)

Birds

Brachyramphus marmoratus
marbled murrelet (T)

Charadrius alexandrinus nivosus
western snowy plover (T)

Haliaeetus leucocephalus
bald eagle (T)

Rallus longirostris obsoletus
California clapper rail (E)

Sternula antillarum (=Sterna, =albifrons) browni
California least tern (E)

Mammals

Reithrodontomys raviventris
salt marsh harvest mouse (E)

Vulpes macrotis mutica
San Joaquin kit fox (E)

Plants

Castilleja affinis ssp. neglecta
Tiburon paintbrush (E)

Ceanothus ferrisae
Coyote ceanothus (E)

Dudleya setchellii
Santa Clara Valley dudleya (E)

Lasthenia conjugens
Contra Costa goldfields (E)
Critical habitat, Contra Costa goldfields (X)

Streptanthus albidus ssp. albidus
Metcalf Canyon jewelflower (E)

Suaeda californica
California sea blite (E)

Candidate Species

Fish

Oncorhynchus tshawytscha
Central Valley fall/late fall-run chinook salmon (C) (NMFS)
Critical habitat, Central Valley fall/late fall-run chinook (C) (NMFS)

Selected Quads

MORGAN HILL (406B) SANTA TERESA HILLS (407A) LOS GATOS (407B) MT. DAY (426B) LICK OBSERVATORY (426C) CALAVERAS RESERVOIR (427A) MILPITAS (427B) SAN JOSE WEST (427C) SAN JOSE EAST (427D)

County Lists

No county species lists requested.

Key:

(E) *Endangered* - Listed as being in danger of extinction.
(T) *Threatened* - Listed as likely to become endangered within the foreseeable future.
(P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.
(NMFS) Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.
Critical Habitat - Area essential to the conservation of a species.
(PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.
(C) *Candidate* - Candidate to become a proposed species.
(V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.
(X) *Critical Habitat* designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, **or may be affected by** projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the nine surrounding quads through the California Native Plant Society's online Inventory of Rare and

Endangered Plants.

Surveying

Some of the species on your list may not be affected by your project. A trained biologist or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list.

For plant surveys, we recommend using the Guidelines for Conducting and Reporting Botanical Inventories. The results of your surveys should be published in any environmental documents prepared for your project.

Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

> Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal consultation with the Service.

  During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.

- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.

  Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our critical habitat page for maps.

Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6580.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be February 05, 2007.

Name (Scientific/Common)	CNDDB Ranks	Other Lists	Listing Status	Total EO's	Element Occ Ranks A	B	C	D	X	U	Population Status Historic >20 yr	Recent <=20 yr	Presence Pres. Extant	Poss. Extirp.	Extirp.
Accipiter cooperii Cooper's hawk	G5 S3	CDFG: SC	Fed: None Cal: None	78 S:1	0	0	1	0	0	0	0	1	1	0	0
Adela oplerella Opler's longhorn moth	G2G3 S2S3	CDFG:	Fed: None Cal: None	8 S:5	0	5	0	0	0	0	0	5	5	0	0
Agelaius tricolor tricolored blackbird	G2G3 S2	CDFG: SC	Fed: None Cal: None	419 S:4	0	0	0	0	0	4	3	1	4	0	0
Ambystoma californiense California tiger salamander	G2G3 S2S3	CDFG: SC	Fed: Threatened Cal: None	839 S:85	31	25	5	2	9	13	12	73	76	1	8
Amsinckia lunaris bent-flowered fiddleneck	G2 S2.2	CNPS: 1B Code: 2-2-3	Fed: None Cal: None	47 S:1	0	0	0	0	0	1	0	1	1	0	0
Antrozous pallidus pallid bat	G5 S3	CDFG: SC	Fed: None Cal: None	111 S:1	0	0	0	0	1	0	0	1	0	1	0
Aquila chrysaetos golden eagle	G5 S3	CDFG: SC	Fed: None Cal: None	89 S:2	0	1	0	0	0	1	0	2	2	0	0
Ardea herodias great blue heron	G5 S4	CDFG:	Fed: None Cal: None	84 S:2	0	1	1	0	0	0	0	2	2	0	0
Astragalus tener var. tener alkali milk-vetch	G1T1 S1.1	CNPS: 1B Code: 3-2-3	Fed: None Cal: None	67 S:3	0	1	0	0	2	0	2	1	1	1	1
Athene cunicularia burrowing owl	G4 S2	CDFG: SC	Fed: None Cal: None	786 S:39	2	15	11	2	3	6	3	36	36	2	1
Atriplex depressa brittlescale	G2Q S2.2	CNPS: 1B Code: 2-2-3	Fed: None Cal: None	53 S:1	0	1	0	0	0	0	0	1	1	0	0
Atriplex joaquiniana San Joaquin spearscale	G2 S2.1	CNPS: 1B Code: 2-2-3	Fed: None Cal: None	76 S:2	0	1	0	0	0	1	1	1	2	0	0
Balsamorhiza macrolepis var. macrolepis big-scale balsamroot	G3G4T2 S2.2	CNPS: 1B Code: 2-2-3	Fed: None Cal: None	25 S:1	0	0	0	0	1	0	0	1	0	0	1
Calasellus californicus	G2G3 S2S3	CDFG:	Fed: None Cal: None	3 S:1	0	0	0	0	0	1	1	0	1	0	0
Campanula exigua chaparral harebell	G2 S2.2	CNPS: 1B Code: 2-2-3	Fed: None Cal: None	31 S:4	0	0	0	0	0	4	4	0	4	0	0

Name (Scientific/Common)	CNDDB Ranks	Other Lists	Listing Status	Total EO's	Element Occ Ranks A	B	C	D	X	U	Population Status Historic >20 yr	Recent <=20 yr	Presence Pres. Extant	Poss. Extirp.	Extirp.
Castilleja affinis ssp. neglecta Tiburon Indian paintbrush	G4G5T1 S1.2	CNPS: 1B Code: 3-2-3	Fed: Endangered Cal: Threatened	8 S:2	0	1	1	0	0	0	0	2	2	0	0
Ceanothus ferrisiae Coyote ceanothus	G1 S1.1	CNPS: 1B Code: 3-3-3	Fed: Endangered Cal: None	5 S:4	0	4	0	0	0	0	0	4	4	0	0
Centromadia parryi ssp. congdonii Congdon's tarplant	G4T3 S3.2	CNPS: 1B Code: 2-2-3	Fed: None Cal: None	74 S:6	0	3	1	0	2	0	2	4	4	1	1
Charadrius alexandrinus nivosus western snowy plover	G4T3 S2	CDFG: SC	Fed: Threatened Cal: None	110 S:2	0	1	0	0	0	1	1	1	2	0	0
Chorizanthe robusta var. robusta robust spineflower	G2T1 S1.1	CNPS: 1B Code: 3-3-3	Fed: Endangered Cal: None	28 S:2	0	0	0	0	2	0	2	0	0	2	0
Cirsium fontinale var. campylon Mt. Hamilton thistle	G2T2 S2.2	CNPS: 1B Code: 2-2-3	Fed: None Cal: None	43 S:32	5	8	6	0	0	13	11	21	32	0	0
Collinsia multicolor San Francisco collinsia	G2 S2.2	CNPS: 1B Code: 2-2-3	Fed: None Cal: None	22 S:1	0	0	0	0	0	1	1	0	1	0	0
Cordylanthus maritimus ssp. palustris Point Reyes bird's-beak	G4?T2 S2.2	CNPS: 1B Code: 2-2-2	Fed: None Cal: None	62 S:1	0	0	0	0	0	1	1	0	1	0	0
Coreopsis hamiltonii Mt. Hamilton coreopsis	G2 S2.2	CNPS: 1B Code: 3-2-3	Fed: None Cal: None	22 S:1	1	0	0	0	0	0	1	0	1	0	0
Corynorhinus townsendii Townsend's big-eared bat	G4T3T4 S2S3	CDFG: SC	Fed: None Cal: None	142 S:1	0	0	0	0	0	1	0	1	1	0	0
Cypseloides niger black swift	G4 S2	CDFG: SC	Fed: None Cal: None	46 S:1	0	0	0	0	0	1	1	0	1	0	0
Dipodomys heermanni berkeleyensis Berkeley kangaroo rat	G3G4T1 S1	CDFG:	Fed: None Cal: None	7 S:1	0	0	0	0	0	1	1	0	1	0	0
Dudleya setchellii Santa Clara Valley dudleya	G1 S1.1	CNPS: 1B Code: 3-3-3	Fed: Endangered Cal: None	39 S:34	13	13	3	1	0	4	0	34	34	0	0
Elanus leucurus white-tailed kite	G5 S3	CDFG:	Fed: None Cal: None	87 S:3	1	1	0	0	0	1	1	2	3	0	0
Emys (=Clemmys) marmorata western pond turtle	G3G4 S3	CDFG: SC	Fed: None Cal: None	312 S:16	1	8	3	1	0	3	0	16	16	0	0

Name (Scientific/Common)	CNDDB Ranks	Other Lists	Listing Status	Total EO's	Element Occ Ranks A	B	C	D	X	U	Population Status Historic >20 yr	Recent <=20 yr	Presence Pres. Extant	Poss. Extirp.	Extirp.
Eryngium aristulatum var. hooveri Hoover's button-celery	G5T2 S2.1	CNPS: 1B Code: 3-3-3	Fed: None Cal: None	10 S:3	0	0	0	0	2	1	2	1	1	2	0
Euphydryas editha bayensis Bay checkerspot butterfly	G5T1 S1	CDFG:	Fed: Threatened Cal: None	24 S:9	0	7	0	0	0	2	0	9	9	0	0
Falco mexicanus prairie falcon	G5 S3	CDFG: SC	Fed: None Cal: None	434 S:2	1	0	0	0	0	1	1	1	2	0	0
Fritillaria liliacea fragrant fritillary	G2 S2.2	CNPS: 1B Code: 2-2-3	Fed: None Cal: None	58 S:8	0	2	2	0	0	4	1	7	8	0	0
Geothlypis trichas sinuosa saltmarsh common yellowthroat	G5T2 S2	CDFG: SC	Fed: None Cal: None	109 S:3	0	2	0	0	0	1	1	2	3	0	0
Hoita strobilina Loma Prieta hoita	G2 S2.1	CNPS: 1B Code: 2-3-3	Fed: None Cal: None	23 S:16	3	5	6	0	0	2	1	15	16	0	0
Lasthenia conjugens Contra Costa goldfields	G1 S1.1	CNPS: 1B Code: 3-3-3	Fed: Endangered Cal: None	31 S:3	0	2	0	0	1	0	1	2	2	0	1
Lepidurus packardi vernal pool tadpole shrimp	G3 S2S3	CDFG:	Fed: Endangered Cal: None	227 S:3	0	2	1	0	0	0	0	3	3	0	0
Lessingia micradenia var. glabrata smooth lessingia	G2T1 S1.2	CNPS: 1B Code: 3-2-3	Fed: None Cal: None	23 S:18	3	6	2	0	0	7	6	12	18	0	0
Lomatium observatorium Mt. Hamilton lomatium	G1 S1.2	CNPS: 1B Code: 3-2-3	Fed: None Cal: None	4 S:2	0	0	0	0	0	2	0	2	2	0	0
Malacothamnus arcuatus arcuate bush mallow	G2Q S2.2	CNPS: 1B Code: 2-2-3	Fed: None Cal: None	20 S:6	0	0	1	0	1	4	5	1	5	1	0
Malacothamnus hallii Hall's bush mallow	G1Q S1.2	CNPS: 1B Code: 3-2-3	Fed: None Cal: None	26 S:10	0	3	1	0	1	5	4	6	9	1	0
Melospiza melodia pusillula Alameda song sparrow	G5T2? S2?	CDFG: SC	Fed: None Cal: None	38 S:3	0	1	0	0	0	2	2	1	3	0	0
Microcina homi Hom's micro-blind harvestman	GNR S1	CDFG:	Fed: None Cal: None	5	0	0	0	0	0	5	5	0	5	0	0
Microcina jungi Jung's micro-blind harvestman	GNR S1	CDFG:	Fed: None Cal: None	1	0	0	0	0	0	1	1	0	1	0	0

Name (Scientific/Common)	CNDDB Ranks	Other Lists	Listing Status	Total EO's	Element Occ Ranks A	B	C	D	X	U	Population Status Historic >20 yr	Recent <=20 yr	Presence Pres. Extant	Poss. Extirp.	Extirp.
Monardella villosa ssp. globosa robust monardella	G5T2 S2.2	CNPS: 1B Code: 2-2-3	Fed: None Cal: None	25 S:2	1	1	0	0	0	0	0	2	2	0	0
Myotis yumanensis Yuma myotis	G5 S4?	CDFG:	Fed: None Cal: None	39 S:2	0	0	0	0	0	2	0	2	2	0	0
Navarretia prostrata prostrate navarretia	G2? S2.1?	CNPS: 1B Code: 2-3-3	Fed: None Cal: None	30 S:2	0	1	0	0	0	1	0	2	2	0	0
Oncorhynchus mykiss irideus steelhead-central California coast esu	G5T2Q S2	CDFG:	Fed: Threatened Cal: None	28 S:1	0	0	0	0	0	1	0	1	1	0	0
Pandion haliaetus osprey	G5 S3	CDFG: SC	Fed: None Cal: None	403 S:2	0	2	0	0	0	0	0	2	2	0	0
Penstemon rattanii var. kleei Santa Cruz Mountains beardtongue	G4T2 S2.2	CNPS: 1B Code: 3-2-3	Fed: None Cal: None	6 S:1	0	0	0	0	0	1	1	0	1	0	0
Phacelia phacelioides Mt. Diablo phacelia	G1 S1.2	CNPS: 1B Code: 3-2-3	Fed: None Cal: None	16 S:1	0	0	0	0	0	1	1	0	1	0	0
Phrynosoma coronatum (frontale population) Coast (California) horned lizard	G4G5 S3S4	CDFG: SC	Fed: None Cal: None	70 S:2	1	0	1	0	0	0	0	2	2	0	0
Plagiobothrys glaber hairless popcorn-flower	GH SH	CNPS: 1A Code: *	Fed: None Cal: None	9 S:3	0	0	0	0	0	3	3	0	0	3	0
Rallus longirostris obsoletus California clapper rail	G5T1 S1	CDFG:	Fed: Endangered Cal: Endangered	85 S:2	0	0	0	0	0	2	2	0	2	0	0
Rana aurora draytonii California red-legged frog	G4T2T3 S2S3	CDFG: SC	Fed: Threatened Cal: None	872 S:24	6	8	3	2	0	5	0	24	24	0	0
Rana boylii foothill yellow-legged frog	G3 S2S3	CDFG: SC	Fed: None Cal: None	438 S:8	2	5	1	0	0	0	0	8	8	0	0
Reithrodontomys raviventris salt-marsh harvest mouse	G1G2 S1S2	CDFG:	Fed: Endangered Cal: Endangered	127 S:13	0	4	1	1	1	6	6	7	12	0	1
Sanicula saxatilis rock sanicle	G2 S2.2	CNPS: 1B Code: 3-2-3	Fed: None Cal: Rare	10 S:3	2	0	0	0	0	1	3	0	3	0	0
Sidalcea malachroides maple-leaved checkerbloom	G3G4 S3S4.2	CNPS: 1B Code: 2-2-2	Fed: None Cal: None	142 S:1	0	0	0	0	0	1	1	0	1	0	0

Name (Scientific/Common)	CNDDB Ranks	Other Lists	Listing Status	Total EO's	Element Occ Ranks A	B	C	D	X	U	Population Status Historic >20 yr	Recent <=20 yr	Presence Pres. Extant	Poss. Extirp.	Extirp.
Sorex vagrans halicoetes salt-marsh wandering shrew	G5T1 S1	CDFG: SC	Fed: None Cal: None	12 S:2	0	0	0	0	1	1	2	0	1	0	1
Streptanthus albidus ssp. albidus Metcalf Canyon jewel-flower	G2T1 S1.1	CNPS: 1B Code: 3-3-3	Fed: Endangered Cal: None	13 S:12	4	4	0	0	2	2	4	8	10	1	1
Streptanthus albidus ssp. peramoenus most beautiful jewel-flower	G2T2 S2.2	CNPS: 1B Code: 2-2-3	Fed: None Cal: None	66 S:25	10	8	1	1	0	5	0	25	25	0	0
Suaeda californica California seablite	G1 S1.1	CNPS: 1B Code: 3-3-3	Fed: Endangered Cal: None	15 S:1	0	0	0	0	0	1	1	0	1	0	0
Trimerotropis infantilis Zayante band-winged grasshopper	G1 S1	CDFG:	Fed: Endangered Cal: None	6 S:1	0	0	0	0	1	0	1	0	0	0	1
Tropidocarpum capparideum caper-fruited tropidocarpum	G1 S1.1	CNPS: 1B Code: 3-3-3	Fed: None Cal: None	19 S:1	0	0	0	0	0	1	1	0	1	0	0
Vulpes macrotis mutica San Joaquin kit fox	G4T2T3 S2S3	CDFG:	Fed: Endangered Cal: Threatened	205 S:1	0	0	0	0	0	1	1	0	1	0	0

CNPS Inventory of Rare and Endangered Plants

Status: Plant Press Manager window with 36 items - Tue, Nov. 7, 2006, 09:06 b

Reformat list as: Standard List - with Plant Press controls

STATUS and RARITY REPORT

scientific	family	CNPS	R-E-D	STATE	State Rank	FEDERAL	Global Rank
Amsinckia lunaris	Boraginaceae	List 1B.2	2-2-3	None	S2.2	None	G2
Astragalus tener var. tener	Fabaceae	List 1B.2	3-2-3	None	S1.1	None	G1T1
Atriplex depressa	Chenopodiaceae	List 1B.2	2-2-3	None	S2.2	None	G2Q
Atriplex joaquiniana	Chenopodiaceae	List 1B.2	2-2-3	None	S2.1	None	G2
Balsamorhiza macrolepis var. macrolepis	Asteraceae	List 1B.2	2-2-3	None	S2.2	None	G3G4T2
Campanula exigua	Campanulaceae	List 1B.2	2-2-3	None	S2.2	None	G2
Castilleja affinis ssp. neglecta	Scrophulariaceae	List 1B.2	3-2-3	CT	S1.2	FE	G4G5T1
Ceanothus ferrisiae	Rhamnaceae	List 1B.1	3-3-3	None	S1.1	FE	G1
Centromadia parryi ssp. congdonii	Asteraceae	List 1B.2	2-2-3	None	S3.2	None	G4T3
Chorizanthe robusta var. robusta	Polygonaceae	List 1B.1	3-3-3	None	S1.1	FE	G2T1
Cirsium fontinale var. campylon	Asteraceae	List 1B.2	2-2-3	None	S2.2	None	G2T2
Collinsia multicolor	Scrophulariaceae	List 1B.2	2-2-3	None	S2.2	None	G2
Cordylanthus maritimus ssp. palustris	Scrophulariaceae	List 1B.2	2-2-2	None	S2.2	None	G4?T2
Coreopsis hamiltonii	Asteraceae	List 1B.2	3-2-3	None	S2.2	None	G2
Dudleya setchellii	Crassulaceae	List 1B.1	3-3-3	None	S1.1	FE	G1
Eriogonum luteolum var. caninum	Polygonaceae	List 3.2	?-2-3	None	S3.2	None	G5T3Q
Eryngium aristulatum var. hooveri	Apiaceae	List 1B.1	3-3-3	None	S2.1	None	G5T2
Fritillaria liliacea	Liliaceae	List 1B.2	2-2-3	None	S2.2	None	G2
Hoita strobilina	Fabaceae	List 1B.1	2-3-3	None	S2.1	None	G2
Lasthenia conjugens	Asteraceae	List 1B.1	3-3-3	None	S1.1	FE	G1
Lathyrus jepsonii var. jepsonii	Fabaceae	List 1B.2	2-2-3	None	S2.2	None	G5T2
Lessingia hololeuca	Asteraceae	List 3	1-?-3	None	S3	None	G3?
		List	3-2-				

Lessingia micradenia var. glabrata	Asteraceae	1B.2	3	None	S1.2	None	G2T1
Lomatium observatorium	Apiaceae	List 1B.2	3-2-3	None	S1.2	None	G1
Malacothamnus arcuatus	Malvaceae	List 1B.2	2-2-3	None	S2.2	None	G2Q
Malacothamnus hallii	Malvaceae	List 1B.2	3-2-3	None	S1.2	None	G1Q
Micropus amphibolus	Asteraceae	List 3.2	?-2-3	None	S3.2?	None	G3
Monardella villosa ssp. globosa	Lamiaceae	List 1B.2	2-2-3	None	S2.2	None	G5T2
Navarretia prostrata	Polemoniaceae	List 1B.1	2-3-3	None	S2.1?	None	G2?
Phacelia phacelioides	Hydrophyllaceae	List 1B.2	3-2-3	None	S1.2	None	G1
Plagiobothrys glaber	Boraginaceae	List 1A	*	None	SH	None	GH
Sanicula saxatilis	Apiaceae	List 1B.2	3-2-3	CR	S2.2	None	G2
Senecio aphanactis	Asteraceae	List 2.2	3-2-1	None	S1.2	None	G3?
Streptanthus albidus ssp. albidus	Brassicaceae	List 1B.1	3-3-3	None	S1.1	FE	G2T1
Streptanthus albidus ssp. peramoenus	Brassicaceae	List 1B.2	2-2-3	None	S2.2	None	G2T2
Suaeda californica	Chenopodiaceae	List 1B.1	3-3-3	None	S1.1	FE	G1

Appendix G

Noise and Vibration Study for Supplemental Environmental Impact Review (January 2007)

Capitol Expressway Light Rail Project

NOISE AND VIBRATION STUDY FOR SUPPLEMENTAL ENVIRONMENTAL IMPACT REVIEW

Valley Transit Consultants
RAJAPPAN & MEYER CONSULTING ENGINEERS, INC.
KORVE ENGINEERING • HATCH MOTT MACDONALD • BIGGS CARDOSA ASSOCIATES
HMH ENGINEERS • SASAKI ASSOCIATES • SBA ARCHITECTS • PARIKH CONSULTANTS

prepared by:

WILSON, IHRIG & ASSOCIATES, INC.

FINAL
January 11, 2007

TABLE OF CONTENTS

VTA CAPITOL EXPRESSWAY LIGHT RAIL

NOISE AND VIBRATION STUDY FOR SUPPLEMENTAL ENVIRONMENTAL IMPACT REVIEW

EXECUTIVE SUMMARY

Noise and vibration levels from future light rail transit operations along Capitol Expressway between Alum Rock Station and Eastridge Transit Center (CELR) have been assessed in detail using the methodology recommended in the Federal Transit Administration's *Guidance Manual for Transit Noise and Vibration Impact Assessment* (updated May 2006). This methodology is based on empirical measurements of the airborne noise and vibration generated by the system's vehicle, vibration propagation rates in the local soils, and the structural dynamics of typical buildings. The predicted levels of noise and vibration and associated impacts have been assessed using criteria and guidelines contained in the FTA Manual. This report provides an update to the analysis conducted for Preliminary Engineering[1].

The following areas with noise and vibration sensitive receptors have been included in this analysis:

- Homes on and near S. Capitol Avenue
- Homes along Capitol Expressway
- Churches on the Capitol Expressway Frontage Road

This analysis incorporates additional test data acquired during June and July 2006 to characterize the vibration propagation of the Project area soils, to characterize the vibration from aerial and at-grade sections of the existing VTA system, and to provide additional documentation of the noise environment. This analysis also incorporates test data acquired from the Vasona alignment[2].

This analysis indicates that there is one area where noise levels would be considered Severe Impacts according to guidelines established by the FTA for residential land use, and thus noise control measures must be considered for these residences, from Sta.12+30 to 14+00 NB. The adoption of noise control measures would reduce the impacts below FTA criteria.

This analysis indicates that there are several areas where noise levels would be considered Moderate Impacts according to guidelines established by the FTA for residential land use, and thus noise control measures must be considered and adopted if they are reasonable at the areas listed below. The adoption of noise control measures would reduce the impacts below FTA criteria.

---

[1] *Noise and Vibration Study for Preliminary Design, Final Report*, March 29, 2006.

[2] *Evaluation of Tire Derived Aggregate As Installed Beneath Ballast and Tie Light Rail Track – Results of 2005 Field Tests,* March 2006.

Areas where noise control measures should be considered:
- Sta. 11+20 to 11+60 SB (3 homes)
- Sta. 13+90 to 18+50 SB (24 homes)
- Sta. 20+70 to 21+00 SB (3 homes)

- Sta. 11+40 to 12+10 NB (3 homes)
- Sta. 20+20 to 22+20 NB (6 residential buildings)
- Sta. 32+00 to 32+30 NB (2 homes).

This analysis indicates that there are several areas where vibration levels for three-car trains would exceed the guidelines established by the FTA for residential land use. The area where these homes are located are as follows:
- Sta. 10+80 to 11+80 SB (3 homes)
- Sta. 21+20 to 23+00 SB (8 homes)
- Sta. 27+10 to 31+00 SB (10 homes)
- Sta. 13+90 NB (1 home)
- Sta. 11+10 to 12+20 NB (4 homes)

Trains running at-grade on standard ballasted track with a tire-derived aggregate (TDA) underlayment with one-car trains should result in acceptable vibration during the daytime and during the nighttime[3]. However, in the proposed schedule, three-car trains would operate during peak commute hours, and thus, between 6:00 A.M. and 7:00 A.M. (which falls under the nighttime period), three-car trains would result in vibration that exceeds the criteria, even with TDA (if applicable); these residual impacts would occur at homes within 100 ft of the near track of the at-grade alignment (10 homes). Additional vibration control measures to further reduce these impacts are discussed in this report.

This analysis indicates that ground vibration generated on the transition structure (embankment, ballasted track) may exceed the FTA impact criteria at several homes with 3-car train operation. In general, vibration from embankment structures is less than that generated by at-grade operations, for similar distances. However, measurement data from VTA indicates that embankment structures can increase the vibration at low frequencies, relative to at-grade. The adoption of vibration control measures would reduce the impacts below FTA criteria.

This analysis indicates that ground vibration generated on the aerial structure (direct fixation fasteners) may exceed the FTA impact criteria at the one home within 40 ft of the guideway support columns. This finding is supported by measurement data conducted near the Tasman East structure and the additional soil vibration propagation data collected in the Project area. Potential vibration control measures are discussed in this report.

Pile driving would be conducted to install foundation piles for the aerial column structures. Noise from pile driving activities would exceed the FTA Construction Noise Criteria for construction activities of 80 dBA Leq over an 8-hour work day. This noise impact would have a duration of nine to eighteen days, while piles are driven for the nearest three columns. The noise generated by this

[3]Daytime is defined as 7 AM to 10 PM, and Nighttime is 10 PM to 7 AM

activity would exceed the criteria at homes within 270 ft of the activity for piles driven constantly over eight hours. Potential noise control measures are discussed in this report.

The pile driving vibration would exceed the FTA Construction Vibration guidelines for homes within 144 ft of the pile driving. This analysis indicates that the pile driving vibration would exceed 1.0 in/sec PPV for the one home closest to the columns at Sta.14+00 NB. This high level of vibration exceeds the FTA guideline of 0.2 in/sec PPV for non-engineered buildings. Potential vibration control measures are discussed in this report.

Comparison with EIR

The EIR does not indicate any noise or vibration impacts from the median-running at-grade alignment alternatives. However, the speed profiles used in the environmental analysis were substantially lower than the current design operational speeds, and the building vibration amplification factor was based on generalized building data. This detailed engineering analysis used building response data measured for residences in San Jose, updated soils data and input force data measured for the existing Kinkisharyo vehicles. With the use of the new FTA criteria for detailed analysis, new measurement data and Tire Derived Aggregate underlayment for the ballasted track as a vibration control measure, the FTA Vibration Criteria would potentially still be exceeded with operation of 3-car trains at some homes, and additional vibration control would be required. One home close to the aerial structure support structure would require vibration control, and potential options are discussed in this report. The appendix contains further discussion and details regarding the analysis refinements compared with the EIR analyses.

1 INTRODUCTION

This detailed noise and vibration assessment for the Santa Clara Valley Transportation Authority (VTA) Capitol Expressway Light Rail (CELR) Corridor Project has been conducted in accordance with the methodology used in the DEIR[4] and recommended in the Federal Transit Administration's guidance manual for *Transit Noise and Vibration Impact Assessment* (Guidance Manual). The vibration prediction methodology was developed by Wilson, Ihrig & Associates, Inc. (WIA) in the 1980s. It has been applied throughout the rail transit industry and has been shown to produce reliable predictions for the purposes of assessing vibration impact from future rail lines.

The predicted wayside noise levels are based on noise data obtained in 2003 during vibration validation measurements of the Kinkisharyo vehicle. Those measurement data indicate that the noise from the Kinkisharyo vehicle is about one to 2 dBA higher than the UTDC vehicles which were assumed in the analysis for the EIR. The current analysis also incorporates additional measurement data acquired during July 2006 to provide additional documentation of the existing ambient noise environment.

The predicted vibration levels are primarily based on measurements made along the operating VTA system, with additional measurement data acquired along the CELR corridor during June and July 2006 to characterize the vibration propagation of the Project area soils, the ambient vibration, and vibration from aerial and at-grade sections of the existing VTA system. The analysis accounts for the distance between the track and individual buildings and the design speeds. All prediction calculations are done in 1/3-octave bands between 6.3 and 160 Hz. The overall vibration level is then calculated from the 1/3-octave band levels.

Groundborne vibration is a complex, frequency-dependent phenomenon. The FTA Guidance Manual presents overall vibration velocity level criteria and 1/3-octave band criteria for various types of land use. Office and commercial land use are not included in the general assessment FTA criteria, but office land use is included in the detailed analysis criteria (DAC). The new FTA detailed analysis criteria is based on the American National Standards Institute (ANSI) S2.71 (was 3.29) "Guide to Evaluation of Human Exposure to Vibration in Buildings," which was used by WIA to evaluate the need for vibration mitigation for the Vasona Corridor study.

2 ASSESSMENT CRITERIA

2.1 Noise Assessment Criteria

The noise criteria in the FTA Guidance Manual are presented in terms of A-weighted noise exposure. These criteria were developed specifically for transit noise sources on fixed guideways. The criteria for impact are based on the existing noise level and the predicted project noise level. A noise impact is determined by the threshold at which the percentage of people highly annoyed by the project becomes measurable, and a severe noise impact is defined by the threshold at which a significant percentage of people would be highly annoyed by the project noise.

[4]Capitol Expressway Corridor, *Environmental Impact Statement/Environmental Impact Report*, April 2005.

The FTA criteria are presented in Figure 2.1. These criteria are separated into three Land Use Categories, which are applicable to parks (Category 1), residential land use (Category 2) and institutional land use (Category 3). Further details regarding the FTA Criteria are provided in the EIR and the *Noise and Vibration Technical Report*[5]. The land use surrounding the CELR alignment is primarily residential, which falls into FTA Land Use Category 2. Occupants of residential land use are generally more sensitive to noise which occurs at night, thus the noise exposure metric used is the Day Night Noise Level, Ldn[6]. Churches and schools are included in FTA Land Use Category 3, which uses the peak-hour equivalent noise level metric, Leq[7].

Figure 2.1 illustrates the noise level at which the Project Noise generates a noise impact, and this threshold is based on the existing noise level. Thus, for Land Use Category 2, an existing noise environment of 65 Ldn would experience a Moderate Impact with a Project noise level of 61 Ldn or greater. A Severe Impact would occur for this area with a Project noise level greater than 66 Ldn.

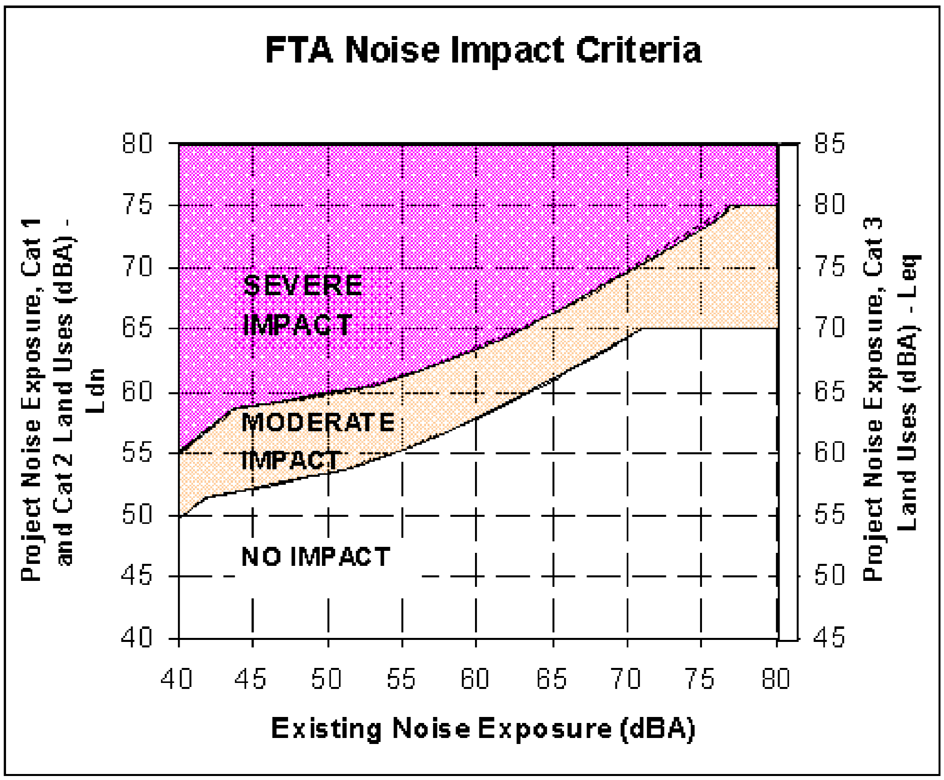

FIGURE 2.1 FTA NOISE CRITERIA FOR CATEGORY 1 AND 2 (LDN) AND CATEGORY 3 (LEQ) LAND USE

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[5] Capitol Expressway Corridor, *Environmental Impact Statement/Environmental Impact Report*, April 2005.

[6]Day Night Noise Level, Ldn, is the equivalent noise level calculated over a 24-hour period. Noise which occurs during the nighttime hours of 10 PM to 7 AM are weighted 10 dB to account for the increased noise sensitivity of residential use.

[7]Peak-Hour Equivalent Noise Level, Leq, is the equivalent noise level calculated over the peak noise hour, which often occurs during commute hours.

The total noise level (Project + Existing noise) is also known as the *cumulative*[8] noise level, derived from the logarithmic sum of the Project and Existing noise levels. In this example, a Project noise level of 65 Ldn would generate a noise impact, and the cumulative noise level would be 68 Ldn, representing an increase of 3 dBA over the existing noise environment. More detailed discussion of the FTA criteria is contained in the EIR.

To determine the existing noise environment, a noise survey was conducted for the EIR, and the existing noise levels documented in 2003 for the EIR and the corresponding FTA Criteria are summarized in column two of Table 2.1 below, with the addition of new data measured in July 2006 to augment the data collected for the EIR. Most of the sensitive land use falls under Land Use Category 2 (residential land use). In addition, there are some churches in the Project area which fall under the FTA Land Use Category 3. The criteria listed in Table 2.1 indicate the allowable *project* noise levels, based on the existing noise environment.

TABLE 2.1 SUMMARY OF FTA NOISE CRITERIA ALONG CAPITOL EXPRESSWAY ALIGNMENT - ALLOWABLE PROJECT NOISE LEVELS

Representative Receptor[1] and Area	Existing Noise Level, Ldn (Leq[2])	Project Noise Impact Criteria - Project Only	
		Land Use Category 2 (Ldn)	Land Use Category 3 (Leq)
N-SEIR Capitol at Highwood (No Existing Barrier)	67 (64)	Moderate: 63 to 67 Severe: >67	Moderate: 66 to 70 Severe: >70
N-1 Capitol Ave at Bambi Ln (No Existing Barrier)	72 (70)	Moderate: 66 to 71 Severe: >71	Moderate: 70 to 74 Severe: >74
N-2 Capitol Ave at Capitol Ct (No Existing Barrier)	73 (71)	Moderate: 66 to 71 Severe: >71	Moderate: 71 to 75 Severe: >75
N-3 Capitol Expwy at Greenstone Cir (With Existing Barrier)	67 (66)	Moderate: 63 to 67 Severe: >67	Moderate: 67 to 72 Severe: >72
N-4 Capitol Expwy at Supreme Dr (With Existing Barrier)	65 (64)	Moderate: 61 to 66 Severe: >66	Moderate: 66 to 70 Severe: >70

Note 1: Reference Technical Report for Noise Measurement Locations and Existing Noise Levels
Note 2: Peak Hour Leq

[8]This definition of cumulative does not include the addition of other noise sources from other approved projects or growth, which may be necessary for a CEQA analysis.

Table 2.2 presents the same criteria summarized in Table 2.1 with respect to the allowable cumulative noise level increase over the existing noise environment. From this table, the allowable *increase* in noise level (Project + Existing) can be ascertained for each representative noise environment. Note that for existing noise environments of Ldn 72 to 73, a noise increase of only 0.6 to 0.8 dBA would constitute a moderate noise impact.

TABLE 2.2 SUMMARY OF FTA NOISE CRITERIA ALONG CAPITOL EXPRESSWAY ALIGNMENT - ALLOWABLE CUMULATIVE NOISE INCREASE

Representative Receptor[1] and Area	Existing Noise Level, Ldn (Leq[2])	Project Noise Impact Criteria - Allowable Increase (Project + Existing)	
		Land Use Category 2 (Ldn)	Land Use Category 3 (Leq)
N-SEIR Capitol at Highwood (No Existing Barrier)	67 (64)	Moderate: 1.2 Severe: >3.2	Moderate: 3.6 Severe: >7.5
N-1 Capitol Ave at Bambi Ln (No Existing Barrier)	72 (70)	Moderate: 0.8 Severe: >2.5	Moderate: 2.7 Severe: >5.8
N-2 Capitol Ave at Capitol Ct (No Existing Barrier)	73 (71)	Moderate: 0.6 Severe: >2.4	Moderate: 2.6 Severe: >5.6
N-3 Capitol Expwy at Greenstone Cir (With Existing Barrier)	67 (66)	Moderate: 1.2 Severe: >3.2	Moderate: 3.3 Severe: >6.8
N-4 Capitol Expwy at Supreme Dr (With Existing Barrier)	65 (64)	Moderate: 1.4 Severe: >3.6	Moderate: 3.6 Severe: >7.5

Note 1: Reference Technical Report for Noise Measurement Locations and Existing Noise Levels
Note 2: Peak Hour Leq

2.2 Vibration Assessment Criteria

The vibration levels generated by rail transit systems are low in that they do not approach levels that can cause damage to contemporary structures. The FTA vibration criteria for train operations are used solely for assessing human annoyance to the vibration, not for assessing the potential for physical damage to the structures. The only environmental concern is potential annoyance to building occupants.

