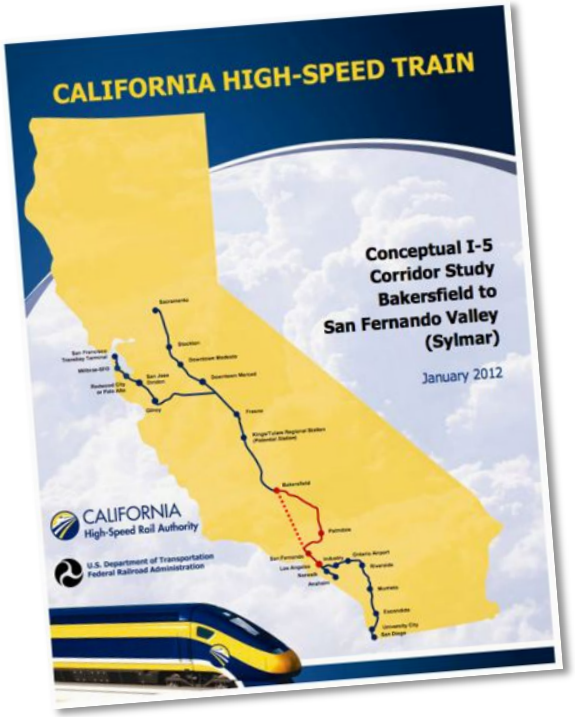
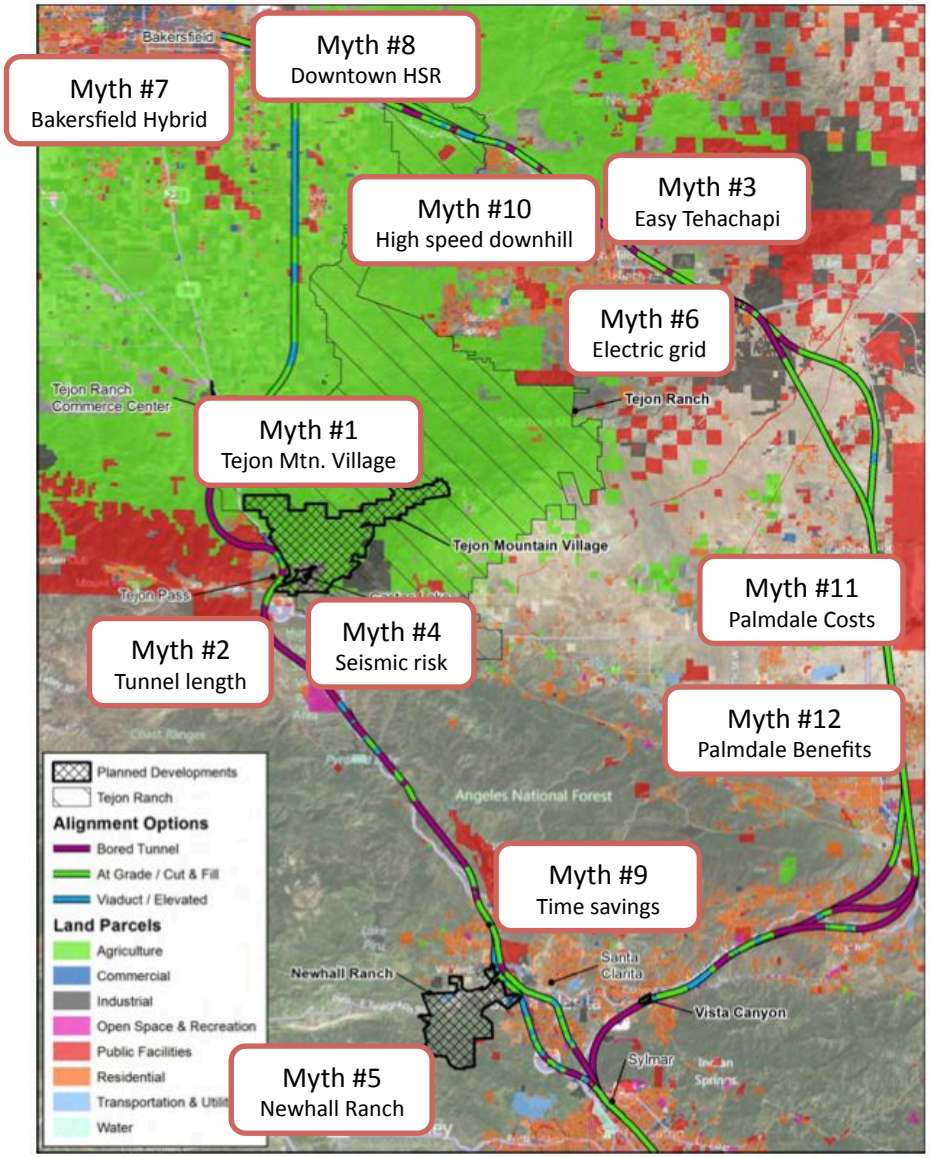
The Truth About Tejon



A series of counter-points to the Parsons Brinckerhoff / HSR Authority Conceptual I-5 corridor study (published January 2012)

Tejon Pass vs. Antelope Valley: 12 Myths



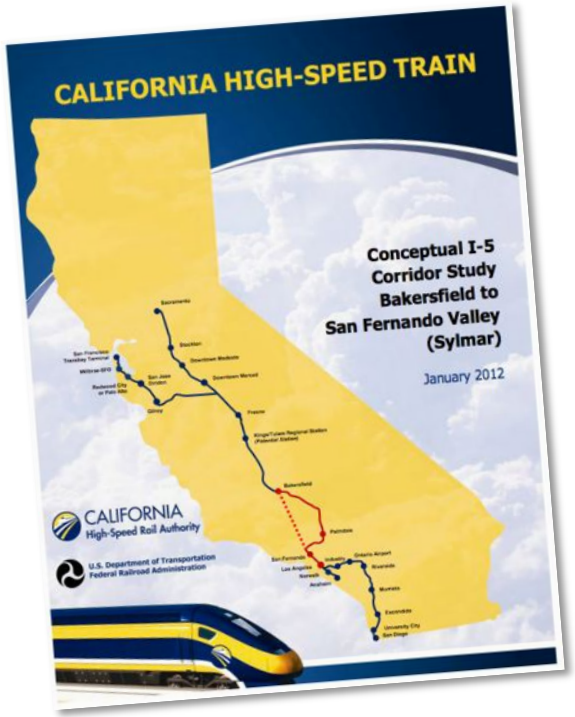
Seeing is believing

- Many of the locations, landmarks and topographical features discussed in this presentation are easier to visualize and understand in Google Earth

  – Download this file: http://www.tillier.net/stuff/hsr/tejon.kml

Myth #1

- Tejon Pass HSR cannot cross into Tejon Mountain Village property



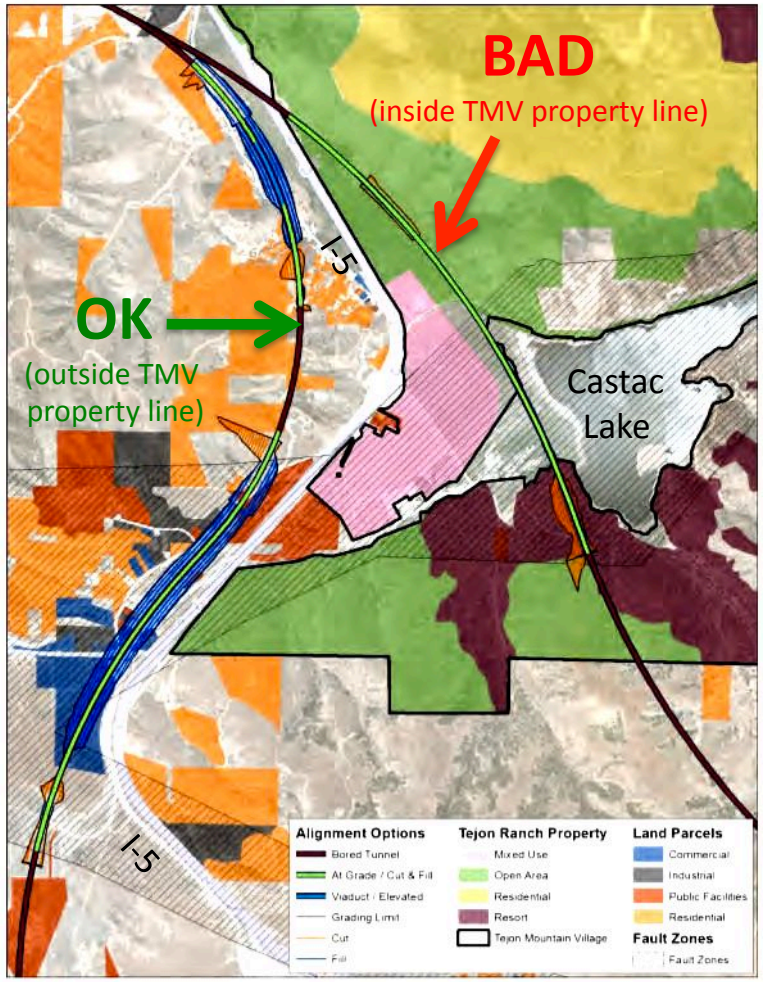
"… Of all of the potentially feasible alignments identified in the Study, only one avoids any direct impact on the Tejon Mountain Village. This alignment will therefore be identified as the representative alignment to compare with the Antelope Valley alignments…."

Tejon Mountain Village (TMV)

- Tejon Mountain Village is a proposed residential, commercial and recreational development by the Tejon Ranch Company
  - 5082-acre gated community
  - two golf courses
  - 3450 homes
  - 160,000 square foot shopping center near I-5
  - up to 750 hotel rooms
- TMV occupies key topography near Tejon Pass

TMV: Absolutely no trespassing!

