City of Morgan Hill

High Speed Rail Alignments

Alignment Analysis

Introduction

The California High Speed Rail Authority (CHSRA) is proposing two alignment alternatives traveling through the City of Morgan Hill (City). They are as follows:

- Alternative 1 – Viaduct West of US 101: An aerial structure on the west side of the US 101 freeway. This alternative will place the high-speed rail system on an aerial structure approximately 50 to 60 feet high.
- Alternative 2 – Embankment East of Union Pacific Rail Road (UPRR) tracks - This alternative places the high-speed rail system on an embankment (earthen and rock mound with retaining walls) that varies in height between approximately five feet to over twenty five feet. The alignment roughly parallels Monterey Road east of the Union Pacific Railroad right-of-way.

The City has asked for a peer review of the proposed CHSRA alignment alternatives to examine other possibilities within the US 101 corridor which can be presented to the CHSRA as additional options to consider for the alignment through Morgan Hill.

Design Considerations

The CHSRA has several constraints on its alternatives related to the City. They are primarily operational standards and cost efficiency to stay within the approved budget for the CHSR project.

- Operational Standards and Speed – Proposition 1A, the high-speed rail legislation of 2008, specifies that the high-speed train must be able to travel between Los Angeles and San Francisco in two hours and forty minutes. This has been a significant driver in development of the alignments for the project.
- In addition to complex structures including straddle bents, viaducts, or berms, there is a trench design standard that requires full waterproofing of any trench systems for the project. The waterproofing standards exceed typical standards and are further discussed in the Morgan Hill Alternatives section of this report.
- Cost – The CHSRA considers cost a significant issue related to the construction of the system. The CHSRA is currently developing its 2018 Business Plan. This plan is developed, by legislation, every two years with the last plan produced in 2016. In its 2016 Business Plan the CHSRA identified the cost of the project as $64.2 Billion. Only a portion of the necessary funds for the completion of the project are currently available to the CHSRA. A majority of the funding is expected to be provided through public/private partnerships (P3). Due to these factors, the CHSRA is very concerned about project funding and is reducing costs at each step.

City of Morgan Hill Proposed Alternatives

The City has developed three alternatives to the CHSRA proposed alignments. These are as follows:

- Viaduct in the Median of the US 101 Freeway: This alternative joins the CHSRA proposed corridor south of Morgan Hill, traverses into the median of the US 101 freeway, then crosses back over the freeway to join the CHSRA proposed corridor north of Morgan Hill.
- Trench Adjacent to the West Side of the US 101 Freeway: This alternative places the high-speed rail system into a trench adjacent to the US 101 freeway. The alignment is in the same proximity as Alternative 1 proposed by the CHSRA.
- Viaduct with Straddle bents, and Pergola structures straddling the US 101 Freeway: This alternative crosses the US 101 freeway on a curve, runs along the eastern edge of the freeway, then crosses back over to meet the CHSRA proposed corridor north of Morgan Hill.

There are several pros and cons of each alternative which are discussed further below.

City of Morgan Hill Alternative Discussion

1. Viaduct in the median of the US 101 freeway

This alternative places the high-speed rail structure completely within the median of the US 101 freeway in the vicinity of Morgan Hill (see Figure 1). This alignment cannot continue down the median south of Morgan Hill due to the proximity to the San Marin Airport and the associated runway protection zone. In addition, this alternative is within a footprint that has not been studied by the CHSRA. This alternative is not compatible with Variation 1 of the Caltrans US-101 Express Lanes Project.

Figure 1: Railroad Viaduct on Median Source Google Images

The maximum design speed for this alternative is 100 mph. The CHSRA is required to meet travel time constraints which will not be met with this speed. Because of this, the alternative will most likely not be acceptable to the CHSRA. In addition, Caltrans has completed a Project Study Report (PSR) on the US-101 Express Lanes Project. This is the widening of the US-101 freeway to add High Occupancy Toll (HOT) lanes. This widening will be within the Caltrans right-of-way in space currently part of the wide center median as well as the eastern and western shoulders. There are two design variations of this widening. Variation 1 calls for a 4-foot median which would not allow the addition of viaduct support structures.

2. Trench adjacent to the west side of the US 101 freeway

The trench alternative is placed in roughly the same location as the viaduct proposed by the CHSRA in Alternative 1 on the west side of the US 101 freeway. The design speed is 200 mph, which will meet the speed goal for CHSRA. This alternative places the structure below grade (see Figure 2). Fencing and walls will be visible from street level. This alternative will reduce the visibility of the rail system throughout Morgan Hill. With the alternative located in the same footprint as Alternative 1, additional environmental studies, other than

noise and vibration, will most likely not be required. If considered, this may reduce the opportunity for delay of the environmental review.

Cost is a consideration for the trench alternative. Recent trench construction in an urban area in southern California was approximately $78 million per mile. This is compared to approximate costs of the viaduct structure at $150 million per mile. However, the CHSRA standards require significant design requirements, such as waterproofing, on a trench structure that will raise the costs to approximately $320 million per mile. It is not known at this time if this alternative will meet the cost considerations imposed by the CHSRA. However, the reduction of visual impacts to residences and businesses along the high-speed rail corridor west of US 101 should be a significant consideration with this alternative.

Figure 2: Railroad Trench Source Google Images

3. <u>Viaduct with Straddle bents, and Pergola structures straddling the US 101 freeway</u>

This alterative places the high-speed rail structure away from the residences along the west side of the US 101 freeway that are significantly impacted by the CHSRA proposed Alternative 1. The alignment crosses the US 101 freeway twice through straddle bent structures (see Figure 3). The design speed is 250 mph. While the design speeds are equal to or greater than what is proposed by the CHSRA, the extra construction costs will be a consideration in the further evaluation of this alternative. Unless all structures remain outside of the US 101 median, the alignment will not be compatible with Caltrans US-101 Express Lanes Project.

Figure 3: Straddle Bent Source Google Images

Conclusion

Of the two CHSRA proposed alternatives, the viaduct along the west side of US 101 creates fewer impacts from the long-term disruption or displacement of established communities and commercial business, and long-term construction impacts within the heart of Morgan Hill. We have shown that the project could not be located within the median of US 101. Of the City of Morgan Hill proposed feasible alternatives, option 2 and 3 described above, may decrease some impacts on the City. However, there may be additional right of way required, costs, or design standard constraints associated with each alternative that will have to be absorbed into the overall costs of the project. Of the City proposed alternatives, the trench appears to be the most viable from the long term visual impacts the project may have on the City. The Viaduct alternative, option 3, may be less desirable to the CHSRA due to cost of the complex structures straddling the freeway.