The vibration criteria for *general assessment* in the FTA Guidance Manual are given in terms of the overall vibration velocity level. This is a single-number measure of vibration that weights all frequencies equally. For Land Use Category 2 with “frequent events” (more than 70 trains per day) the applicable overall vibration criterion is 72 dB re: 1 inch/second (VdB). Institutional Land Use (Category 3) uses the same metric, with a criterion of 75 VdB, which can also be applied to offices.

The most recent version of the Guidance Manual (May 2006) also includes 1/3-octave band criteria for detailed analysis[9]. The FTA criterion curve for residences limits any 1/3-octave level between 8 Hz and 100 Hz to a maximum of 72 dB re: 1 µin/sec (nighttime) and 78 dB for daytime. These Detailed Analysis Criteria (DAC) curves are shown in Figure 2.2. Vibration that exceeds the DAC would be considered a significant impact.

Ambient vibration levels were measured in June 2006 to document the existing vibration near residences and structures along the CELR alignment during the course of conducting soil vibration propagation tests. The number and type of vehicles which contributed to these ambient vibration data is unknown. Table 2.3 summarizes the measurement locations and the range of maximum vibration levels measured. Figure 2.3 compares the vibration spectra with the FTA DAC criteria.

TABLE 2.3 SUMMARY OF EXISTING VIBRATION

	Maximum Existing Vibration (VdB)	
Area	**Frequently Occurring[1]**	**Occasional[2]**
Highwood Drive	54	59 - 64
Bambi Lane	55 - 57	62 - 68
Capitol Court	55	62 - 69
Woodmoor Drive	53 - 55	59 - 69

Note 1: Vibration level which occurred 10% of the time during the measurement period
Note 2: Vibration level which occurred up to 1% of the time during the measurement period

[9] This detailed analysis criteria is based on the ANSI Standard S2.71 (was 3.29): *Guide to the Evaluation of Human Exposure to Vibration in Buildings*

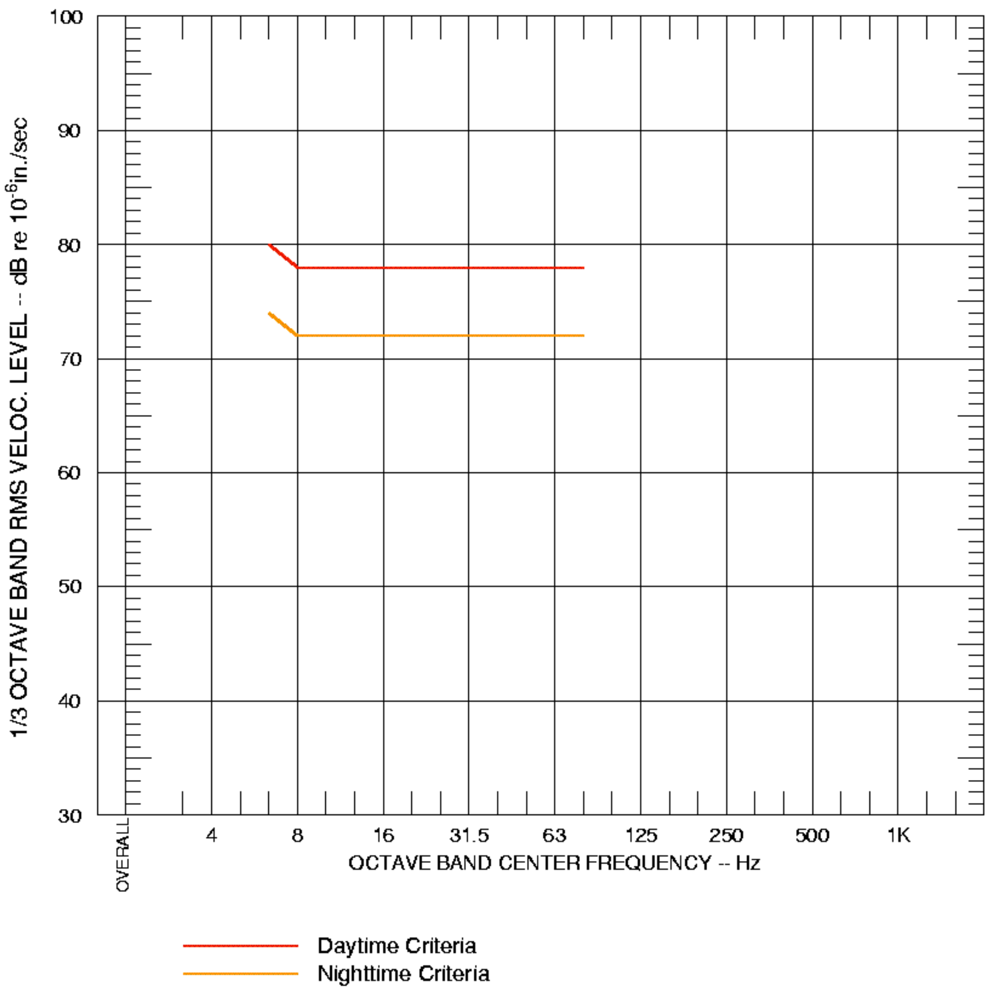

FIGURE 2.2 FTA 1/3-OCTAVE BAND DETAILED ANALYSIS CRITERIA FROM MAY 2006 GUIDANCE MANUAL

2.3 Construction Criteria

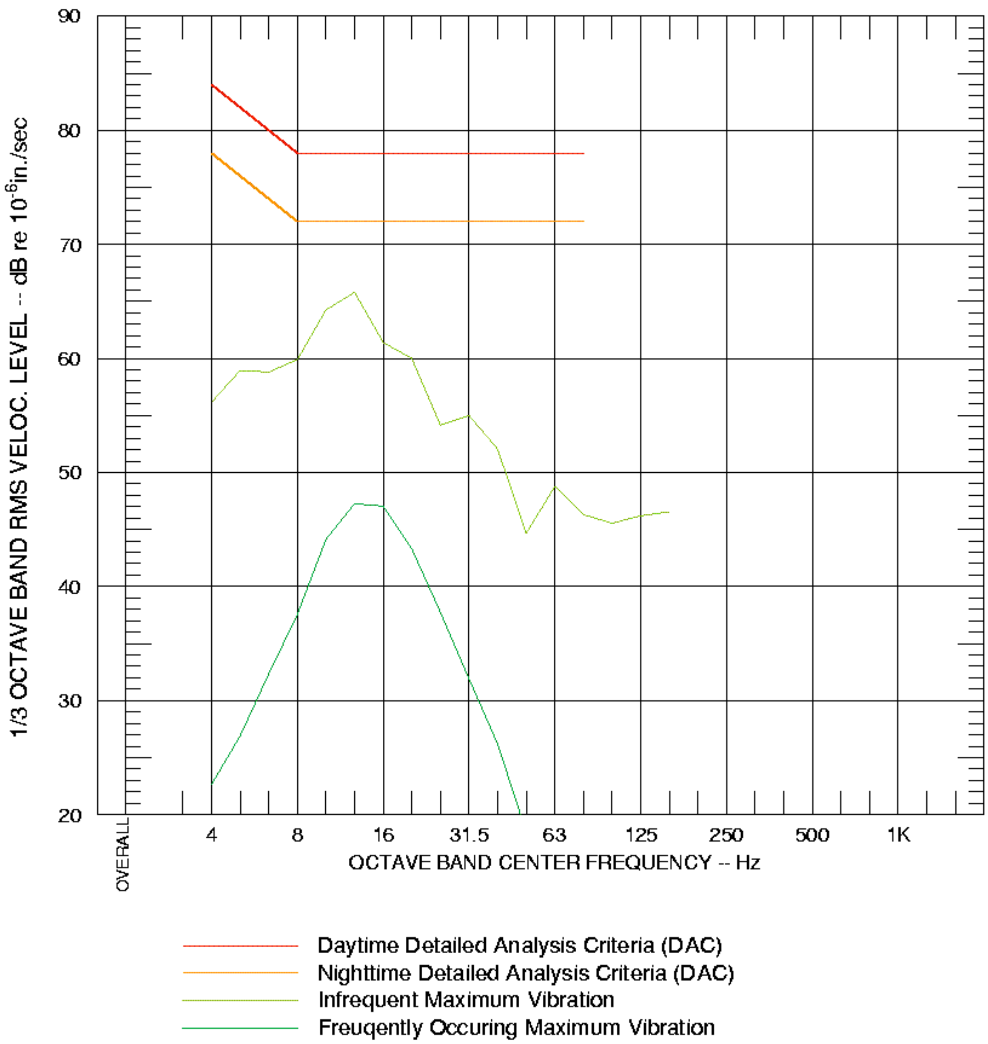

FIGURE 2.3 COMPARISON OF EXISTING VIBRATION WITH FTA DAC CRITERIA
MEASURED ON THE SIDEWALK OR PAVEMENT NEAR SETBACK
JUNE 2006

Construction Noise Criteria

The EIR uses the FTA Construction Noise Criteria to evaluate the potential for construction noise impact, which is shown below in Table 2.3. Adverse impacts may occur if noise and vibration is generated that substantially affects nearby sensitive receptors (e.g., residences, schools, hospitals)[10]. "Substantially" was not defined in the EIR phase. To develop a context for determining whether the construction activity "substantially" affects the community, we recommend that the duration of impact should be taken into account (in terms of days for noise and hours/day for vibration annoyance/work-interference), and whether the residents or commercial businesses could reasonably make accommodations for the duration of impact. The pile driving activity would not be stationary at one area, since the columns are spread out over a distance of 3,000 ft along the alignment. With proper advance notification, it is possible that many residents and businesses could plan their schedules to reduce the impact of the construction activities. However, a"temporary duration" of several days could present a hardship to nearby residents and businesses, since the logistics of getting out of the house or office could be difficult to manage. Thus, for evaluation of pile driving noise, we recommend that the number of days a receptor would be impacted should be considered when evaluating the level of construction noise impact.

Furthermore, we recommend that a maximum noise level be defined to limit the pile driving noise, irrespective of time duration. The maximum noise level should be measured with a sound level meter response setting as described below. The recommended maximum noise limits are also indicated in Table 2.3 below.

TABLE 2.3 RECOMMENDED CONSTRUCTION NOISE CRITERIA

Land Use	FTA Noise Limit, 8-hour L_{eq} (dBA)		Recommended Maximum Noise Level[1], L_{max}
	Daytime	Nighttime	
Residential	80	70	90 dBA (slow) or 125 dBC (fast)
Commercial	85	85	95 dBA (slow) or 125 dBC (fast)
Industrial	90	90	100 dBA (slow) or 125 dBC (fast)
Note 1: Applied at nearest affected building, during daytime hours, 8:00 A.M. to 5:00 P.M., Monday through Friday			

Source: FTA, 2006 and WIA recommended practice

[10] *Capitol Expressway Corridor - Final Environmental Impact Report*, April 2005

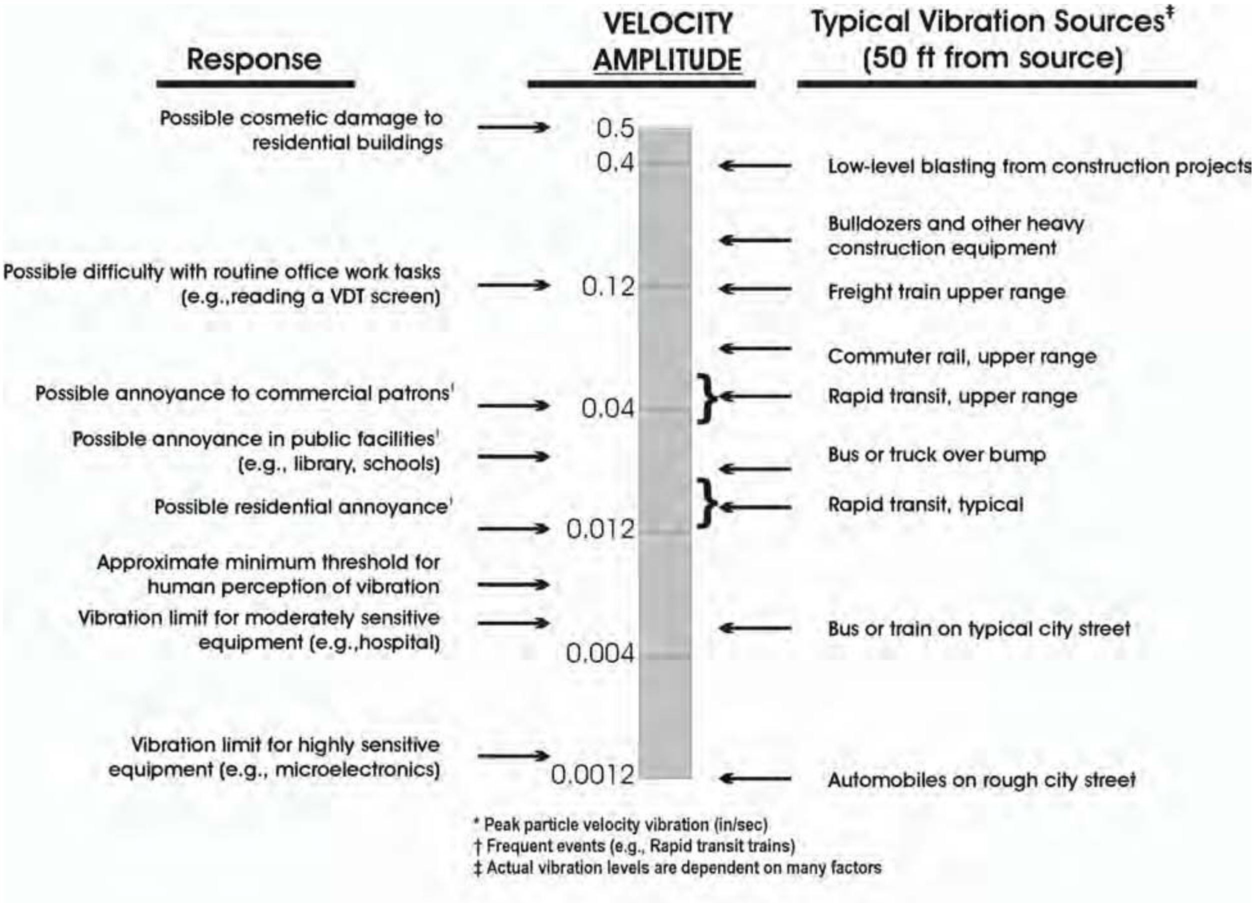

FIGURE 2.3 PEAK PARTICLE VIBRATION AMPLITUDES AND TYPICAL HUMAN RESPONSE

Construction Vibration Criteria

The FTA Construction Vibration guidelines are summarized in Table 2.4, and Figure 2.3 presents typical levels of groundborne vibration and the typical response to those values of vibration in units of inches/second peak particle velocity (PPV). People are often less familiar with the relation between the effects of groundborne vibration and the quantitative values of vibration, compared to noise. As shown in Figure 2.3, humans are sensitive to groundborne vibration at much lower levels than that which may cause structural damage or even cosmetic damage. This should be taken into consideration when notifying the public about the potential vibration from pile driving activities. Public outreach and education are key to acceptance by the Project neighbors, as long as permanent damage does not occur.

The FTA recommends that the general assessment criteria (GAC) be used to evaluate potential annoyance or interference with vibration-sensitive activities. Thus, for residential land use, the RMS criterion of 72 VdB would be approximately equivalent to 0.015 in/sec PPV, which is consistent with the data shown in Figure 2.3 for frequent or continuing vibration. Similarly, commercial patrons might be annoyed at vibration of 0.05 in/sec PPV, and vibration on the order of 0.15 in/sec PPV can interfere with working on a computer or reading a computer screen. As discussed previously for construction noise, we recommend that the number of days a receptor would be impacted should be considered when evaluating the level of construction vibration impact.

TABLE 2.4 FTA CONSTRUCTION VIBRATION CRITERIA
To Avoid Damage to Buildings During Pile Driving

Building Category	Peak Particle Velocity (in/sec)	Approx. Lv†
I. Reinforced-concrete, steel or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90
†RMS Velocity in decibels (VdB) re 1 micro-inch/second		

Source: FTA, 2006

3 NOISE PREDICTION METHODOLOGY AND ASSESSMENT

3.1 Methodology

The noise prediction methodology uses the reference sound equivalent level (SELref) as a building block for determining the total project noise level. The SELref is used to determine the equivalent noise level (Leq) for different operational conditions, and the hourly Leq are used to determine the Ldn. The model equations are:

Leq(hour) = SELref + CSpeed + CDistance + CTrains + Ccars + Constant

where

SELref	=	reference SEL at 50 mph and 50 ft distance for 1 car
CSpeed	=	speed correction, 20*log(Speed/50)
CDistance	=	distance correction, 10*log(Distance/50)
CTrains	=	correction for number of trains per hour, 10*log (trains per hour)
CCars	=	correction for number of cars per train, 10*log(cars per train)
Constant	=	dimensional constant to convert seconds to hours, -10*log(3600) = -35.56

Additional adjustments are made to provide for the effect of train warning horns at grade crossings, and adjustments are added to account for jointed track at crossovers (+5), embedded track at grade(+3), and aerial structure with slab track (+4).

The Ldn is the equivalent noise level over a 24-period, with noise occurring between 10:00 P.M. and 7:00 A.M. penalized by 10 dBA:

Ldn = 10*log [15*10(Leq(day)/10) + 9*10((Leq(night)+10)/10)]

This analysis has been made using the following operational and structural assumptions:

Operational Parameter	Value
Train Speed	55 mph, except 30 to 35 mph through stations, 35 mph near Ocala Station, and 4 mphps acceleration/deceleration
Headways (each direction)[11]	10 minutes (6:00 A.M. to 7:30 PM) 15 minute (7:30 PM to 11:30 PM) 30 minutes (11:30 PM to 1:30 A.M. and 4:30 A.M. to 6:00 A.M.)
Train consist[12]	Peak: 3 cars (6:00 A.M. to 9:00 A.M., 3:30 PM to 7:30 PM) Base: 1 car (9:00 A.M. to 3:30 PM) Owl: 1 car (4:30 A.M. to 6:00 A.M., 7:30 PM to 1:30 A.M.)
Trackwork	At-grade: ballasted track on concrete ties

[11] Information provided in the EIR indicated headways of 15 minutes during the hours of 6 AM to 7: 30 PM.

[12]Modified from information provided in the EIR, which originally indicated 2 car trains during peak hours.

At-grade: ballasted track with panels (grade crossings and stations)
Embankment: ballasted track on concrete ties
Aerial: direct fixation fasteners, no sound barrier assumed

3.2 Estimated Levels of Wayside Noise

In this section, we present the predicted noise exposure levels for the areas with noise sensitive receptors along the Capitol Corridor. The noise levels are summarized in Table 3.1, comparing the existing noise environment with the predicted future noise environment. The acoustical effect of existing sound walls along the alignment (e.g., masonry walls between residential backyards and Capitol Expressway) was incorporated into the calculations as indicated in Table 3.1. Review of Table 3.1 indicates that there are some homes which would be impacted by the Project, and potentially eight homes which would experience a Severe Impact. Noise control measures are recommended for these homes, as discussed in Section 4.

3.2.1 Aerial Structure

As shown in Table 3.1, there are potentially eight homes which would experience a severe increase over the existing noise environment from operations on the aerial structure or embankment, from Sta. 12+30 to 14+00 NB. The existing noise environment was documented in July 2006, and with an existing noise environment of 67 Ldn, an increase greater than 3.2 dBA would be considered a Severe Impact, as summarized in Table 2.2. Thus, noise control measures are indicated for these homes, as discussed below in Section 4.

There are several other homes which would experience a moderate increase over the existing noise environment from operations on the aerial structure or embankment. Except as described above, the noise increase at residential receptors would be less than 2.0 dBA, well below the Severe Impact threshold described in Table 2.2.

Twenty-seven homes near the southbound direction of the transition/aerial guideway would experience a noise increase of 0.9 to 1.4 dBA which would exceed the FTA Moderate Impact criteria. Twenty-four homes are located from Sta. 13+90 to 18+50 SB and three homes are located from Sta. 20+70 to 21+00 SB.

Six residential buildings near the northbound direction of the transition/aerial guideway would experience a noise increase of 1.0 to 1.2 dBA which would exceed the FTA Moderate Impact criteria. These homes are located near Sta. 20+20 to 22+20 NB.

3.2.2 At-grade Structure

As shown in Table 3.1 there are several homes (8) which would experience a moderate increase over the existing noise environment from operations on the at-grade structure.

Eight homes would experience a noise increase of 1.3 to 1.8 dBA which would exceed the FTA Moderate Impact criteria. Three homes are located near Sta .11+20 to 11+60 SB and three homes are located near Sta. 11+40 to 12+10 NB.

For two homes near the Ocala grade crossing (Sta. 32+00 to 32+30 NB), the noise increase of 2.1 to 2.3 dBA would exceed the FTA Moderate Impact threshold as the VTA trains sound their warning bells through the Ocala grade crossing.

TABLE 3.1 SUMMARY OF PREDICTED PROJECT NOISE LEVELS

Station Number	Location Street (ID)	Near Track	Track Type	Speed (mph) near	Speed (mph) far	Dist[1] (ft)	Noise Levels (dBA) Existing[2]	Noise Levels (dBA) Total Ldn	Noise Levels (dBA) Total Peak Hour Leq	Noise Levels (dBA) Exposure Increase[2]	Impact Level Moderate	Impact Level Severe	Comment
10+80	SFR on Lombard	SB	at	30	30	48	67	68.1		1.1	--	--	
10+80	SFR on Lombard	SB	at	30	30	103	67	67.6		0.6	--	--	
11+20	SFR on Lombard	SB	at	35	40	62	67	68.3		1.3	x	--	6
11+40	SFR on Capitol Ave	SB	at	45	45	71	67	68.6		1.6	x	--	6
11+60	SFR on Capitol Ave	SB	at	45	45	74	67	68.6		1.6	x	--	6
12+00	Co	SB	at	45	50	62	70		71.1	1.1	--	--	
12+40	Co	SB	ae	45	50	77	70		72.0	2.0	--	--	
13+90	SFR on Excalibur	SB	ae	55	55	174	72	72.9		0.9	x	--	6
14+10	SFR on Excalibur	SB	ae	55	55	174	72	72.9		0.9	x	--	6
14+30	SFR on Excalibur	SB	ae	55	55	176	72	72.9		0.9	x	--	6
14+60	SFR on Capitol Ave	SB	ae	55	55	115	72	73.3		1.3	x	--	6
14+75	SFR on Capitol Ave	SB	ae	55	55	121	72	73.2		1.2	x	--	6
14+90	SFR on Capitol Ave	SB	ae	55	55	121	72	73.2		1.2	x	--	6
15+60	SFR on Capitol Ave	SB	ae	55	55	121	72	73.2		1.2	x	--	6
16+00	SFR on Capitol Ave	SB	ae	55	55	138	72	73.1		1.1	x	--	6
16+20	SFR on Capitol Ave	SB	ae	55	55	135	72	73.1		1.1	x	--	6
16+30	SFR on Capitol Ave	SB	ae	55	55	144	72	73.1		1.1	x	--	6
16+50	SFR on Capitol Ave	SB	ae	55	55	138	72	73.1		1.1	x	--	6
16+60	SFR on Capitol Ave	SB	ae	55	55	138	72	73.1		1.1	x	--	6
16+80	SFR on Capitol Ave	SB	ae	55	55	144	72	73.1		1.1	x	--	6
16+90	SFR on Capitol Ave	SB	ae	55	55	138	72	73.1		1.1	x	--	6
17+10	SFR on Capitol Ave	SB	ae	55	55	146	72	73.1		1.1	x	--	6
17+20	SFR on Capitol Ave	SB	ae	55	55	139	72	73.1		1.1	x	--	6
17+40	SFR on Capitol Ave	SB	ae	55	55	138	72	73.1		1.1	x	--	6
17+50	SFR on Capitol Ave	SB	ae	55	55	148	72	73.1		1.1	x	--	6
17+70	SFR on Capitol Ave	SB	ae	55	55	135	72	73.1		1.1	x	--	6
17+90	SFR on Capitol Ave	SB	ae	55	55	131	72	73.2		1.2	x	--	6
18+00	SFR on Capitol Ave	SB	ae	55	55	125	72	73.2		1.2	x	--	6
18+20	SFR on Capitol Ave	SB	ae	55	55	128	72	73.2		1.2	x	--	6
18+40	SFR on Capitol Ave	SB	ae	55	55	128	72	73.2		1.2	x	--	6
18+50	SFR on Capitol Ave	SB	ae	55	55	113	72	73.3		1.3	x	--	6
18+70	commercial (take)	SB	ae	55	55	108	NA		NA	NA	--	--	
19+00	commercial capitol/story	SB	ae	55	55	102	70		72.0	2.0	--	--	
19+70	commercial capitol/story	SB	ae	55	55	115	70		71.8	1.8	--	--	
20+60	commercial capitol/story	SB	ae	55	55	95	70		72.1	2.1	--	--	
20+70	SFR on Brentford	SB	ae	55	55	102	72	73.4		1.4	x	--	6
20+90	SFR on Brentford	SB	ae	55	55	102	72	73.4		1.4	x	--	6
21+00	SFR on Brentford	SB	ae	55	55	108	72	73.4		1.4	x	--	6
21+20	SFR on Brentford	SB	at	55	55	80	72	72.8		0.8	--	--	
21+30	SFR on Brentford	SB	at	55	55	82	72	72.8		0.8	--	--	
21+60	SFR on Brentford	SB	at	55	55	85	72	72.7		0.7	--	--	
21+70	SFR on Brentford	SB	at	55	55	77	72	72.8		0.8	--	--	
21+90	SFR on Brentford	SB	at	55	55	82	72	72.8		0.8	--	--	
22+00	SFR on Brentford	SB	at	55	55	95	72	72.7		0.7	--	--	
22+20	SFR on Brentford	SB	at	55	55	97	72	72.7		0.7	--	--	
22+40	SFR on Brentford	SB	at	55	55	84	72	72.7		0.7	--	--	
22+60	SFR on Brentford	SB	at	55	55	97	72	72.7		0.7	--	--	
22+70	SFR on Brentford	SB	at	55	55	75	72	72.8		0.8	--	--	
22+90	SFR on Brentford	SB	at	55	55	84	72	72.7		0.7	--	--	
23+00	SFR on Brentford	SB	at	55	55	125	72	72.5		0.5	--	--	
23+30	commercial capital/foxdale	SB	at	55	55	130	70		70.7	0.7	--	--	
24+20	MFR onFoxdale	SB	at	55	55	128	67	67.5		0.5	--	--	5
24+90	MFR onFoxdale	SB	at	55	55	128	67	67.5		0.5	--	--	5
25+90	MFR onFoxdale	SB	at	55	55	128	67	67.5		0.5	--	--	5
27+10	sfr on greenstone	SB	at	55	55	136	67	67.5		0.5	--	--	5
27+20	sfr on greenstone	SB	at	55	55	75	67	67.8		0.8	--	--	5
27+40	sfr on greenstone	SB	at	55	55	80	67	67.8		0.8	--	--	5
27+60	sfr on greenstone	SB	at	55	55	110	67	67.6		0.6	--	--	5
28+00	SFR on whitestone	SB	at	55	55	98	67	67.6		0.6	--	--	5
28+20	SFR on whitestone	SB	at	55	55	64	67	67.9		0.9	--	--	5
28+40	SFR on whitestone	SB	at	55	55	105	67	67.6		0.6	--	--	5
28+90	SFR on bluestone	SB	at	55	55	82	67	67.8		0.8	--	--	5
29+10	SFR on bluestone	SB	at	55	55	79	67	67.8		0.8	--	--	5
29+20	SFR on bluestone	SB	at	55	55	125	67	67.5		0.5	--	--	5
29+70	SFR on brownstone	SB	at	55	55	89	67	67.7		0.7	--	--	5
29+90	SFR on brownstone	SB	at	50	50	69	67	67.7		0.7	--	--	5
30+00	SFR on brownstone	SB	at	50	50	115	67	67.5		0.5	--	--	5
30+40	SFR on pinkstone	SB	at	45	50	87	67	67.5		0.5	--	--	5
30+70	SFR on pinkstone	SB	at	45	45	80	67	67.5		0.5	--	--	5
30+80	SFR on pinkstone	SB	at	45	45	85	67	67.5		0.5	--	--	5
31+30	SFR on silverstone	SB	at	40	40	92	67	67.4		0.4	--	--	5
31+50	SFR on silverstone	SB	at	35	35	87	67	67.3		0.3	--	--	5
31+70	SFR on silverstone	SB	at	35	35	120	67	67.2		0.2	--	--	5

TABLE 3.1 SUMMARY OF PREDICTED PROJECT NOISE LEVELS

Station Number	Location Street (ID)	Near Track	Track Type	Speed (mph) near	Speed (mph) far	Dist[1] (ft)	Noise Levels (dBA) Existing[2]	Total Ldn	Total Peak Hour Leq	Exposure Increase[2]	Impact Level Moderate	Severe[3]	Comment
10+40	SFR on Capitol/Wilbur	NB	at	30	30	69	67	67.8		0.8	--	--	
10+60	SFR on Capitol	NB	at	30	30	77	67	67.8		0.8	--	--	
10+80	SFR on Capitol	NB	at	30	30	79	67	67.7		0.7	--	--	
11+00	SFR on Capitol	NB	at	35	30	80	67	67.9		0.9	--	--	
11+20	SFR on Capitol	NB	at	40	35	77	67	68.1		1.1	--	--	
11+40	SFR on Capitol/Westboro	NB	at	40	45	66	67	68.6		1.6	x	--	6
11+80	SFR on Capitol/Westboro	NB	at	45	45	64	67	68.8		1.8	x	--	6
12+10	SFR on Capitol	NB	at	50	45	75	67	68.7		1.7	x	--	6
12+30	SFR on Capitol	NB	ae	50	45	79	67	70.4		3.4	x	x	**3**
12+50	SFR on Capitol	NB	ae	55	45	82	67	70.6		3.6	x	x	**3**
12+60	SFR on Capitol	NB	ae	55	45	82	67	70.6		3.6	x	x	**3**
12+80	SFR on Capitol/Highwood	NB	ae	55	45	66	67	71.1		4.1	x	x	**3**
13+40	SFR on Capitol/Highwood	NB	ae	55	55	64	67	71.6		4.6	x	x	**3**
13+60	SFR on Capitol	NB	ae	55	55	72	67	71.3		4.3	x	x	**3**
13+80	SFR on Capitol	NB	ae	55	55	75	67	71.2		4.2	x	x	**3**
13+90	SFR on Capitol	NB	ae	55	55	33	67	73.5		6.5	x	x	**3**
16+60	office	NB	ae	55	55	148	71		72.2	1.2	--	--	
17+30	church	NB	ae	55	55	138	71		72.3	1.3	--	--	
18+00	church/slab	NB	ae	55	55	148	71		72.2	1.2	--	--	
18+60	CO	NB	ae	55	55	135	71		72.3	1.3	--	--	
18+80	Co	NB	ae	55	55	171	71		72.0	1.0	--	--	
19+40	co	NB	ae	55	55	138	71		72.3	1.3	--	--	
19+80	co	NB	ae	55	55	138	71		72.3	1.3	--	--	
20+20	MFR 2719 Kollmar	NB	ae	55	55	103	73	74.2		1.2	x	--	6
20+80	SFR on S. Capitol/Sussex	NB	ae	55	55	125	73	74.0		1.0	x	--	6
21+20	SFR on S. Capitol/Sussex	NB	ae	55	55	118	73	74.0		1.0	x	--	6
21+50	SFR on S. Capitol/Tudor	NB	ae	55	55	115	73	74.1		1.1	x	--	6
21+90	SFR on S. Capitol/Tudor	NB	ae	55	55	118	73	74.0		1.0	x	--	6
22+20	SFR on S. Capitol/Capitol ct	NB	ae	55	55	120	73	74.0		1.0	x	--	6
22+60	SFR on S. Capitol/Capitol ct	NB	at	55	55	118	73	73.4		0.4	--	--	
22+90	SFR on S. Capitol/murtha	NB	at	55	55	118	73	73.4		0.4	--	--	
23+40	SFR on S. Capitol/murtha	NB	at	55	55	118	73	73.4		0.4	--	--	
23+70	SFR on S. Capitol/Bristol	NB	at	55	55	118	73	73.4		0.4	--	--	
24+20	SFR on S. Capitol/Bristol	NB	at	55	55	118	73	73.4		0.4	--	--	
24+50	SFR on S. Capitol/dublin	NB	at	55	55	118	73	73.4		0.4	--	--	
24+90	SFR on S. Capitol/dublin	NB	at	55	55	118	73	73.4		0.4	--	--	
25+10	SFR on S. Capitol/belfast	NB	at	55	55	118	73	73.4		0.4	--	--	
25+60	SFR on S. Capitol/belfast	NB	at	55	55	118	73	73.4		0.4	--	--	
25+80	SFR on S. Capitol/coventry	NB	at	55	55	118	73	73.4		0.4	--	--	
26+40	SFR on S. Capitol/coventry	NB	at	55	55	128	73	73.4		0.4	--	--	
26+70	SFR on S. Capitol/cornwall	NB	at	55	55	125	73	73.4		0.4	--	--	
27+20	SFR on S. Capitol/cornwall	NB	at	55	55	118	73	73.4		0.4	--	--	
27+60	SFR on S. Capitol	NB	at	55	55	141	73	73.4		0.4	--	--	
27+70	SFR on S. Capitol	NB	at	55	55	146	73	73.4		0.4	--	--	
27+90	SFR on S. Capitol	NB	at	55	55	143	73	73.4		0.4	--	--	
28+10	SFR on S. Capitol	NB	at	55	55	146	73	73.4		0.4	--	--	
28+30	SFR on S. Capitol/woodmoor	NB	at	55	55	138	73	73.4		0.4	--	--	
28+60	SFR on S. Capitol/woodmoor	NB	at	55	55	144	73	73.4		0.4	--	--	
28+90	SFR on S. Capitol	NB	at	55	55	138	73	73.4		0.4	--	--	
29+00	SFR on S. Capitol	NB	at	55	55	141	73	73.4		0.4	--	--	
29+30	SFR on S. Capitol	NB	at	55	55	138	73	73.4		0.4	--	--	
29+50	SFR on S. Capitol	NB	at	55	55	144	73	73.4		0.4	--	--	
29+60	SFR on S. Capitol	NB	at	55	55	138	73	73.4		0.4	--	--	
29+80	SFR on S. Capitol	NB	at	50	50	136	73	73.3		0.3	--	--	
30+00	SFR on S. Capitol	NB	at	50	50	136	73	73.3		0.3	--	--	
30+20	SFR on S. Capitol	NB	at	50	50	136	73	73.3		0.3	--	--	
30+30	SFR on S. Capitol	NB	at	50	50	135	73	73.3		0.3	--	--	
30+50	SFR on S. Capitol	NB	at	45	45	135	73	73.3		0.3	--	--	
30+70	SFR on S. Capitol	NB	at	45	45	138	73	73.3		0.3	--	--	
31+10	SFR Evermont	NB	at	40	40	138	73	73.2		0.2	--	--	
31+30	SFR Evermont	NB	at	40	40	82	65	66.8		0.6	--	--	5
31+50	SFR Evermont	NB	at	35	35	82	65	66.4		0.5	--	--	5
32+00	SFR Evermont	NB	at	30	30	105	65	67.3		2.3	x	--	4,5,6
32+20	SFR on Home Gate	NB	at	30	30	89	65	67.1		2.1	x	--	4,5,6
32+30	SFR on Home Gate	NB	at	30	30	85	65	65.4		0.4	--	--	5
32+40	SFR on Home Gate	NB	at	30	30	89	65	65.3		0.3	--	--	5
32+50	SFR on Home Gate	NB	at	30	30	115	65	65.3		0.3	--	--	5
32+60	SFR on Home Gate	NB	at	30	30	105	65	65.3		0.3	--	--	5
32+70	SFR on Home Gate	NB	at	30	30	95	65	65.3		0.3	--	--	5
32+80	SFR on Home Gate	NB	at	30	30	103	65	65.3		0.3	--	--	5
32+90	SFR on Home Gate	NB	at	30	30	103	65	65.3		0.3	--	--	5

TABLE 3.1 SUMMARY OF PREDICTED PROJECT NOISE LEVELS

Station Number	Location Street (ID)	Near Track	Track Type	Speed (mph) near	Speed (mph) far	Dist[1] (ft)	Noise Levels (dBA) Existing[2]	Total Ldn	Total Peak Hour Leq	Exposure Increase[2]	Impact Level Moderate	Severe[3]	Comment
33+00	SFR on Home Gate	NB	at	30	30	103	65	65.3		0.3	--	--	5
33+10	SFR on Home Gate	NB	at	30	30	100	65	65.3		0.3	--	--	5
33+20	SFR on Home Gate	NB	at	30	30	98	65	65.3		0.3	--	--	5
33+30	SFR on Home Gate	NB	at	30	30	92	65	65.3		0.3	--	--	5
33+40	SFR on Home Gate	NB	at	30	30	92	65	65.3		0.3	--	--	5
33+50	SFR on Home Gate	NB	at	30	30	108	65	65.3		0.3	--	--	5
33+60	SFR on Home Gate	NB	at	30	30	125	65	65.3		0.3	--	--	5
33+70	SFR on Home Gate	NB	at	30	30	141	65	65.2		0.2	--	--	5
33+80	SFR on Home Gate	NB	at	30	30	141	65	65.2		0.2	--	--	5
33+90	SFR on Home Gate	NB	at	30	30	144	65	65.2		0.2	--	--	5
34+20	SFR on Supreme Dr	NB	at	30	30	157	65	65.2		0.2	--	--	5
34+60	SFR on Supreme Dr	NB	at	30	30	135	65	65.2		0.2	--	--	5
34+80	SFR on Supreme Dr	NB	at	30	30	157	65	65.2		0.2	--	--	5
35+00	SFR on Supreme Dr	NB	at	30	30	151	65	65.2		0.2	--	--	5
35+20	SFR on Supreme Dr	NB	at	30	30	131	65	65.2		0.2	--	--	5
35+40	SFR on Supreme Dr	NB	at	30	30	115	65	65.3		0.3	--	--	5
35+50	SFR on Supreme Dr	NB	at	30	30	118	65	65.3		0.3	--	--	5
35+70	SFR on Supreme Dr	NB	at	30	30	105	65	65.3		0.3	--	--	5
35+80	SFR on Supreme Dr	NB	at	30	30	112	65	65.3		0.3	--	--	5

Notes:

at= At-Grade, ae= Aerial or Embankment
1: Distance to near track; far track generally an additional 15 ft further
2: Noise Exposure Metric for non-residential areas is L_{eq}, rather than L_{dn}
3: Noise Exposure Increase exceeds the "Severe Impact" Threshold
4: Grade Crossing
5: Noise Reduction from Existing Sound Wall Included in Calculations
6: Noise Exposure Increase exceeds the "Moderate Impact" Threshold

4 NOISE CONTROL MEASURES

Severe Noise Impact

The analysis indicates that a noise increase resulting in a Severe Impact would be generated for homes along the NB section of the aerial or embankment structure, between Sta. 12+30 and 14+00 NB. A sound wall on the transition structure and on the aerial structure should provide the noise reduction required to reduce the noise below the FTA impact thresholds. The top of the sound barrier should be at least 2.7 ft above the top of rail, with no gaps at the bottom between the embankment or between the aerial structure and the sound barrier. The barrier should extend from Sta. 12+05 to 14+30 NB.