Figure 5.6-1 Representative Alignments in the Tejon Pass Area



- CHSRA / PB took the avoidance of Tejon Mountain Village property as a strict non-negotiable constraint, as in "NO TRESPASSING"
- Dozens of promising HSR alignments were eliminated as a result of this constraint
- As a direct result, the west of I-5 alignment suffers from numerous shortcomings

Consequences of TMV avoidance

- Slower and longer alignment west of I-5
  - 120 mph curves
- Requires a very long tunnel (8.7 miles) just south of Tejon Pass (see Myth #2)
  - Significantly longer than any tunnels contemplated in Antelope Valley, or even in a TMV-crossing alignment
- Alignment crosses directly through Garlock / San Andreas fault convergence zone (see Myth #4)
  - A seismic Bermuda Triangle
- Alignment crosses through town of Lebec

A good Tejon Pass alignment through TMV

- Total exposed length = 1.7 miles
- Majority of alignment is in a deep bored tunnel with no surface impacts
  - Hundreds of feet below surface
- Exposed section is near I-5 & high voltage power lines
  - Already heavily impacted, far from idyllic
- Trains will crest pass at only 130 – 150 mph
  - Much quieter than 220 mph
  - Much quieter than military jets cleared to fly down to 200 ft AGL along Visual Route 1262, right over TMV

A question of cost

- Avoiding TMV at <u>any</u> cost makes no financial sense
  - TMV avoidance serves solely to protect private economic interests, and those economic interests must be weighed against the public costs incurred to avoid TMV
  - HSR is not the death of TMV and can be mitigated without necessarily upsetting the TMV business case
  - TMV avoidance violates the I-5 study's own alignment development methodology constraints
    - "Proposed Developments - to be avoided *where possible*"

Tejon Mountain Village conclusions

- Strict avoidance of Tejon Mountain Village has far-reaching negative consequences
  - Slow speeds, seismic convergence zone crossing, 8.7-mile long tunnel, and crossing town of Lebec
- The single Tejon Pass alignment selected by CHSRA / PB is definitely not representative of good Tejon Pass alignments, for the purpose of comparing with Antelope Valley
- Impacts to TMV must be viewed in the context of relevant dollar amounts
  - Tejon Mountain Village mitigation (tens of millions)
  - Tejon Ranch Company market cap (hundreds of millions)
  - Tejon HSR savings (several billion)
- The bulk of TMV is miles away from the HSR alignment

Myth #2

- Tejon Pass HSR requires more tunneling than Antelope Valley HSR

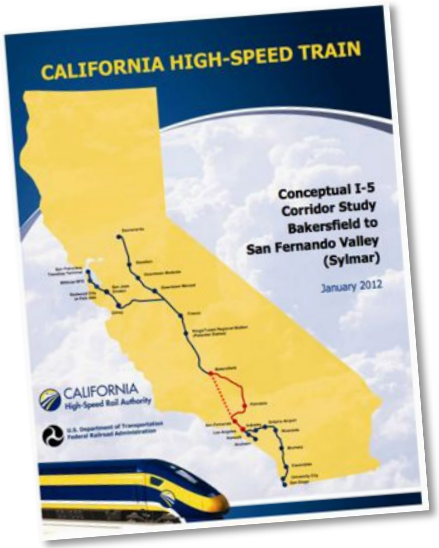
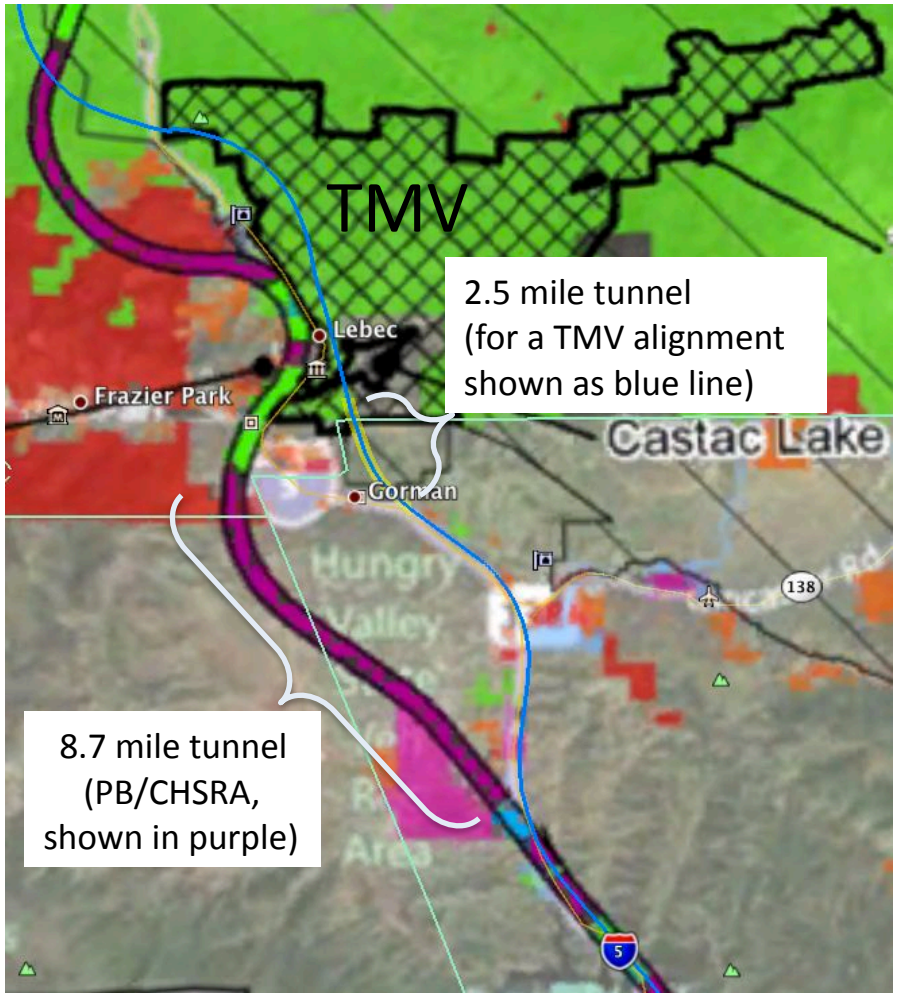


Table 6.3-1 Key Quantities and Costs for Bakersfield to Sylmar

	Antelope Valley **		I-5 Alignment***
	Low Cost	High Cost	
Total length (miles)	**116.7**	**119.0**	**93.4**
Number of tunnels	16	19	16
Longest tunnel (miles)	7.1	7.1	8.7
Tunnel length (miles)	29.4	29.3	31.4

Longest tunnel at Tejon Summit



- Longest tunnel in PB/ CHSRA conceptual Tejon alignment is 8.7 miles
  - It results solely from avoidance of Tejon Mountain Village
  - TMV-crossing alignment requires only 2.5 mile tunnel
- +6.2 miles of tunnel <u>just to avoid TMV!!</u>

What does +6.2 miles of tunnel cost?

- Unit costs from December 2010, used in CHSRA cost estimates

C2. Structures - Tunnels			
1	TBM Single Track Twin Tunnels 30 ft ID Unpressurized TBM in hard rock	route mile	$123,782,700
2	TBM Single Track Twin Tunnels 30 ft ID Slurry TBM in hard rock	route mile	$182,983,121
3	TBM Single Track Twin Tunnels 30 ft ID in soft ground	route mile	$161,455,695
10	At-Grade in Cut - 2 Track (10' Avg. Exc Depth)	route mile	$3,347,515
11	At-Grade in Cut - 2 Track (15' Avg. Exc Depth)	route mile	$4,585,342
12	At-Grade in Cut - 2 Track (20' Avg. Exc Depth)	route mile	$6,027,679
13	At-Grade in Cut - 2 Track (40' Avg. Exc Depth)	route mile	$13,906,717
14	At-Grade in Cut - 2 Track (60' Avg. Exc Depth)	route mile	$25,283,962
15	At-Grade in Cut - 2 Track (80' Avg. Exc Depth)	route mile	$40,331,633
16	At-Grade in Cut - 2 Track (100' Avg. Exc Depth)	route mile	$58,909,801
21	At-Grade in Fill - 2 Track (5' Avg. Fill Ht)	route mile	$1,662,994
22	At-Grade in Fill - 2 Track (10' Avg. Fill Ht)	route mile	$2,115,070
23	At-Grade in Fill - 2 Track (15' Avg. Fill Ht)	route mile	$2,685,546
24	At-Grade in Fill - 2 Track (20' Avg. Fill Ht)	route mile	$3,352,897
25	At-Grade in Fill - 2 Track (40' Avg. Fill Ht)	route mile	$7,270,888
26	At-Grade in Fill - 2 Track (60' Avg. Fill Ht)	route mile	$13,040,238
27	At-Grade in Fill - 2 Track (80' Avg. Fill Ht)	route mile	$20,714,766
28	At-Grade in Fill - 2 Track (100' Avg. Fill Ht)	route mile	$30,305,234

This ($125M per mile tunnels) …

… instead of this
(~$25M per mile earthworks)

Difference = $100M per mile*

(* base unit costs, before about 50% overhead is applied, including 25% contingency, 6% engineering design, 3% program management, 4% construction management, 0.5% agency, 4% mobilization, 3% environmental mitigation)

The additional tunneling cost to avoid Tejon Mountain Village costs <u>at least $620M</u>, closer to $1B with overhead