The sound barrier could reflect the train noise to the opposite side (along the SB side), but typically the moving train would block the reflected sound. However, we recommend that an option be included in the design to use acoustically absorptive materials on the trackside of the barrier, either in the selection of the barrier (e.g., acoustically absorptive cementitious finish), or as an add-on treatment for later installation. Other measures which can reduce operation noise include: reducing train speed, reduced train schedule, shorter train consists. These are also discussed below in Section 6 with regard to the potential for vibration control.

The sound barrier should have a minimum surface density of 3 lb/sq ft. Suitable materials include precast concrete, stucco on lath and cementitious wall board. Translucent and transparent materials such as acrylic or glass can also be used in combination, as long as the surface density requirement is met. The sound barrier should not have vertical or horizontal gaps, since they will contribute to a degradation of the noise reduction performance.

Moderate Noise Impacts

The analysis indicates that a moderate noise increase would be generated for some homes along the SB side of the alignment (30), and some homes on the NB side of the alignment (11). Sound barriers could be used to reduce the noise below the FTA impact thresholds. The only area where this would not work is the Ocala grade crossing, where construction a median sound barrier would not be feasible.

Transition/Aerial Guideway Sound Barrier

To reduce the Moderate Impact at twenty-five homes near the southbound direction of the transition/aerial guideway a sound barrier could be constructed from Sta. 13+70 to 18+95 SB with a nominal height of 2.1 ft above the top of rail. To reduce the Moderate Impact at three homes further south, the aerial structure sound barrier could be constructed from Sta. 20+05 to 21+90 SB, with a nominal height of 3.2 ft above the top of rail.

To reduce the moderate noise impact at six residential buildings near the northbound direction of the transition/aerial guideway a sound barrier could be constructed from Sta. 19+50 to 21+10 NB with a nominal height of 3.9 ft above top of rail for the apartment building and from Sta. 21+10 to 22+80 NB with a height of 3.2 ft above top of rail for the single family residences.

It is possible to raise the aerial structure guideway curb height slightly to reduce the incremental sound barrier height and the resulting visual impact. However, the extent to which the curb can be raised should be explored by the structural engineer.

At-Grade Median Sound Barrier

To reduce the moderate noise impact below the FTA threshold, an at-grade median sound barrier of 3.5 ft height above top of rail could be constructed from Sta .11+00 to 12+10 SB for three homes and from Sta. 11+15 to 12+50 NB for another three homes on the other side of the alignment (this sound barrier should be coordinated with the aerial structure sound barrier required to reduce the Severe Impact).

It would not be feasible to construct a sound barrier to reduce the moderate noise impact for two homes near the Ocala grade crossing (Sta. 32+00 to 32+30 NB). Augmenting the intersection with visual warning methods could be considered to reduce the warning horn and bell soundings. Alternately building insulation could be considered to reduce the noise within the residences.

5 VIBRATION PREDICTION METHODOLOGY AND ASSESSMENT

5.1 Methodology

The vibration prediction methodology breaks the generation/transmission path into three independent pieces to characterize the train, the soil, and the building. The equation for the model is:

$$\mathbf{Lv} = \mathbf{FDL + LSR + BVR}$$

where

Lv = calculated, interior vibration level, dB re: 1 in/sec

FDL = empirically derived force density level for the train, dB re: 1 lb/ft^{½} (function of vehicle design, wheel condition, speed, track condition)

LSR = empirically determined soil line source response, dB re: 1 inch ft½/second lb (accounts for soil properties and distance from track)

BVR = generic by building type, measurement-based building vibration response, dB (relative correction, accounts for combined coupling loss between soil and foundation, and resonant amplification of floor motion)

Force Density Level. The force density level of a given transit vehicle and track system is independent of the local soil conditions, but a force density level can change over time if the system's wheels and rails are not well maintained. Specifically, wheel flats and corrugated rails can cause an increase in wayside vibration levels.

The force density level for VTA's KinkiSharyo vehicle trains was empirically derived near Ellis Street during work that WIA conducted for another project. The FDL spectrum is similar to that of the UTDC vehicle, except for a peak which appears in the 8 to 12.5 Hz 1/3-octave bands at certain train speeds (most dramatically above 30 mph). This behavior does not appear to be limited to the Ellis Street area, because these same low frequency peaks have been measured along the Vasona corridor for the TDA measurements in 2005 and 2006. The force density level at 55 mph on ballasted track used for the current analysis is shown in Figure 5.1.

The adjustment for the aerial structure was obtained from studies of the VTA system along the Tasman East alignment (see the Appendix). Figure 5.1 also shows the FDL transmitted into the ground at each column, *derived* for trains on the aerial structure.

The adjustment for the embankment structure was derived from measurements on the Vasona Corridor in 2005. Those data indicate a speed and distance dependent difference between B&T track on embankment and at-grade approaching the Hamilton Avenue overcrossing. See the Appendix for more discussion. Figure 5.1 shows the FDL *derived* for trains on the transition embankment structure.

As noted above, our measurements of the VTA Kinkisharyo vehicles indicate a substantial low frequency response for speeds around 30 mph and higher. This could be due to long-wave perturbations on the rail which are difficult to remove with standard rail grinding machinery. With this vehicle operating in soil conditions which have a substantial low frequency response, the resulting ground vibration would be higher than areas with less of a low frequency response. Figure 5.2 compares the FDL for the Kinkisharyo vehicles at different speeds, and also compares these data with FDL used for the previous VTA UTDC vehicle.

Line Source Response. The line source response for a given area of the planned alignment is determined empirically by impacting the ground with an instrumented hammer and measuring the resulting vibration at several distances from the impact point. Analysis of these measurement data yields the point source transfer mobility function, which is numerically integrated over the length of the transit vehicle to obtain the line source transfer mobility. We have used the LSR curves derived from new measurements conducted in June 2006 (see Appendix). This additional work generally confirms the results obtained during the EIR work at location V1 (Ryan Elementary School). The data from location V1 indicates that the vibration at mid to high frequencies does not attenuate much at close-in distances. This has been confirmed by recent vibration measurement data, discussed in detail in the Appendix.

The test source data were numerically integrated using custom WIA software over the length of a three-car train (270 ft, 82 m) and a one-car train (90 ft, 27.4 m).

Figure 5.3 shows the line source responses for three-car trains at 100 ft used for the areas analyzed, including the data obtained for the EIR. The values, shapes of the spectra, and spread among the various areas are typical for the types of soil deposits that cover the floor of Santa Clara Valley. The data clearly convey that some geologic structures transmit vibration more readily than others, which is one reason that vibration propagation tests at several locations are necessary for the analysis and vibration control design of rail transit systems. While Figure 5.3 shows the line source response at 100 ft, the analysis utilizes the response at each building along the alignment, using the distance of each building from the track. More details are contained in the Appendix.

Also included in the Appendix is a comparison of the LSR data obtained for the CELR and the Vasona projects.

Building Vibration Response. When propagating vibration encounters a building foundation, some of the vibrational energy is transmitted to the foundation while the rest is reflected and refracted. However, because building materials are flexible, building floors react dynamically when the foundation is vibrated. Vibration of the floor can be different than that of the outdoor ground surface vibration, and there can be a high level of variability in the building response of different buildings, due to the differences in design and construction for each building.

For homes on raised foundations, vibration at the center of the floor is higher than near the edges. Most of the older homes are constructed on raised foundations, while newer homes are generally constructed as slab-on-grade, so that the response of the first floor is the same as that of the concrete slab; in turn, the concrete slab response is similar to that of the underlying soil. Shown in Figure 5.4 are the BVR used for slab-on-grade homes, raised foundation homes, and mobile homes, the latter two are derived from measurement data conducted during design of previous transit projects in the Bay Area. Since several homes also have a 2nd floor level, Figure 5.4 also illustrates the building vibration response of the 2nd floor (slab-on-grade), obtained during engineering design studies for previous transit projects.

These data were obtained by impacting the ground in front of each building and comparing the ground vibration measured near the house with the vibration measured inside the house. These building response data are considered to be independent of the soil, and thus can be meaningfully applied to the evaluation of homes with similar construction. With the new FTA Detailed Analysis Criteria, project-specific information would be useful to document potential local behaviors of buildings, and we recommend that additional tests which combine the LSR and the BVR be conducted during Final Engineering Design.

Design Factor. As with any predictive methodology, the results of the vibration prediction model have some degree of uncertainty associated with them. We have included a "design factor" in these calculations, which accounts for uncertainty in the local soil conditions, variability between trains and variability of the building response within a class of buildings. The design factor ranges from 1 to 7 dB and is a function of frequency. DF1 was used in areas where the soil vibration propagation test data is less certain, and DF2 was used in areas where the vibration data are more certain. Information on where the design factors were applied is indicated in Appendix G.

Table 5.1 Engineering Design Factors Used for CELR Vibration Analysis (VdB)

	1/3 Octave Band Center Frequency														
	6.3	**8**	**10**	**12.5**	**16**	**20**	**25**	**31.5**	**40**	**50**	**63**	**80**	**100**	**125**	**160**
DF1	0.7	0.7	0.6	0.5	1.9	1.7	2.5	3.9	3	4.4	4.6	6.2	7.2	6.2	5.2
DF2	0	0	0	.5	.5	1	1	1	1.5	1.5	1.5	2	2	2	2

Operational assumptions for the vibration analysis are the same as those discussed in Section 3.1 for the noise analysis.

5.2 Estimated Levels of Groundborne Vibration

In this section, we present the predicted vibration for those areas with vibration sensitive receptors along the Capitol Expressway Corridor. The vibration levels for 3-car trains are summarized in Table 5.2 and evaluated against the daytime and nighttime criteria. The nighttime criterion is the most restrictive condition, since peak hour operations would typically start at 6 AM[13]. This analysis indicates that there are many residences which would experience overall vibration levels exceeding 72 VdB, but only 26 homes which would exceed the FTA DAC. Most of these impacts would be reduced with the use of Tire Derived Aggregrate (TDA) in the ballasted track areas. More information on TDA is provided in Section 6. The vibration from 1-car trains would be at least 2 to 3 dB lower than the 3-car train, depending on the local soil conditions; 2-car trains would be typically 1 to 2 dB lower than vibration for a 3-car train. Since 1-car trains would be operated for

[13]Daytime hours are 7 AM to 10 PM, and nighttime hours are 10 PM to 7 AM (FTA)

the other nighttime hours, no "residual" impacts would occur for the other nighttime hours. Review of the information in Table 5.2 indicates that no residual impacts would occur during the daytime, with the vibration control measures applied as required for nighttime vibration impacts.

The areas, which require vibration control are indicated in the plan drawings, shown in the Appendix. For areas where the vibration level exceeds the FTA DAC curves of 72 dB or 78 dB, we have also presented some of the detailed predictions illustrating the 1/3-octave band spectrum levels, with the overall vibration level indicated on the left side of the figures, as discussed below.

5.2.1 Aerial Structure

As shown in Table 5.2, there are potentially four homes on the NB side of the alignment which would experience vibration exceeding the FTA General Assessment Criteria of 72 VdB; however only one home (Sta. 13+90 NB) would experience vibration exceeding the FTA DAC for nighttime and daytime, as shown in Figure 5.5. Thus, vibration control is indicated for this one home to address nighttime and daytime vibration impacts.

5.2.2 Ballasted Track Structures

As shown in Table 5.2, there are potentially 92 homes which would experience vibration exceeding the FTA General Assessment Criteria of 72 VdB; however, only 25 of these homes would experience vibration exceeding the FTA DAC. Selected samples of the predicted vibration at these homes are shown in Figures 5.6 and 5.7 and compared with the nighttime and daytime DAC. Vibration control is required for 25 homes (Sta. 11+20 to 11+60, Sta. 21+20 to 22+90 and 27+20 to 30+80 SB, Sta. 11+20 to 12+10 NB) to address nighttime vibration impacts.

5.2.3 VTA Vibration and Existing Vibration Environment

As noted previously in Section 2, the measured existing vibration at homes adjacent to the alignment ranges from 54 to 69 VdB, however the distribution of vehicles during those measurements is unknown. From observation, the primary source of this existing vibration is automotive and truck traffic on Capitol Expressway and local streets. Thus, in some areas the vibration caused by the VTA CELR operations would be comparable to the vibration caused every day by passing trucks and automobiles. However, in comparing the existing vibration to the predicted vibration at the vibration impacted areas, the expected VTA vibration would be greater than the existing; the vibration from a VTA train passby would be somewhat higher than a very heavy truck passing over a bump on the road at high speed.

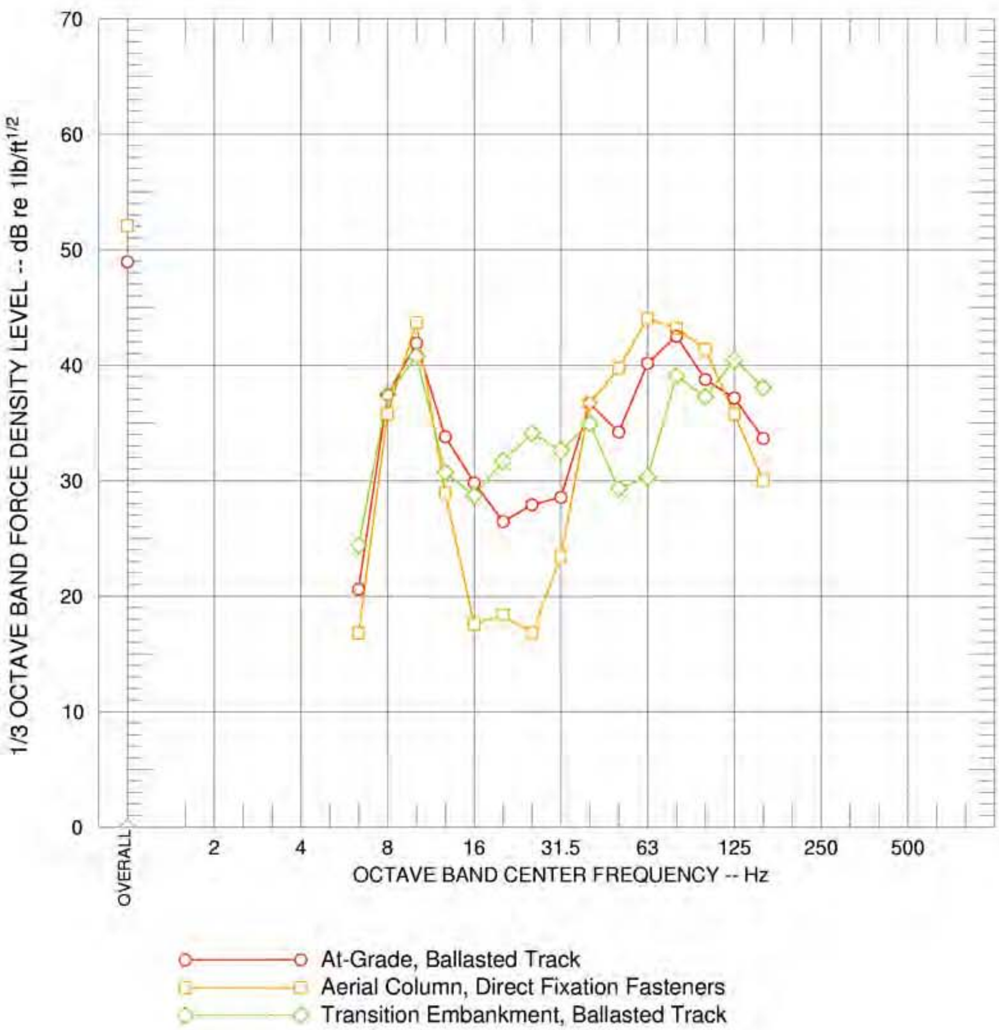

FIGURE 5.1 FORCE DENSITY LEVELS (FDL)
FORCE TRANSMITTED INTO THE GROUND
VTA KINKISHARYO TRAINS AT 55 MPH

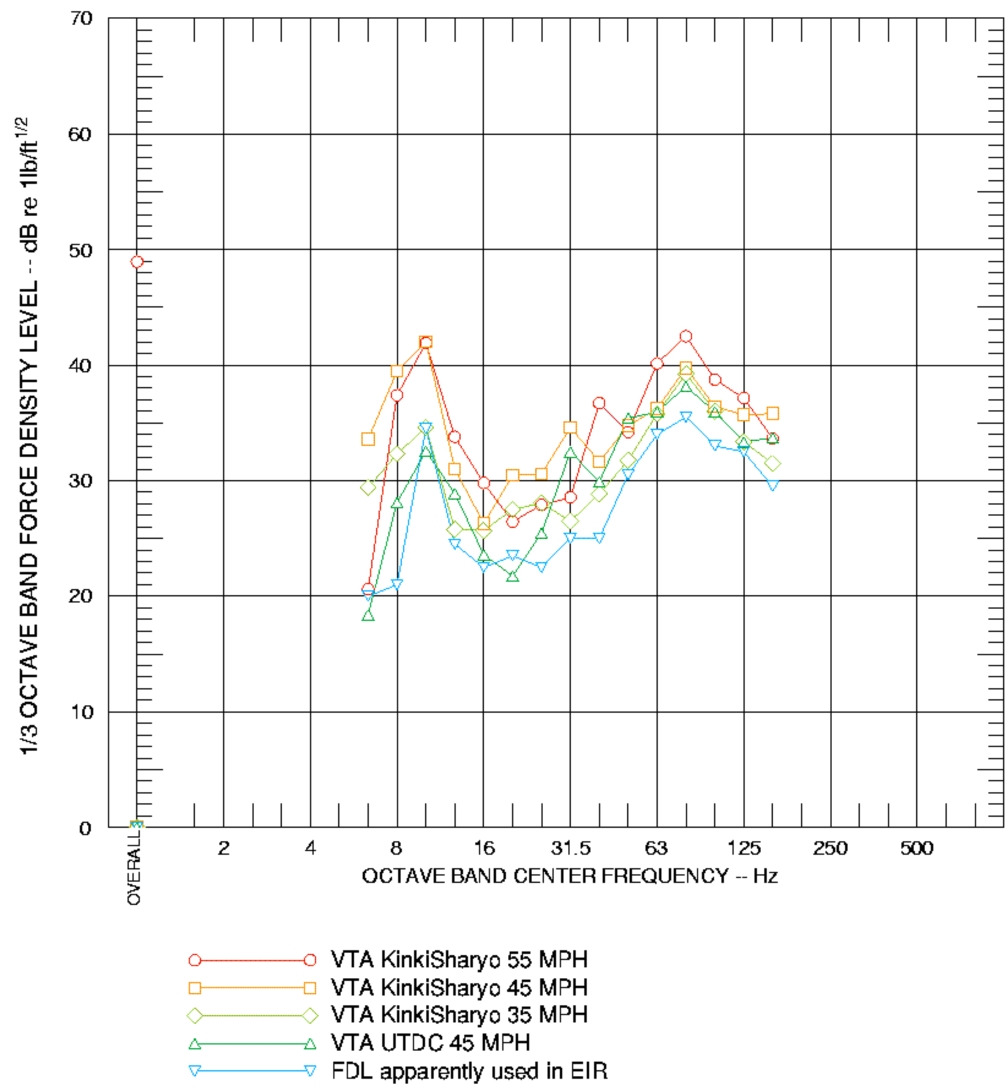

FIGURE 5.2 COMPARE DIFFERENT AT-GRADE FORCE DENSITY LEVELS (FDL)
FORCE TRANSMITTED INTO THE GROUND
BALLASTED TRACK

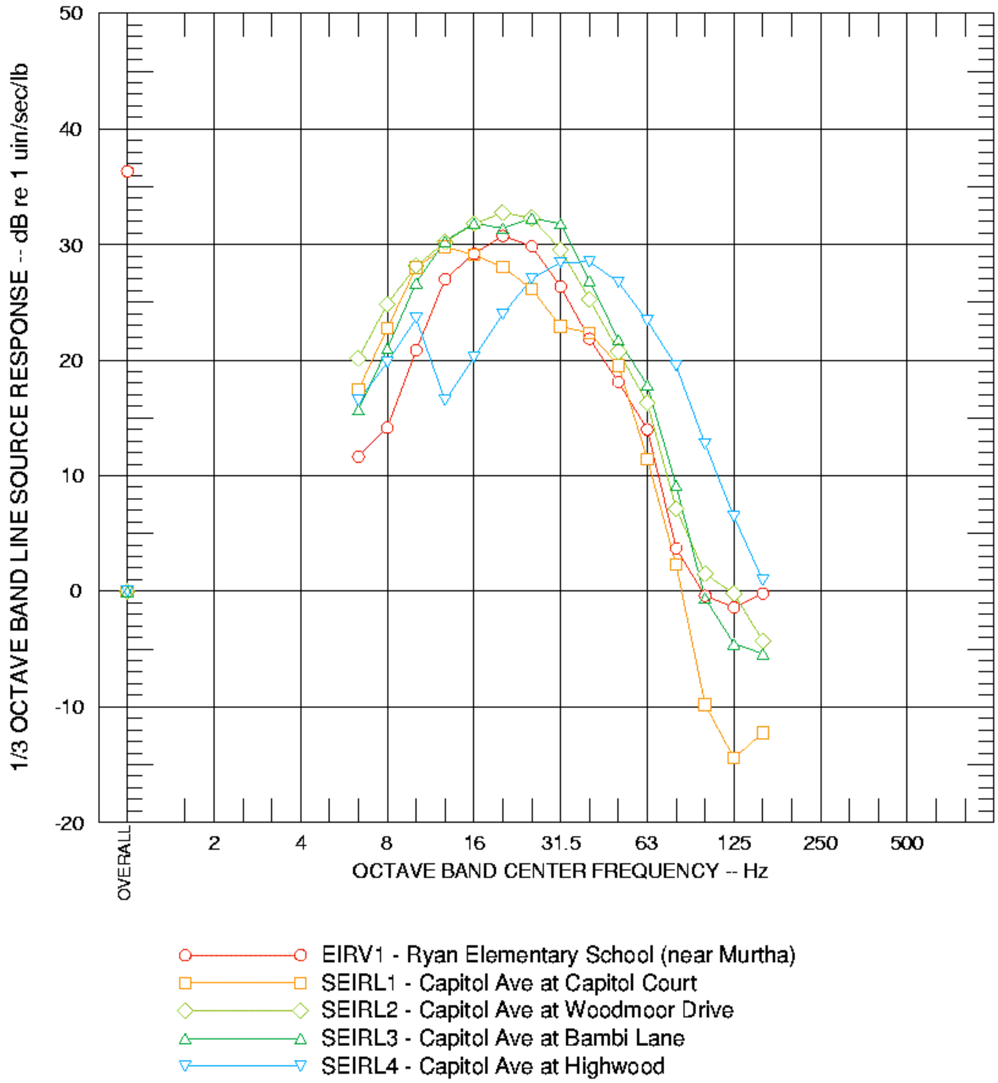

FIGURE 5.3 LINE SOURCE RESPONSE (LSR)
CALCULATED AT 100 FT DISTANCE FROM FORCE INPUT
THREE-CAR TRAIN (270 FT LENGTH)

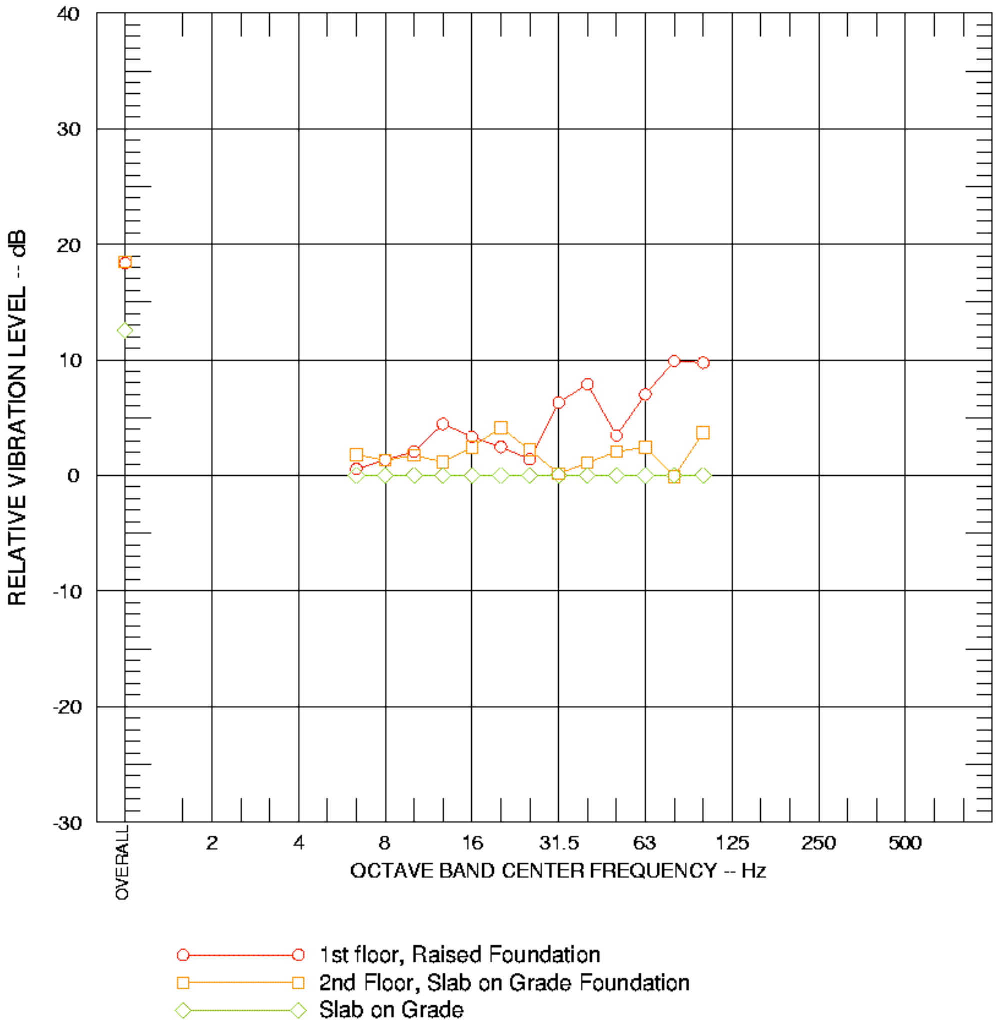

FIGURE 5.4 BUILDING VIBRATION RESPONSE (BVR)
INCORPORATES EXPECTED BUILDING COUPLING AND FLOOR RESPONSE

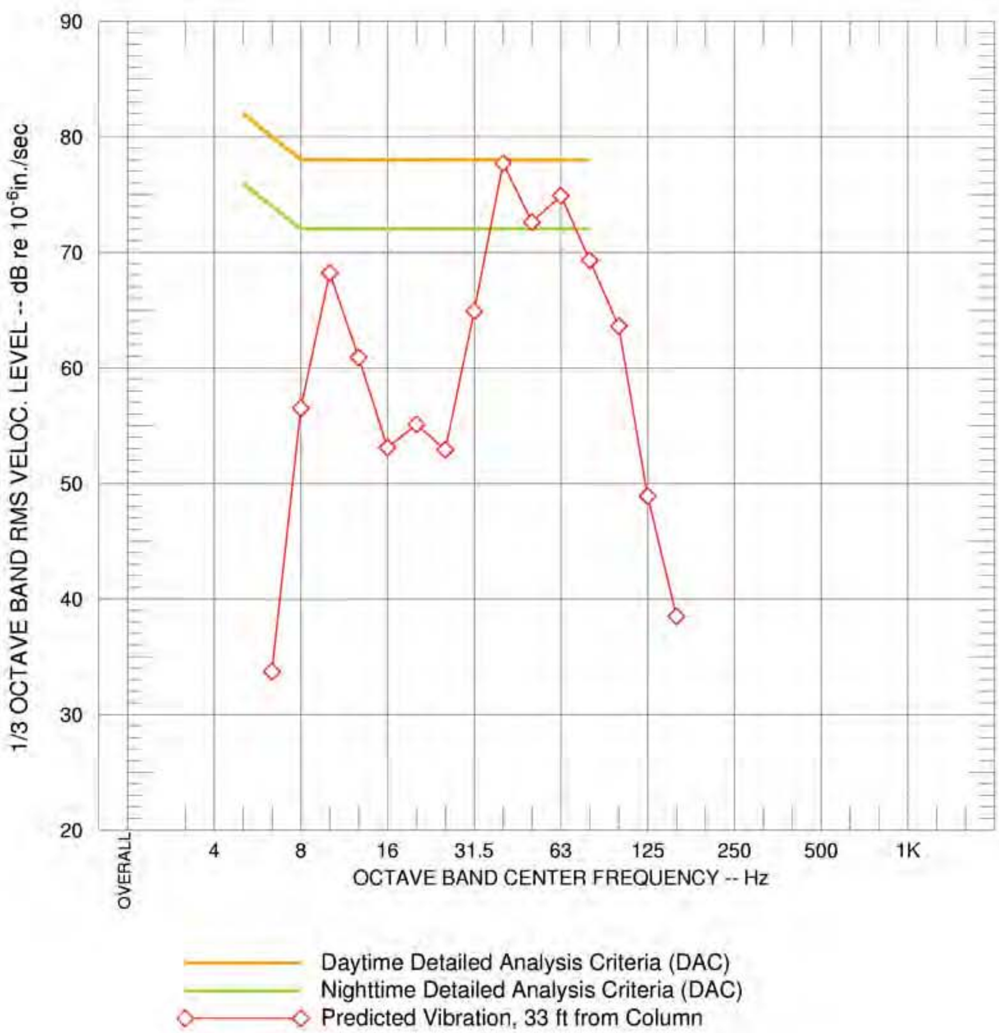

FIGURE 5.5 PREDICTED VIBRATION AT RESIDENCE ADJACENT TO AERIAL STRUCT. STA 13+90 NB

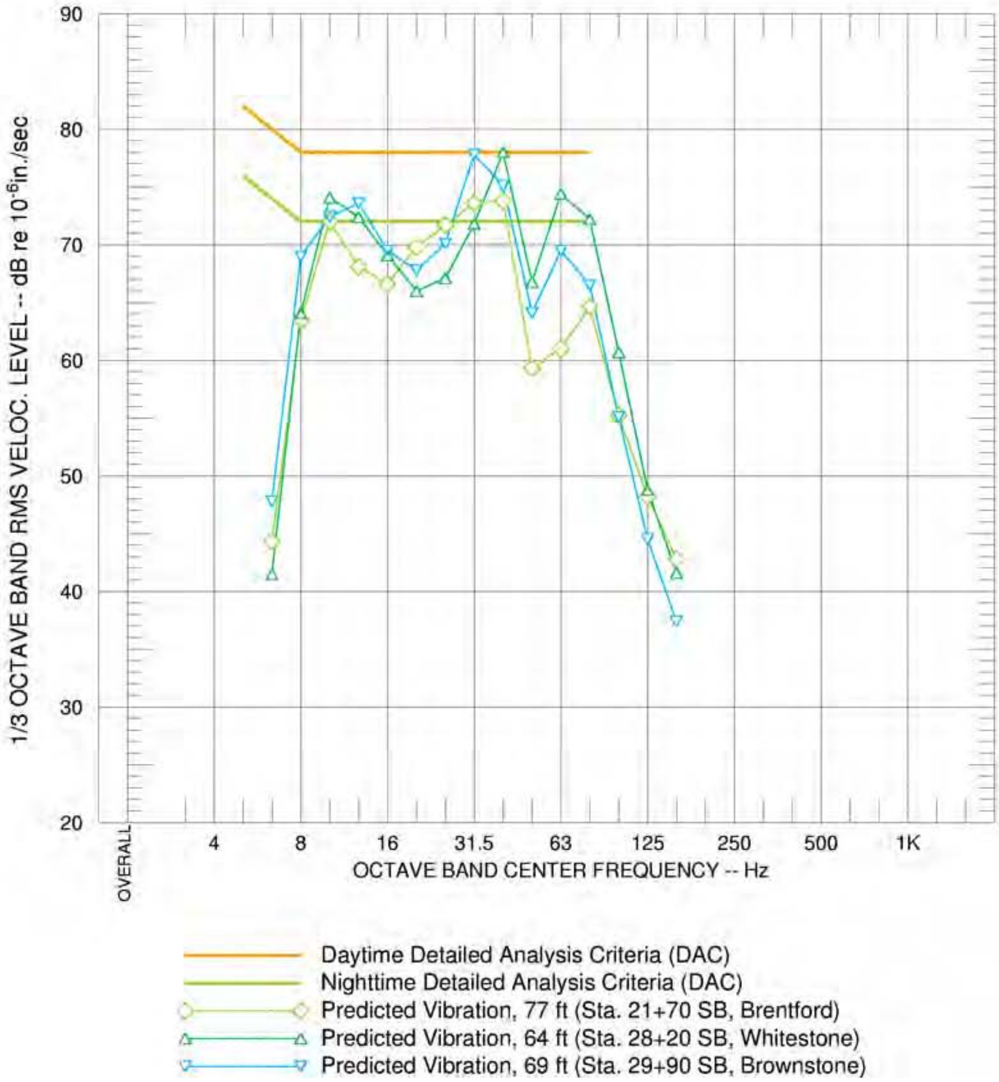

FIGURE 5.6 PREDICTED VIBRATION AT RESIDENCES ALONG SB TRACK EMBANKMENT OR AT-GRADE SECTIONS, SELECTED PREDICTIONS DISTANCES SHOWN FROM NEAR TRACK