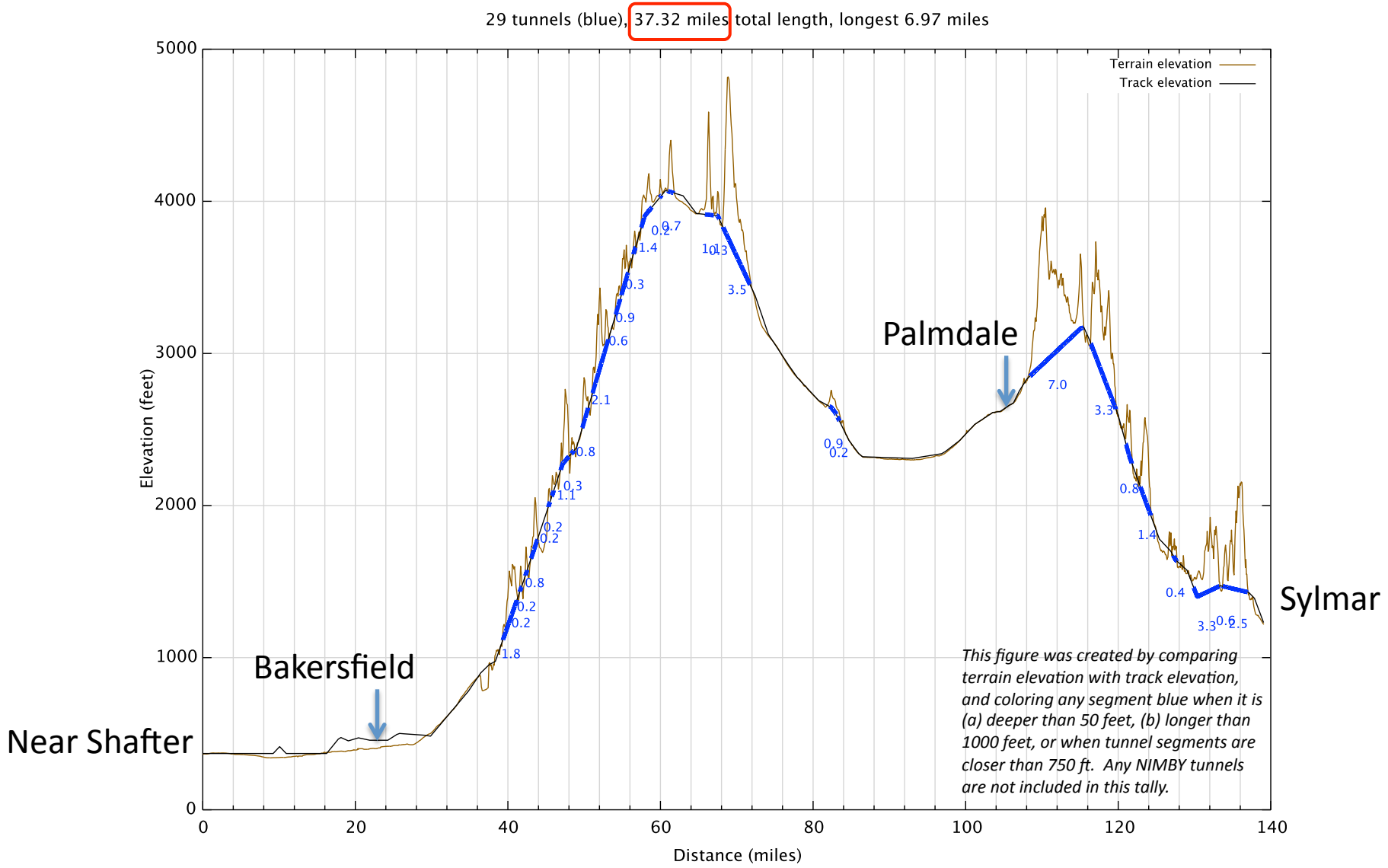
Is sparing Tejon Mountain Village worth $620 million?

- TMV is a development being proposed by the Tejon Ranch Company (NYSE: TRC) Here is its market capitalization:

It is cheaper to <u>acquire the entire Tejon Ranch Company</u> (including extensive land holdings and interests beyond TMV) than to build just one longer tunnel to avoid TMV.

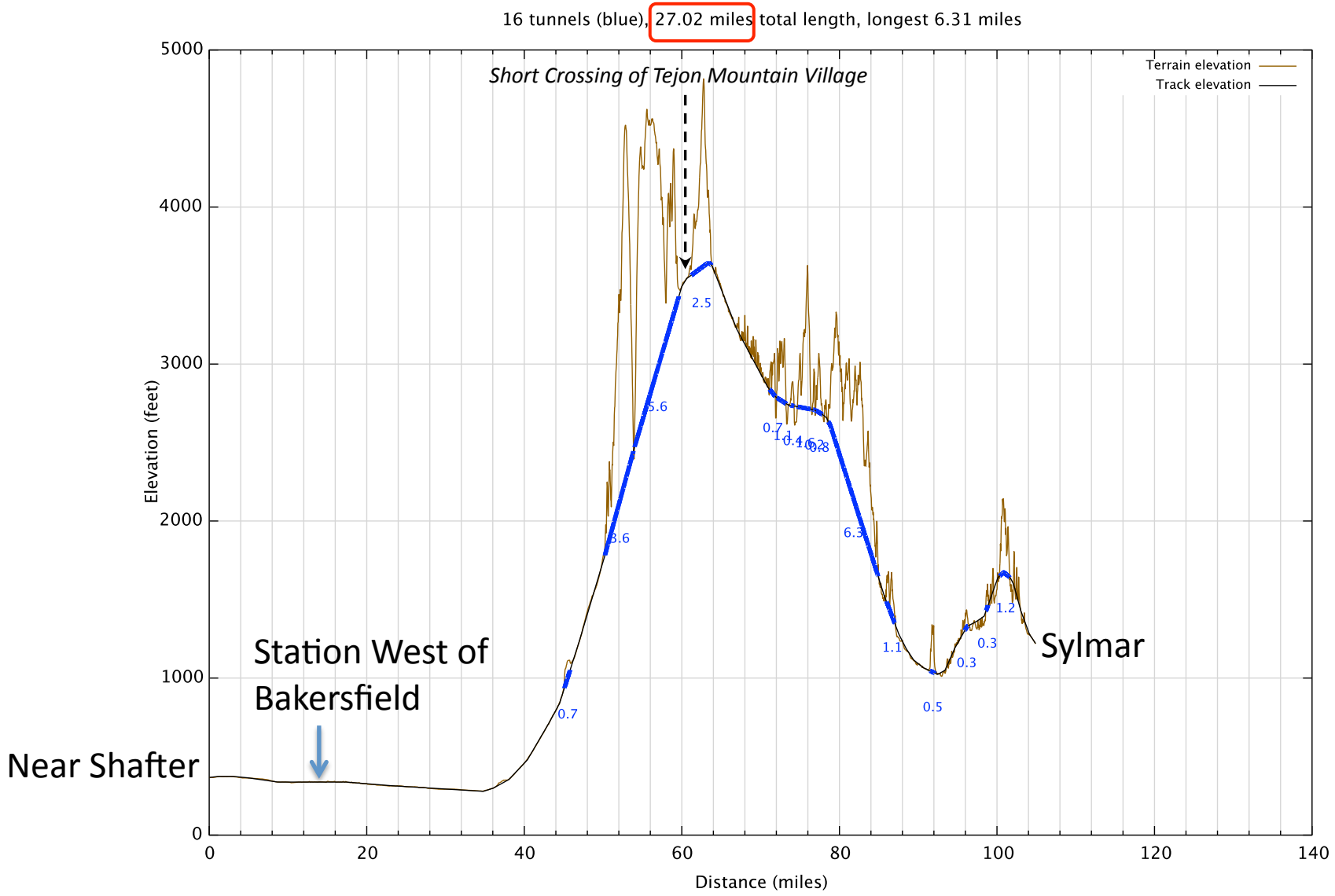
Truth about tunnels: Antelope Valley

- Antelope Valley alignment (including New-T3, SR-14 Hybrid, Santa Clarita South)



Truth about tunnels: Tejon Pass

- An example Tejon pass alignment that crosses TMV



Discussion

- The Tejon Pass alignment selected for study by PB/CHSRA has far more tunneling than is strictly necessary
  - Total tunnel length: 31.4 miles
  - Longest tunnel: 8.7 miles (due to TMV avoidance)
- Better Tejon Pass alignments are possible that have less tunneling
  - Total tunnel length: 27.0 miles (example alignment… 25 miles is possible)
  - Longest tunnel is then: 6.3 miles (Castaic Grade)
- The Antelope Valley alignment compared in the PB/CHSRA I-5 conceptual alignment study has far less tunneling and far more tall bridges than is reasonable for the topography of Tehachapi Pass.
- The detailed alignments described in DEIR/SAA documents reveal:
  - Total tunnel length: 37.3 miles
  - Longest tunnel: 7.0 miles (San Gabriel tunnel, just south of Palmdale)