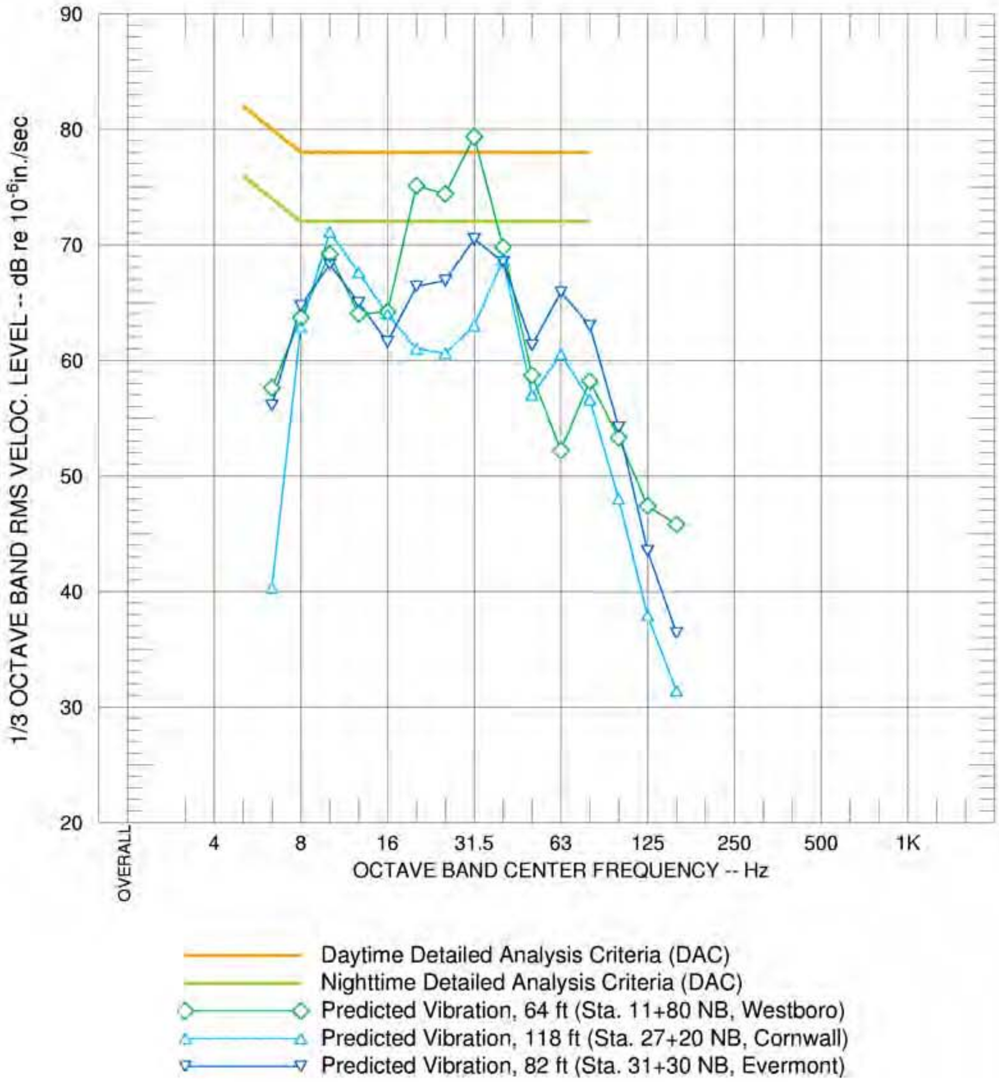

FIGURE 5.7 PREDICTED VIBRATION AT RESIDENCES ALONG NB TRACK
AT-GRADE OR EMBANKMENT SECTIONS
SELECTED PREDICTIONS

TABLE 5.2 SUMMARY OF PREDICTED VIBRATION LEVELS - 3-CAR TRAINS

Station Number	Location Street (ID)	Near Track	Track type	Speed (near track)	Dist.[1] (ft)	FTA General Criteria	Groundborne Vibration Range	FTA DAC Exceed. wo/ mit	GBV w/Mit. Range	FTA DAC Exceed. w/mit	Recommended Vibration Control	Comment
10+80	SFR on Lombard	SB	at	30	48	72	74 - 78	--	-	--	--	2
10+80	SFR on Lombard	SB	at	30	103	72	66 - 69	--	-	--	--	
11+20	SFR on Lombard	SB	ate	35	62	72	75 - 78	y	70 - 72	--	TDA	3
11+40	SFR on Capitol Ave	SB	ate	45	71	72	78 - 81	y	74 - 76	--	TDA	3
11+60	SFR on Capitol Ave	SB	ate	45	74	72	78 - 81	y	73 - 76	--	TDA	3
12+00	Co	SB	ate	45	62	n/a	76 - 79	--	-	--	--	5
12+40	Co	SB	dff	45	77	n/a	64 - 66	--	-	--	--	5
13+90	SFR on Excalibur	SB	dff	55	174	72	63 - 64	--	-	--	--	
14+10	SFR on Excalibur	SB	dff	55	174	72	63 - 64	--	-	--	--	
14+30	SFR on Excalibur	SB	dff	55	176	72	63 - 63	--	-	--	--	
14+60	SFR on Capitol Ave	SB	dff	55	115	72	68 - 69	--	-	--	--	
14+75	SFR on Capitol Ave	SB	dff	55	121	72	67 - 68	--	-	--	--	
14+90	SFR on Capitol Ave	SB	dff	55	121	72	67 - 68	--	-	--	--	
15+60	SFR on Capitol Ave	SB	dff	55	121	72	67 - 68	--	-	--	--	
16+00	SFR on Capitol Ave	SB	dff	55	138	72	66 - 66	--	-	--	--	
16+20	SFR on Capitol Ave	SB	dff	55	135	72	66 - 67	--	-	--	--	
16+30	SFR on Capitol Ave	SB	dff	55	144	72	65 - 66	--	-	--	--	
16+50	SFR on Capitol Ave	SB	dff	55	138	72	66 - 66	--	-	--	--	
16+60	SFR on Capitol Ave	SB	dff	55	138	72	66 - 66	--	-	--	--	
16+80	SFR on Capitol Ave	SB	dff	55	144	72	65 - 66	--	-	--	--	
16+90	SFR on Capitol Ave	SB	dff	55	138	72	66 - 66	--	-	--	--	
17+10	SFR on Capitol Ave	SB	dff	55	146	72	65 - 66	--	-	--	--	
17+20	SFR on Capitol Ave	SB	dff	55	139	72	65 - 66	--	-	--	--	
17+40	SFR on Capitol Ave	SB	dff	55	138	72	66 - 66	--	-	--	--	
17+50	SFR on Capitol Ave	SB	dff	55	148	72	65 - 65	--	-	--	--	
17+70	SFR on Capitol Ave	SB	dff	55	135	72	66 - 67	--	-	--	--	
17+90	SFR on Capitol Ave	SB	dff	55	131	72	66 - 67	--	-	--	--	
18+00	SFR on Capitol Ave	SB	dff	55	125	72	67 - 67	--	-	--	--	
18+20	SFR on Capitol Ave	SB	dff	55	128	72	66 - 67	--	-	--	--	
18+40	SFR on Capitol Ave	SB	dff	55	128	72	66 - 67	--	-	--	--	
18+50	SFR on Capitol Ave	SB	dff	55	113	72	68 - 69	--	-	--	--	
18+70	commercial (take)	SB	dff	55	108	n/a	-	--	-	--	--	
19+00	commercial capitol/story	SB	dff	55	102	n/a	66 - 66	--	-	--	--	5
19+70	commercial capitol/story	SB	dff	55	115	n/a	65 - 65	--	-	--	--	5
20+60	commercial capitol/story	SB	dff	55	95	n/a	66 - 67	--	-	--	--	5
20+70	SFR on Brentford	SB	dff	55	102	72	70 - 70	--	-	--	--	
20+90	SFR on Brentford	SB	dff	55	102	72	70 - 70	--	-	--	--	
21+00	SFR on Brentford	SB	dff	55	108	72	69 - 70	--	-	--	--	
21+20	SFR on Brentford	SB	ate	55	80	72	79 - 80	y	76 - 76	--	TDA	3
21+30	SFR on Brentford	SB	ate	55	82	72	79 - 80	y	75 - 76	--	TDA	3
21+60	SFR on Brentford	SB	ate	55	85	72	78 - 79	y	75 - 75	--	TDA	3
21+70	SFR on Brentford	SB	ate	55	77	72	79 - 80	y	76 - 76	--	TDA	3
21+90	SFR on Brentford	SB	ate	55	82	72	79 - 80	y	75 - 76	--	TDA	3
22+00	SFR on Brentford	SB	ate	55	95	72	77 - 78	--	-	--	--	2
22+20	SFR on Brentford	SB	ate	55	97	72	77 - 78	--	-	--	--	2
22+40	SFR on Brentford	SB	ate	55	84	72	78 - 79	y	75 - 76	--	TDA	3
22+60	SFR on Brentford	SB	at	55	97	72	77 - 78	--	-	--	--	2
22+70	SFR on Brentford	SB	at	55	75	72	80 - 81	y	77 - 77	y	TDA	3,4,6
22+90	SFR on Brentford	SB	at	55	84	72	79 - 80	y	76 - 76	y	TDA	3,4,6
23+00	SFR on Brentford	SB	at	55	125	72	74 - 75	--	-	--	--	2
23+30	commercial capital/foxdale	SB	at	55	130	n/a	70 - 71	--	-	--	--	5
24+20	MFR onFoxdale	SB	at	55	128	72	74 - 75	--	-	--	--	2
24+90	MFR onFoxdale	SB	at	55	128	72	74 - 75	--	-	--	--	2
25+90	MFR onFoxdale	SB	at	55	128	72	74 - 75	--	-	--	--	2
27+10	sfr on greenstone	SB	at	55	136	72	73 - 74	--	-	--	--	2
27+20	sfr on greenstone	SB	at	55	75	72	80 - 81	y	77 - 77	y	TDA	3,4,6
27+40	sfr on greenstone	SB	at	55	80	72	79 - 80	y	76 - 77	y	TDA	3,4,6
27+60	sfr on greenstone	SB	at	55	110	72	76 - 76	--	-	--	--	2
28+00	SFR on whitestone	SB	at	55	98	72	77 - 78	--	-	--	--	2
28+20	SFR on whitestone	SB	at	55	64	72	82 - 83	y	78 - 78	y	TDA	3,4,6
28+40	SFR on whitestone	SB	at	55	105	72	76 - 77	--	-	--	--	2
28+90	SFR on bluestone	SB	at	55	82	72	79 - 80	y	76 - 76	y	TDA	3,4,6
29+10	SFR on bluestone	SB	at	55	79	72	79 - 80	y	76 - 77	y	TDA	3,4,6
29+20	SFR on bluestone	SB	at	55	125	72	74 - 75	--	-	--	--	2
29+70	SFR on brownstone	SB	at	55	89	72	78 - 79	y	75 - 76	--	TDA	3
29+90	SFR on brownstone	SB	at	50	69	72	82 - 83	y	78 - 79	y	TDA	3,4,6
30+00	SFR on brownstone	SB	at	50	115	72	76 - 77	--	-	--	--	2
30+40	SFR on pinkstone	SB	at	45	87	72	78 - 79	y	75 - 76	y	TDA	3,4,6
30+70	SFR on pinkstone	SB	at	45	80	72	79 - 80	y	76 - 76	y	TDA	3,4,6
30+80	SFR on pinkstone	SB	at	45	85	72	79 - 79	y	76 - 76	y	TDA	3,4,6
31+30	SFR on silverstone	SB	at	40	92	72	75 - 76	--	-	--	--	2
31+50	SFR on silverstone	SB	at	35	87	72	73 - 74	--	-	--	--	2
31+70	SFR on silverstone	SB	at	35	120	72	69 - 70	--	-	--	--	
10+00	SFR on Capitol/Wilbur (NA)	NB	at	30	180	72	59 - 59	--	-	--	--	
10+40	SFR on Capitol/Wilbur	NB	at	30	69	72	71 - 74	--	-	--	--	2

TABLE 5.2 SUMMARY OF PREDICTED VIBRATION LEVELS - 3-CAR TRAINS

Station Number	Location Street (ID)	Near Track	Track type	Speed (near track)	Dist.[1] (ft)	FTA General Criteria	Groundborne Vibration Range	FTA DAC Exceed. wo/ mit	GBV w/Mit. Range	FTA DAC Exceed. w/mit	Recommended Vibration Control	Comment
10+60	SFR on Capitol	NB	at	30	77	72	69 - 72	--	-	--	--	2
10+80	SFR on Capitol	NB	at	30	79	72	68 - 71	--	-	--	--	2
11+00	SFR on Capitol	NB	ate	35	80	72	73 - 76	--	-	--	--	2
11+20	SFR on Capitol	NB	ate	40	77	72	75 - 78	y	70 - 72	--	TDA	3
11+40	SFR on Capitol/Westboro	NB	ate	40	66	72	76 - 80	y	71 - 74	--	TDA	3
11+80	SFR on Capitol/Westboro	NB	ate	45	64	72	79 - 82	y	75 - 77	--	TDA	3
12+10	SFR on Capitol	NB	ate	50	75	72	78 - 81	y	74 - 76	--	TDA	3
12+30	SFR on Capitol	NB	dff	50	79	72	68 - 70	--	-	--	--	
12+50	SFR on Capitol	NB	dff	55	82	72	68 - 71	--	-	--	--	
12+60	SFR on Capitol	NB	dff	55	82	72	68 - 71	--	-	--	--	
12+80	SFR on Capitol/Highwood	NB	dff	55	66	72	70 - 74	--	-	--	--	2
13+40	SFR on Capitol/Highwood	NB	dff	55	64	72	71 - 74	--	-	--	--	2
13+60	SFR on Capitol	NB	dff	55	72	72	69 - 73	--	-	--	--	2
13+80	SFR on Capitol	NB	dff	55	75	72	69 - 72	--	-	--	--	
13+90	SFR on Capitol	NB	dff	55	33	72	77 - 81	y	77 - 81	y	--	3,6
16+60	office	NB	dff	55	148	n/a	63 - 65	--	-	--	--	5
17+30	church	NB	dff	55	138	n/a	64 - 66	--	-	--	--	5
18+00	church/slab	NB	dff	55	148	n/a	61 - 62	--	-	--	--	5
18+60	CO	NB	dff	55	135	n/a	62 - 63	--	-	--	--	5
18+80	Co	NB	dff	55	171	n/a	60 - 61	--	-	--	--	5
19+40	co	NB	dff	55	138	n/a	61 - 63	--	-	--	--	5
19+80	co	NB	dff	55	138	n/a	61 - 63	--	-	--	--	5
20+20	MFR 2719 Kollmar	NB	dff	55	103	72	69 - 70	--	-	--	--	
20+80	SFR on S. Capitol/Sussex	NB	dff	55	125	72	68 - 68	--	-	--	--	
21+20	SFR on S. Capitol/Sussex	NB	ate	55	118	72	73 - 73	--	-	--	--	2
21+50	SFR on S. Capitol/Tudor	NB	ate	55	115	72	73 - 73	--	-	--	--	2
21+90	SFR on S. Capitol/Tudor	NB	ate	55	118	72	73 - 73	--	-	--	--	2
22+20	SFR on S. Capitol/Capitol ct	NB	ate	55	120	72	73 - 73	--	-	--	--	2
22+60	SFR on S. Capitol/Capitol ct	NB	at	55	118	72	74 - 74	--	-	--	--	2
22+90	SFR on S. Capitol/murtha	NB	at	55	118	72	74 - 74	--	-	--	--	2
23+40	SFR on S. Capitol/murtha	NB	at	55	118	72	74 - 74	--	-	--	--	2
23+70	SFR on S. Capitol/Bristol	NB	at	55	118	72	74 - 74	--	-	--	--	2
24+20	SFR on S. Capitol/Bristol	NB	at	55	118	72	74 - 74	--	-	--	--	2
24+50	SFR on S. Capitol/dublin	NB	at	55	118	72	74 - 74	--	-	--	--	2
24+90	SFR on S. Capitol/dublin	NB	at	55	118	72	74 - 74	--	-	--	--	2
25+10	SFR on S. Capitol/belfast	NB	at	55	118	72	74 - 74	--	-	--	--	2
25+60	SFR on S. Capitol/belfast	NB	at	55	118	72	74 - 75	--	-	--	--	2
25+80	SFR on S. Capitol/coventry	NB	at	55	118	72	74 - 75	--	-	--	--	2
26+40	SFR on S. Capitol/coventry	NB	at	55	128	72	74 - 74	--	-	--	--	2
26+70	SFR on S. Capitol/cornwall	NB	at	55	125	72	74 - 74	--	-	--	--	2
27+20	SFR on S. Capitol/cornwall	NB	at	55	118	72	75 - 76	--	-	--	--	2
27+60	SFR on S. Capitol	NB	at	55	141	72	73 - 74	--	-	--	--	2
27+70	SFR on S. Capitol	NB	at	55	146	72	73 - 73	--	-	--	--	2
27+90	SFR on S. Capitol	NB	at	55	143	72	73 - 74	--	-	--	--	2
28+10	SFR on S. Capitol	NB	at	55	146	72	73 - 73	--	-	--	--	2
28+30	SFR on S. Capitol/woodmoor	NB	at	55	138	72	74 - 74	--	-	--	--	2
28+60	SFR on S. Capitol/woodmoor	NB	at	55	144	72	73 - 74	--	-	--	--	2
28+90	SFR on S. Capitol	NB	at	55	138	72	74 - 74	--	-	--	--	2
29+00	SFR on S. Capitol	NB	at	55	141	72	73 - 74	--	-	--	--	2
29+30	SFR on S. Capitol	NB	at	55	138	72	74 - 74	--	-	--	--	2
29+50	SFR on S. Capitol	NB	at	55	144	72	73 - 74	--	-	--	--	2
29+60	SFR on S. Capitol	NB	at	55	138	72	74 - 74	--	-	--	--	2
29+80	SFR on S. Capitol	NB	at	50	136	72	75 - 75	--	-	--	--	2
30+00	SFR on S. Capitol	NB	at	50	136	72	75 - 75	--	-	--	--	2
30+20	SFR on S. Capitol	NB	at	50	136	72	75 - 75	--	-	--	--	2
30+30	SFR on S. Capitol	NB	at	50	135	72	75 - 75	--	-	--	--	2
30+50	SFR on S. Capitol	NB	at	45	135	72	74 - 74	--	-	--	--	2
30+70	SFR on S. Capitol	NB	at	45	138	72	74 - 74	--	-	--	--	2
31+10	SFR Evermont	NB	at	40	138	72	70 - 71	--	-	--	--	
31+30	SFR Evermont	NB	at	40	82	72	76 - 77	--	-	--	--	2
31+50	SFR Evermont	NB	at	35	82	72	74 - 75	--	-	--	--	2
32+00	SFR Evermont	NB	at	30	105	72	70 - 71	--	-	--	--	
32+20	SFR on Home Gate	NB	at	30	89	72	73 - 74	--	-	--	--	2
32+30	SFR on Home Gate	NB	at	30	85	72	73 - 74	--	-	--	--	2
32+40	SFR on Home Gate	NB	at	30	89	72	73 - 74	--	-	--	--	2
32+50	SFR on Home Gate	NB	at	30	115	72	69 - 70	--	-	--	--	
32+60	SFR on Home Gate	NB	at	30	105	72	70 - 71	--	-	--	--	
32+70	SFR on Home Gate	NB	at	30	95	72	72 - 73	--	-	--	--	2
32+80	SFR on Home Gate	NB	at	30	103	72	71 - 72	--	-	--	--	
32+90	SFR on Home Gate	NB	at	30	103	72	71 - 72	--	-	--	--	
33+00	SFR on Home Gate	NB	at	30	103	72	71 - 72	--	-	--	--	
33+10	SFR on Home Gate	NB	at	30	100	72	71 - 72	--	-	--	--	
33+20	SFR on Home Gate	NB	at	30	98	72	71 - 72	--	-	--	--	
33+30	SFR on Home Gate	NB	at	30	92	72	72 - 73	--	-	--	--	2
33+40	SFR on Home Gate	NB	at	30	92	72	72 - 73	--	-	--	--	2
33+50	SFR on Home Gate	NB	at	30	108	72	70 - 71	--	-	--	--	

TABLE 5.2 SUMMARY OF PREDICTED VIBRATION LEVELS - 3-CAR TRAINS

Station Number	Location Street (ID)	Near Track	Track type	Speed (near track)	Dist.[1] (ft)	FTA General Criteria	Groundborne Vibration Range	FTA DAC Exceed. wo/ mit	GBV w/Mit. Range	FTA DAC Exceed. w/mit	Recommended Vibration Control	Comment
33+60	SFR on Home Gate	NB	at	30	125	72	68 - 69	--	-	--	--	
33+70	SFR on Home Gate	NB	at	30	141	72	67 - 68	--	-	--	--	
33+80	SFR on Home Gate	NB	at	30	141	72	67 - 68	--	-	--	--	
33+90	SFR on Home Gate	NB	at	30	144	72	67 - 67	--	-	--	--	
34+20	SFR on Supreme Dr	NB	at	30	157	72	66 - 66	--	-	--	--	
34+60	SFR on Supreme Dr	NB	at	30	135	72	67 - 68	--	-	--	--	
34+80	SFR on Supreme Dr	NB	at	30	157	72	66 - 66	--	-	--	--	
35+00	SFR on Supreme Dr	NB	at	30	151	72	66 - 67	--	-	--	--	
35+20	SFR on Supreme Dr	NB	at	30	131	72	68 - 69	--	-	--	--	
35+40	SFR on Supreme Dr	NB	at	30	115	72	69 - 70	--	-	--	--	
35+50	SFR on Supreme Dr	NB	at	30	118	72	69 - 70	--	-	--	--	
35+70	SFR on Supreme Dr	NB	at	30	105	72	70 - 71	--	-	--	--	
35+80	SFR on Supreme Dr	NB	at	30	112	72	70 - 71	--	-	--	--	

Notes: 26

at= At-Grade, ate= Embankment, dff = Direct Fixation Fasteners, TDA = Tire Derived Aggregate
1: Distance to near track; far track generally an additional 15 ft further
2: Vibration Exceeds FTA General Analysis Criteria but not FTA Detailed Analysis Criteria. No Vibration Control Required
3: Vibration Control Indicated, Vibration Exceeds FTA Detailed Analysis Criteria
4: Potential Residual Impact, Vibration Still Exceeds FTA Detailed Analysis Criteria
5: No criteria for General Analysis, 84 VdB for detailed analysis
6: Alternative control measures to be considered in Final Engineering including: speed reduction, moving alignment, deeper TDA layer, etc.
All vibration reported in VdB re 1 microinch/sec

6 VIBRATION CONTROL MEASURES

Vibration isolation systems provide no reduction at or below the system's resonant frequency; they tend to amplify vibration at frequencies in the vicinity of the resonance frequency, and they isolate vibration at frequencies one or two 1/3-octaves above the resonance frequency. The amount of isolation increases as the frequency increases above the resonant frequency. Because any system would both amplify and attenuate vibration at different frequencies, the spectrum of the vibration that is being mitigated must be considered when choosing an appropriate isolation system. In some cases, a given isolation system might exacerbate the amount of vibration transmitted into the ground.

Table 6.1 compares the criterion distances to achieve the FTA DAC without vibration control, and with the vibration control in the form of Tire Derived Aggregate (TDA). TDA has little effect for vibration below 16 Hz, and as discussed previously, the VTA Kinkisharyo vehicle has substantial response in the low frequencies (10 Hz 1/3-octave band, see Figure 5.2). Thus, as shown in Table 6.1, since there are some areas where the TDA would be unable to reduce vibration in the frequencies below 16 Hz, the TDA in these areas would not be effective at achieving compliance with the FTA DAC.

EIR Mitigation
The EIR did not indicate any noise or vibration impacts from the median-running at-grade alignment alternatives. The Appendix compares the vibration prediction results using the data used for the EIR and the current data.

Ballasted Track
At-Grade Track
The current analysis indicates that the FTA DAC would be exceeded for 12 homes along the SB section of the at-grade structure, between Sta. 22+70 to 30+80 SB. Tire Derived Aggregate (TDA) used between the subballast and the compacted soil should reduce the vibration levels, but the vibration could potentially remain above the FTA DAC (nighttime) at 11 homes with 3-car train operations. Figure 6.1 illustrates the effect of TDA vibration control at selected buildings, similar to those shown in Figure 5.6.

TDA is currently in use at selected areas of the Vasona corridor. WIA has measured what is referred to as the “insertion loss” values from those installations, and that data have been used in the current analysis to evaluate vibration control effectiveness. The TDA layer should be nominally 12 in thick, under a subballast layer of 12 in and a ballast layer of 12 in thickness. Recent completed studies (August 2006) have confirmed the measurement results obtained in 2005, with little or no changes in the physical characteristics of TDA sections along the Vasona corridor.

Even with the TDA vibration control there remains the potential for 11 homes to experience vibration exceeding the FTA DAC (nighttime). As an example of the potential residual vibration impact, Figure 6.2 shows the predicted vibration with and without TDA, in comparison with the 1/3-octave band FTA DAC for one home (Sta. 28+20). Even with TDA, the low frequency vibration would still exceed the DAC at the 10 Hz 1/3-octave band for nighttime operations with 3-car trains. Additional vibration control measures could include reducing the train consist to 1 or 2-car trains during this time (6 to 7 AM). Other vibration control options are discussed further in this section.

Embankment/Transition Structures
Vibration control is indicated along the embankment structures for 13 homes, located at Sta. 11+20 to 11+60 SB, 21+20 to 22+40 SB and 11+20 to 12+10 NB. TDA as described above would be sufficient to reduce the vibration below the FTA DAC criteria for all residences along the embankment sections.

Vibration Control Extents
The TDA should be installed in the areas listed below, for both directions of ballasted track (at-grade or embankment). The sections of TDA can be connected to make larger contiguous sections, for ease of construction.

- Sta. 10+60 to12+20 SB/NB
- Sta. 21+25 to 23+15 SB/NB
- Sta. 27+00 to 27+70 SB/NB
- Sta. 28+00 to 28+60 SB/NB
- Sta. 28+80 to 31+25 SB/NB

Aerial Structure
Vibration control is indicated for one residence close to the aerial structure support columns. As a rule, vibration from aerial structures is concentrated at frequencies below 30Hz, due to the inherent design of the structure. Numerical models of trackbed forces indicate that reducing the fastener stiffness may cause a slight increase in vibration levels below 30Hz due to the lower natural frequency of the softer fastener, and may increase wayside noise on a concrete aerial structure. This effect has been observed on the BART system.

It may be possible to provide vibration isolation between the guideway and the support bent, similar to isolation designs we have recommended to vibration isolate Automated People Mover system support structures integrated into airport buildings, and discussed below. Increasing the foundation stiffness may reduce ground vibration (e.g., using large diameter friction piles driven to a substantial depth). Other vibration control options are discussed below.

Other Vibration Control Alternatives

The following lists possible additional measures that may be considered to provide additional vibration control. In some cases these measures would also reduce the noise. However, some operational changes such as reducing the train consist or reducing train speed could have a substantial effect on the level of service provided by the CELR. These and other measures should be evaluated during Final Engineering.

Thicker TDA Layer

The current work on TDA indicates that a 12-inch thick layer provides substantial vibration reduction at higher frequencies. For vibration which is not dominated by low frequency response of the soil, vibration reduction on the order of 4 to 6 VdB can be achieved. It is possible that increasing the thickness of the TDA layer to 18-inches or perhaps greater would improve the low frequency characteristics of the TDA layer. A finite element analysis or test measurement program should be conducted during Final Engineering to evaluate how much additional vibration reduction could be achieved.

Floating Slab Trackbed

Floating slabs are ideal for reducing low frequency vibration components below 30 Hz. They have been used at several rapid transit systems, including an outdoor installation for BART (North Concord). Floating slab trackbeds have been installed for several light rail systems, including Buffalo, Newark-Elizabeth Rail Link (New Jersey), SF MUNI and Charlotte, NC. An 8 Hz floating slab trackbed design would eliminate the residual vibration impact at some receptors.

Soil Barriers

The need for vibration control often brings up a question regarding surface or subsurface barriers to block the vibration. Some studies have been made of the viability of trenches, backfilled with lightweight material (e.g., styrofoam or TDA). Some recent work in Japan has shown some interesting results, though the effect of the barrier diminishes with increasing distance from the barrier. We recommend that closer study be conducted during Final Engineering of those research results to see if any of those techniques can be feasibly applied to the CELR project. We know of a study conducted by the Toronto Transit Commission, which indicated vibration reduction on the order of 3 to 5 dB for frequencies higher than 25 or 30 Hz. As shown above in Sections 5 and 6, the vibration impact is primarily due to vibration in the 30 to 80 Hz region, with some contributions around 12 Hz. Thus, a trench could be effective at reducing vibration, but this may be a costly option. Locally, a study by San Francisco MUNI using asbestos in the trench yielded poor results.

Questions are often raised about soil barriers, because everyone has experience with sound barriers, and it seems obvious that a similar solution would work for vibration. Additional comments are included in the Appendix.

Vibration Isolation Through Grade Separation

Large discontinuities in the ground surface can also reduce vibration. For instance, the Santa Clara Water District canal in Phase 1B, near the Glen Hanning residences is expected to provide a substantial reduction in the vibration. The surface waves would be substantially affected, but in areas of small discontinuities (e.g., less than 5 ft), the difference is small or insignificant. However, as discussed above in Section 5 of our analysis, some low frequency amplification can occur for embankment structures with respect to standard at-grade structures.

Vibration Isolation of Structures
Buildings can be vibration isolated to reduce the influence of exterior vibration sources (e.g., roadways, trains, subways, etc.), this requires the use of large steel springs or rubber pads. Such isolation could also be considered between the guideway and the support columns. Large bearing pads could be used to support the guideway in the vertical and lateral directions, providing vibration isolation. A detailed dynamic analysis using the "finite element method" would be required to determine the potential amount of vibration reduction possible for either of these methods.

Reducing Long Waves in the Rail
Research in corrugation and wheel/rail vibration suggests that long waves on the order of 10 ft may exist in the rail, which would increase the low frequency contribution of the force density level. Traditional rail grinding techniques cannot eliminate these waves, but there are rail grinders with the capability to do so. The specification tolerance for rail used in high speed rail also can limit the long waves in the rail. As mentioned in Section 5, it is possible that the strong low frequency components of the Kinkisharyo vehicle is caused by some unexpected interaction of the VTA rail system with the Kinkisharyo vehicle.

Other Measures
Reduced consist or train speeds could potentially restrict the Project in such a way that substantially jeopardize the Project. These two measures are discussed in Appendix I. In addition, while moving the alignment farther away would work in concept, the limited available space would make this measure difficult or infeasible. This measure is also discussed in Appendix I.

Conclusion
Aerial structure foundations are supported on friction piles. Vibration of the ground would be produced by the piles supporting the aerial structure bent, column or pedestal. These piles are, in effect, "welded" to the surrounding soil. Thus, aerial structure vibration would be produced by a source at depth. Thus, trenching, soil barriers or wrapping the foundation with neoprene would be ineffective for frequencies on the order of 10 to 30 Hz.

To reduce the vibration at the one home near aerial structure columns (Sta. 13+90 NB), the following can be considered:

- Maximize the foundation stiffness. The current foundation design already accounts for an "infinitely" stiff foundation, but it may be possible to stiffen this foundation further -
  - Increase pile diameters
  - Increase depth of piles
  - Increase the number piles
- Isolation of the guideway from the support bent with natural rubber isolators
- Move the column foundation so the center of the column would be 49 ft from the edge of the nearby residence.

A finite element analysis should be conducted to evaluate either a) the effect of stiffening the column foundation or b) vibration isolation design between the guideway and the support structure.

To reduce the residual impact at residences along the ballasted track sections, long-wave rail grinding or long-wave rail specifications can be considered. A finite element analysis of a deeper TDA layer would also be informative. Alternatively, reduced operational speed, reduced train consist, operational restrictions or floating slab trackbed could be considered during Final Engineering to reduce the vibration .

SUMMARY OF PREDICTED VIBRATION LEVELS - 3-CAR TRAINS - DISTANCE REQUIRED TO REDUCE IMPACT
TABLE 6.1 (AREAS OF POTENTIAL RESIDUAL IMPACT ONLY)

Station Number	Location Street (ID)	Near Track	Track type	Speed (near track)	Dist.[1] (ft)	FTA General Criteria	Groundborne Vibration Range	FTA DAC Exceed. wo/ mit	GBV w/Mit. Range	FTA DAC Exceed. w/mit	Recommended Vibration Control	Comment
22+60	SFR on Brentford	SB	at	55	97	72	77 - 78	--	-	--	--	2
22+70	SFR on Brentford	SB	at	55	**89**	72	78 - 79	y	75 - 76	--	TDA	**3,4,6**
22+90	SFR on Brentford	SB	at	55	**89**	72	78 - 79	y	75 - 76	--	TDA	**3,4,6**
23+00	SFR on Brentford	SB	at	55	125	72	74 - 75	--	-	--	--	2
23+30	commercial capital/foxdale	SB	at	55	130	n/a	70 - 71	--	-	--	--	5
24+20	MFR onFoxdale	SB	at	55	128	72	74 - 75	--	-	--	--	2
24+90	MFR onFoxdale	SB	at	55	128	72	74 - 75	--	-	--	--	2
25+90	MFR onFoxdale	SB	at	55	128	72	74 - 75	--	-	--	--	2
27+10	sfr on greenstone	SB	at	55	136	72	73 - 74	--	-	--	--	2
27+20	sfr on greenstone	SB	at	55	**89**	72	78 - 79	y	75 - 76	--	TDA	**3,4,6**
27+40	sfr on greenstone	SB	at	55	**89**	72	78 - 79	y	75 - 76	--	TDA	**3,4,6**
27+60	sfr on greenstone	SB	at	55	110	72	76 - 76	--	-	--	--	2
28+00	SFR on whitestone	SB	at	55	98	72	77 - 78	--	-	--	--	2
28+20	SFR on whitestone	SB	at	55	**89**	72	78 - 79	y	75 - 76	--	TDA	**3,4,6**
28+40	SFR on whitestone	SB	at	55	105	72	76 - 77	--	-	--	--	2
28+90	SFR on bluestone	SB	at	55	**89**	72	78 - 79	y	75 - 76	--	TDA	**3,4,6**
29+10	SFR on bluestone	SB	at	55	**89**	72	78 - 79	y	75 - 76	--	TDA	**3,4,6**
29+20	SFR on bluestone	SB	at	55	125	72	74 - 75	--	-	--	--	2
29+70	SFR on brownstone	SB	at	55	89	72	78 - 79	y	75 - 76	--	TDA	3
29+90	SFR on brownstone	SB	at	55	**89**	72	78 - 79	y	75 - 76	--	TDA	**3,4,6**
30+00	SFR on brownstone	SB	at	50	115	72	76 - 77	--	-	--	--	2
30+40	SFR on pinkstone	SB	at	45	**92**	72	78 - 78	y	75 - 75	--	TDA	**3,4,6**
30+70	SFR on pinkstone	SB	at	45	**92**	72	78 - 78	y	75 - 75	--	TDA	**3,4,6**
30+80	SFR on pinkstone	SB	at	45	**92**	72	78 - 78	y	75 - 75	--	TDA	**3,4,6**
31+30	SFR on silverstone	SB	at	40	92	72	75 - 76	--	-	--	--	2
31+50	SFR on silverstone	SB	at	35	87	72	73 - 74	--	-	--	--	2
31+70	SFR on silverstone	SB	at	35	120	72	69 - 70	--	-	--	--	
13+60	SFR on Capitol	NB	dff	55	72	72	69 - 73	--	-	--	--	2
13+80	SFR on Capitol	NB	dff	55	75	72	69 - 72	--	-	--	--	
13+90	SFR on Capitol	NB	dff	55	**56**	72	71 - 75	--	-	--	--	**3,6**

Notes:

at= At-Grade, ate= Embankment, dff = Direct Fixation Fasteners, TDA = Tire Derived Aggregate
1: Distance to near track; far track generally an additional 15 ft further
2: Vibration Exceeds FTA General Analysis Criteria but not FTA Detailed Analysis Criteria. No Vibration Control Required
3: Vibration Control Indicated, Vibration Exceeds FTA Detailed Analysis Criteria at Design Distance
4: Potential Residual Impact, Vibration Still Exceeds FTA Detailed Analysis Criteria at Design Distance
5: No criteria for General Analysis, 84 VdB for detailed analysis
6: At Distance Required to Reduce Impact, as Shown
All vibration reported in VdB re 1 microinch/sec

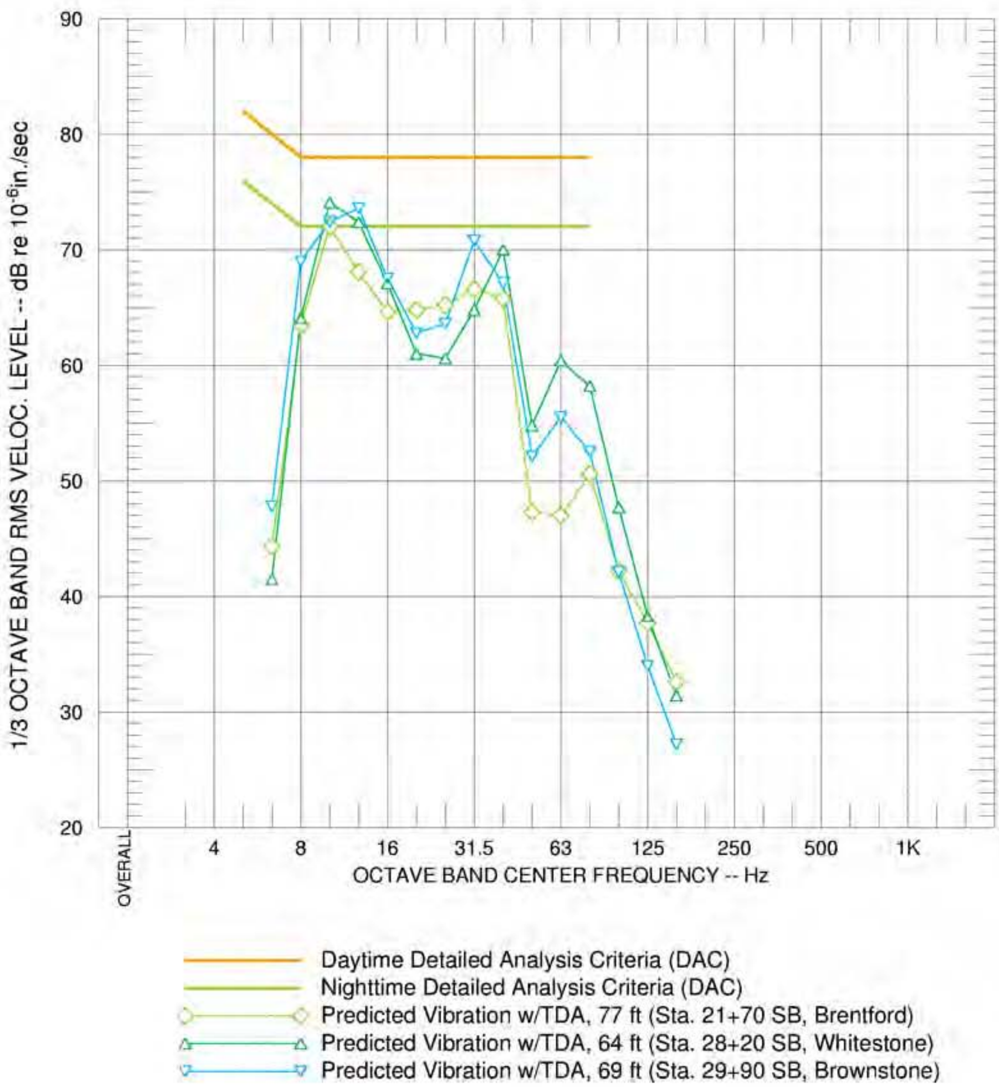

FIGURE 6.1 PREDICTED MITIGATED VIBRATION AT RESIDENCE ALONG SB TRACK WITH POTENTIAL RESIDUAL IMPACT
DISTANCE SHOWN FROM NEAR TRACK (COMPARE FIG. 5.6)

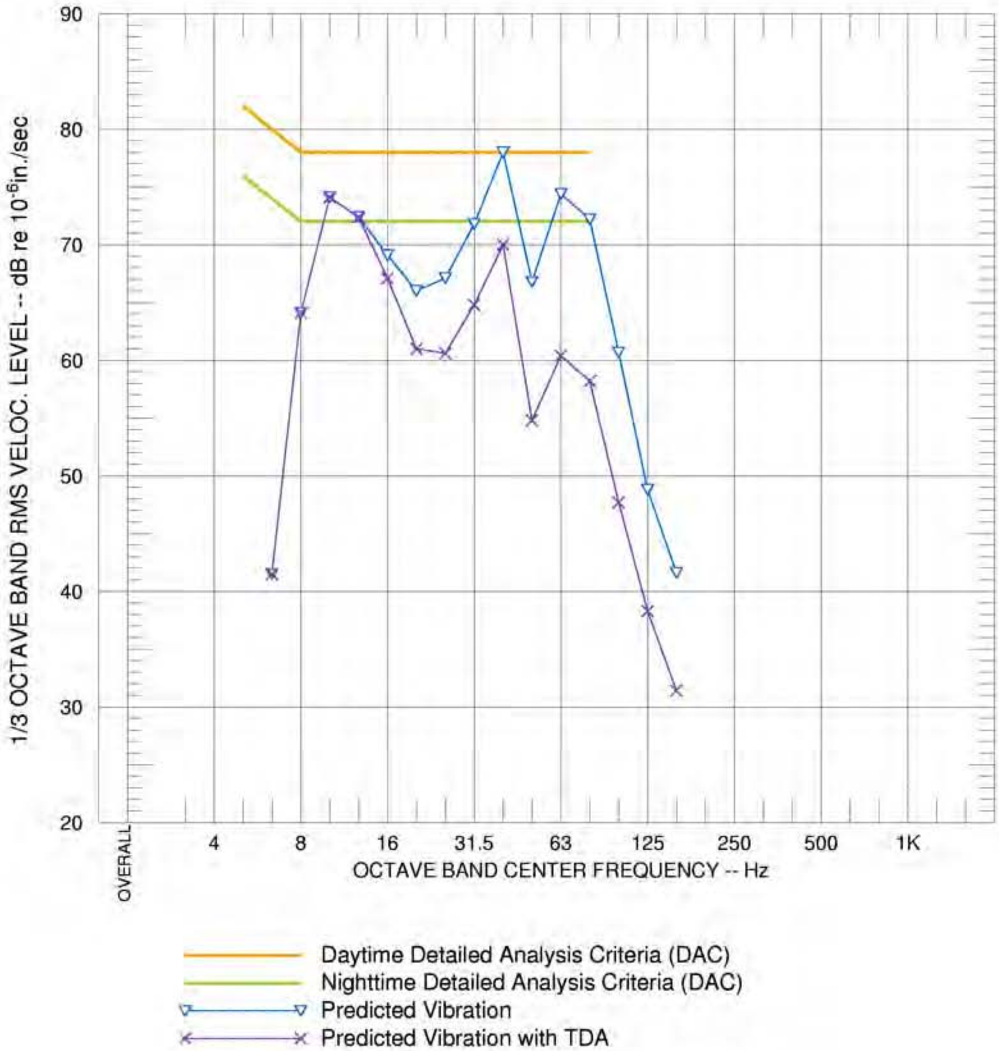

FIGURE 6.2 COMPARE VIBRATION AT RESIDENCE AT 28+20 SB (WHITESTONE) AT-GRADE SECTION WITH TDA, WITH POTENTIAL RESIDUAL IMPACT 64 FT FROM NEAR TRACK CENTERLINE

7 PILE DRIVING NOISE AND VIBRATION

Construction noise impacts were identified during the environmental phase for homes within 125 ft of the corridor. The EIR includes control measures for pile driving activities:

- impact pile driving is limited to weekdays and the hours of 8 AM to 5 PM,
- avoid impact pile driving near noise-sensitive areas, where possible,
- use drilled piles, sonic or vibratory pile drivers where geologically feasible.

The EIR indicates that construction noise impacts would be reevaluated during final design.

Generally, for stiff sand and clay subsoil conditions, the traditional impact hammer is often used, and depending on pile length and subsurface conditions, each pile may require approximately 30 to 60 minutes of constant hammering to drive into the ground. For the VTA Capitol Corridor project, there would be several piles driven daily. Assuming 16 in or 18 in square reinforced concrete piles at 65 to 75 ft lengths, there may be 9 to 12 piles driven each day, for a duration of 3 to 6 days at each column site. The aerial structure columns are typically spaced about 120 to 130 ft apart. Thus, as the piles for each column are completed, the piling activity would move about 120 to 130 ft to the next column site.

In addition, five homes along Capitol Avenue, approximately 40 to 60 ft from the VTA aerial structure, were previously slated for demolition during the environmental phase. Based on the current engineering design, those homes would not be taken.

Thus, this analysis addresses two purposes:

1) determination of impact (environmental analysis) for the five homes that have been removed from the “take” list,
2) determine noise and vibration control measures required to reduce (and preferably to eliminate) adverse impacts.

Along the Project, piles for the aerial structure would be driven from approximately Sta. 12+00 to 21+90, approximately 40 to 130 ft from residential structures and 50 to 130 ft from commercial structures.

7.1 Pile Driving Noise

The noise from typical pile driving is primarily generated by the contact between the hammer and the pile (metal on concrete), or between the hammer slug and the anvil (metal on metal). Based on measurements conducted by WIA at construction projects in the bay area, this can generate maximum noise levels on the order of 85 to 105 dBA at 100 ft [14] for diesel and hydraulic hammers, depending on the hammer size, pile type and subsoil conditions. Sonic and vibratory drivers use a continuous, steady-state vibration to push the pile into the ground, and under ideal conditions (with no debris or other obstructions in the pile path) these methods can generate noise levels less than 80 dBA at 100 ft. Static/inertia methods and screw/twisting methods do not use the traditional hammer, and generate even lower levels of noise. The use of stubs or follows to drive the top of pile below the ground surface also adds some 4 to 5 dBA to the pile driving noise; the ringing of the metal stub

[14] Measurements taken with the slow meter setting

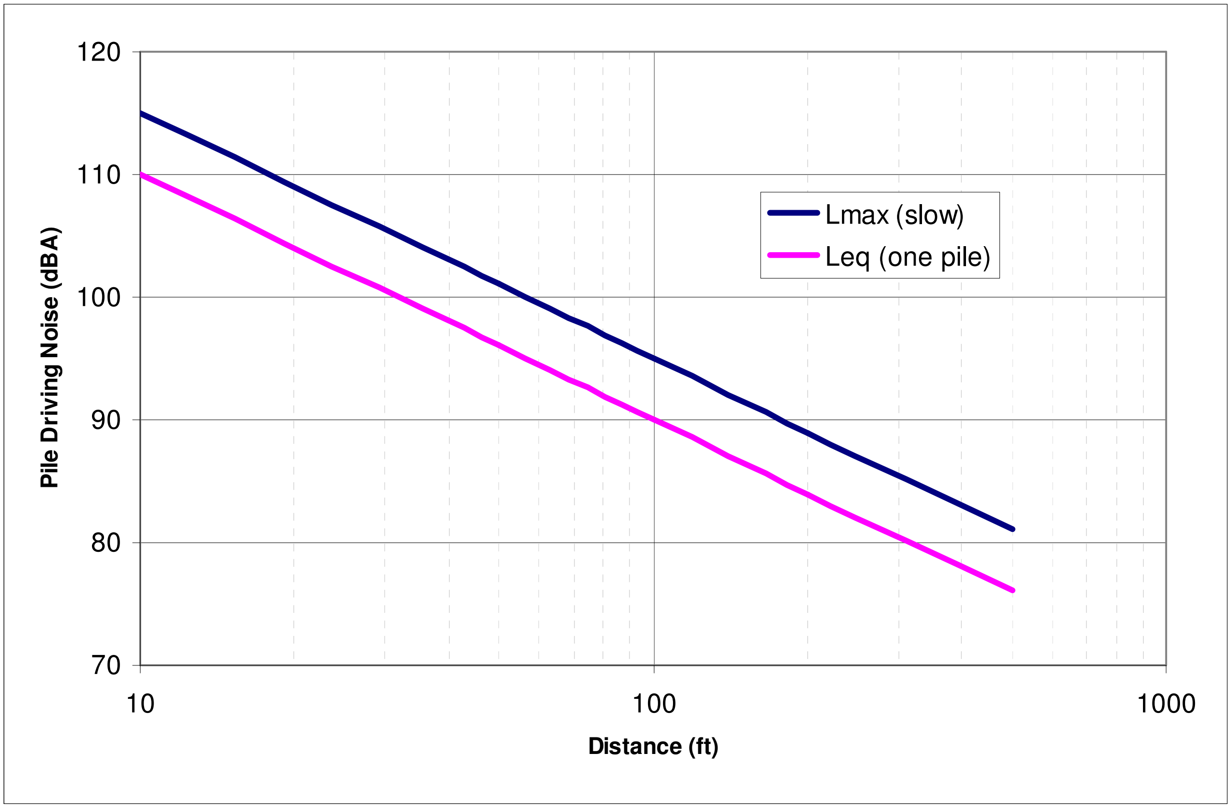

FIGURE 7.1 EXPECTED PILE DRIVING NOISE LEVELS

and the noise characteristics of metal on metal impacts also make the pile driving noise more objectionable and annoying. Figure 7.1 illustrates the expected pile driving noise levels as a function of distance. This data indicates that residences within 270 ft of pile driving activity would experience noise levels exceeding the FTA criterion of 80 dBA Leq. As discussed in Section 2.3, the threshold at which pile driving noise impacts become "substantial" has not been identified[15].

Furthermore, building occupants within 180 ft of the pile driving would experience maximum noise levels exceeding the *recommended* maximum noise criterion of 90 dBA.

The equivalent noise level (L_{eq}) during impact pile driving is approximately 5 dBA less than the maximum noise level (slow setting), depending on the hammer rate and the type of pile. Thus, time-averaging the L_{eq} over an 8-hour construction day, the equivalent noise level from impact pile driving, measured at 100 ft, is expected to be 86 dBA (L_{eq}) for piles driven over an aggregate duration of 3 hours, up to a range of 90 dBA (L_{eq}) for pile driven over an aggregate duration of 7 hours (allowing a minimum 1 hour for pile setup). Such noise levels would exceed the FTA Construction daytime noise criteria indicated in Table 2.3.

Thus, as the aggregate duration of pile driving is reduced, a higher noise level threshold is allowed to comply with the FTA Criteria, as shown in Table 7.1.

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[15] In Section 2.3 we suggest that the number of days of pile driving noise which exceeds the FTA criteria should be considered when determining whether the impact is substantial and adverse.

TABLE 7.1 NOISE LEVEL ADJUSTMENT FOR DAILY PILE DRIVING - TO COMPLY WITH FTA CRITERIA[1] (BASED ON AGGREGATE DURATION OF ACTIVITY)

Aggregate Hours per Day	Adjustment to the Measured Pile Driving L_{eq} (pile)	Allowable Pile Driving Noise at Residences L_{eq} (pile)
7 to 8	0 dBA	80 dBA
6	-1 dBA	81 dBA
5	-2 dBA	82 dBA
4	-3 dBA	83 dBA
3	-4 dBA	84 dBA
2.5	-5 dBA	85 dBA
2	-6 dBA	86 dBA

Note 1: L_{eq}(8 hour) = 80 dBA

Table 7.2 summarizes the expected noise levels from impact pile driving, assuming 6 hours of pile driving noise each day (30 minutes for 12 piles). The range of data represents the noise from the nearest column and the next closest column. As shown in this table, without noise reduction or aggregate time duration limits, the impact pile driving noise level would exceed the FTA criteria at most residences and businesses adjacent to the VTA aerial structures. Depending on the length of the piles and the height of the hammer, this noise impact could extend to the second row of buildings, affecting homes as far as 375 ft away.

As the pile driving activity progresses along the VTA alignment, it would move farther from (or closer to) each building by approximately 120 to 130 ft. For buildings close to the alignment (e.g., 40 to 60 ft), this difference in distance would cause the noise level to change by approximately 6 to 10 dBA; pile driving *two* columns away would cause a change of 12 to 15 dBA. For buildings farther from the alignment (e.g., 100 to 120 ft), noise at one column distance would be 2 to 4 dBA less, and activities two columns away would be 6 to 8 dBA less.

Table 7.2 also indicates the amount of noise reduction recommended, depending on whether the noise impact would be controlled for the nearest column foundation construction, or whether the noise impact would be controlled for the next nearest column foundations.

TABLE 7.2 PILE DRIVING NOISE (dBA) - 6 HOURS OVER AN 8 HOUR DAY
RANGE OF DATA SHOWN FOR NEAREST PILE AND NEXT NEAREST PILE

Civil Station	Dist. to Nearest Column (ft)	Building (Number)	Crit. dBA	Pile Driving Noise (L_{eq}) Nearest Column	Next Nearest	Reduction Recom[1]
10+80 to 11+60 SB	295 to 525 ft	Capitol Avenue residences (4)	80	75 to 80	73 to 77	none
11+60 to 12+00 SB	230 ft	Capitol Avenue residence (1)	80	82	78	none to A
12+00 to 12+40 SB	75 to 165 ft	commercial (2)	85	85 to 91	78 to 80	none
13+90 to 14+50 SB	175 ft	Excalibur Residences (3)	80	84	80	none to A
14+50 to 18+60 SB	105 to 150 ft	Capitol Avenue residences (22)	80	86 to 88	81 to 83	A to B
19+00 to 20+60 SB	95 to 115 ft	Commercial (3)	85	88 to 89	82 to 83	A to B
20+70 to 21+30 SB	95 to 110 ft	Brentford residences (4)	80	88 to 89	82 to 83	A to B
21+30 to 21+90 SB	150 to 310 ft	Brentford residences (4)	80	81 to 86	78 to 81	A
11+00 to 11+80 NB	360 to 500 ft	Capitol Avenue residences (3)	80	75 to 78	73 to 76	none
11+80 to 12+30 NB	160 to 230 ft	Capitol Avenue residences (2)	80	82 to 87	79 to 81	A to B
12+30 to 14+00 NB	35 to 85 ft	Capitol Avenue residences (8)	80	91 to 99	83 to 86	B to C
14+00 to 15+00 NB	100 to 110 ft	Dover Way residences (5)	80	88 to 89	82 to 83	A to B
16+60 NB	145 ft	California Teachers	85	86	81	none
17+20 NB	135 ft	Templo Juan	80	86	81	A(2)
18+00 NB	145 ft	Assemblies of God	80	86	81	A(2)
18+50 to 19+80NB	135 to 170 ft	Gas Station/Commercial (4)	85	84 to 86	80 to 81	none
20+20 to 20+50 NB	85 ft	Kollmar Apartments (1)	80	89	82	A to B
20+50 to 21+50 NB	125 to 130 ft	Capitol Avenue/Sussex residences (2)	80	87	81 to 82	A to B
21+50 to 21+90 NB	195 to 310 ft	Capitol Avenue/Tudor (2)	80	77 to 83	77 to 79	none to A

Note 1: If indicator pile testing shows that lower noise levels can be achieved, then the noise control effort may be reduced accordingly.
Note 2: Only if church activities will occur during pile driving work.
Reduction Measures: A: 5 dBA, B: 5 to10 dBA, C: 10 dBA or greater

7.2 Pile Driving Vibration

Based on vibration data from pile driving activities collected around the Bay Area, we expect that the vibration from impact pile driving of concrete piles for the VTA project could generate vibration exceeding 0.3 in/sec (PPV) at 100 ft depending on the hammer size, pile type and subsoil conditions. Sonic, vibratory drivers and static/inertia methods and screw/twisting methods generate lower levels of vibration. Impact, sonic and vibratory pile driving would generate vibration which can be clearly feelable to people in buildings within 50 ft of the piling activity. Figure 7.2 illustrates the expected vibration velocity amplitudes as a function of distance from the pile driving activity.

This data is based on measurement data from pile driving at unrelated projects and the vibration propagation characteristics of the soil measured in June 2006 (and discussed above for the LSR).

The vibration from driving each pile would vary somewhat as the depth of the pile increases, and this signature would vary from location to location, depending on the underlying soil. In the Appendix, we have included a typical plot of the peak particle velocity in the vertical direction over the course of one pile.

Table 7.3 summarizes the expected vibration amplitudes from impact pile driving, using data shown in Figure 7.2. As shown in this table, without vibration reduction, the impact pile driving vibration would exceed the building damage criteria at approximately 43 residential buildings and some businesses adjacent to the VTA aerial structures.

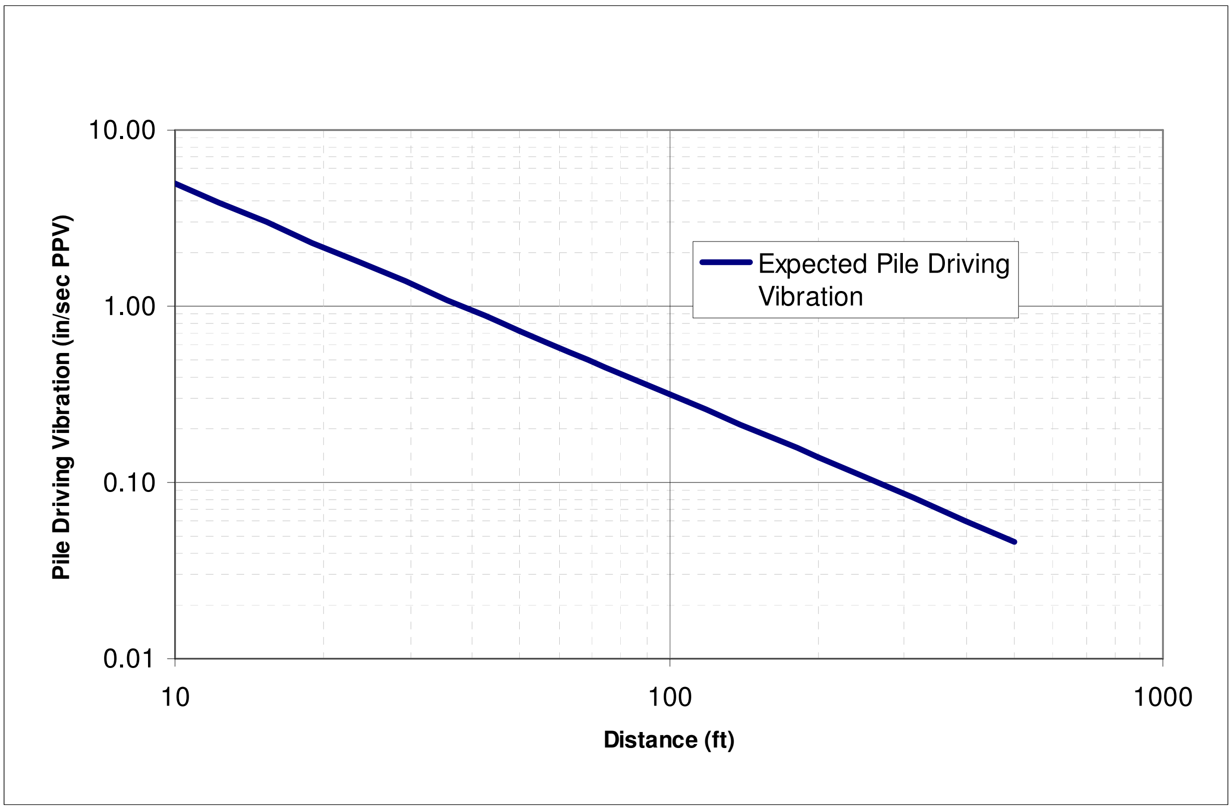

FIGURE 7.2 EXPECTED GROUND VIBRATION FROM PILE DRIVING

As discussed above for noise, as the pile driving activity moves along the VTA alignment, it would move farther from (or closer to) each building by approximately 120 to 130 ft. For buildings close to the alignment (e.g., 40 to 60 ft), this difference in distance would cause the vibration level to change by a factor of 2 to 3; pile driving *two* columns away would cause a change by a factor of 4 to 6. For buildings farther from the alignment (e.g., 100 to 120 ft), vibration at one column distance would be about a factor of 1.5 less, and activities two columns away would be a factor of 2 less. Vibration beyond 144 ft of the pile driving should be 0.2 in/sec PPV or less and would thus be in compliance with the FTA Construction Vibration criteria.

TABLE 7.3 PILE DRIVING VIBRATION (in/sec PPV)

Civil Station	Dist. (ft)	Building (Number)	FTA Criteria		Pile Driving Vib.[1]		Notes/ Control Meas.
			Annoy.	Bldg. Damage	Nearest Column	Next Nearest Column	
10+80 to 11+30 SB	410 to 525 ft	Capitol Avenue residences (3)	0.015	0.2	≤0.060	≤0.060	2
11+40 to 12+00 SB	230 to 295 ft	Capitol Avenue residences (2)	0.015	0.2	0.09 to 0.12	0.07 to 0.09	2
12+00 to 12+40 SB	75 to 165 ft	commercial (2)	N/A	0.5	0.17 to 0.43	0.09 to 0.15	none
13+90 to 14+50 SB	175 ft	Excalibur Residences (3)	0.015	0.2	0.16	0.09	2
14+50 to 18+60 SB	105 to 150 ft	Capitol Avenue residences (22)	0.015	0.2	0.20 to **0.29**	0.10 to 0.12	X,2
19+00 to 20+60 SB	95 to 115 ft	Commercial (3)	N/A	0.5	0.27 to 0.34	0.12 to 0.13	none
20+70 to 21+30 SB	95 to 110 ft	Brentford residences (4)	0.015	0.2	**0.29** to **0.32**	0.12 to 0.13	X,2
21+30 to 21+90 SB	150 to 310 ft	Brentford residences (4)	0.015	0.2	0.08 to 0.20	0.06 to 0.10	2
11+00 to 11+80 NB	210 to 500 ft	Capitol Avenue residences (4)	0.015	0.2	0.05 to 0.13	0.04 to 0.08	2
12+10 to 14+00 NB	35 to 130 ft	Capitol Avenue residences (9)	0.015	0.2	**0.23** to **1.20**	0.11 to **0.21**	X, Y,2
14+00 to 15+00 NB	100 to 110 ft	Dover Way residences (5)	0.015	0.2	**0.28** to **0.32**	0.12 to 0.13	X,2
16+60 NB	145 ft	California Teachers	0.015	0.2	0.20	0.10	2
17+20 NB	135 ft	Templo Juan	0.015	0.2	**0.21**	0.11	X,2
18+00 NB	145 ft	Assemblies of God	0.015	0.2	0.20	0.10	2
18+50 to 19+80 NB	135 to 170 ft	Gas Station/Commercial	N/A	0.5	0.17 to 0.21	0.09 to 0.11	none
20+20 to 20+50 NB	85 ft	Kollmar Apartments (1)	0.015	0.2	**0.31**	0.13	X,2
20+50 to 22+00 NB	125 to 130 ft	Capitol Avenue/Sussex residences (2)	0.015	0.2	**0.23** to **0.24**	0.11	X,2
21+50 to 21+90 NB	195 to 310 ft	Capitol Avenue/Tudor (2)	0.015	0.2	0.08 to 0.14	0.06 to 0.08	2

Control Measure: X: crack survey and repair damage, Y: Use Non-Impact Methods

Notes 1: Bold numbers indicate potential threshold damage exceedance.

2: Potential Annoyance or Work Interference

8 PILE DRIVING NOISE AND VIBRATION CONTROL ALTERNATIVES

At the rate of three to six days per column site, the noise from impact pile driving would potentially exceed the FTA criteria for a minimum of three days at most receptors. Review of the noise predictions in Table 7.2 indicates that for a few receptors along the alignment the pile driving at two columns away (lower end of the range) would still exceed the FTA noise criteria; for these homes the noise impact could extend to eighteen days for three column sites. To reduce the level of noise impact, noise control measures could be implemented to limit the duration of noise impact to a span of 3 to 6 days (e.g., work conducted on the nearest column foundation).

For most areas of construction noise impact, the noise control measures should reduce the noise by about 5 dBA. This may require the use of a noise shield and/or reducing the daily aggregate impact pile driving time as discussed above in Table 7.1. The noise shield should be constructed of material with a minimum surface density of 2 lb/sq ft with a sound transmission class of STC 25 or greater. If this option is pursued, more details should be provided in the construction specifications. There are safety and equipment maintenance issues which need to be resolved and coordinated in the specification, construction and use of a pile driving shroud. There is one vendor who can custom manufacture a “curtain.” To date, we have seen limited success with lightweight materials (less than 1 lb/sq ft), but we have not yet seen an effectively implemented heavyweight shroud.

For the residences near the Sta. 14+00 NB, within 85 ft from the piling activity, the noise control measures should reduce the noise by 5 to 10 dBA. This may require the use of a noise shield as described above and reducing the daily aggregate impact pile driving time as discussed above for Table 7.1.

For residences which are between 85 to 300 ft from the piling activity, additional noise control measures can be considered, but the predicted noise impact would only occur while the piles are driven for the nearest column foundation.

Other “off-site” measures to provide additional **noise** control could include:

- Install temporary noise curtains/barriers at affected receptors. These barriers could be installed on the building (e.g., transparent, “STC 25" blankets), and, correctly installed, can potentially reduce the noise by 15 to 20 dBA inside the building. To evaluate the effectiveness of such measures, the maximum interior noise level should be no greater than 60 dBA, (5 dBA can be achieved with a lightweight shroud, but we have not yet seen an effective implementation with a heavyweight shroud),
- Relocate residents and offices for the duration of the nearby pile driving (e.g., three closest columns, 9 to 18 days),
- Provide a daytime “quiet” place in a hotel or temporary office where residents and businesses can conduct work-related business (e.g., internet access, telephone access, copier, etc.), or conduct quiet activities (e.g., read, nap, etc.).

Review of the vibration predictions in Table 7.3 indicates that the pile driving has the potential to exceed the FTA Construction Vibration Criteria at several residential buildings and one church. Vibration reduction techniques could include:

- soil-mix foundation
- moving foundation piles

The soil-mix method would involve an augered-stem to mix concrete into the soil, thereby increasing the stiffness. A single pile would then be inserted for the column foundation. To reduce the vibration by moving the foundation piles would require increasing the distance from the nearest pile to the residence to approximately 144 ft.

There may be some areas where the piling method cannot be feasibly changed. In those cases, there is the potential for generating cosmetic damage in nearby buildings, pending results of on-site vibration monitoring, discussed below. Cosmetic damage can be repaired, but the related logistics and legal issues may make it an expensive route to take.

There may also be some areas where the piling duration cannot be meaningfully reduced. In those cases, the potential for annoyance and work interference is increased, pending results of on-site vibration monitoring, discussed below. Reducing the daily duration of impact piling (to reduce annoyance) may increase the overall duration of the pile driving, thereby increasing the potential disruption and construction costs. However, “off-site” measures may be useful to reduce these impacts. Pre-construction crack surveys and vibration monitoring during construction should be conducted for these buildings within 135 ft. Table 7.3 also indicates that the vibration from the nearest and the next nearest column has the potential to cause annoyance.

Noise and vibration measurements during the indicator pile phase will be useful to confirm the noise and vibration generated by the contractor’s equipment. We recommend that noise and vibration monitoring be conducted to collect information regarding the maximum and equivalent noise levels generated during pile driving and to test any noise control measures. The vibration monitoring should measure vibration velocity information as a function of pile depth and distance from the pile. Since the soil conditions may vary along the project area, the vibration measurements should be collected at most, if not all, of the indicator pile test areas.

The following recommendations should reduce the adverse **vibration** impact (potential building damage):

- For buildings (residences and churches) which are less than 110 ft from the piling activity, 1) use non-impact methods and/or reduce amount of impact pile driving required and 2) conduct a detailed crack survey before and after the piling activity and repair any damage that is caused.

- Note that the peak particle vibration from pile driving has the potential to exceed the recommended criteria at approximately 43 residential buildings and one church within 135 ft of the nearest column structure. To reduce the occurrence of building damage, it is imperative that use of alternative methods be used where feasible and concurrent vibration and crack monitoring be conducted to monitor the vibration and reduce the likelihood of cosmetic damage.

- Move foundation/piles to 144 ft from nearest building would reduce the vibration to 0.2 in/sec or below.

To reduce the adverse **vibration** impact (annoyance), when possible, limit the duration of impact pile driving to three hours/day near daytime occupied buildings,

Other "off-site" measures to reduce the annoyance and work interference aspects of pile driving vibration could include:

- Relocate residents and offices for the duration of the nearby pile driving (e.g., three closest columns, 9 to 18 days),
- Provide a daytime "quiet" place in a hotel or temporary office where residents and businesses can conduct work-related business (e.g., internet access, telephone access, copier, etc.), or conduct quiet activities (e.g., read, nap, etc.).

Noise and Vibration Control Measures
A combination of the following measures is recommended to reduce noise and vibration impacts, as discussed above:

1. Noise Shield: A pile driving noise shield could be effective at reducing the pile driving noise by a minimum 5 dBA, depending on the size of the shield and how well it surrounds the pile and hammer. We have observed that contractors have a difficult time using a noise curtain because the curtain is difficult to control (e.g., flaps in the wind and catches on the hammer or pile when moved). We recommend that a portable shield/barrier be used with the following properties, to provide a nominal 10 dBA noise reduction:

    a. Use a frame and/or attachment devices which will resist the wind forces,
    b. Have a minimum height of 20 ft to cover the bottom half of the hammer and the top 10 ft of the pile,
    c. Use solid materials with a minimum surface density of 3 lb/sq ft (e.g., 3/4" plywood), or overlapping heavy construction blankets with a minimum 2 lb/sq ft density (e.g., STC 25, mass-loaded vinyl construction blankets),
    d. Shield and cover the pile and hammer on three sides (open to the crane operator or foreman),
    e. Crane shall be oriented so that the open side of the shield does not face any noise sensitive buildings,
    f. Overlap shield materials so that there are no gaps in the shield,
    g. The shield material should be located at least 6 inches away from the hammer and pile,
    h. Ideally, the entire pile surface area would be shielded by the noise shield, so that all four sides are blocked from nearby noise sensitive buildings.

2. Pre-Drilling Piles: Pre-drilling may provide a means to reduce the duration of impact pile driving, and should be explored. Reducing the total impact time to an aggregate duration of no more than 2 hours per day will reduce the equivalent noise level by 6 dBA to a range of 80 to 90 dBA (L_{eq}) at a distance of 100 ft.

3. Non-Impact Piles: Using the Soil-Mix method would reduce the vibration below the FTA Criteria. We recommend this technique be considered for homes which would be within 75 ft of pile driving.

4. Reduced Impact Pile Driving Time: Limiting the hours per day of impact pile driving would reduce the equivalent noise level and would reduce potential work interference.

5. Excessive Vibration: If pile driving amplitudes exceed the building threshold criteria, cosmetic repair work may be required at nearby buildings. A detailed pre-construction crack survey should be conducted at homes and businesses where these criteria are expected to be exceeded, and vibration monitoring, crack monitors and photo documentation should be conducted during pile driving activity.

6. Relocating Items on Shelves: Since items on shelves and walls may move during pile driving activity, we recommend that nearby residents be advised that they should move fragile and precious items off of shelves and walls for the duration of the impact pile driving. Achievement of standards for building damage would not eliminate annoyance, since the vibration would still be quite feelable.

7. Advance Notification (Work Interference): The impact pile driving vibration may cause interference with persons working at home or the office on their computers. We recommend that the nearby residents and businesses be advised in advance of times when piles would be driven, particularly piles within 160 ft of any occupied building, so that they may plan accordingly, if possible.

8. Notification of Pile Driving Schedule: Nearby residents and businesses should be kept up to date on the expected pile driving schedule. In particular, these notifications should be made with home-bound residents, homes where there is day-time occupancy (e.g., work at home, stay-at-home parents) and offices/commercial businesses where extensive computer/video monitor work is conducted.

Contractor Controls

In light of the above, we recommend that the following items be incorporated into the Contractor specifications for the Indicator and Production pile driving programs:

- Comply with the maximum noise levels (L_{max}) and equivalent noise levels (L_{eq}) indicated in Table 2.3,
- Comply with the maximum vibration limits indicated in Table 2.4,
- Perform a detailed crack survey and photo documentation prior to construction of all potentially affected wood-frame buildings within 135 ft of the piling activity,
- Coordinate and perform noise and vibration monitoring at a representative sampling of potentially affected buildings along the Project corridor,
- Install crack monitors and provide photo documentation at all potentially affected buildings during pile driving activity and through construction,
- Community Notification and Involvement:
  - provide a minimum four-week advance notice of start of piling operations to all affected receptors (e.g., internet, phone and fax), and regular, up-to-date communications. This includes education of the public on the expected noise and vibration,

- provide a knowledgeable Community Liaison to Respond to Questions and Complaints regarding pile driving noise and vibration,
- provide assistance as needed to nearby residents or offices who may require help relocating valuable items off shelves.

9. CONCLUSIONS AND RECOMMENDATIONS

Noise and vibration impacts have been indicated for the VTA CELR project, and the effectiveness of control measures have been discussed. The analyses to date indicate that Project area would generate higher than expected vibration due to the interaction of the VTA system and the Project area soils. Some additional studies are recommended during Final Engineering to study several parameters, including:

- Project-specific tests of the combined LSR and BVR to document potential local behaviors of buildings,
- Deeper TDA layer effect with a finite element analysis or test measurement program to evaluate how much additional vibration reduction could be achieved,
- Embankment vibration amplification effect at 60 to 100 ft distance.

Noise Control Measures:
For the current design and operating conditions, noise control measures in the form of an embankment/aerial structure sound barrier is indicated to reduce noise at eight homes (**Severe Impact**). The barrier should extend from Sta. 12+05 to 14+30 NB with a minimum height of 2.7 ft above top of rail.

To reduce noise which exceeds the FTA **Moderate** Impact criteria, the following could be implemented:

Transition/Aerial Structure Sound Barrier

- Sta. 13+70 to 18+95 SB, 2.1 ft above TOR (24 homes)
- Sta. 20+05 to 21+90 SB, 3.2 ft above TOR (3 homes)
- Sta. 19+50 to 21+10 NB, 3.9 ft above TOR (1 building)
- Sta. 21+10 to 22+80 NB, 3.2 ft above TOR (5 homes)

At-Grade Median Sound Barrier

- Sta. 11+00 to 12+10 SB, 3.5 ft above TOR (3 homes)
- Sta. 11+15 to 12+50 NB, 3.5 ft above TOR (3 homes)

Vibration Control Measures:
For the current design and operating conditions, vibration control is indicated to reduce the vibration at 25 homes along the at-grade or embankment sections. The following vibration control measures (or better) are recommended to comply with the FTA Detailed Analysis Criteria:

~~Tire Derived Aggregate Underlayment~~
Vibration control is indicated for the following at-grade track areas:

- Sta. 10+60 to12+20 SB/NB - seven homes
- Sta. 21+25 to 23+15 SB/NB - eight homes
- Sta. 27+00 to 27+70 SB/NB - two homes
- Sta. 28+00 to 28+60 SB/NB - one home
- Sta. 28+80 to Sta 31+25 SB/NB - seven homes

Based on current information, TDA may not be sufficient to reduce the vibration, and additional vibration control measures might be required. Some possible measures are discussed in Section 6, and further study should be conducted during Final Design to determine which measures may be feasible, if any. The additional vibration control may be required for the following 11 homes (less than 90 ft from the near track) due to 3-car operation during the nighttime hours:

- Sta. 22+60 to 22+90 SB - two homes
- Sta. 27+20 to 27+40 SB - two homes
- Sta. 28+20 SB - one home
- Sta. 28+90 to 29+10 SB - two homes
- Sta. 29+90 SB - one home
- Sta. 30+40 to 30+80 SB - three homes

<u>Aerial Structure Vibration Impacts</u>

Vibration control is required to reduce the vibration impact at one home adjacent to the aerial structure (Sta. 14+00 NB) for 3-car operation during the daytime and nighttime hours. This could be accomplished by providing vibration isolation between the aerial structure guideway and the supporting bent structure. Alternatively, moving the column away from the residence (to 49 ft), reducing the operational speed to 50 mph during the daytime and 35 mph during the nighttime (with 3-car trains) or limiting trains to 1-car consists would reduce the vibration.

Pile Driving Impacts During Construction:

Pile driving would generate substantial noise and vibration levels. The noise would potentially impact homes within 270 ft of the pile driving activity for piles driven constantly over an 8 hour day, and the vibration would impact residences and office buildings within 144 ft of the pile driving activity. Noise and vibration control measures include scheduling and coordination with the public. Pre-construction crack surveys and vibration monitoring are also recommended for buildings close to the pile driving activity, as discussed above.

APPENDIX A: ADDITIONAL COMMENTS ON SOIL BARRIERS

Soil Barriers

The need for vibration control often brings up a question regarding surface or subsurface barriers to block the vibration. Some studies have been made of the viability of trenches, backfilled with lightweight material (e.g., styrofoam or TDA). We know of a study conducted by the Toronto Transit Commission, which indicated vibration reduction on the order of 3 to 5 dB for frequencies higher than 25 or 30 Hz. As shown above in Sections 5 and 6, the vibration impact is primarily due to vibration in the 30 to 80 Hz region, with some contributions around 12 Hz. Thus, a trench could be effective at reducing vibration, but this may be a costly option. Locally, a study by San Francisco MUNI using asbestos in the trench yielded poor results.

A recent paper presented at Inter-Noise 2006[16] describes research for a wave impedance barrier using a combination of gas-filled cushions, sheet piles and a soil mix wall to create a "Hybrid Vibration Isolation Wall." The research shows promising results for areas close to the wall (i.e., less than 12.5 m or 41 ft), however the effectiveness of the barrier decreases with increasing distance. The hybrid test configuration utilized a pattern of 13 m (42.6 ft) and 4 m (13.1 ft) deep sheet piles, and gas-filled cushions and soil mix wall to 8 m (26.2 ft) depth. A closer look at these research results is recommended during Final Engineering Design.

The question is often raised, because everyone has experience with sound barriers, and it seems obvious that a similar solution would work for vibration. Listed below are several relevant points:

- Sound and vibration involve wave propagation. Sound involves compression waves whereas ground vibration is more complex and involves different kinds of wave motion: surface (Rayleigh), shear, PSV (compression and shear), Love, and others.

- In order for a barrier to be effective, it needs to of comparable or larger dimension than the wavelength of the wave motion in question.

- Sound in air has a fairly consistent speed (344 m/s), and the corresponding wavelength for a mid frequency tone (e.g., 400 Hz) is 0.86 m (2.8 ft) and low frequency tone (e..g., 63 Hz) is 5.46 m (17.9 ft). Thus, 10 ft sound barrier would be very effective for the mid and high frequencies, but ineffective at the low frequencies. Since people are not very sensitive to the low frequencies, this is generally not a problem.

- Vibration speeds in soil is more complex, with a typical speed of 80 to 280 m/s. Transit vibration that may affect humans is generally restricted to frequencies below 250 Hz. Thus, the wavelength at *250 Hz is 0.32 to 1.12 m* (1.05 to 3.7 ft). As shown in Sections 5 and 6 above, vibration from VTA trains can generate substantial vibration at lower frequencies, with wavelengths at *12 Hz of 6.67 to 23.33 m (21.9 to 76.6 ft).*

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[16]Ishii, H., Kanda, H., et. Al., "Numerical Analysis on Vibration Reduction Effect of 'Hybrid Vibration Isolation Wall' Using Gas Cushions," paper presented at Inter-Noise 2006, December 2006, Honolulu, HI.

- Effective sound barriers for mid and low frequency sound have a surface density on the order of 2 to 4 lb/sq ft. This large discontinuity between the medium (air) and the barrier causes the waves to reflect off the barrier.

- Since soils in the vicinity of transit structures, roads and homes are fairly well compacted and dense, a "soil barrier" would need to be very lightweight (e.g., air, styrofoam) and soft, and contained in manner that is structurally stable. Thus the soil barrier should be a trench with a minimum depth of 50 ft and a minimum width of 3 ft

- As noted earlier, at least two tests have been conducted to evaluate the feasibility of these methods, with poor results.

APPENDIX B: SAMPLE PLOT OF PILE DRIVING VIBRATION

Pile Driving Vibration

The vibration from driving each pile would vary somewhat as the depth of the pile increases, and this signature would vary from location to location, depending on the underlying soil. The figure below illustrates a plot of the peak particle velocity in the vertical direction over the course of one pile, measured for an unrelated project in the Bay Area.

In some cases the vibration for the first few feet of the pile driving could be highest, as the pile punches through the top fill layers. Underlying soft layers would result in lower vibration, but as the pile is driven into the foundation layer, the vibration levels increase again. It may be the case that a pile is driven 30 ft with 60 to 120 blows in a few minutes, only to require an additional 30 minutes and over 1000 blows to drive the pile to required friction specifications (e.g. refusal)

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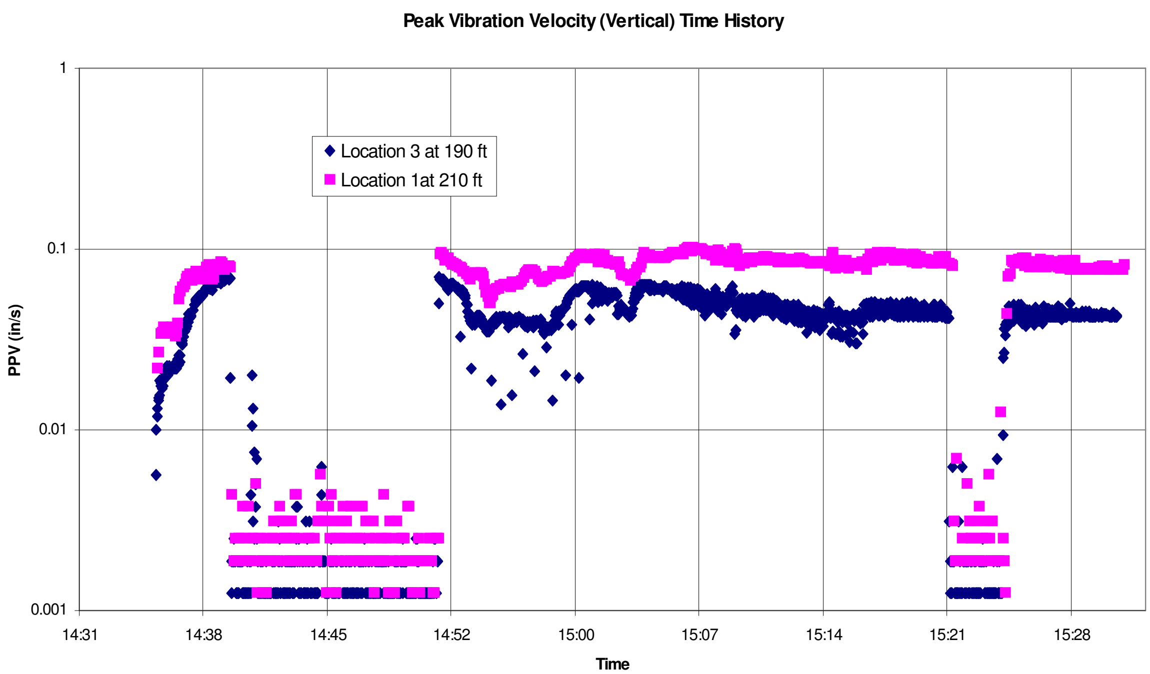

FIGURE CONCRETE INDICATOR PILE VIBRATION

APPENDIX C: COMPARISON OF VIBRATION PREDICTION RESULTS FOR EIR AND SEIR ANALYSES

Comparison of Predictions

The EIR indicated that there would be no vibration impact with TDA implemented on the median-running alignment. We have recalculated predictions using information used for EIR, compared with data used for SEIR. Note that we have obtained the EIR parameters from information provided in the Technical Report, but some data was not explicitly provided, and we had to *derive* those parameters. Table E-1 summarizes the vibration impact results from the EIR[17].