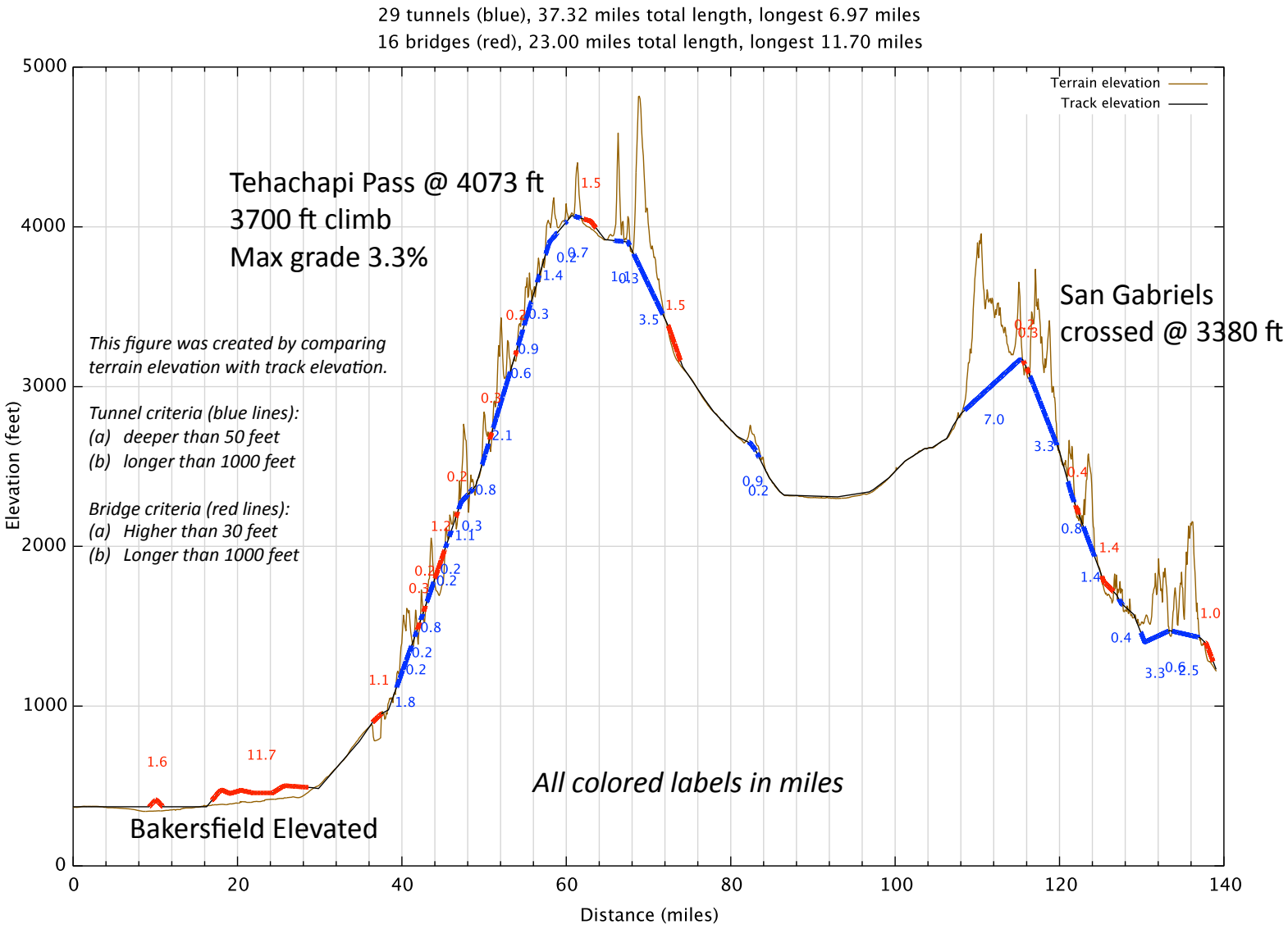
Tunnel conclusions

- The PB/CHSRA I-5 conceptual alignment study grossly distorts the truth about tunnels
  - Exaggerates by 4 to 6 miles the length of tunneling for Tejon Pass alignment
    - By selection of an exceptionally poor alignment that avoids TMV
  - Underestimates by about 8 miles the length of tunneling required for the Tehachapi / Palmdale alignment
    - By use of obsolete engineering data that has since been refined in DEIR/SAA documents
- Tejon Pass tunnels are both shorter and fewer than Antelope Valley tunnels
- Antelope Valley requires <u>at least 10 more miles</u> of tunneling than Tejon Pass
  - "It's the topography, stupid"

Myth #3

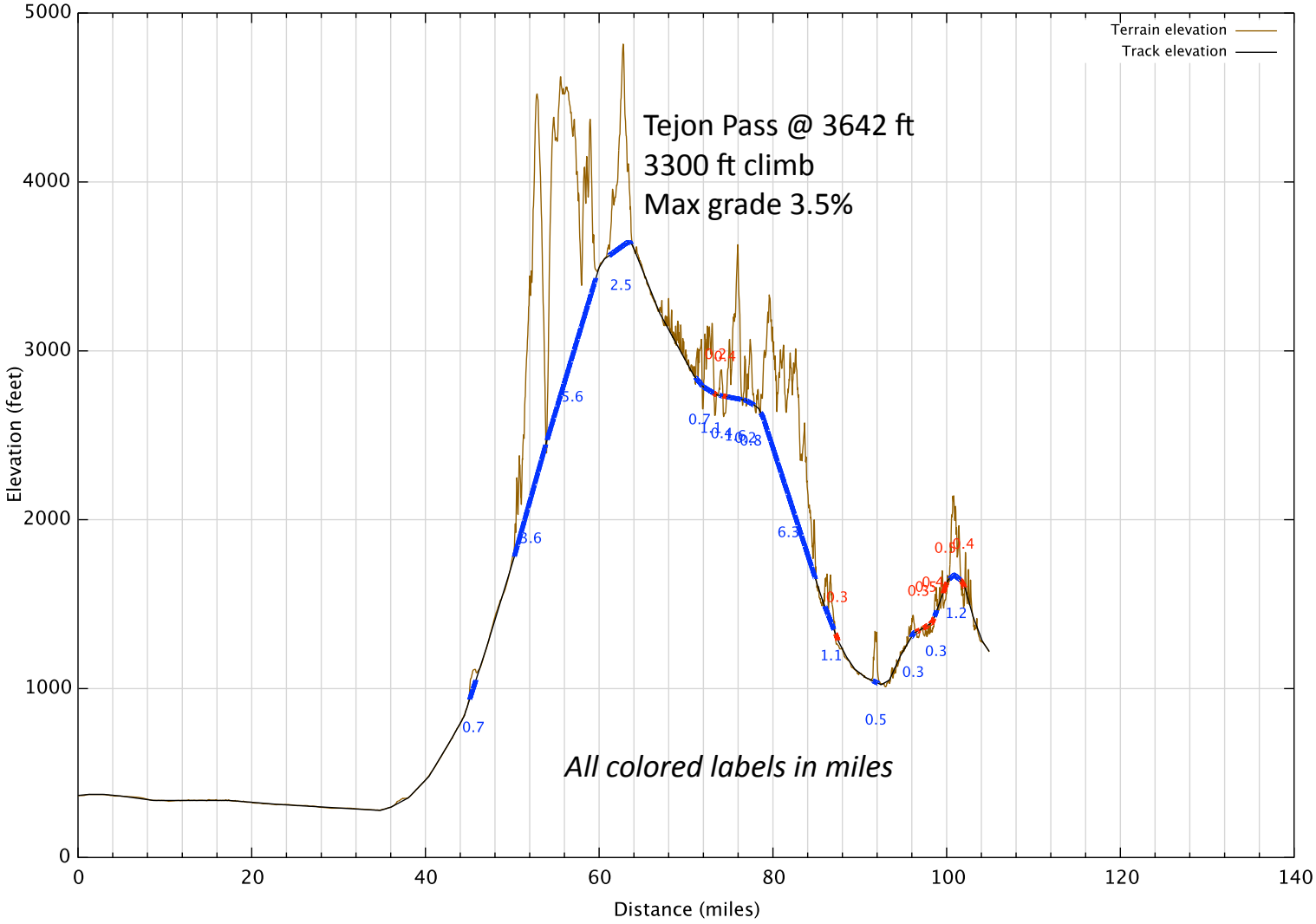
- Tehachapi Pass is the easier mountain crossing, as the Southern Pacific Railroad figured out way back in the 1870s

Antelope Valley HSR



Tejon Pass HSR

16 tunnels (blue), 27.02 miles total length, longest 6.31 miles
8 bridges (red), 2.95 miles total length, longest 0.52 miles



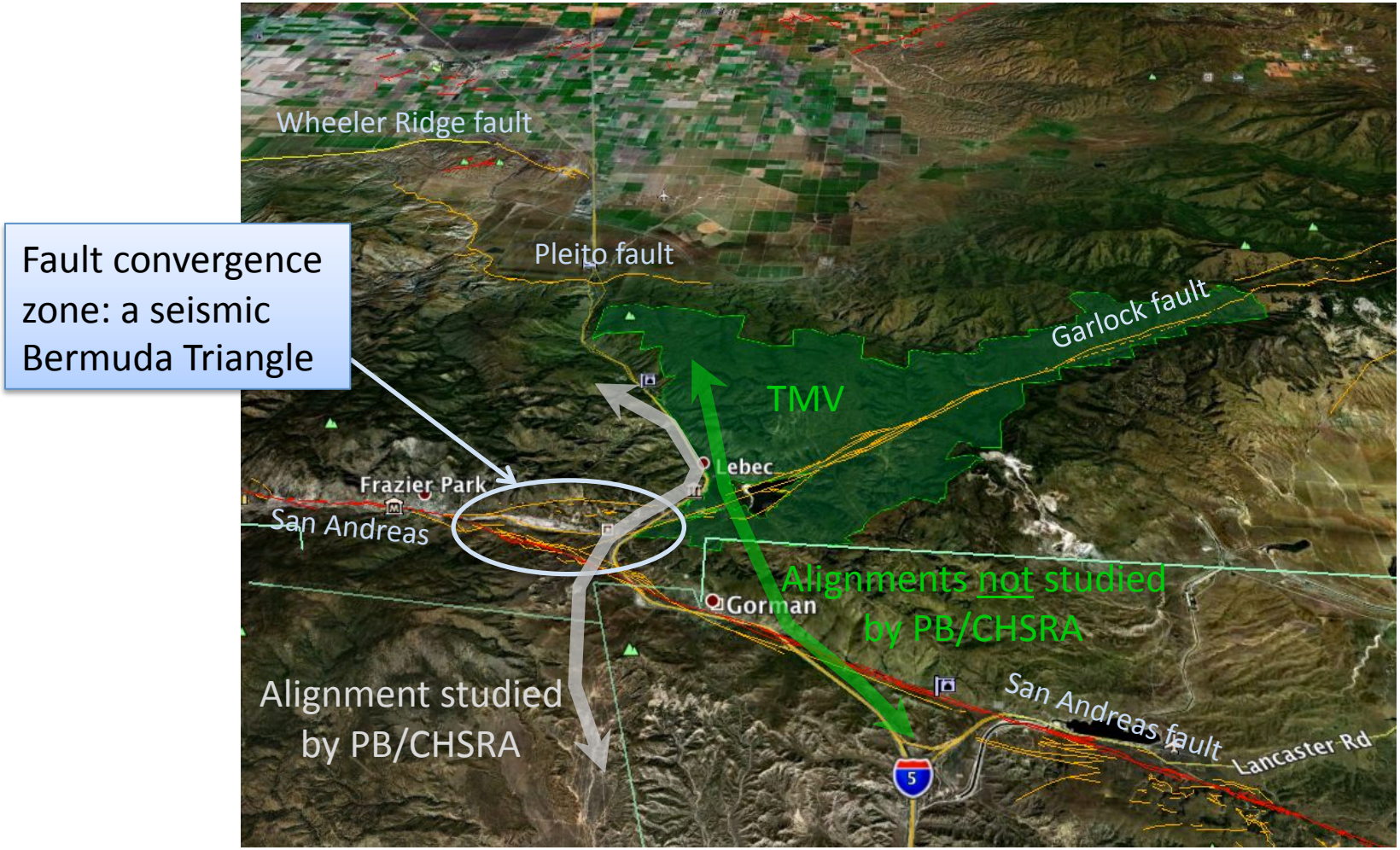
Mountain crossing conclusions

- Tejon Pass is 431 ft lower than Tehachapi Pass
- Tejon Pass is 34 miles shorter
  - I-5 study claimed only 23-25 miles
- Tejon Pass has 10+ fewer miles of tunnels
  - (see Myth #2)
- Tejon Pass has 20 fewer miles of bridges
  - Primarily because downtown Bakersfield need not be crossed on a 12-mile viaduct (see Myth #8)

Myth #4

- Tejon Pass HSR suffers from greater seismic risk, compared to Antelope Valley HSR
  - Crosses Garlock / San Andreas fault convergence zone
  - Parallels San Gabriel fault

Faults in the Tejon Pass area



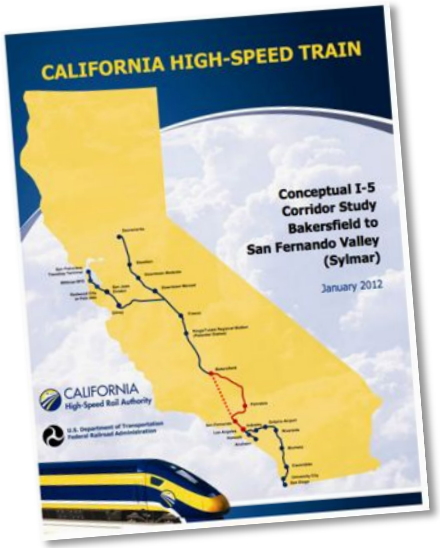
View looking north along Grapevine, towards Central Valley

Seismic conclusions

- The Tejon Pass alignment selected for study by CHSRA / PB passes directly through the convergence zone
  - CHSRA / PB study claims this is a result of topography, but the root cause is in fact the avoidance of Tejon Mountain Village (see Myth #1)
- Better Tejon Pass alignments are possible that cross the Garlock and San Andreas outside of the fault convergence zone
  - ALL faults crossed at grade (unlike Antelope Valley HSR)
  - Optimal alignment encroaches into Tejon Mountain Village
- The San Gabriel fault is not a significant seismic risk
  - The Tejon route runs parallel to it (at a distance of a few miles) for ~20 miles
  - It hasn't ruptured in tens of thousands of years, unlike other far more active faults in the area (e.g. San Andreas)
  - As a vote of confidence in the San Gabriel fault, the CHSRA's own Antelope Valley alignment crosses the fault in the Santa Susanna tunnel near Santa Clarita… the "fault chamber" promises to be quite a piece of engineering

Myth #5

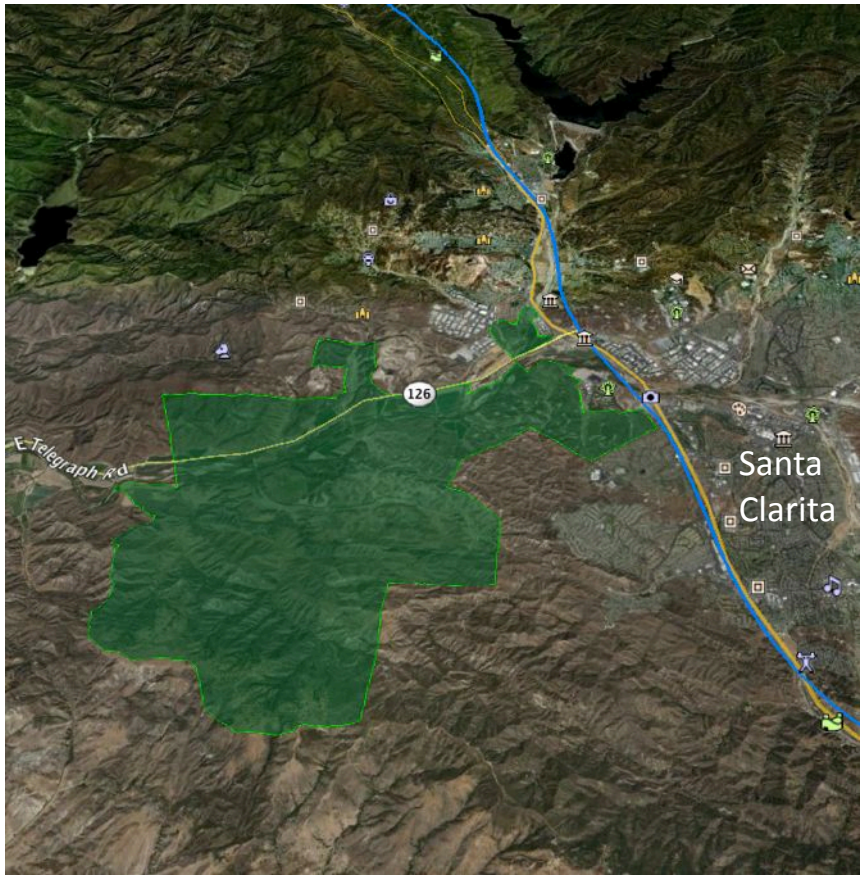
- Tejon Pass HSR via Santa Clarita would significantly impact Newhall Ranch



"… There is significant potential for additional constraints to be identified through additional community involvement through Santa Clarita. There is therefore a risk that no feasible alignment can be found …"

"…The 120 mph slower speed zone through Newhall reduces this time saving by 1 minute 16 seconds …"

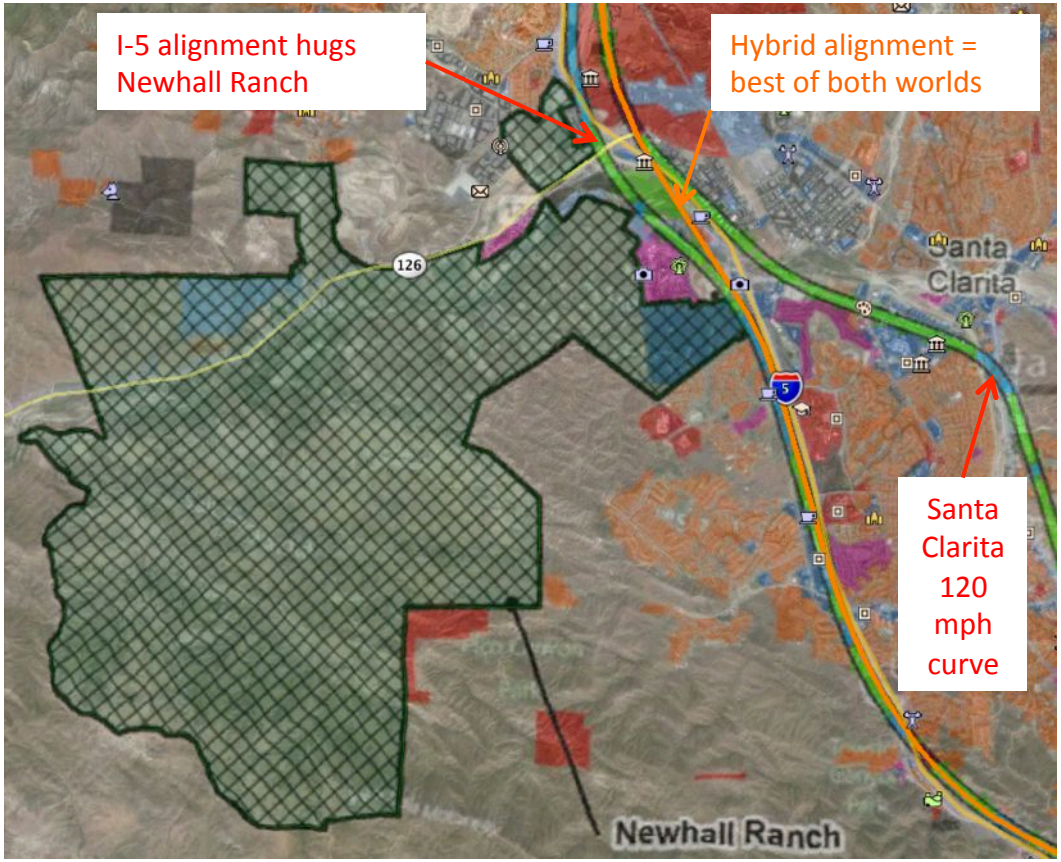
Newhall Ranch



- Newhall Ranch is a development by the Newhall Land and Farming Company west of Santa Clarita, being developed in phases with the most recent phase approved by Los Angeles County in October 2011. This phase includes a proposed 20,000 home community

Newhall Ranch discussion

- HSR through Santa Clarita follows I-5, a heavily-impacted transportation corridor
  - Yellow line in figure at right
- Two flawed alignments were studied by PB/CHSRA:
  - Metrolink alignment, away from Newhall Ranch but with a 120 mph speed restriction
  - I-5 alignment, hugging Newhall Ranch with 200 mph speed limit
- The two alignments can be combined to form a better alignment
  - Orange line in figure
  - ½ mile away from Newhall Ranch AND 200 mph
  - Minor business impacts at cross-over