TABLE E-1 Vibration Impacts from EIR

Location	Side	Dist. To Near Track (Ft)	Speed (mph)	Groundborne Vibration (VdB) Without (With) TDA Mitigation		
				Project Level	Impact Crit.	Num Impacts
Northern Terminus to Story	E (NB)	55	35	75 (70)	72	1 (0)
	W (SB)	40	35	79 (73)	72	1(1)
Story Rd to Ocala	E (NB)	95	20	53	72	0
	W (SB)	75	45	73 (69)	72	12 (0)
Ocala to Cunningham	E (NB)	110	35	66	72	0
	W (SB)	N/A	N/A	N/A	72	N/A

In general, the main areas of difference between the EIR and Current analysis are as follows:

- Speed: The EIR used slower operational speeds, as low as 20 mph, compared to the current operational speed projections of 40 to 55 mph for most of the alignment. The difference in vibration levels for trains operating at 20 and 55 mph is 9 VdB

- FDL: The EIR used a different FDL (See Figure 5.2). The Kinkisharyo vehicle was measured by WIA for a different project. The initial indication was that the older UTDC vehicle and the newer Kinkisharyo vehicle were comparable, with no resulting difference in vibration. Unfortunately, with the low frequency soil characteristics of the CELR project, the differences between the two FDL are substantial, particularly at speeds higher than 45 mph (see Figure 5.2), and the contribute to increased vibration levels on the order of 5 VdB.

- Building Response: The EIR used a general assumption regarding building response to vibration, generally on the order of +1 dB. We have used measured building response data obtained at single family structures in San Jose and Fremont for a different project. That data, shown in Figure 5.4, shows that the response is on the order of 2 to 10 dB, depending on frequency.

[17]Technical Report, Table 14

- Soil Response (LSR): The EIR used the LSR response derived from a test conducted in a nearby school yard. While that data (EIRV1) seems high, we conducted additional soil propagation tests (see other section of the Appendix), and confirmed that the LSR response is valid for most of the alignment, and in some cases we measured even higher response. These LSR results increase the vibration 3 to 8 dB in the 8 to 10 Hz range.

- TDA Insertion Loss: The EIR calculations also overestimated the effectiveness of TDA in this project area. As discussed above, both the soil and FDL have substantial low frequency response, and the TDA is not effective on that frequency range.

Thus, the differences between the EIR analysis and the current analysis have increased the predicted vibration levels by as much as 18 VdB. Table E-2 presents a summary of the current analysis in the same format as Table E-1.

TABLE E-2 Vibration Impacts from SEIR Analysis

Location	Side	Dist. To Near Track (Ft)	Speed (mph)	Groundborne Vibration Without (With) TDA		
				Project Level (VdB)	FTA DAC Impact Crit. (dB)	Num Impacts[1]
Northern Terminus to Story	E (NB)	48 to 176	40 to 55	68 to 82 (77)	72	5(1)
	W (SB)	33 to 82	30 to 55	65 to 81 (76)	72	4(0)
Story Rd to Ocala	E (NB)	77 to 136	35 to 55	76	72	0
	W (SB)	103 to 146	30 to 55	68 to 83 (78)	72	18(11)
Ocala to Cunningham	E (NB)	85 to 157	30	74	72	0
	W (SB)	N/A	N/A	N/A	72	N/A

Note 1: using FTA DAC Criteria for nighttime

APPENDIX D: COMPARISON OF CELR LSR WITH VASONA LSR

Compare Vasona and CELR LSR

As indicated in the report, the local soil conditions for the CELR contributes to the level of vibration impact. To gain an understanding of how the vibration propagation for soils in the CELR may be different from other areas, we have plotted the range of measured LSRs for the Vasona and CELR projects in the Figure below.

The data shown are for a receiver at 50 ft from the source, and review of the data confirms that the low frequency response of the project area soils can be as much as 25 dB greater than those measured along the Vasona corridor. The data above 20 Hz is fairly similar between the two projects, but the high response of the CELR soils in the 8 to 12 Hz range, combined with the Kinkisharyo FDL result in predicted vibration levels which cannot be controlled with TDA or similar measures as discussed in the report.

Fortunately, the CELR alignment is generally farther away from residential buildings than the Vasona project, and the additional distance allows for dissipation of vibration.

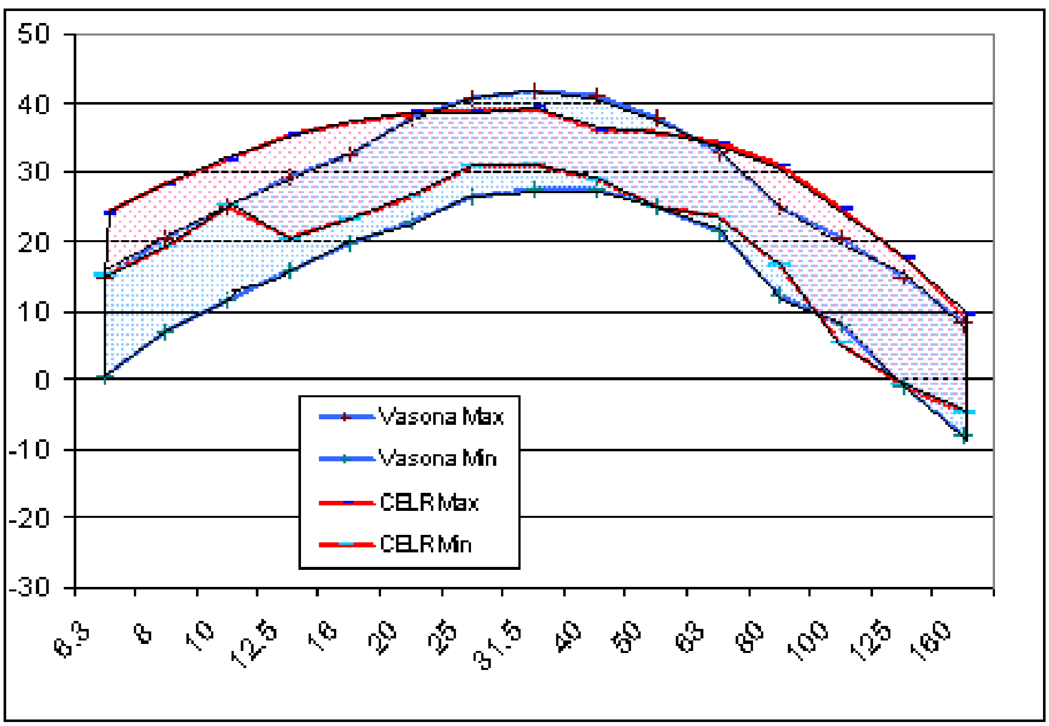

FIGURE D1 COMPARISON OF THE RANGE OF LSR DATA USED FOR VASONA AND CELR PROJECTS. DATA AT 50 FT FROM NEAR TRACK CENTERLINE

APPENDIX E: LSR MEASUREMENT RESULTS

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27 July 2006 File: 04163.01

FROM: Deborah A. Jue and Andrew Jessop, Wilson, Ihrig & Associates, Inc.

SUBJECT: Vibration Field Tests - Phase 1A
VTA Capitol Corridor

This memorandum summarizes the preliminary results from field work conducted in June 2006 for the VTA Capitol Corridor project.

Vibration propagation tests were conducted at four sites on 29 and 30 June 2006:
1) Capitol Court at Capitol Avenue,
2) Woodmoor Drive at Capitol Avenue,
3) Bambi Lane at Capitol Avenue, and
4) Highwood Drive at Capitol Avenue.

The test methodology incorporated the WIA instrumented drop hammer, in which a 40 lb weight was dropped from a height of 5 ft. The resulting force transmitted into the ground was measured with a load cell, and the resulting vibration propagated into the surrounding soil was measured with geophones mounted to the ground surface at various distances from the hammer.

At Location 1, the drop hammer was applied at eleven locations along Capitol Avenue at 30 ft spacings. See Figure 1. The geophones were mounted on Capitol Court to a distance of 150 ft from the centerline of the hammer locations and off-axis along Capitol Avenue to a distance of 100 ft from the centerpoint of the hammer locations. Capitol Court lies approximately 120 ft to the east of the VTA alignment.

At Location 2, the drop hammer was applied at eleven locations along Capitol Avenue at 30 ft spacings; the geophones were mounted on Woodmoor Drive to a distance of 200 ft from the centerline of the hammer locations and off-axis along Capitol Avenue to a distance of 150 ft from the centerpoint of the hammer locations. Woodmoor Drive lies approximately 125 ft to the east of the VTA alignment. See Figure 2.

At Location 3, the drop hammer was applied at Capitol Avenue at 30 ft spacings; the geophones were mounted on Bambi Lane to a distance of 200 ft from the centerline of the hammer locations and off-axis along Capitol Avenue to a distance of 150 ft from the centerpoint of the hammer locations. Bambi Lane lies approximately 120 ft west of the VTA alignment. See Figure 3.

At Location 4, the drop hammer was applied at the cul-de-sac at the end of Highwood Drive at 30 ft spacings; the geophones were mounted on Highwood Drive to a distance of 200 ft from the centerline of the hammer locations and off-axis to a distance of 100 ft from the centerpoint of the hammer locations. Bambi Lane lies approximately 85 ft to the east of the VTA alignment. See Figure 4.

The available geotechnical information indicates that the subsurface conditions in the project area are composed of fairly homogeneous soil with clay and sand. Our vibration propagation data indicates that Locations 2 and 3 have similar propagation characteristics, but the soil in the vicinity of Locations 1 and 4 have markedly different characteristics. LSRs obtained at locations 2 and 3 have similar characteristics as the EIRV1 LSR used in the first report, while Locations 1 and 4 are lower, particularly in the middle frequencies.

The raw data for each geophone transducer is illustrated in Figure 5 at 6.3 Hz and in Figure 6 at 31.5 Hz. The data shown is the surface vibration normalized by the input force, or point source transfer mobility.

Figure 7 illustrates the line source response (LSR) transfer mobility for all 4 measurements locations calculated at a distance of 100 ft. The LSR has been integrated over the length of a three-car train, to correspond to the expected response from train operations on an at-grade structure. Figure 7also shows the LSR that was used in the EIR (V1), derived from vibration propagation tests conducted in the playground of the nearby Ryan Elementary School. For areas between test locations, we grouped data for Locations 2 and 3 and Locations 1 and 4 into additional curve-fit sets.

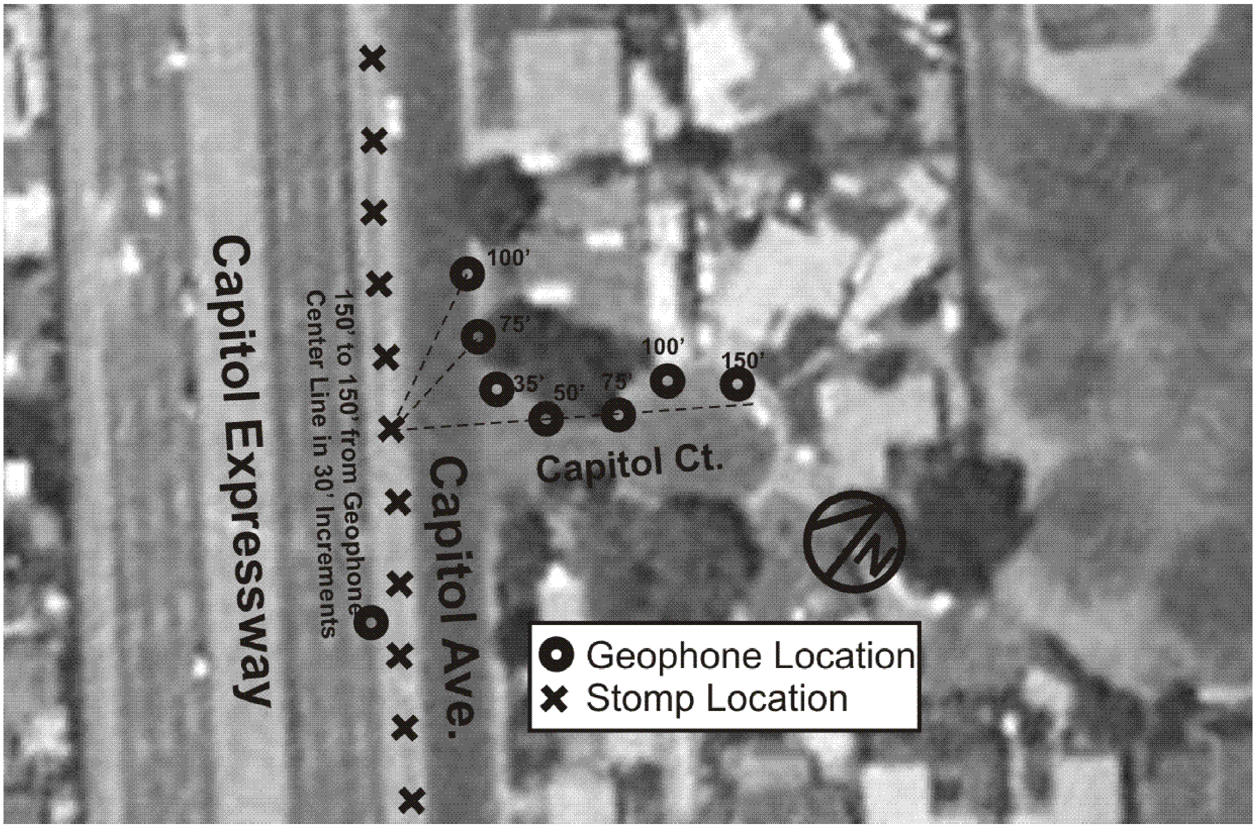

Figure 1 Location 1, Capitol Court

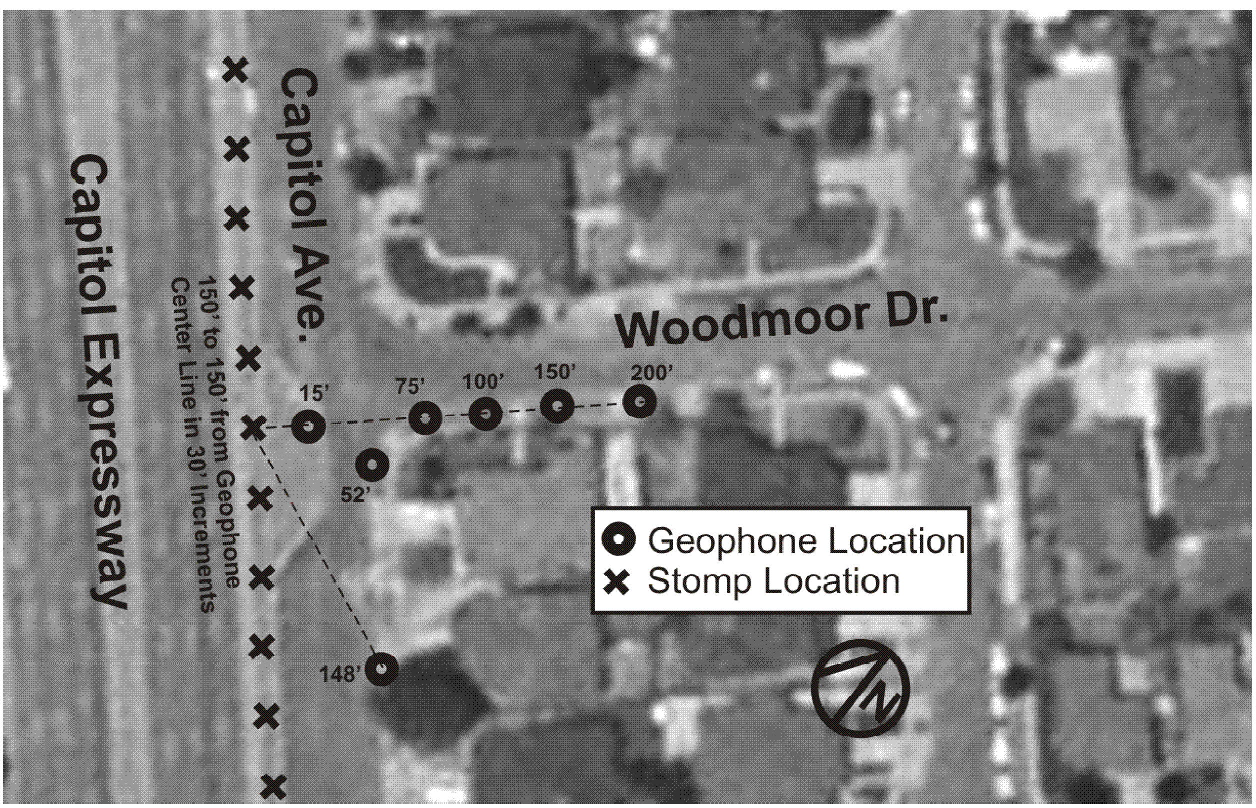

Figure 2 Location 2 Woodmoor Drive

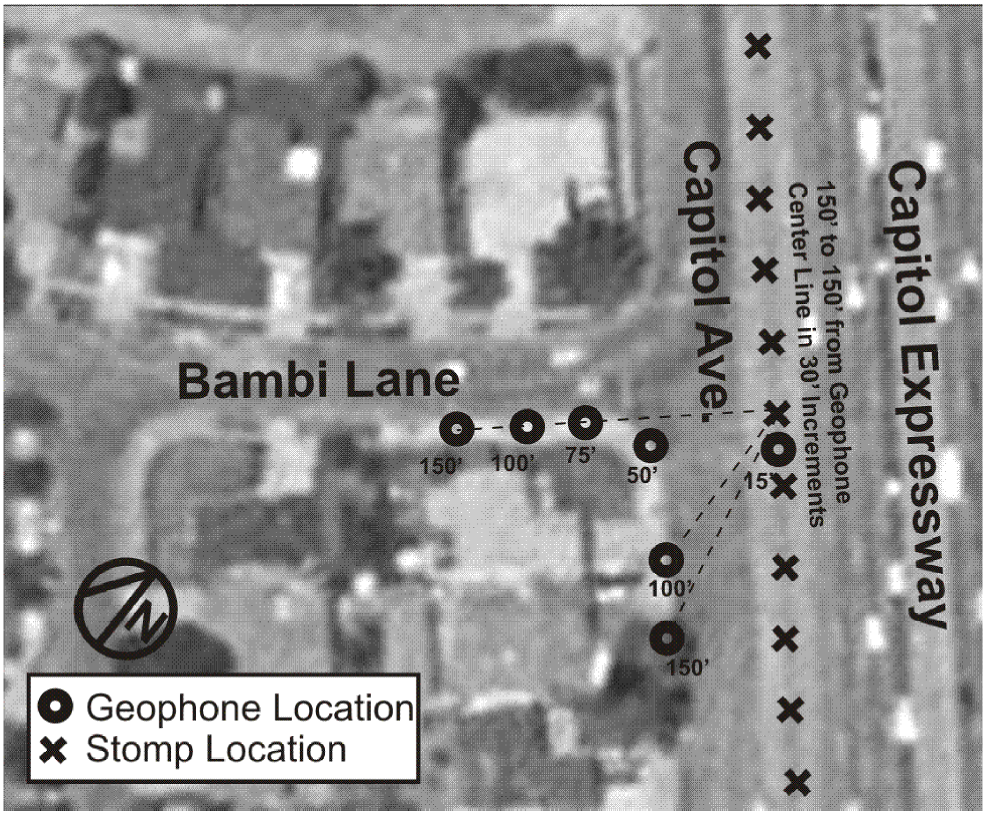

Figure 3 Location 3, Bambi Lane

Figure 5 Point Source Mobility at 6.3 Hz

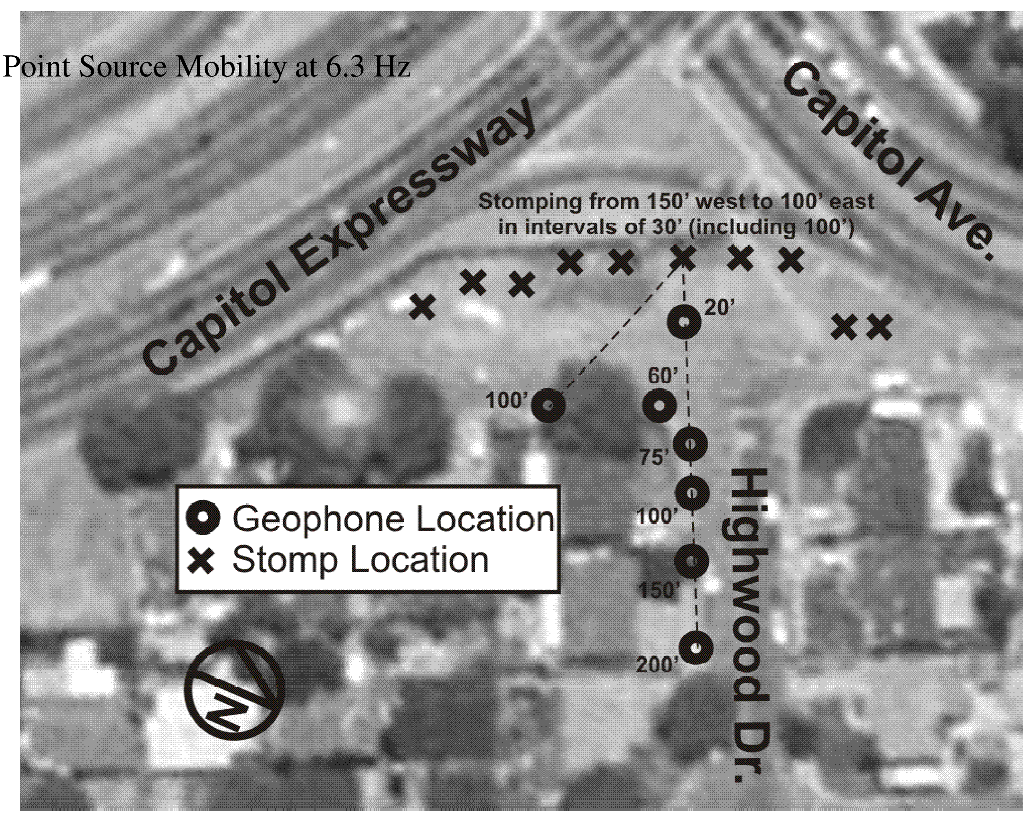

Figure 4 Location 4, Highwood Drive

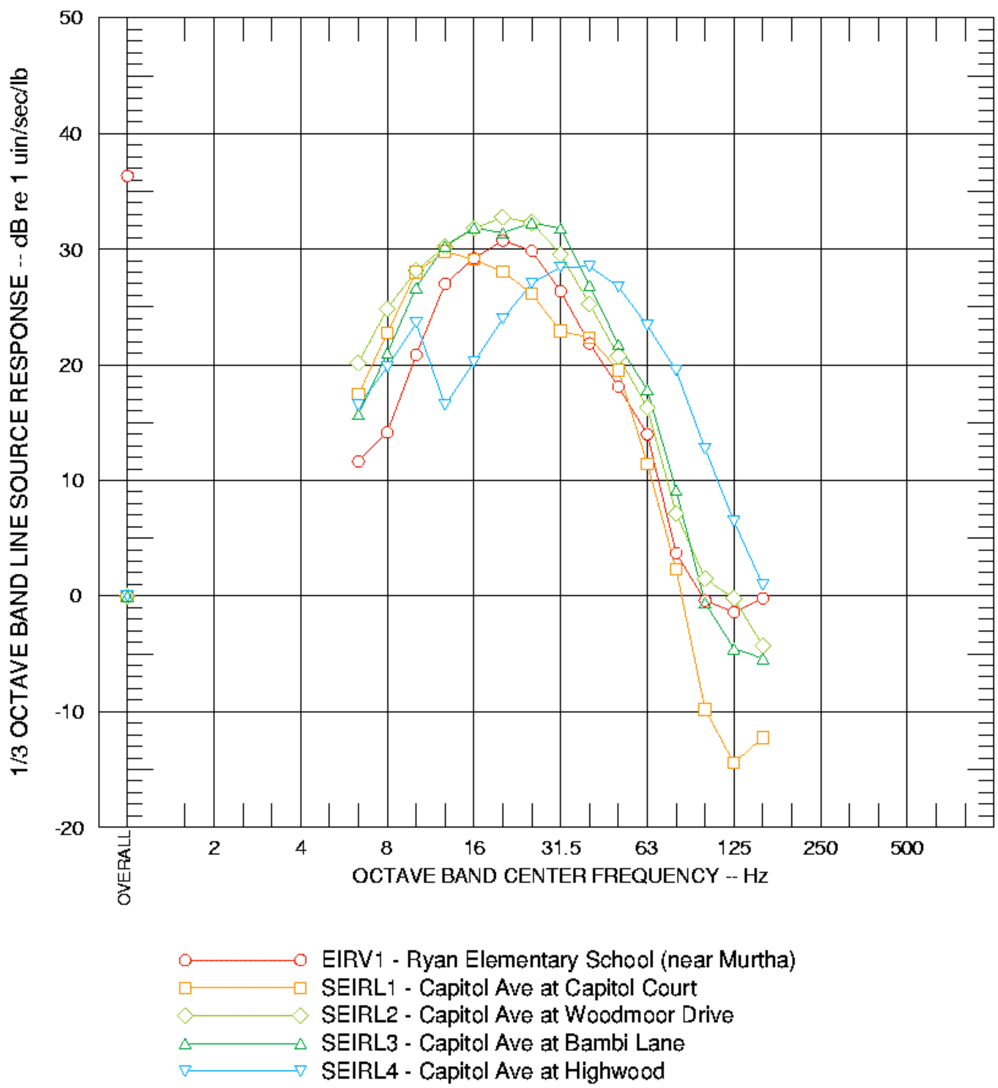

FIGURE 7 LINE SOURCE RESPONSE (LSR)
CALCULATED AT 100 FT DISTANCE FROM FORCE INPUT
THREE-CAR TRAIN (270 FT LENGTH)

APPENDIX F: AERIAL AND AT-GRADE MEASUREMENT RESULTS

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27 July 2006 File: 04163.01

FROM: Deborah A. Jue and Andrew Jessop, Wilson, Ihrig & Associates, Inc.

SUBJECT: Vibration Field Tests - Phase 1A
VTA Capitol Corridor

This memorandum summarizes the preliminary results from field work conducted in July 2006 for the VTA Capitol Corridor project.

Vibration from train passbys were conducted at three sites on 12 July 2006:
1) Lundy Place at Capitol Avenue (aerial structure)
2) Fallingtree Lane at Capitol Avenue (at-grade), and
3) Capitol Avenue near River Run Place (at-grade).

These measurements were conducted at areas where the soil conditions are expected to be similar. The measurements were normalized for speed and compared between the aerial structure and the at-grade locations to derive an empirical correction factor between at-grade and aerial structure.

At Location 1, the geophones were mounted at a distance of 10 and 62 ft from the nearest column. See Figure 1.

At Location 2, the geophones were mounted at a distance of 14.5 and 62 ft from the nearest track of the VTA alignment. See Figure 2.

At Location 3, the geophones were mounted at a distance of 13.5 and 49.5 ft from the nearest track of the VTA alignment. See Figure 3.

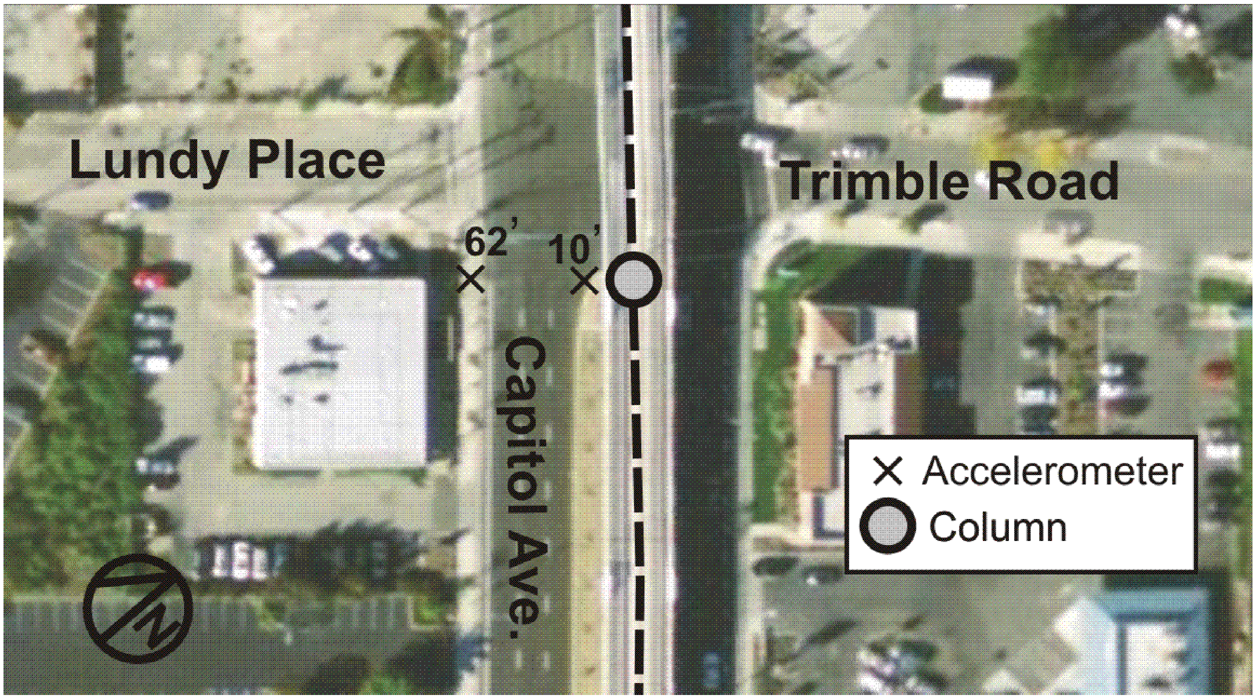
The available geotechnical information indicates that the subsurface conditions in the project area are composed of fairly homogeneous soil with firm to stiff clay..

Figure 4 illustrates selected passbys measured at Location 1, which were used to derive the correction factor. These passbys were correlated with their corresponding passbys at Locations 2 or 3 to reduce the influence of different train consists.

Figure 5 illustrates selected passbys measured at Location 2, which were used to derive the correction factor. These passbys were correlated with their corresponding passbys at Location 1.

Figure 6 illustrates selected passbys measured at Location 3, despite having a similar soil condition, the vibration was clearly dissimilar to Locations 1 and 2, and this data was not used to derive an aerial correction.

Figure 7 compares the aerial structure corrections derived from these measurements, with the previously derived correction used for the Vasona alignment. The final correction was obtained as an average of the two corrections.