Newhall Ranch conclusions

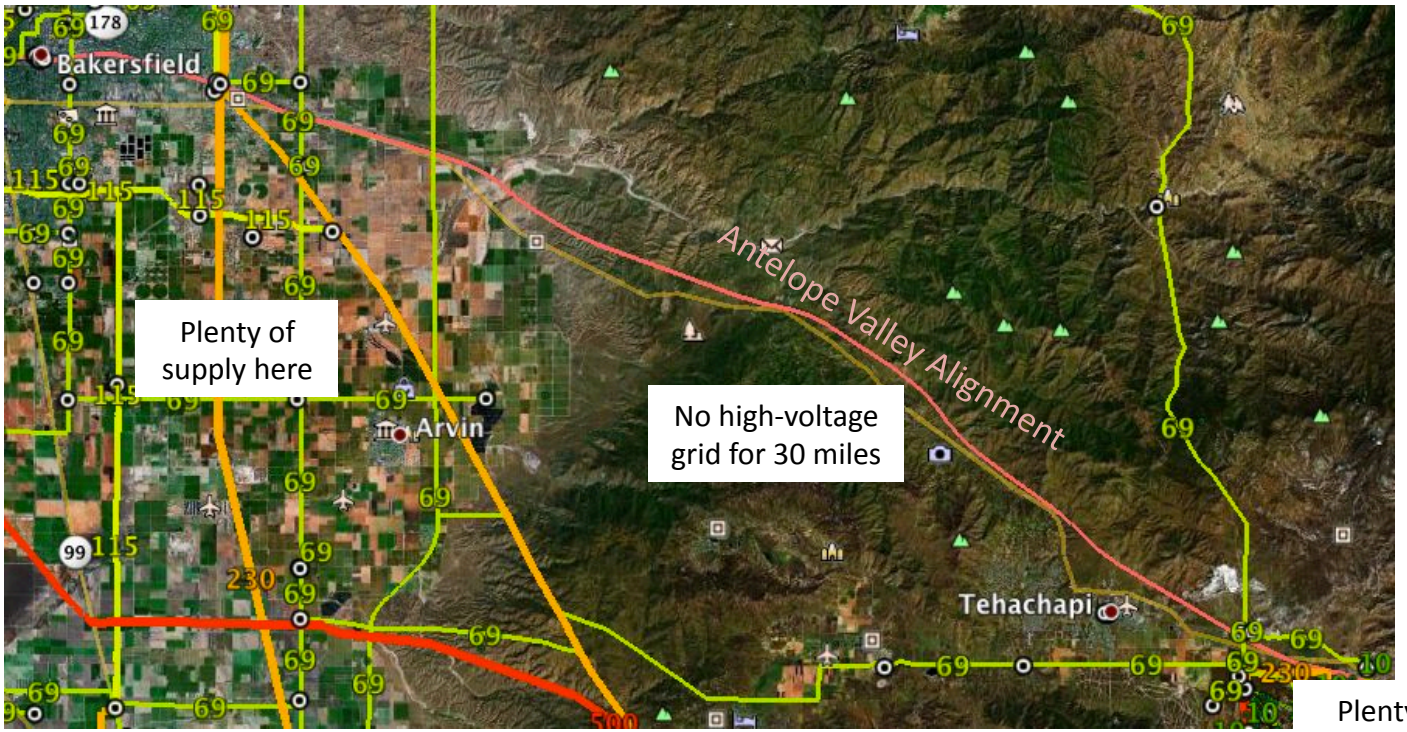
- Bulk of Newhall Ranch lies miles away from HSR alignment
- Vicinity of I-5 is already heavily impacted
- An alignment exists that stays about ½ mile away from most Newhall Ranch boundaries

Myth #6

- Antelope Valley HSR via Tehachapi Pass can just plug in to the electric grid

There is no electric grid

- For 30 miles along the Tehachapi Pass climb, where HSR electrical load will be heaviest (tens of megawatts), there is no grid to speak of.



Tejon Pass electric grid

- Dense, high-capacity electric grid supply along Tejon alignment
- HSR can tap into grid at existing substations

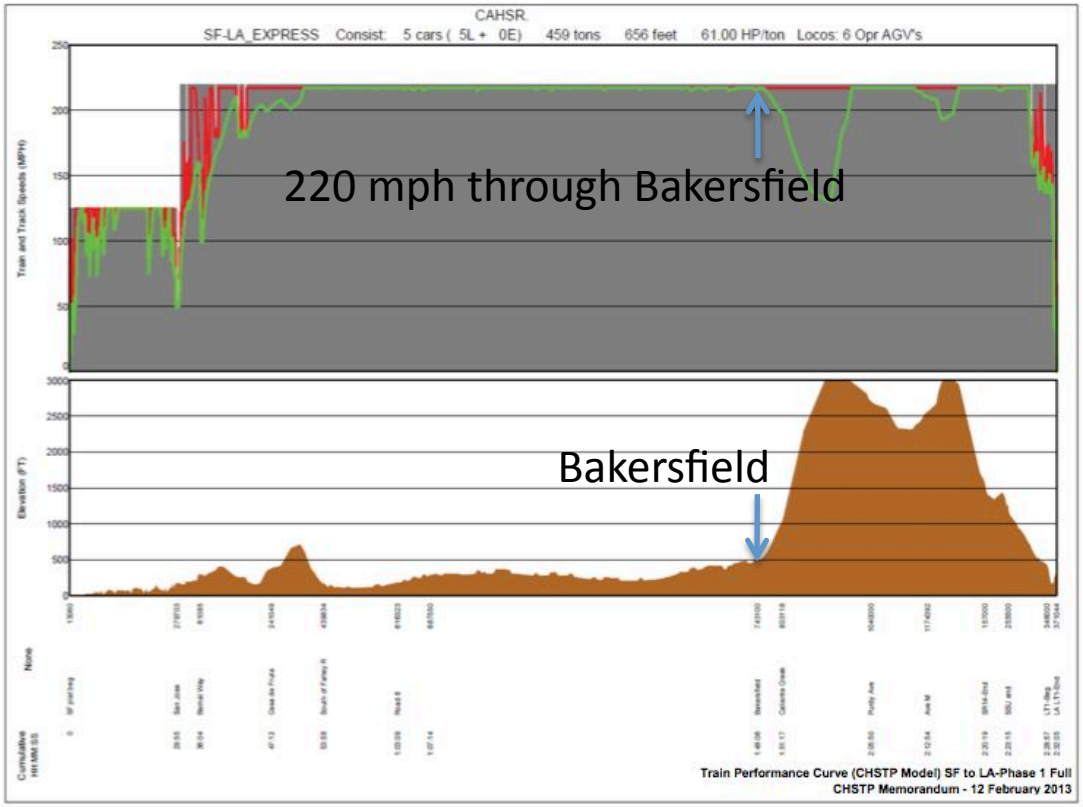
Looking North from Santa Clarita, Tejon Pass HSR in blue

Electric grid conclusions

- The Antelope Valley HSR alignment requires the development of new high-voltage supply corridors to supply 30 miles of HSR in the most power-hungry section (the 3700-foot Tehachapi climb)
  - New high-voltage transmission lines through wilderness areas require their own environmental clearance process
  - New high-voltage transmission lines are not free
- Electric grid is ready as-is for Tejon Pass HSR

Myth #7

- Bakersfield can be crossed at 220 mph



CHSRA / PB Simulations

Bakersfield Hybrid Alignment (B3)

Looking East

- Bakersfield Hybrid Alignment (B3) is most likely to be selected
  - B3 was introduced in Revised DEIR to lower community impacts
- Bakersfield Hybrid Alignment contains several sharp curves

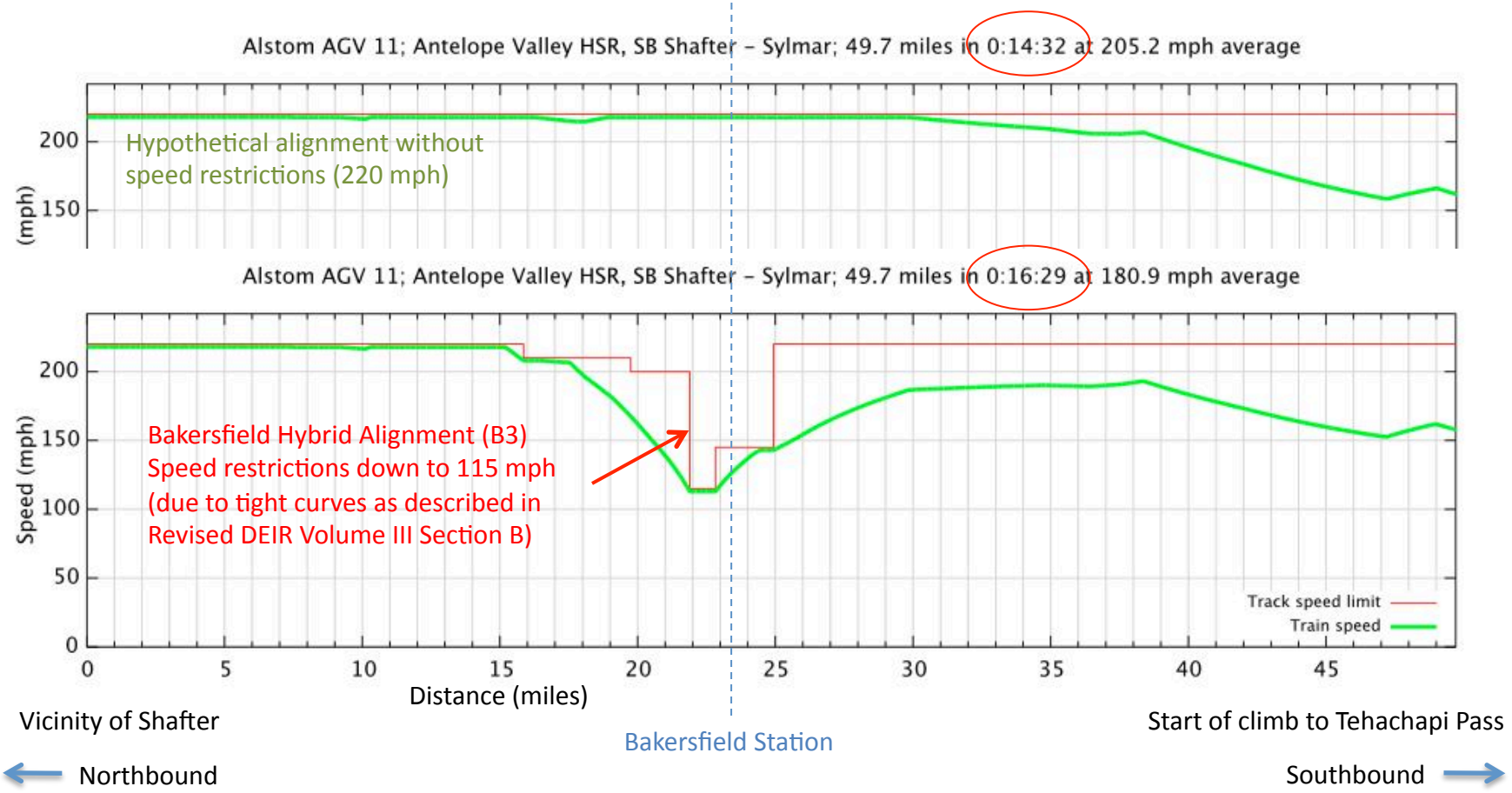
ALIGNMENT B3

CURVE No.	DESIGN SPEED (MPH)	RADIUS (R) (FT)	ACTUAL SUPERELEVATION EA (IN)	UNBALANCED SUPERELEVATION EU (IN)	SPIRAL LENGTH LS (FT)	CURVE LENGTH LC (FT)
120	250	60000	2.75	1.42	1200	1200
121	210	19500	6.00	3.05	1720	17056
122	200	19600	6.00	2.16	1720	2333
123	115	6000	6.00	2.82	1000/1050	332
124	115	6000	6.00	2.82	1050/1000	1192
125	145	9500	6.00	2.85	1300	2842

From Fresno – Bakersfield Revised DEIR Volume III Section B

Bakersfield TPC results

Time Lost due to Bakersfield Hybrid Alignment speed limits: 2 minutes



Bakersfield Hybrid conclusions

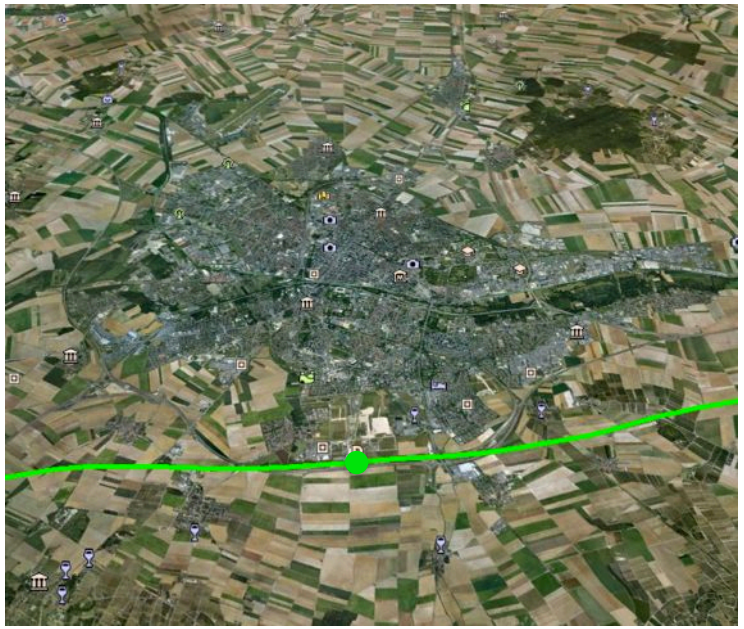
- Bakersfield Hybrid Alignment is 2 minutes slower for non-stop express trains than previously simulated by PB / CHSRA
  - Every minute counts, for goal of SF-LA in 2:40
  - Two minutes is 1.25% of the entire SF-LA run
  - The next minute saved is always more expensive than the last minute (diminishing returns)
  - Wasting 2 minutes is inconsistent with the purpose of HSR

Myth #8

- Bakersfield must be served with a downtown station

Downtowns and 220 mph don't mix

- Crossing downtown Bakersfield requires about 12 miles of concrete viaduct
  - Nearly 100 feet high in places, built above new Centennial Freeway
- None of the proposed alignments are favored by the city
  - All have significant impacts either to the city or to HSR itself (see Myth #7)
- No city anywhere in the world has trains traveling at 220 mph through downtown
  - Bakersfield could be one of the first
  - Most trains will not stop in Bakersfield
  - 220 mph = 100+ dBA sound exposure level, nearly impossible to mitigate even with ugly sound walls
- Foreign HSR steers clear of city centers
  - Exceptions: when city has developed around HSR stop, or when trains slow down to < 125 mph

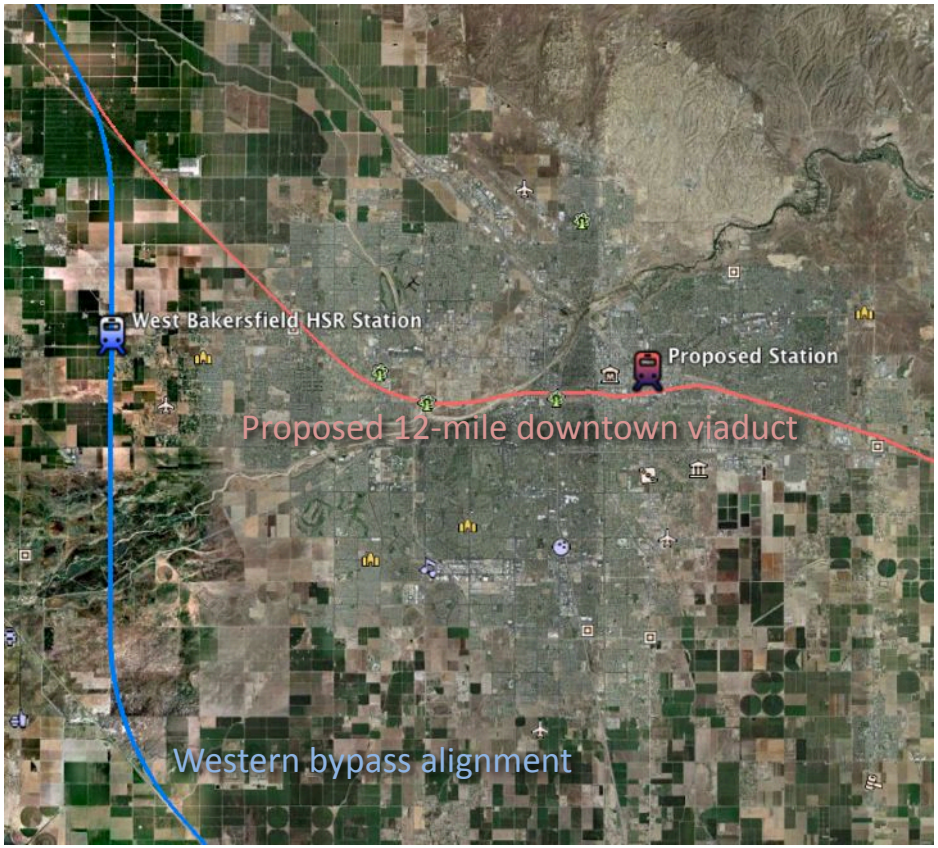


Reims, France (pop 188,000 about ½ Bakersfield)
HSR in green, opened 2007
Station at green dot with cross-platform rail connection to downtown

A better way to serve Bakersfield

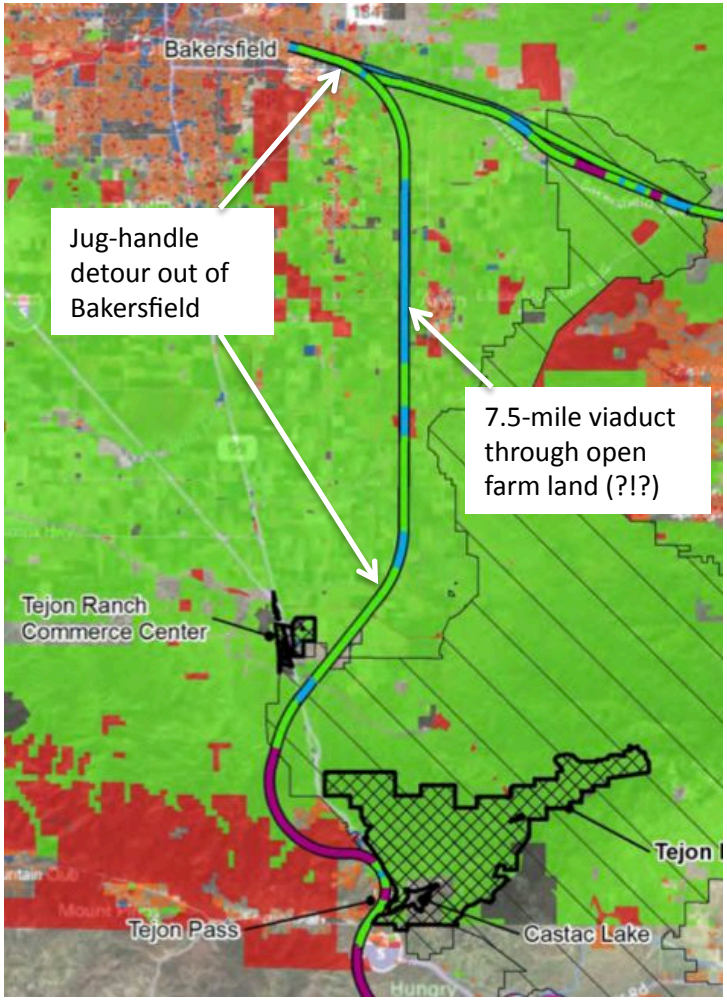
- Peripheral station on Rte 58, with new transit links to downtown
  - Less noise impact
  - Faster
  - Cheaper than 12 miles of viaduct