Lundy Place
Trimble Road
62'
10'
Capitol Ave.
Accelerometer
Column
N


Falling Tree Dr.
13.5'
62'
Capitol Ave.
Accelerometer
N


River Run Dr
13.5'
49.5'
Capitol Ave.
N
× Accelerometer

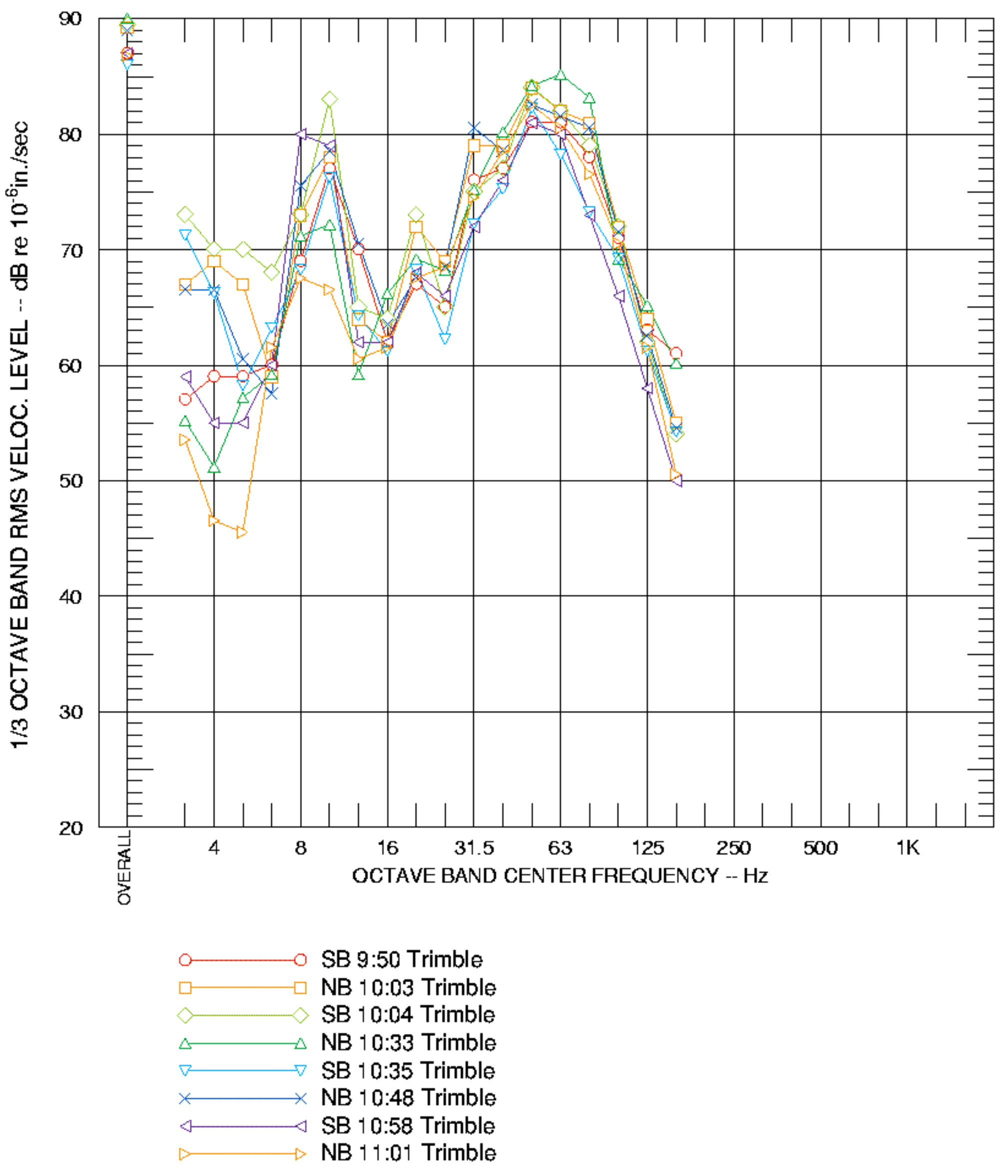


FIGURE 4 AERIAL PASSBYS 10 FT FROM NEAR COLUMN: LUNDY/TRIMBLE
12 JULY 2006
9:50 to 11:01 AM

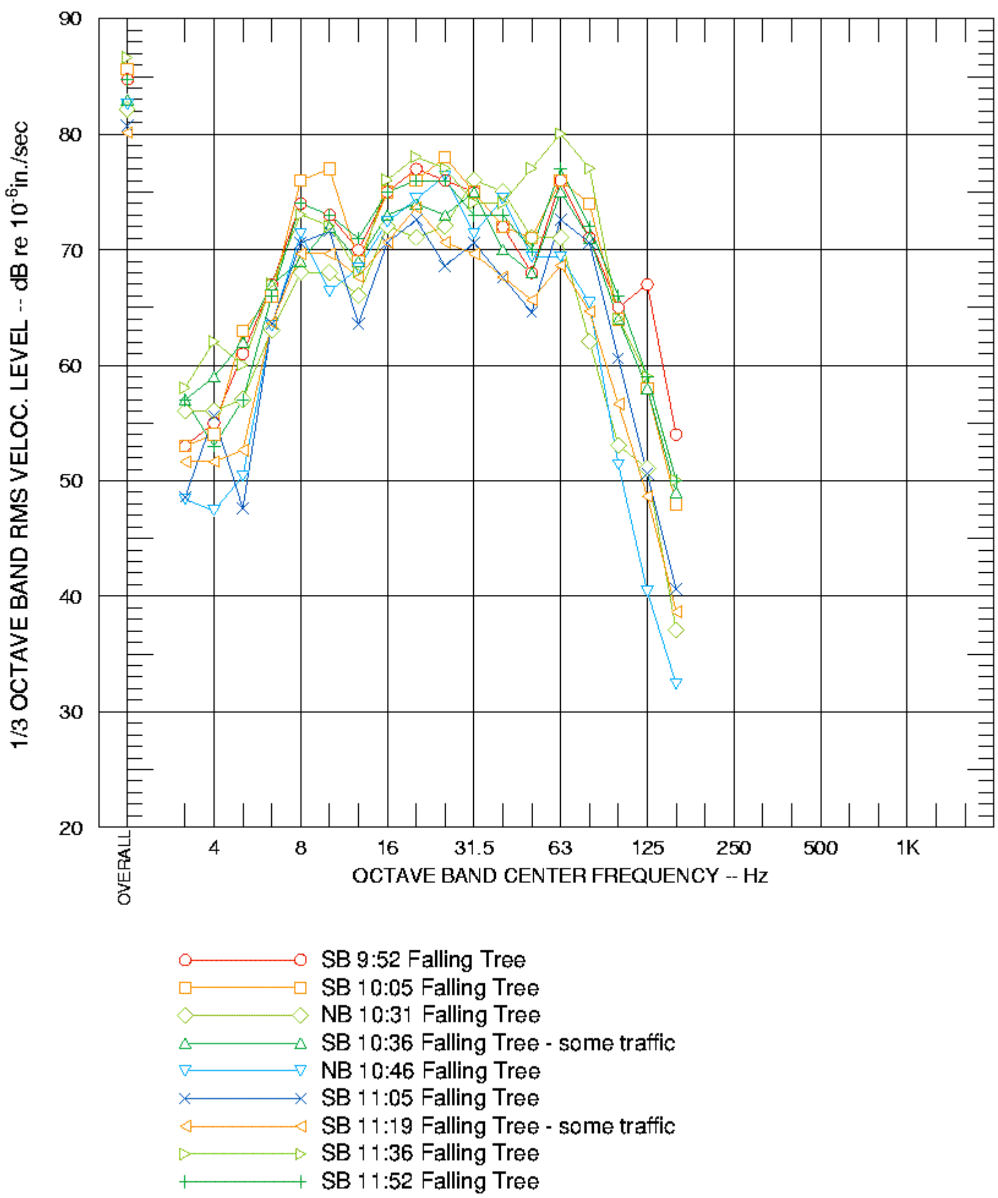


FIGURE 5 AT-GRADE PASSBYS 10 FT FROM NEAR TRACK (SB): FALLING TREE LN
12 JULY 2006
9:52 TO 11:52 AM

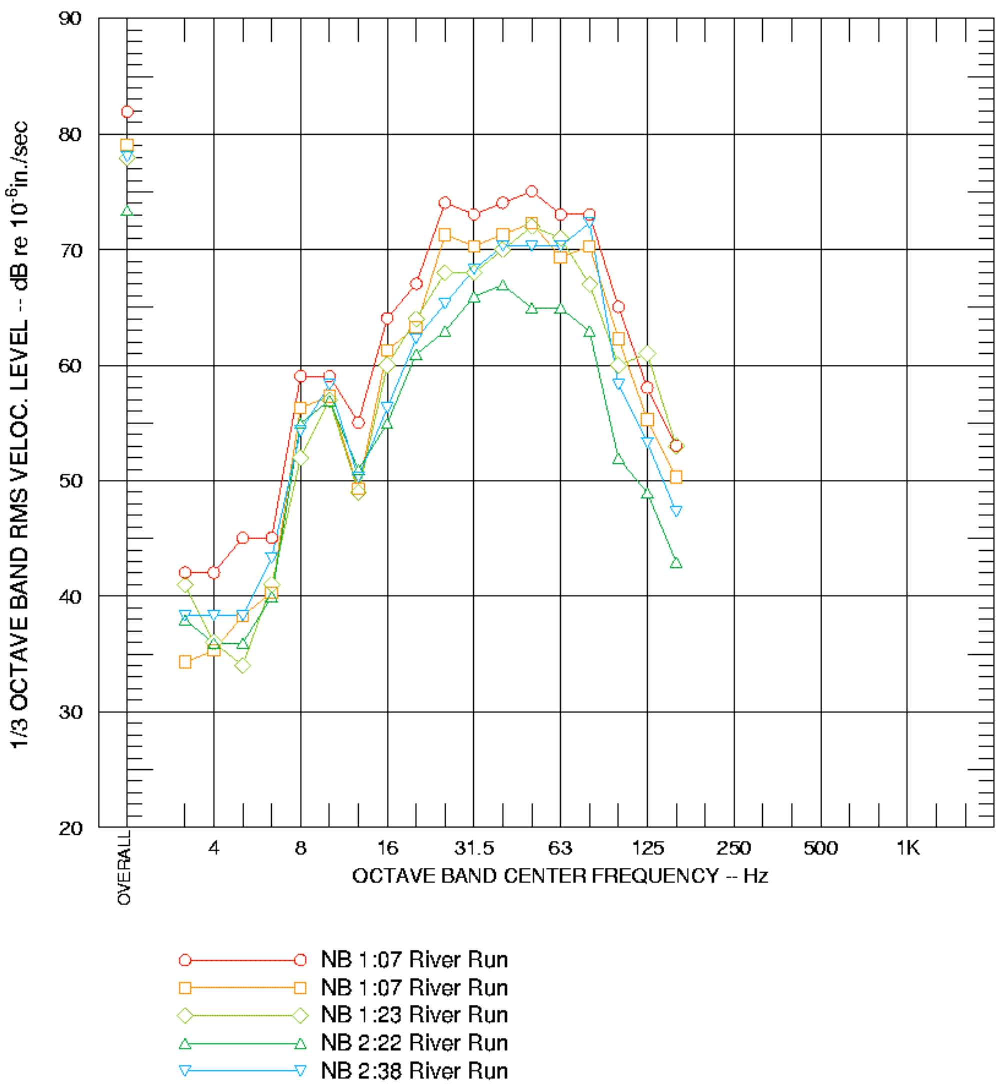


FIGURE 6 AT-GRADE PASSBYS 10 FT FROM NEAR TRACK (SB): RIVER RUN PL
12 JULY 2006
1:07 TO 2:38 PM

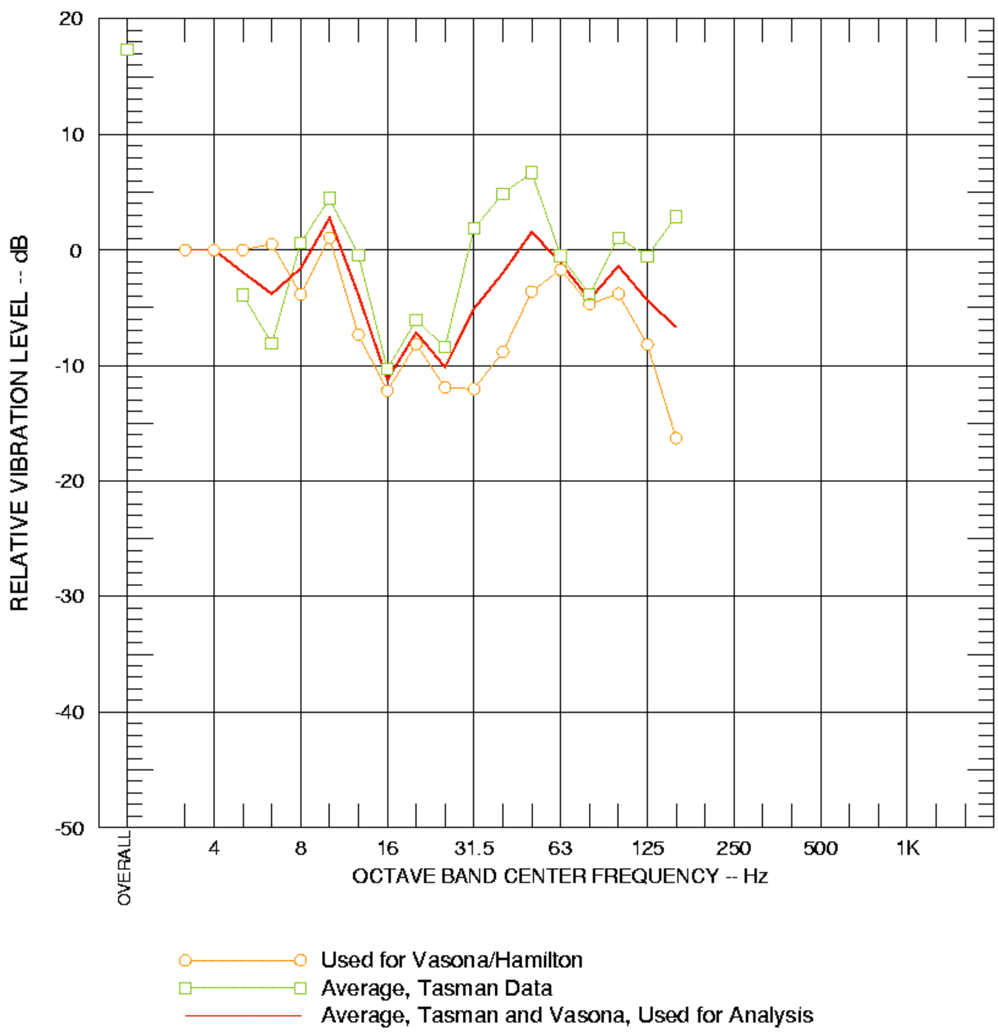
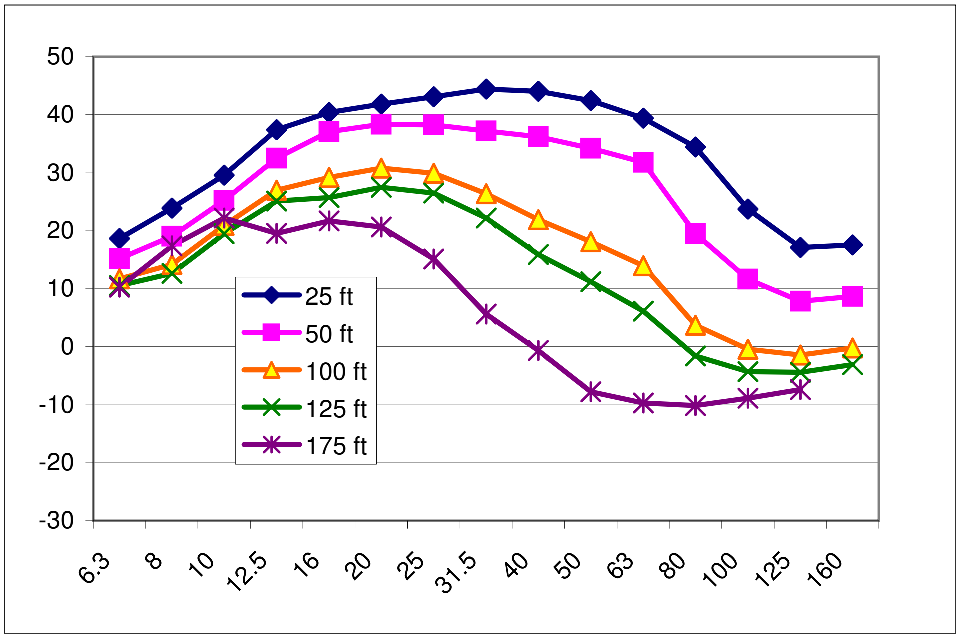


FIGURE 7 CORRECTION FROM AT-GRADE TO AERIAL STRUCTURE

APPENDIX G: LSR COEFFICIENTS

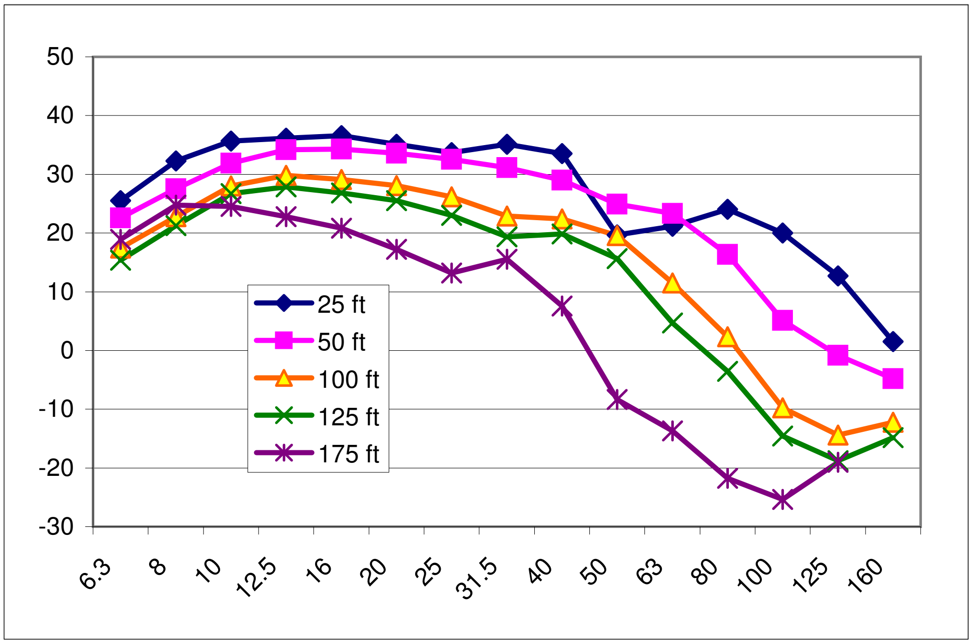
LSR COEFFICIENTS - EIRV1



Frequency	A	B	C
6.3	34.9	-11.6	0.0
8	46.4	-16.1	0.0
10	49.7	-14.4	0.0
12.5	53.6	-7.5	-2.9
16	-3.4	66.3	-25.0
20	4.6	58.1	-22.5
25	20.3	43.0	-19.1
31.5	31.8	36.3	-19.5
40	-4.7	84.9	-35.8
50	-22.3	107.0	-43.4
63	-57.8	147.7	-55.9
80	92.7	-35.1	-4.7
100	79.8	-40.1	0.0
125	60.2	-30.8	0.0
160	58.8	-29.5	0.0

TM = A + B*log(d) + C*(log(d))^2
TM = Transfer Mobility
d = distance in feet

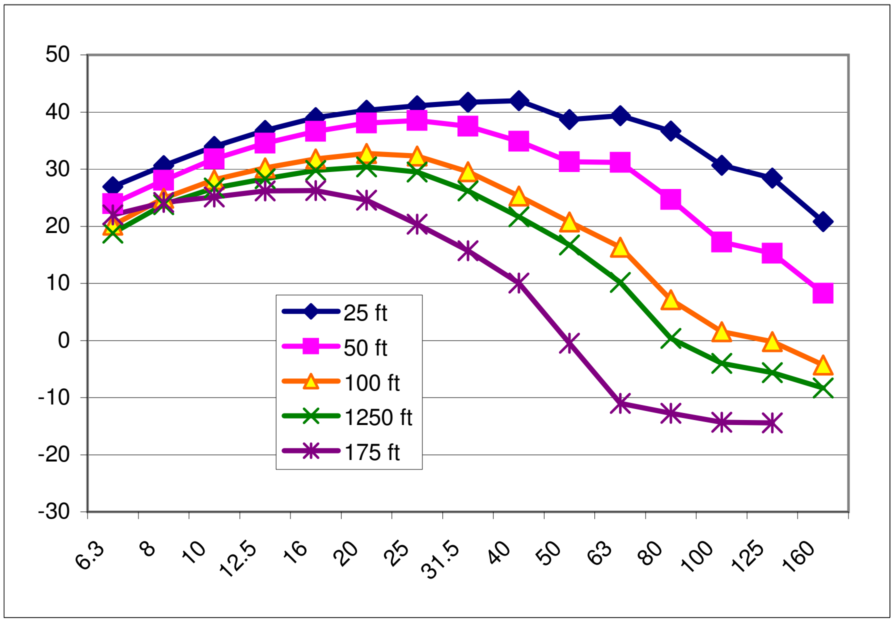
LSR COEFFICIENTS - SEIRL1



Frequency	A	B	C
6.3	11.8	26.1	-11.6
8	54.3	-15.8	0.0
10	51.4	-10.3	-0.7
12.5	14.1	34.2	-13.2
16	8.7	42.5	-16.2
20	-9.0	61.8	-21.6
25	-29.6	85.6	-28.8
31.5	-1.9	59.1	-23.4
40	27.2	20.6	-11.5
50	-142.6	197.4	-58.1
63	-172.9	247.1	-77.4
80	-23.9	83.5	-35.2
100	89.2	-49.5	0.0
125	75.7	-45.1	0.0
160	16.9	-2.6	-6.0

TM = A + B*log(d) + C*(log(d))^2
TM = Transfer Mobility
d = distance in feet

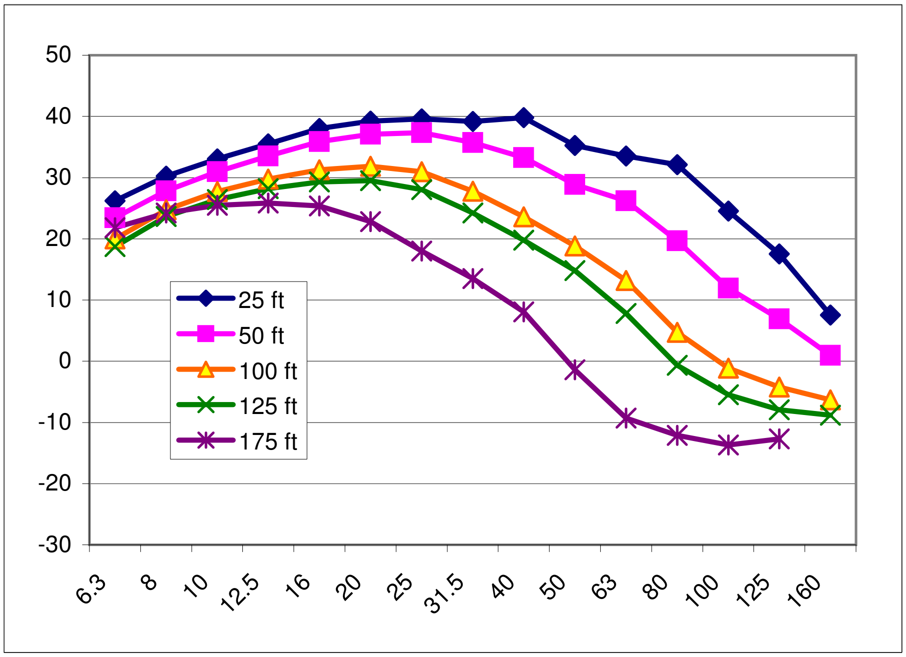
LSR COEFFICIENTS - SEIRL2



Frequency	A	B	C
6.3	29.5	4.6	-4.7
8	35.6	0.6	-3.0
10	25.0	17.6	-8.0
12.5	19.3	28.9	-11.7
16	19.2	32.5	-13.1
20	10.9	44.6	-16.8
25	4.4	54.8	-20.4
31.5	11.0	51.3	-21.0
40	42.2	19.1	-13.8
50	32.7	28.1	-17.0
63	-9.4	86.0	-36.6
80	19.9	54.6	-30.5
100	64.1	-6.8	-12.2
125	60.1	-5.2	-12.5
160	79.1	-41.7	0.0

TM = A + B*log(d) + C*(log(d))^2
TM = Transfer Mobility
d = distance in feet

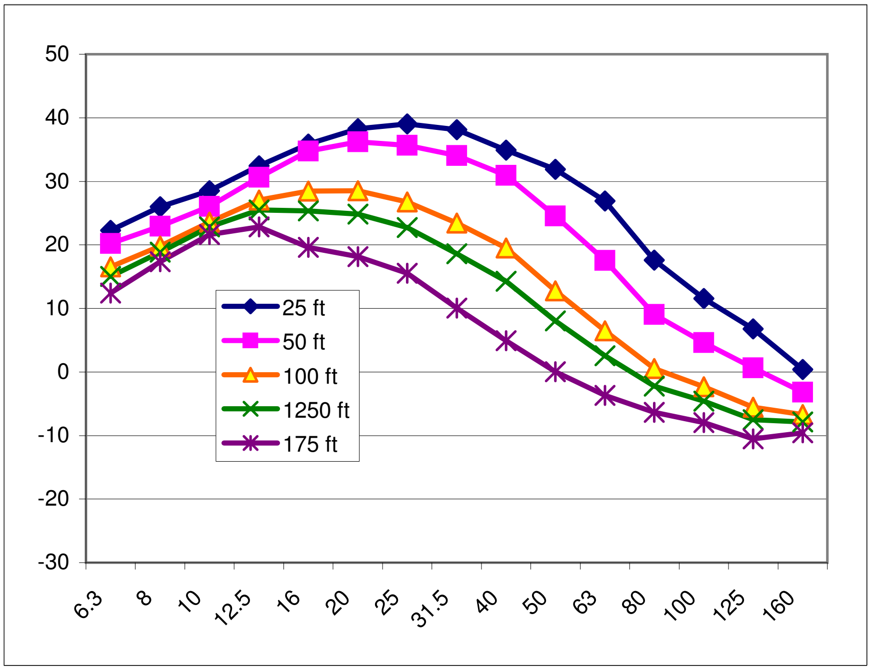
LSR COEFFICIENTS - SEIRL3



Frequency	A	B	C
6.3	30.5	2.1	-3.7
8	33.2	2.8	-3.5
10	27.4	13.1	-6.5
12.5	22.1	23.0	-9.6
16	16.4	34.1	-13.3
20	8.3	46.1	-17.2
25	-3.8	62.7	-22.7
31.5	-4.1	65.9	-25.0
40	29.2	31.7	-17.2
50	17.4	40.8	-20.0
63	-6.1	71.8	-31.1
80	55.7	3.1	-14.3
100	76.0	-32.8	-2.9
125	59.1	-25.2	-3.2
160	29.0	-10.1	-3.8

TM = A + B*log(d) + C*(log(d))^2
TM = Transfer Mobility
d = distance in feet

LSR COEFFICIENTS - SEIRL4



Frequency	A	B	C
6.3	10.8	20.6	-8.9
8	40.3	-10.2	0.0
10	40.0	-8.2	0.0
12.5	16.9	25.1	-10.0
16	-26.4	84.3	-28.4
20	-26.5	90.1	-31.3
25	-17.9	83.4	-30.5
31.5	-29.0	98.6	-36.2
40	-44.1	113.8	-41.0
50	8.1	51.1	-24.4
63	47.7	-1.6	-9.5
80	57.2	-28.3	0.0
100	43.9	-23.1	0.0
125	35.4	-20.5	0.0
160	16.8	-11.8	0.0

TM = A + B*log(d) + C*(log(d))^2
TM = Transfer Mobility
d = distance in feet

TABLE SOIL DATA AND DESIGN FACTOR ASSIGNMENTS - PHASE 1A

Station Number	Location Street (ID)	Near Track	Track type	LSR Type Used	Design Factor
10+80	SFR on Lombard	SB	at	SEIRL4	DF2
10+80	SFR on Lombard	SB	at	SEIRL4	DF2
11+20	SFR on Lombard	SB	ate	SEIRL4	DF2
11+40	SFR on Capitol Ave	SB	ate	SEIRL4	DF2
11+60	SFR on Capitol Ave	SB	ate	SEIRL4	DF2
12+00	Co	SB	ate	SEIRL4	DF2
12+40	Co	SB	dff	SEIRL4	DF2
13+90	SFR on Excalibur	SB	dff	SEIRL3	DF1
14+10	SFR on Excalibur	SB	dff	SEIRL3	DF1
14+30	SFR on Excalibur	SB	dff	SEIRL3	DF1
14+60	SFR on Capitol Ave	SB	dff	SEIRL3	DF1
14+75	SFR on Capitol Ave	SB	dff	SEIRL3	DF1
14+90	SFR on Capitol Ave	SB	dff	SEIRL3	DF1
15+60	SFR on Capitol Ave	SB	dff	SEIRL3	DF1
16+00	SFR on Capitol Ave	SB	dff	SEIRL3	DF1
16+20	SFR on Capitol Ave	SB	dff	SEIRL3	DF1
16+30	SFR on Capitol Ave	SB	dff	SEIRL3	DF1
16+50	SFR on Capitol Ave	SB	dff	SEIRL3	DF1
16+60	SFR on Capitol Ave	SB	dff	SEIRL3	DF1
16+80	SFR on Capitol Ave	SB	dff	SEIRL3	DF1
16+90	SFR on Capitol Ave	SB	dff	SEIRL3	DF1
17+10	SFR on Capitol Ave	SB	dff	SEIRL3	DF1
17+20	SFR on Capitol Ave	SB	dff	SEIRL3	DF1
17+40	SFR on Capitol Ave	SB	dff	SEIRL3	DF1
17+50	SFR on Capitol Ave	SB	dff	SEIRL3	DF1
17+70	SFR on Capitol Ave	SB	dff	SEIRL3	DF1
17+90	SFR on Capitol Ave	SB	dff	SEIRL3	DF1
18+00	SFR on Capitol Ave	SB	dff	SEIRL3	DF1
18+20	SFR on Capitol Ave	SB	dff	SEIRL3	DF1
18+40	SFR on Capitol Ave	SB	dff	SEIRL3	DF1
18+50	SFR on Capitol Ave	SB	dff	SEIRL3	DF1
18+70	SFR on Capitol Ave	SB	dff	SEIRL2n3	DF1
19+00	commercial capitol/story	SB	dff	SEIRL2n3	DF1
19+70	commercial capitol/story	SB	dff	SEIRL2n3	DF1
20+60	commercial capitol/story	SB	dff	SEIRL2n3	DF1
20+70	SFR on Brentford	SB	dff	SEIRL2n3	DF1
20+90	SFR on Brentford	SB	dff	SEIRL2n3	DF1
21+00	SFR on Brentford	SB	dff	SEIRL2n3	DF1
21+20	SFR on Brentford	SB	ate	SEIRL2	DF1
21+30	SFR on Brentford	SB	ate	SEIRL2	DF1
21+60	SFR on Brentford	SB	ate	SEIRL2	DF1
21+70	SFR on Brentford	SB	ate	SEIRL2	DF1
21+90	SFR on Brentford	SB	ate	SEIRL2	DF1
22+00	SFR on Brentford	SB	ate	SEIRL2	DF1
22+20	SFR on Brentford	SB	ate	SEIRL2	DF1
22+10	SFR on Brentford	SB	ate	SEIRL2	DF1
22+60	SFR on Brentford	SB	at	SEIRL2	DF1
22+70	SFR on Brentford	SB	at	SEIRL2	DF1
22+90	SFR on Brentford	SB	at	SEIRL2	DF1
23+00	SFR on Brentford	SB	at	SEIRL2	DF1
23+30	commercial capital/foxdale	SB	at	SEIRL2	DF1
24+20	MFR onFoxdale	SB	at	SEIRL2	DF1
24+90	MFR onFoxdale	SB	at	SEIRL2	DF1
25+90	MFR onFoxdale	SB	at	SEIRL2	DF1
27+10	sfr on greenstone	SB	at	SEIRL2	DF1
27+20	sfr on greenstone	SB	at	SEIRL2	DF1
27+40	sfr on greenstone	SB	at	SEIRL2	DF1
27+60	sfr on greenstone	SB	at	SEIRL2	DF1
28+00	SFR on whitestone	SB	at	SEIRL2	DF1
28+20	SFR on whitestone	SB	at	SEIRL2	DF1
28+40	SFR on whitestone	SB	at	SEIRL2	DF1

TABLE SOIL DATA AND DESIGN FACTOR ASSIGNMENTS - PHASE 1A

Station Number	Location Street (ID)	Near Track	Track type	LSR Type Used	Design Factor
28+90	SFR on bluestone	SB	at	SEIRL2	DF1
29+10	SFR on bluestone	SB	at	SEIRL2	DF1
29+20	SFR on bluestone	SB	at	SEIRL2	DF1
29+70	SFR on brownstone	SB	at	SEIRL2	DF1
29+90	SFR on brownstone	SB	at	SEIRL2	DF1
30+00	SFR on brownstone	SB	at	SEIRL2	DF1
30+40	SFR on pinkstone	SB	at	SEIRL2	DF1
30+70	SFR on pinkstone	SB	at	SEIRL2	DF1
30+80	SFR on pinkstone	SB	at	SEIRL2	DF1
31+30	SFR on silverstone	SB	at	SEIRL2	DF1
31+50	SFR on silverstone	SB	at	SEIRL2	DF1
31+70	SFR on silverstone	SB	at	SEIRL2	DF1
10+00	SFR on Capitol/Wilbur (NA)	NB	at	SEIRL4	DF1
10+40	SFR on Capitol/Wilbur	NB	at	SEIRL4	DF2
10+60	SFR on Capitol	NB	at	SEIRL4	DF2
10+80	SFR on Capitol	NB	at	SEIRL4	DF2
11+00	SFR on Capitol	NB	ate	SEIRL4	DF2
11+20	SFR on Capitol	NB	ate	SEIRL4	DF2
11+40	SFR on Capitol/Westboro	NB	ate	SEIRL4	DF2
11+80	SFR on Capitol/Westboro	NB	ate	SEIRL4	DF2
12+10	SFR on Capitol	NB	ate	SEIRL4	DF2
12+30	SFR on Capitol	NB	dff	SEIRL4	DF2
12+50	SFR on Capitol	NB	dff	SEIRL4	DF2
12+60	SFR on Capitol	NB	dff	SEIRL4	DF2
12+80	SFR on Capitol/Highwood	NB	dff	SEIRL4	DF2
13+40	SFR on Capitol/Highwood	NB	dff	SEIRL4	DF2
13+60	SFR on Capitol	NB	dff	SEIRL4	DF2
13+80	SFR on Capitol	NB	dff	SEIRL4	DF2
13+90	SFR on Capitol	NB	dff	SEIRL4	DF2
16+60	office	NB	dff	SEIRL1n4	DF2
17+30	church	NB	dff	SEIRL1n4	DF2
18+00	church/slab	NB	dff	SEIRL1n4	DF2
18+60	CO	NB	dff	SEIRL1n4	DF2
18+80	Co	NB	dff	SEIRL1n4	DF2
19+40	co	NB	dff	SEIRL1n4	DF2
19+80	co	NB	dff	SEIRL1n4	DF2
20+20	MFR 2719 Kollmar	NB	dff	SEIRL1	DF1
20+80	SFR on S. Capitol/Sussex	NB	dff	SEIRL1	DF1
21+20	SFR on S. Capitol/Sussex	NB	ate	SEIRL1	DF1
21+50	SFR on S. Capitol/Tudor	NB	ate	SEIRL1	DF1
21+90	SFR on S. Capitol/Tudor	NB	ate	SEIRL1	DF1
22+20	SFR on S. Capitol/Capitol ct	NB	ate	SEIRL1	DF1
22+60	SFR on S. Capitol/Capitol ct	NB	at	SEIRL1	DF1
22+90	SFR on S. Capitol/murtha	NB	at	SEIRL1	DF1
23+40	SFR on S. Capitol/murtha	NB	at	SEIRL1	DF1
23+70	SFR on S. Capitol/Bristol	NB	at	SEIRL1	DF1
24+20	SFR on S. Capitol/Bristol	NB	at	SEIRL1	DF1
24+50	SFR on S. Capitol/dublin	NB	at	SEIRL1	DF1
24+90	SFR on S. Capitol/dublin	NB	at	SEIRL1	DF1
25+10	SFR on S. Capitol/belfast	NB	at	SEIRL1	DF1
25+60	SFR on S. Capitol/belfast	NB	at	SEIRL1	DF1
25+80	SFR on S. Capitol/coventry	NB	at	SEIRL1	DF1
26+40	SFR on S. Capitol/coventry	NB	at	SEIRL1	DF1
26+70	SFR on S. Capitol/cornwall	NB	at	SEIRL1	DF1
27+20	SFR on S. Capitol/cornwall	NB	at	SEIRL2	DF1
27+60	SFR on S. Capitol	NB	at	SEIRL2	DF1
27+70	SFR on S. Capitol	NB	at	SEIRL2	DF1
27+90	SFR on S. Capitol	NB	at	SEIRL2	DF1
28+10	SFR on S. Capitol	NB	at	SEIRL2	DF1
28+30	SFR on S. Capitol/woodmoor	NB	at	SEIRL2	DF1
28+60	SFR on S. Capitol/woodmoor	NB	at	SEIRL2	DF1

TABLE SOIL DATA AND DESIGN FACTOR ASSIGNMENTS - PHASE 1A

Station Number	Location Street (ID)	Near Track	Track type	LSR Type Used	Design Factor
28+90	SFR on S. Capitol	NB	at	SEIRL2	DF1
29+00	SFR on S. Capitol	NB	at	SEIRL2	DF1
29+30	SFR on S. Capitol	NB	at	SEIRL2	DF1
29+50	SFR on S. Capitol	NB	at	SEIRL2	DF1
29+60	SFR on S. Capitol	NB	at	SEIRL2	DF1
29+80	SFR on S. Capitol	NB	at	SEIRL2	DF1
30+00	SFR on S. Capitol	NB	at	SEIRL2	DF1
30+20	SFR on S. Capitol	NB	at	SEIRL2	DF1
30+30	SFR on S. Capitol	NB	at	SEIRL2	DF1
30+50	SFR on S. Capitol	NB	at	SEIRL2	DF1
30+70	SFR on S. Capitol	NB	at	SEIRL2	DF1
31+10	SFR Evermont	NB	at	SEIRL2	DF1
31+30	SFR Evermont	NB	at	SEIRL2	DF1
31+50	SFR Evermont	NB	at	SEIRL2	DF1
32+00	SFR Evermont	NB	at	SEIRL2	DF1
32+20	SFR on Home Gate	NB	at	SEIRL2	DF1
32+30	SFR on Home Gate	NB	at	SEIRL2	DF1
32+40	SFR on Home Gate	NB	at	SEIRL2	DF1
32+50	SFR on Home Gate	NB	at	SEIRL2	DF1
32+60	SFR on Home Gate	NB	at	SEIRL2	DF1
32+70	SFR on Home Gate	NB	at	SEIRL2	DF1
32+80	SFR on Home Gate	NB	at	SEIRL2	DF1
32+90	SFR on Home Gate	NB	at	SEIRL2	DF1
33+00	SFR on Home Gate	NB	at	SEIRL2	DF1
33+10	SFR on Home Gate	NB	at	SEIRL2	DF1
33+20	SFR on Home Gate	NB	at	SEIRL2	DF1
33+30	SFR on Home Gate	NB	at	SEIRL2	DF1
33+40	SFR on Home Gate	NB	at	SEIRL2	DF1
33+50	SFR on Home Gate	NB	at	SEIRL2	DF1
33+60	SFR on Home Gate	NB	at	SEIRL2	DF1
33+70	SFR on Home Gate	NB	at	SEIRL2	DF1
33+80	SFR on Home Gate	NB	at	SEIRL2	DF1
33+90	SFR on Home Gate	NB	at	SEIRL2	DF1
34+20	SFR on Supreme Dr	NB	at	SEIRL2	DF1
34+60	SFR on Supreme Dr	NB	at	SEIRL2	DF1
34+80	SFR on Supreme Dr	NB	at	SEIRL2	DF1
35+00	SFR on Supreme Dr	NB	at	SEIRL2	DF1
35+20	SFR on Supreme Dr	NB	at	SEIRL2	DF1
35+40	SFR on Supreme Dr	NB	at	SEIRL2	DF1
35+50	SFR on Supreme Dr	NB	at	SEIRL2	DF1
35+70	SFR on Supreme Dr	NB	at	SEIRL2	DF1
35+80	SFR on Supreme Dr	NB	at	SEIRL2	DF1

APPENDIX H: VTA EMBANKMENT B&T VS AT-GRADE B&T

Embankments

It is generally considered that an elevation difference between the system track and the receiver will either reduce the vibration or effect no change from a flat topography where the ground elevation at the track is essentially the same as the ground elevation at nearby receivers.

Some slight amplification of the low frequencies has been observed during our recent work with the BART and VTA systems, and we have studied the measurement data obtained near the Hamilton Overcrossing along the Vasona Corridor for the Tire Derived Aggregate study. The VTA data confirms that this embankment amplification has a distance (and possibly speed) dependent relationship. For the CELR corridor, the centerline of the track on embankment transition sections from at-grade to aerial structure are approximately 60 ft or greater from nearby receivers. Thus, we have used the data collected at 50 ft distance and 50 mph from the VTA TDA study (2005 results). It is possible that this amplification effect could be further refined during Final Engineering, and comparative measurements of the vibration at 60 to 100 ft would be useful.

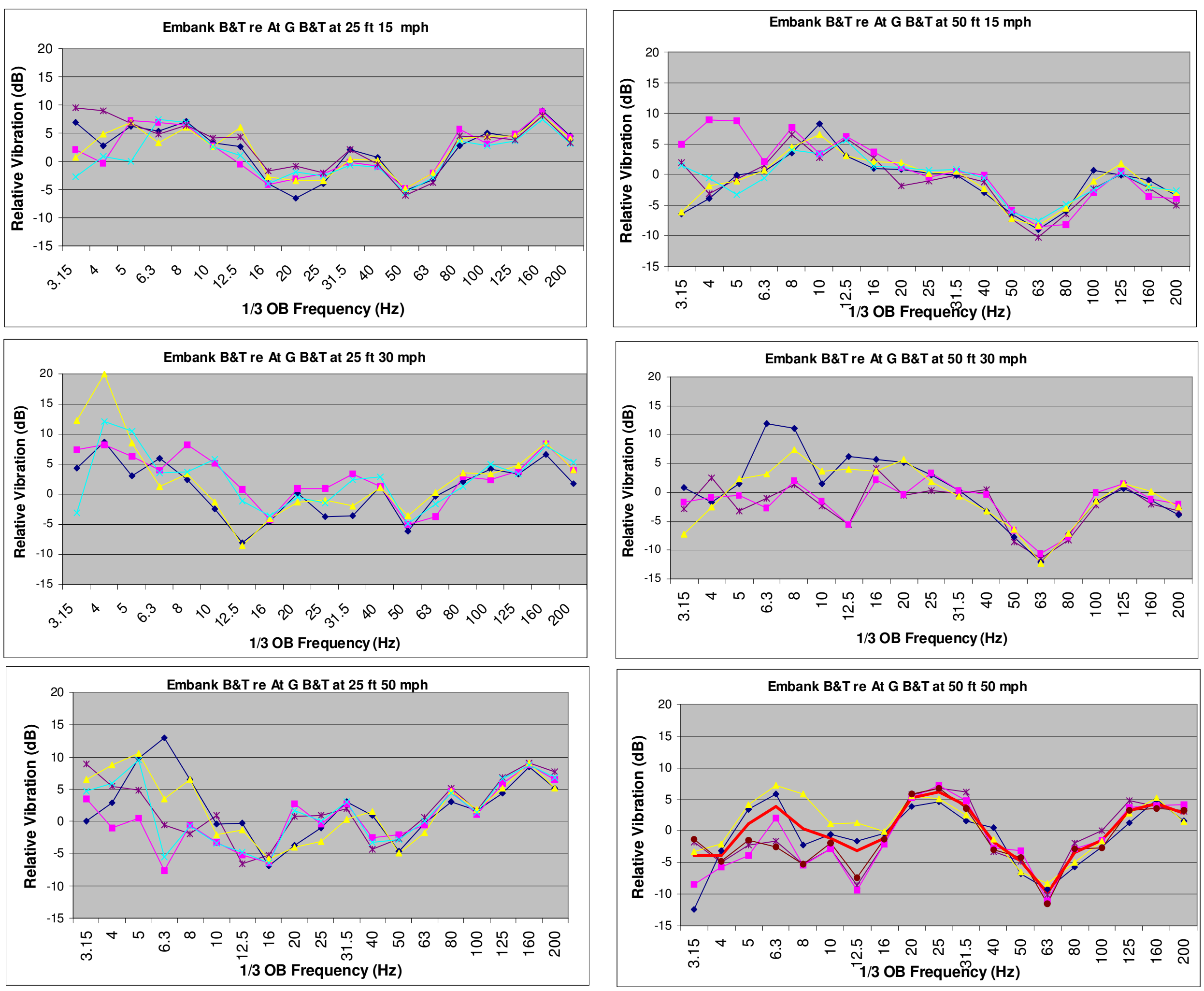


FIGURE H1 Vibration from Embankment Compared to At-Grade (VTA)

APPENDIX I: ADDITIONAL MEASURES TO CONTROL VIBRATION

As discussed in the report, reduced consist or train speeds could potentially restrict the Project in such a way that substantially jeopardize the Project. In addition, while moving the alignment farther away would work in concept, the limited available space would make this measure difficult or infeasible.

Reduced Train Consist

The proposed operations would run 1-car trains except during peak commute hours when 3-car trains are proposed (6 AM to 9 AM and 3:30 PM to 7:30 PM). Limiting the peak hour train consist to a 2 or 1-car train during that one nighttime hour between 6 AM and 7 AM would reduce the vibration on the order of 1 to 2, or 2 to 3 dB, respectively, in the 10 or 12.5 Hz 1/3-octave band. This measure would effect the capacity of the system during that one peak commute hour.

Reduced Speed

Reducing the speed of train operations would reduce the vibration (and noise). Reducing the speed from 55 mph to 45 mph would reduce the vibration by 1 to 2 dB, depending on local soil conditions. This measure could affect the system schedule and affect the capacity of the system during that one peak commute hour.

Table I1 summarizes the vibration impacts at selected areas with TDA (where applicable) and train speeds reduced to comply with the FTA DAC (nighttime). As noted previously, given the proposed VTA operating schedule, for all impacts except the one aerial structure impact, these speed restrictions would apply between 6 and 7 AM, when the 3-car trains are operated. In some cases, since the TDA would not be effective at reducing the low frequencies, the speed reduction would also eliminate the need for other vibration control (e.g., TDA). For the one home impacted near the aerial structure, a speed reduction to 50 mph during the daytime would be sufficient.

Alignment Adjustment

Increasing the distance from residences to the alignment or aerial support columns would be beneficial, if it would be possible to do so without impacting the residences on the other side of the alignment or causing problems with the traffic lanes or alignment geometry. For instance, north of Ocala Station, the alignment would be about 90 to 150 ft from the homes on the NB side of the alignment and 60 to 125 ft from the homes on the SB side; a slight shift to the north could eliminate residual impacts. Moving the center of the support column at Sta. 14+10 NB to be 49 ft from the edge of the nearby residence would reduce the vibration at the nearby home.

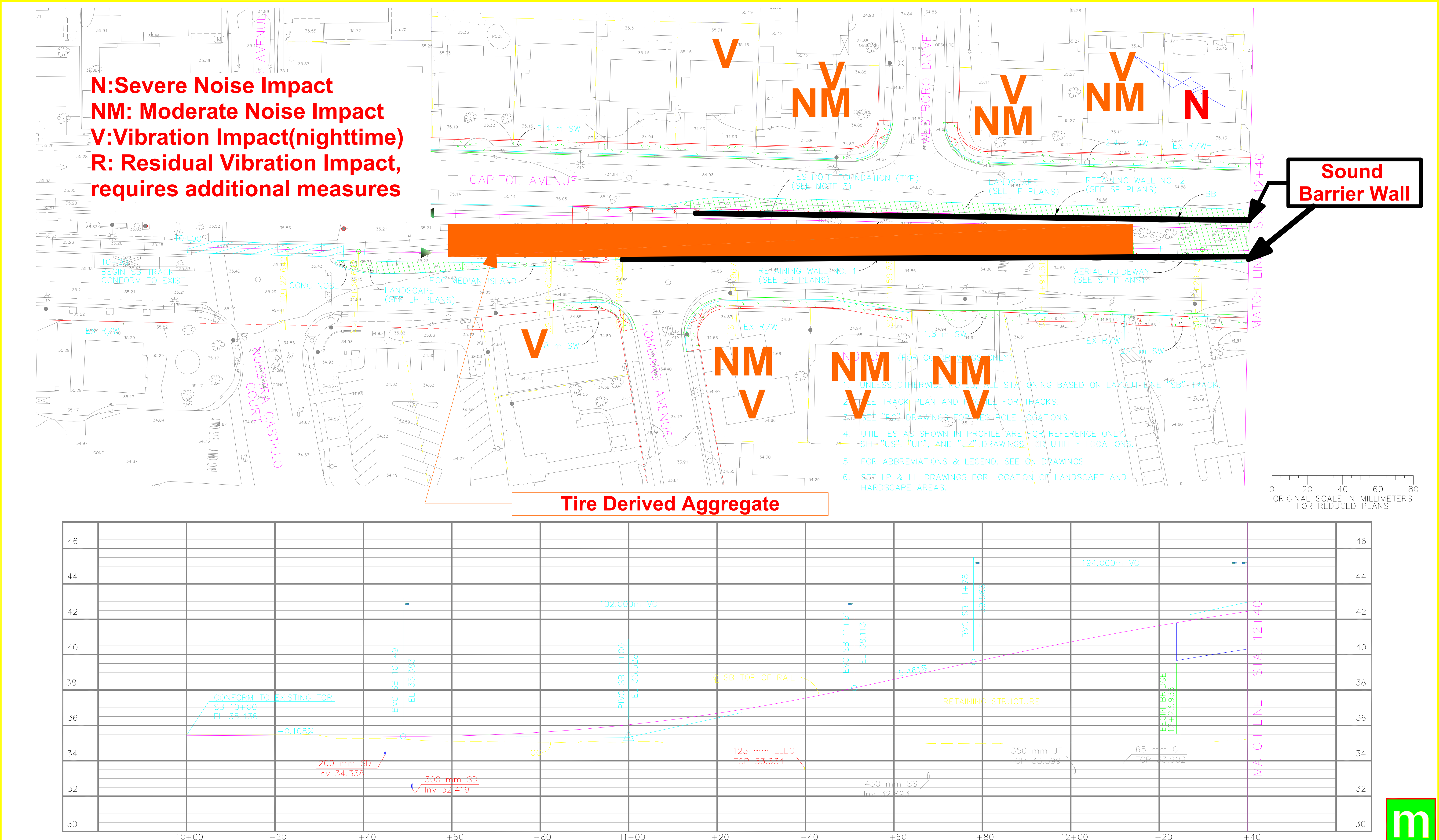
TABLE I1 SUMMARY OF PREDICTED VIBRATION LEVELS - 3-CAR TRAINS - WITH REDUCED SPEEDS (AREAS OF POTENTIAL RESIDUAL IMPACT ONLY)

Station Number	Location Street (ID)	Near Track	Track type	Speed (near track)	Dist.[1] (ft)	FTA General Criteria	Groundborne Vibration Range	FTA DAC Exceed. wo/ mit	GBV w/Mit. Range	FTA DAC Exceed. w/mit	Recommended Vibration Control	Comment
22+60	SFR on Brentford	SB	at	55	97	72	77 - 78	--	-	--	--	2
22+70	SFR on Brentford	SB	at	**40**	75	72	80 - 81	y	76 - 77	y	TDA	**3,4,6**
22+90	SFR on Brentford	SB	at	**40**	84	72	76 - 77	--	-	--	--	**3,4,6**
23+00	SFR on Brentford	SB	at	55	125	72	74 - 75	--	-	--	--	2
23+30	commercial capital/foxdale	SB	at	55	130	n/a	70 - 71	--	-	--	--	5
24+20	MFR onFoxdale	SB	at	55	128	72	74 - 75	--	-	--	--	2
24+90	MFR onFoxdale	SB	at	55	128	72	74 - 75	--	-	--	--	2
25+90	MFR onFoxdale	SB	at	55	128	72	74 - 75	--	-	--	--	2
27+10	sfr on greenstone	SB	at	55	136	72	73 - 74	--	-	--	--	2
27+20	sfr on greenstone	SB	at	**40**	75	72	77 - 78	y	73 - 74	--	TDA	**3,4,6**
27+40	sfr on greenstone	SB	at	**40**	80	72	76 - 77	--	-	--	--	**3,4,6**
27+60	sfr on greenstone	SB	at	55	110	72	76 - 76	--	-	--	--	2
28+00	SFR on whitestone	SB	at	55	98	72	77 - 78	--	-	--	--	2
28+20	SFR on whitestone	SB	at	**40**	64	72	79 - 80	y	74 - 75	--	TDA	**3,4,6**
28+40	SFR on whitestone	SB	at	55	105	72	76 - 77	--	-	--	--	2
28+90	SFR on bluestone	SB	at	**40**	82	72	76 - 77	--	-	--	--	**3,4,6**
29+10	SFR on bluestone	SB	at	**40**	79	72	76 - 77	--	-	--	--	**3,4,6**
29+20	SFR on bluestone	SB	at	55	125	72	74 - 75	--	-	--	--	2
29+70	SFR on brownstone	SB	at	55	89	72	78 - 79	y	75 - 76	--	TDA	3
29+90	SFR on brownstone	SB	at	**40**	69	72	78 - 79	y	74 - 74	--	TDA	**3,4,6**
30+00	SFR on brownstone	SB	at	50	115	72	76 - 77	--	-	--	--	2
30+40	SFR on pinkstone	SB	at	**40**	87	72	75 - 76	--	-	--	--	**3,4,6**
30+70	SFR on pinkstone	SB	at	**40**	80	72	76 - 77	--	-	--	--	**3,4,6**
30+80	SFR on pinkstone	SB	at	**40**	85	72	76 - 77	--	-	--	--	**3,4,6**
31+30	SFR on silverstone	SB	at	40	92	72	75 - 76	--	-	--	--	2
31+50	SFR on silverstone	SB	at	35	87	72	73 - 74	--	-	--	--	2
31+70	SFR on silverstone	SB	at	35	120	72	69 - 70	--	-	--	--	
13+60	SFR on Capitol	NB	dff	55	72	72	69 - 73	--	-	--	--	2
13+80	SFR on Capitol	NB	dff	55	75	72	69 - 72	--	-	--	--	
13+90	SFR on Capitol	NB	dff	**40**	33	72	73 - 77	--	-	--	--	**3,6**

Notes:

at= At-Grade, ate= Embankment, dff = Direct Fixation Fasteners, TDA = Tire Derived Aggregate
1: Distance to near track; far track generally an additional 15 ft further
2: Vibration Exceeds FTA General Analysis Criteria but not FTA Detailed Analysis Criteria. No Vibration Control Required - Design Speed
3: Vibration Control Indicated, Vibration Exceeds FTA Detailed Analysis Criteria with Design Speed
4: Potential Residual Impact, Vibration Still Exceeds FTA Detailed Analysis Criteria at Design Speed
5: No criteria for General Analysis, 84 VdB for detailed analysis
6: Reduced Speed from Design Speed, as Shown
All vibration reported in VdB re 1 microinch/sec

APPENDIX J: AREAS OF NOISE AND VIBRATION IMPACT



NO.	DATE	REVISIONS

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DESIGNED A. Do — CHECKED C. Nguyen
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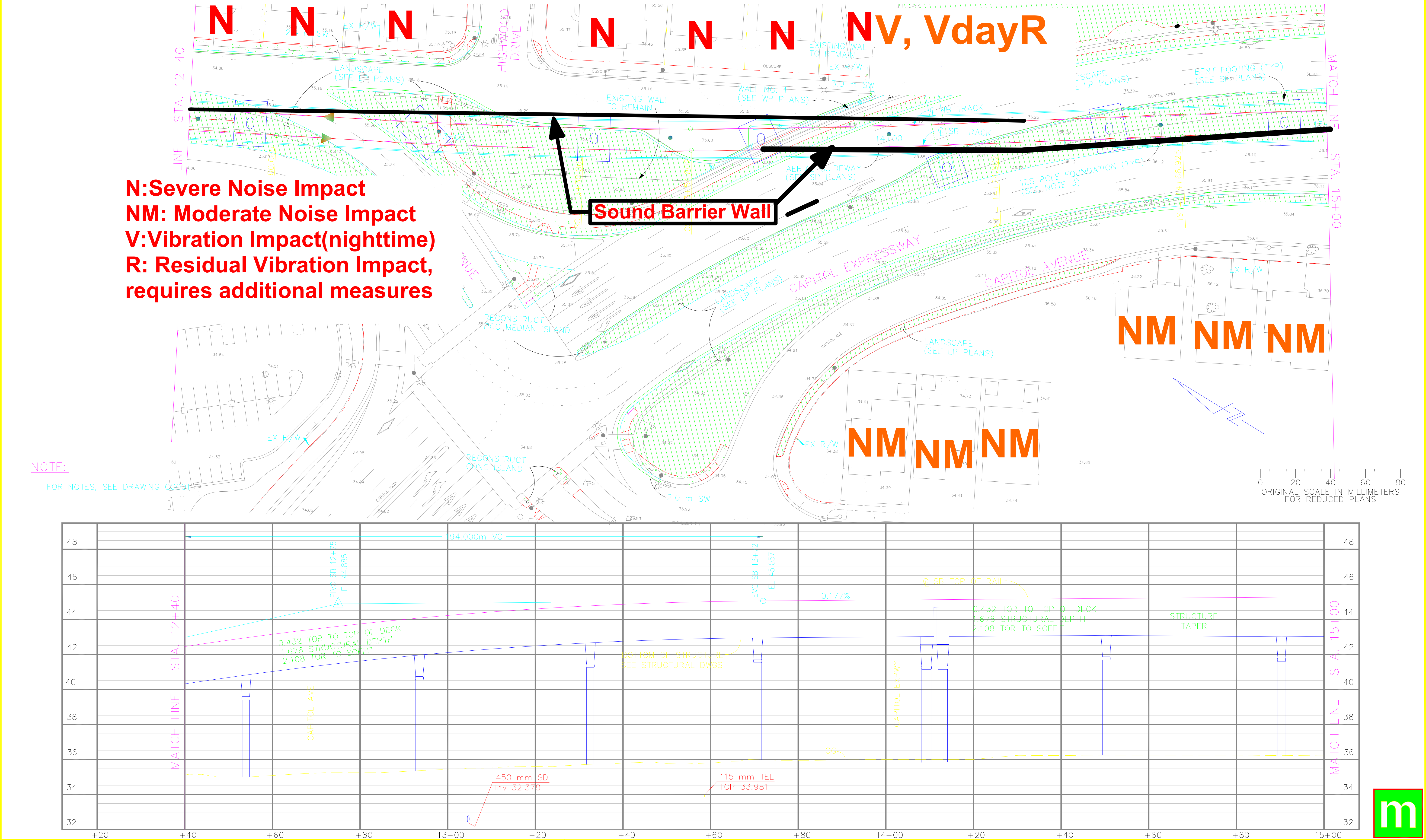
SUBMITTAL DATE 05/16/2006 — BOARD APPROVAL DATE

CAPITOL EXPRESSWAY LIGHT RAIL PROJECT
CIVIL
ALIGNMENT PLAN AND PROFILE
STA 10+00 TO STA 12+40

SHEET
OF
DRAWING NO. CG001
REVISION B

PCA NO. N/A — CONTRACT NO. (A###) ##### — FILE LOCATION PE Phase/Plans/35%/03/CG-Sheets



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CAPITOL EXPRESSWAY LIGHT RAIL PROJECT

CIVIL
ALIGNMENT PLAN AND PROFILE
STA 12+40 TO STA 15+00

SHEET
OF
DRAWING NO. CG002
REVISION B

PCA NO. N/A
CONTRACT NO. (A###) #####
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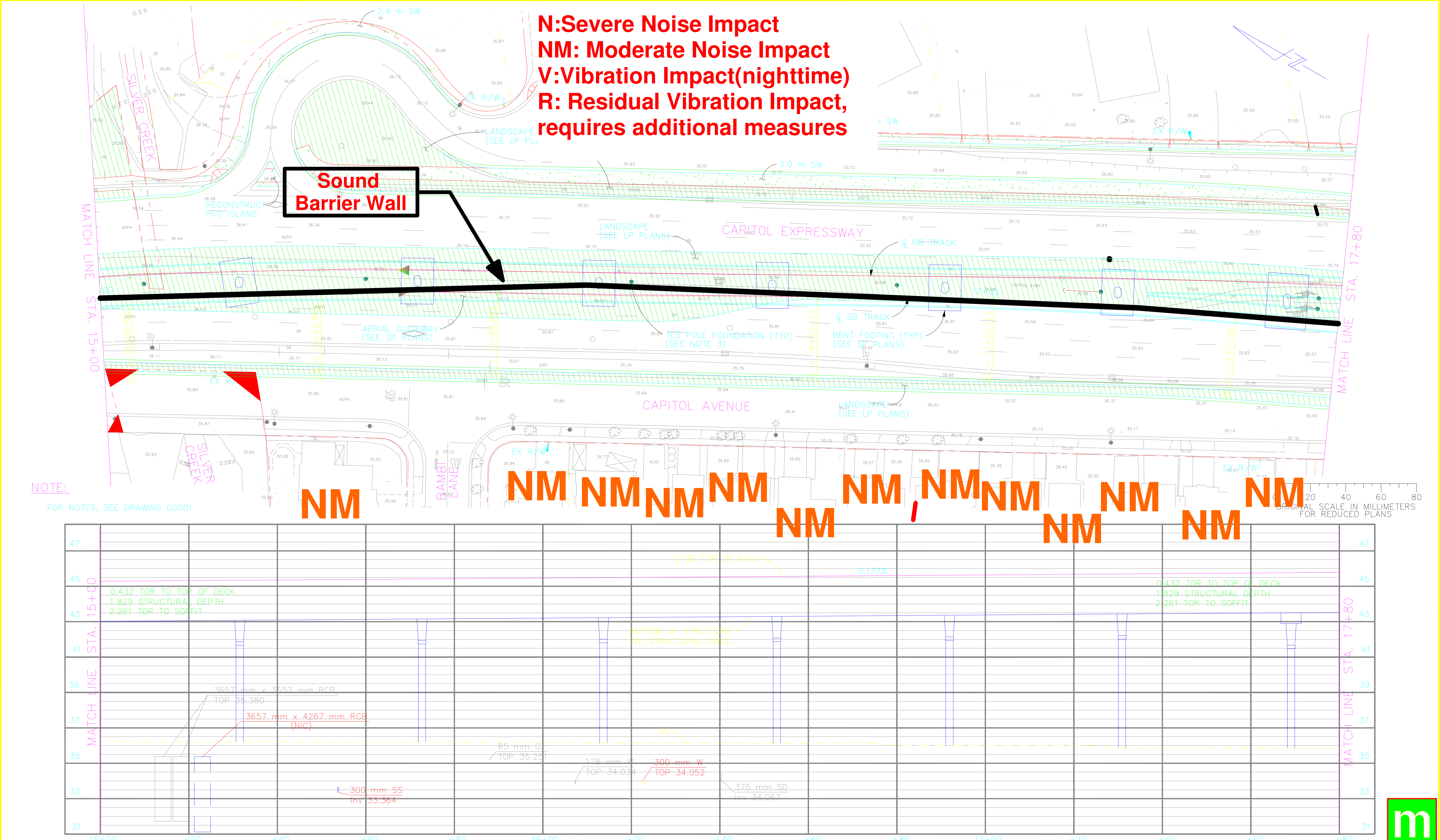

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CAPITOL EXPRESSWAY LIGHT RAIL PROJECT

CIVIL

ALIGNMENT PLAN AND PROFILE

STA 15+00 TO STA 17+80

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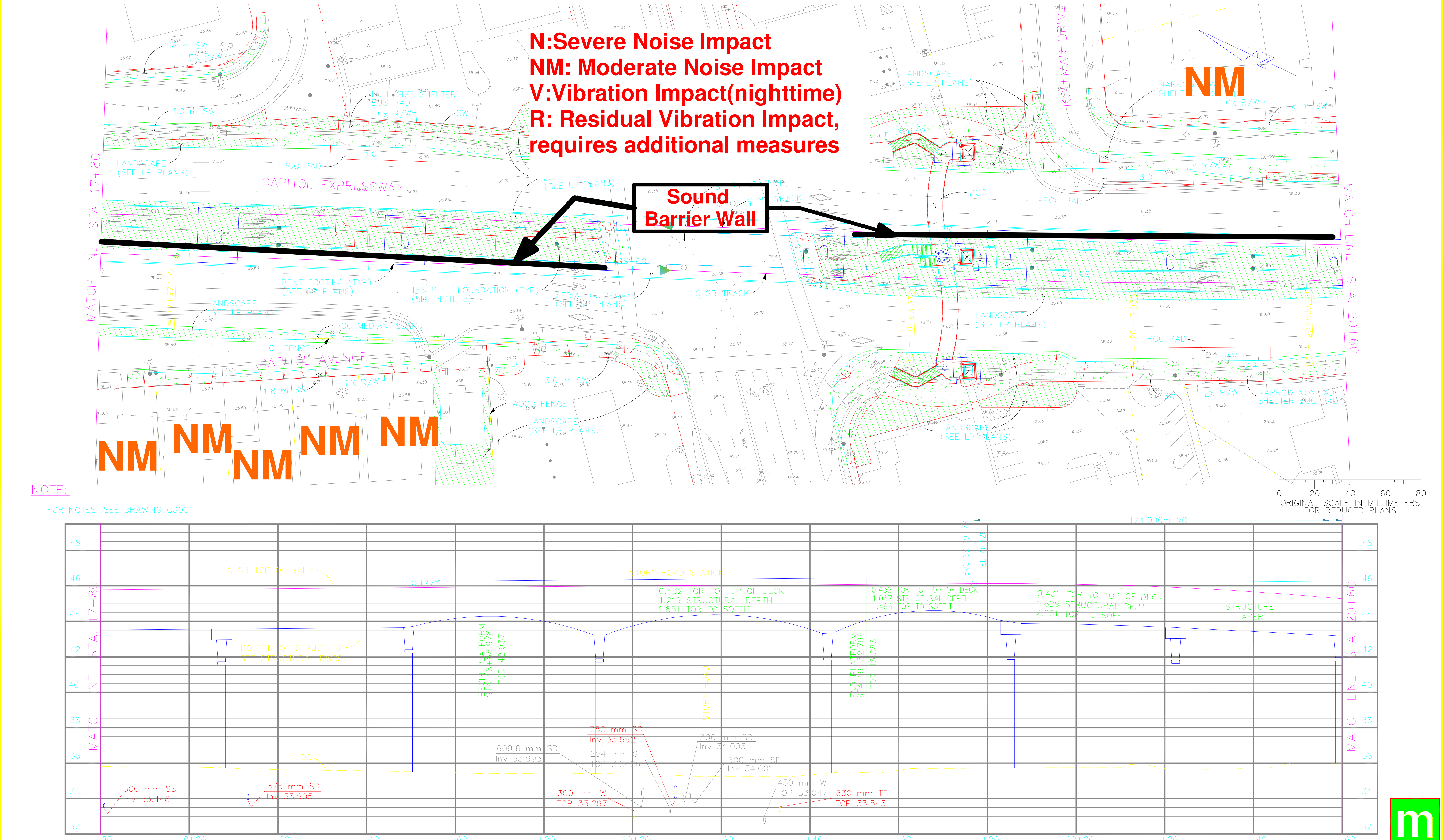

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CIVIL
ALIGNMENT PLAN AND PROFILE
STA 17+80 TO STA 20+60

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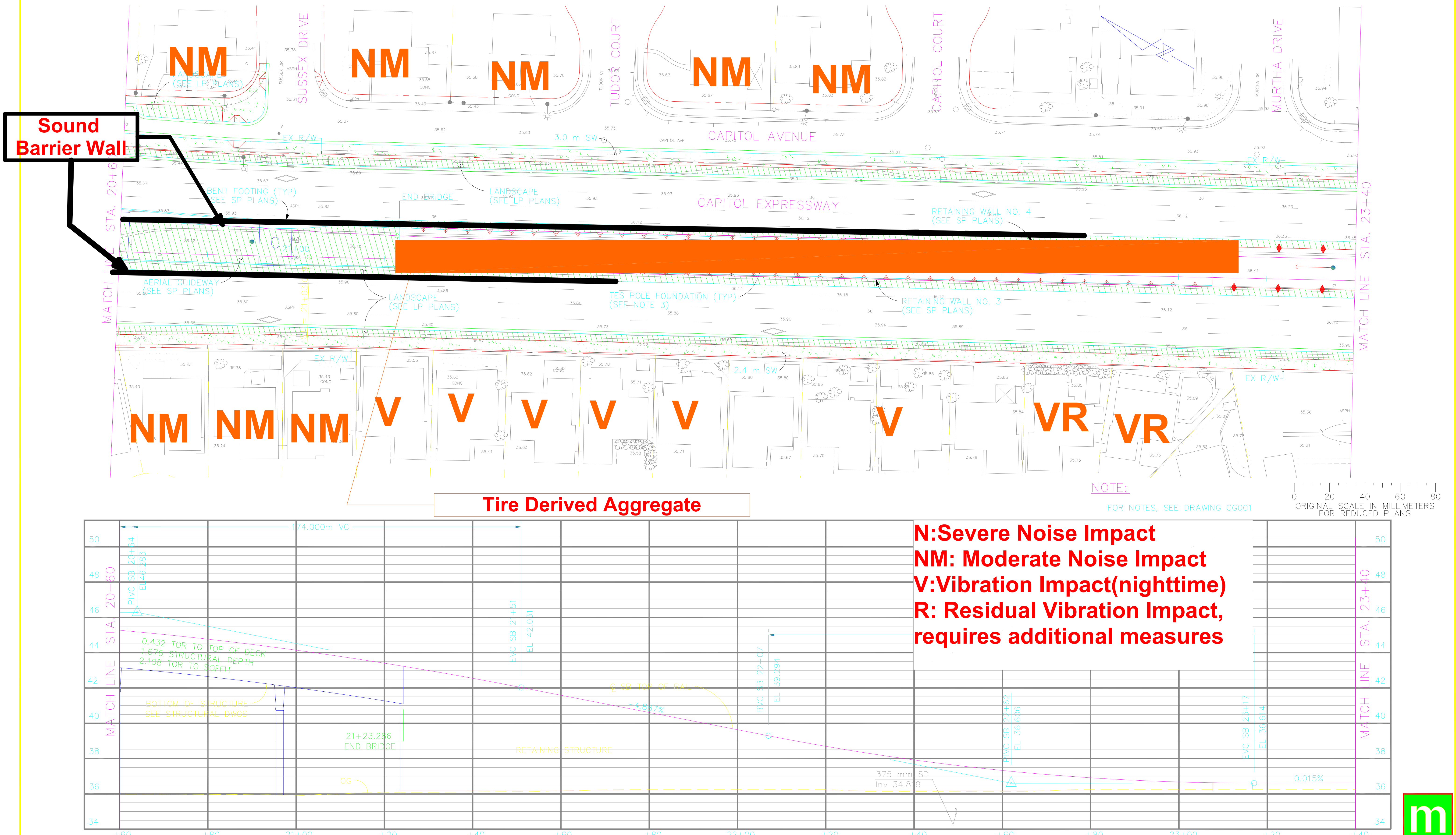

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BOARD APPROVAL DATE

CAPITOL EXPRESSWAY LIGHT RAIL PROJECT

CIVIL
ALIGNMENT PLAN AND PROFILE
STA 20+60 TO STA 23+40

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OF
DRAWING NO. CG005
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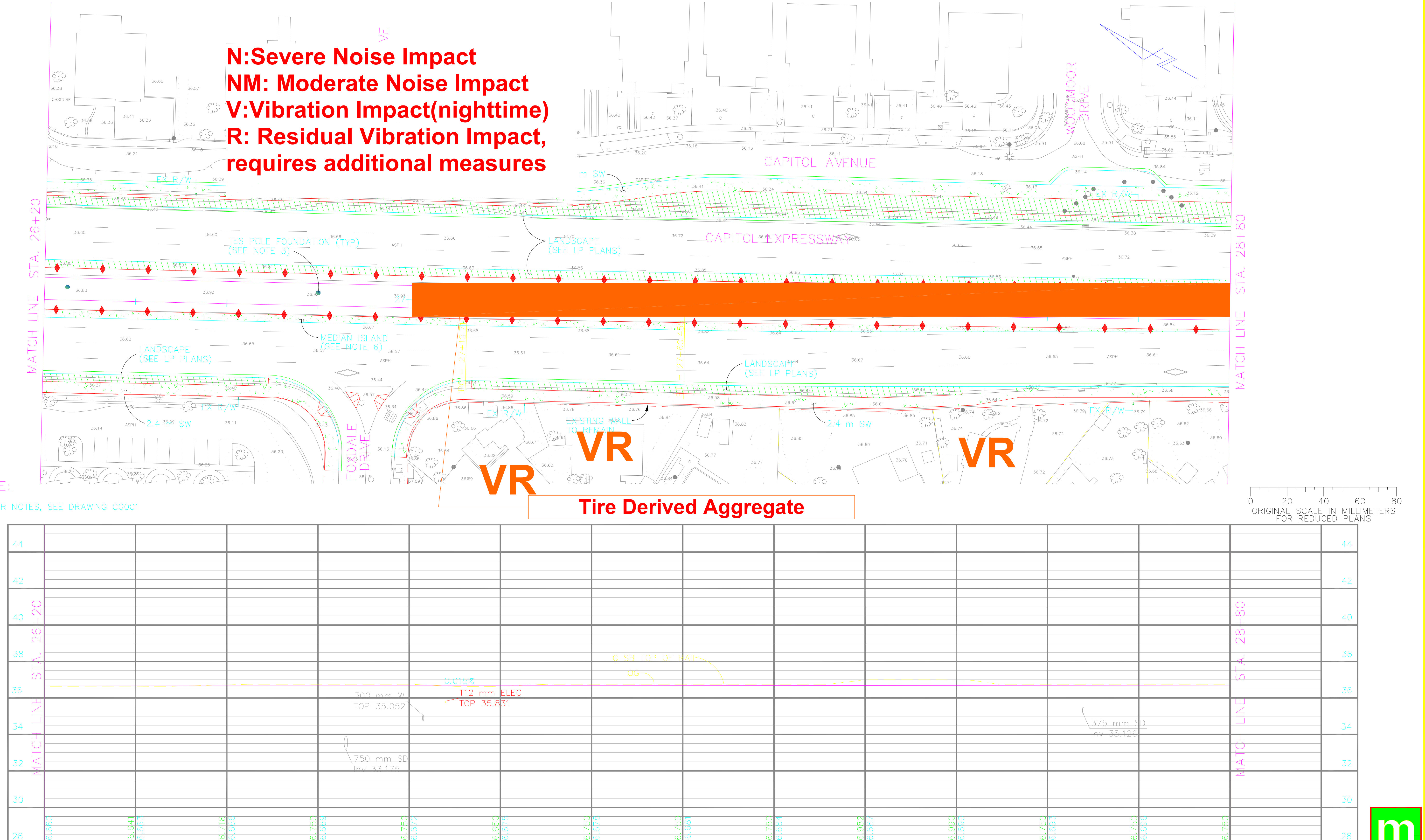

NOTE:

FOR NOTES, SEE DRAWING CG001

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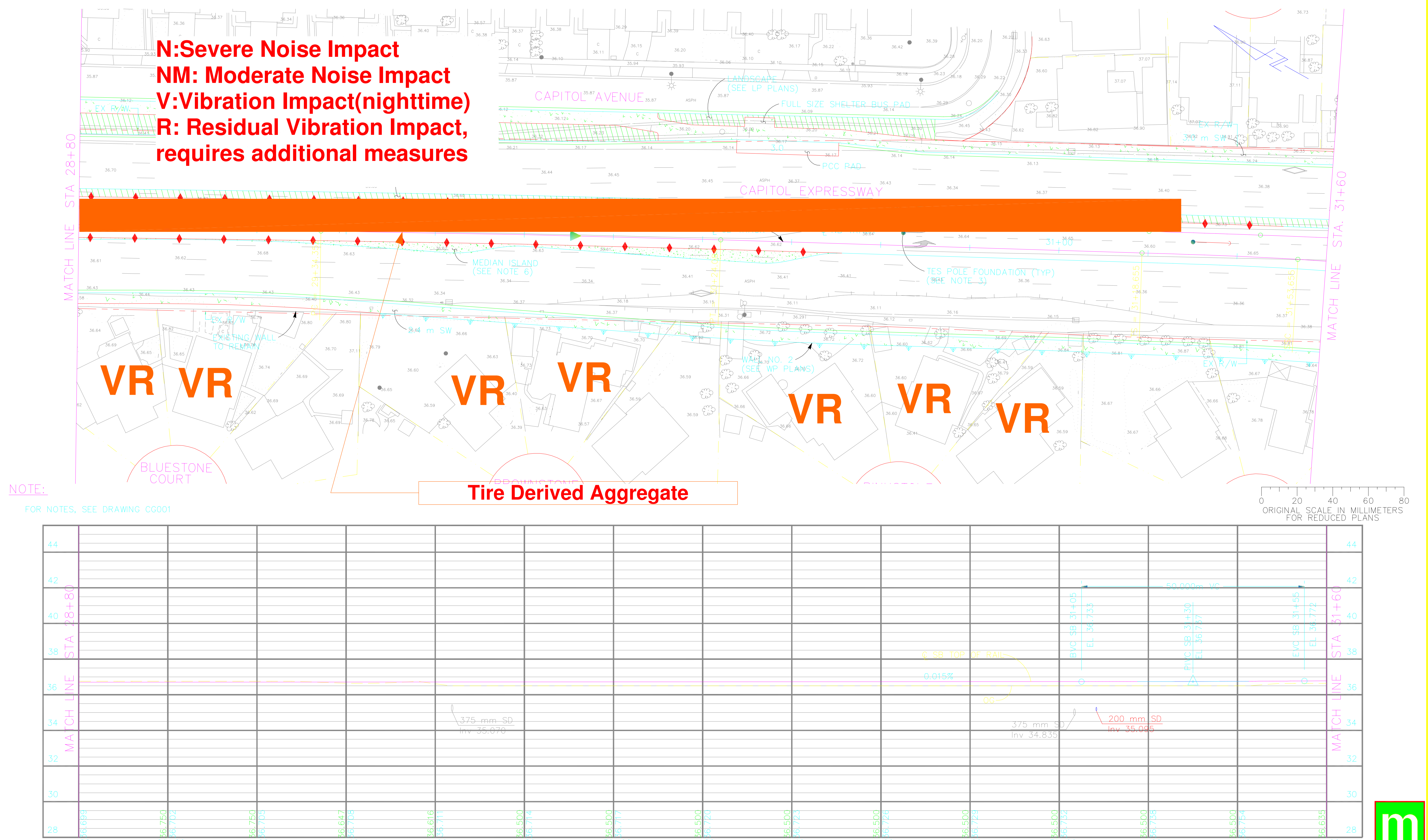
SCALE 1:400 H; 1:100 V
SUBMITTAL DATE 05/16/2006
BOARD APPROVAL DATE

CAPITOL EXPRESSWAY LIGHT RAIL PROJECT

CIVIL
ALIGNMENT PLAN AND PROFILE
STA 26+20 TO STA 28+80

SHEET
OF
DRAWING NO. CG007
REVISION B

PCA NO. N/A
CONTRACT NO. (A###) #####
FILE LOCATION PE Phase/Plans/35%/03/CG-Sheets



NO.	DATE	REVISIONS

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DESIGNED: A. Do
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CADD FILE NAME: PEPCG008.dwg

SANTA CLARA Valley Transportation Authority

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CADD FILE DATE: 02/12/2006
SCALE: 1:400 H; 1:100 V
SUBMITTAL DATE: 05/16/2006
BOARD APPROVAL DATE:

CAPITOL EXPRESSWAY LIGHT RAIL PROJECT

CIVIL
ALIGNMENT PLAN AND PROFILE
STA 28+80 TO STA 31+60

SHEET
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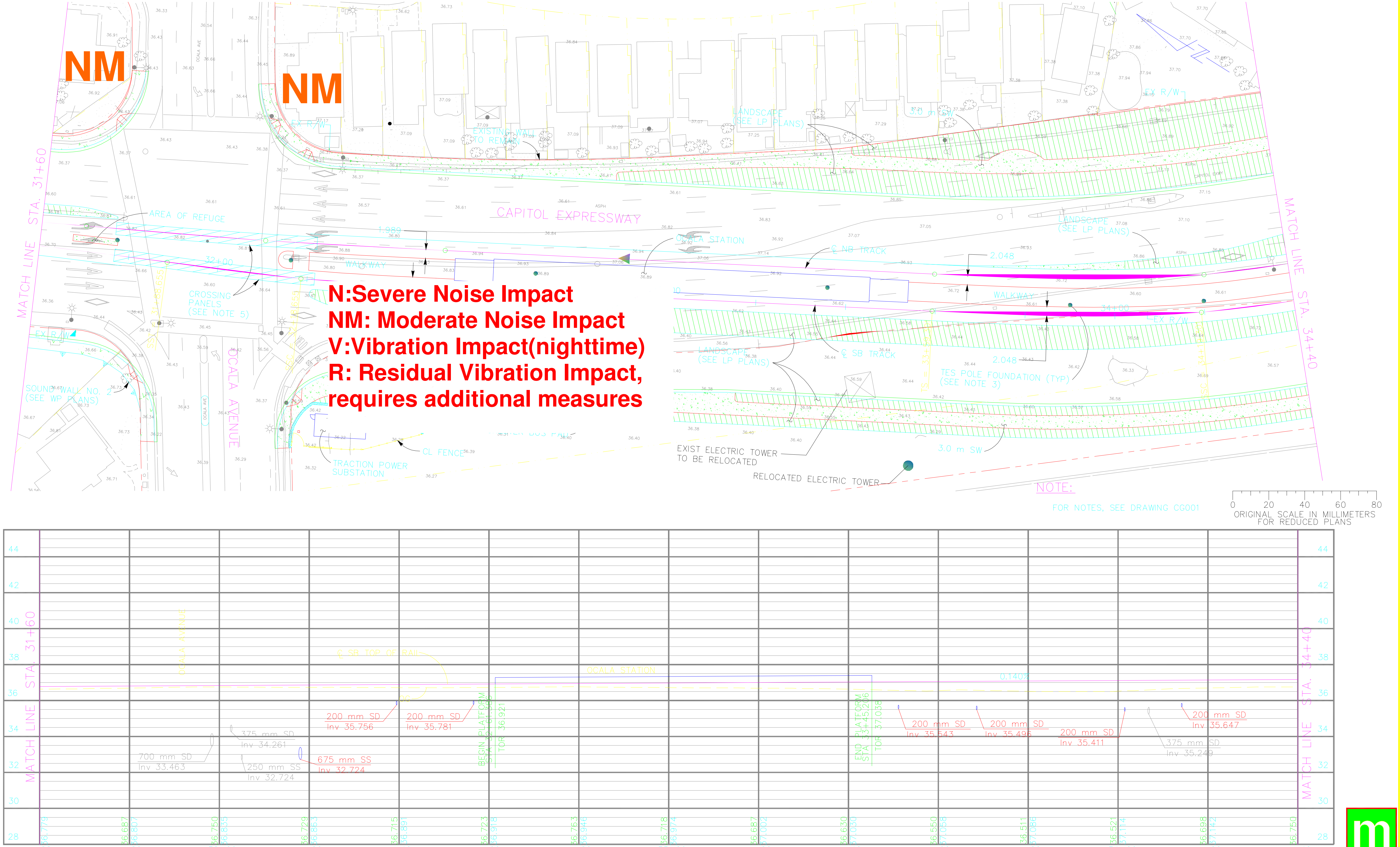
DRAWING NO. CG008
REVISION B
PCA NO. N/A
CONTRACT NO. (A###) #####
FILE LOCATION: PE Phase/Plans/35%/03/CG-Sheets



NO.	DATE	REVISIONS	

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BOARD APPROVAL DATE

CAPITOL EXPRESSWAY LIGHT RAIL PROJECT

CIVIL
ALIGNMENT PLAN AND PROFILE
STA 31+60 TO STA 34+40

SHEET
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REVISION B

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