Bakersfield



CHSRA/PB Tejon study alignment

- CHSRA I-5 study assumed downtown station
  - Western bypass does not meet "purpose and need"… (of HSR, or of concrete industry?)
- Eastward exit requires about 10 miles of detour
  - Long "jug handle" to rejoin southerly direction into Grapevine
  - In addition to 12 miles of downtown viaduct



Downtown Bakersfield conclusions

- 220 mph HSR through downtowns is generally a bad idea
  - Noise, or speed restriction… pick your poison
- Station on periphery of Bakersfield is suitable
  - Fewer community impacts, far lower cost
  - Consistent with foreign HSR practice
- Downtown Bakersfield alignment adds about 10 miles of unnecessary detour for a Tejon Pass alignment

Myth #9

- Tejon Pass HSR is only 3 - 5 minutes faster than Antelope Valley HSR

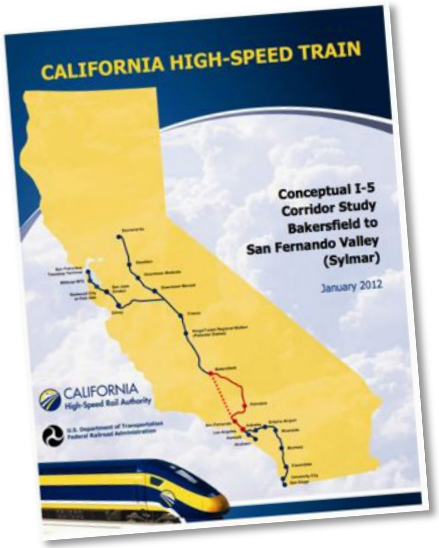


Table 7.2-1 Bakersfield to Sylmar travel times

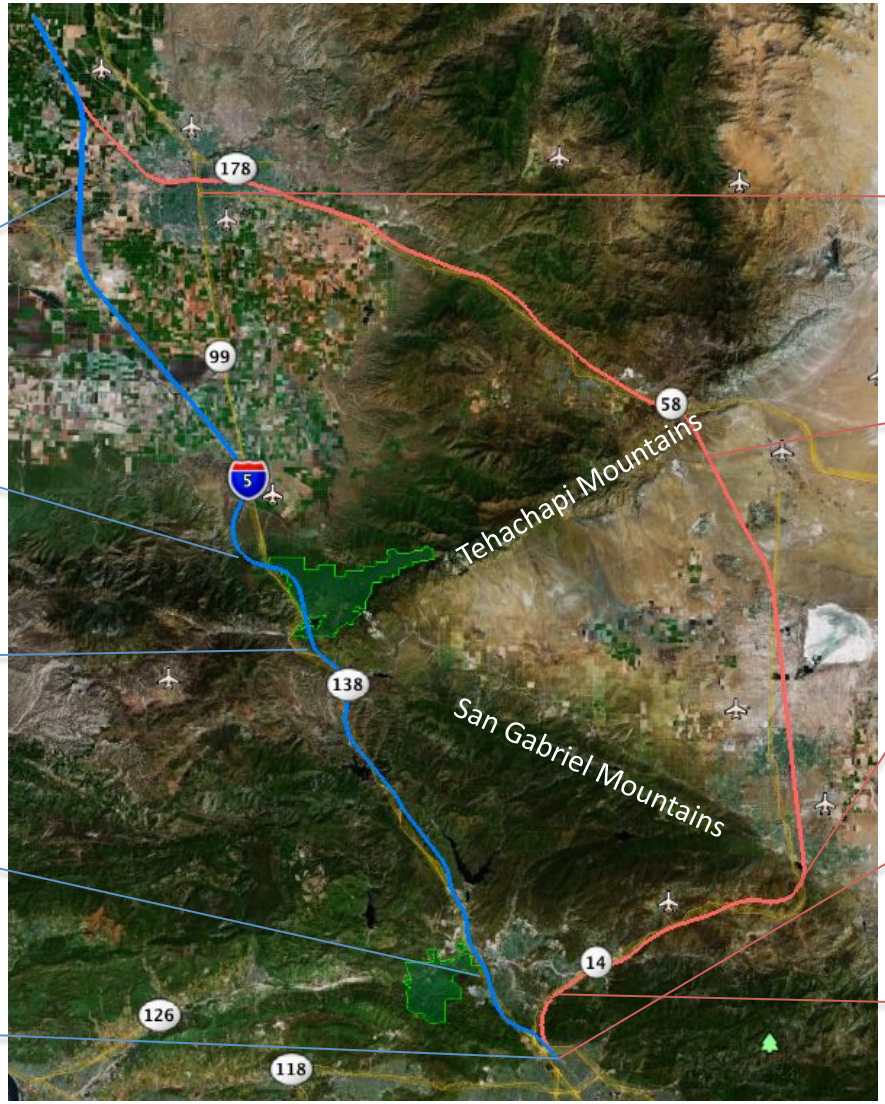
Travel time for a non-stop train (min:sec)	I-5 Grapevine		Antelope Valley	
	Faster	Slower	Faster	Slower
Southbound	33:15	34:34	39:07	40:31
Northbound	32:06	33:20	35:17	36:21
Average	32:40	33:57	37:21	38:26

Assumptions

Antelope Valley alignment depicted and analyzed here, from north to south, consists of: WS2 Shafter Bypass, B3 Bakersfield Hybrid, New E2, New T3, New AV4, SR14 E/W Hybrid, and Santa Clarita South.

Tejon Pass

- West of Bakersfield alignment (no downtown station)
- Minimum curve radius 4 km (180 mph)
- No 120 mph limit near Tejon Pass
- No 120 mph limit through Santa Clarita / Newhall
- 150 mph limit starting at Sylmar

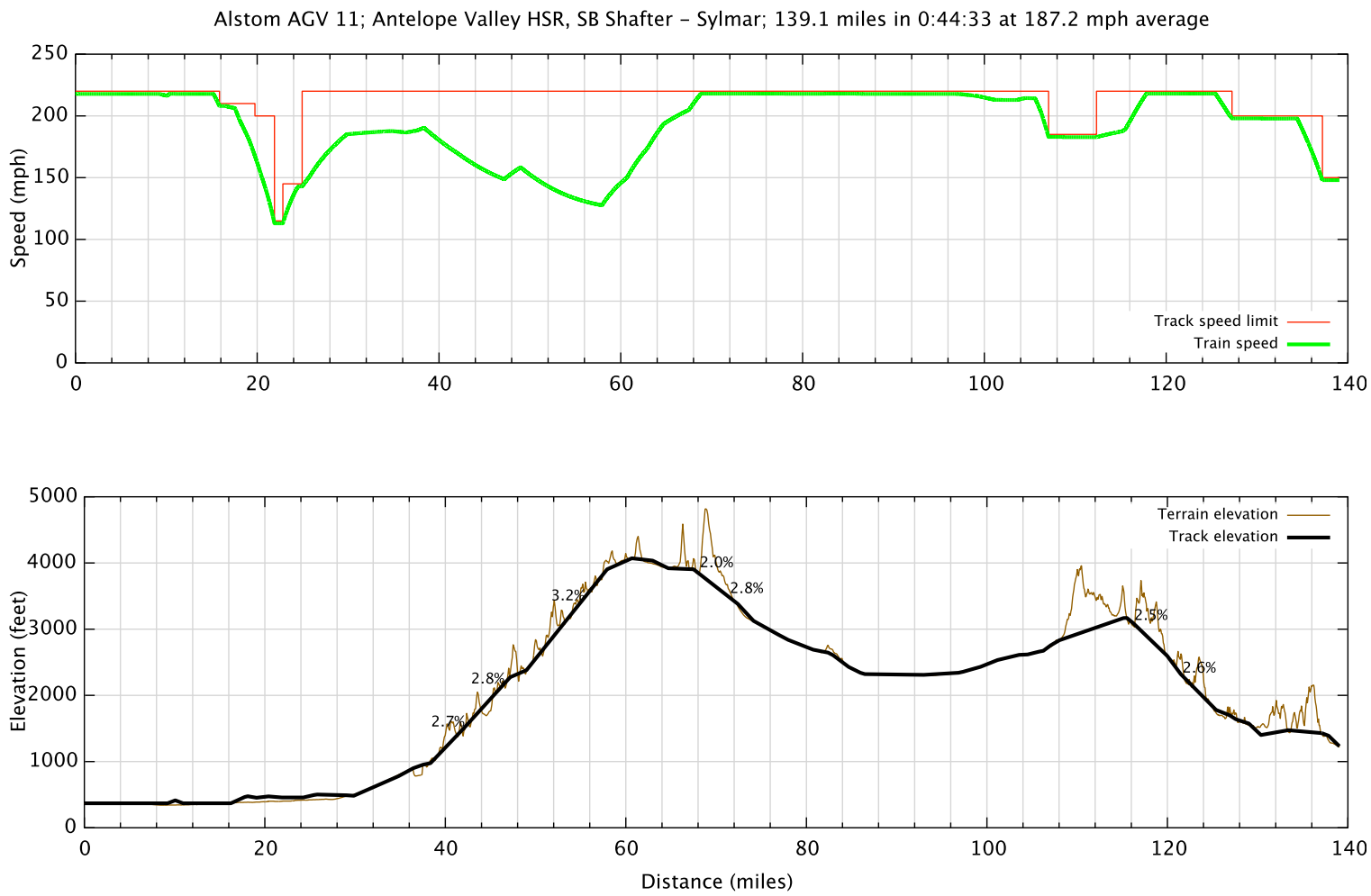


Antelope Valley

- Bakersfield 115 mph speed limit (B3 Hybrid)
- Realistic Antelope Valley Alignment (from DEIR/AA)
- Palmdale 185 mph speed limit (SR-14 E/W Hybrid)
- 150 mph limit starting at Sylmar
- Santa Clarita South 200 mph speed limit

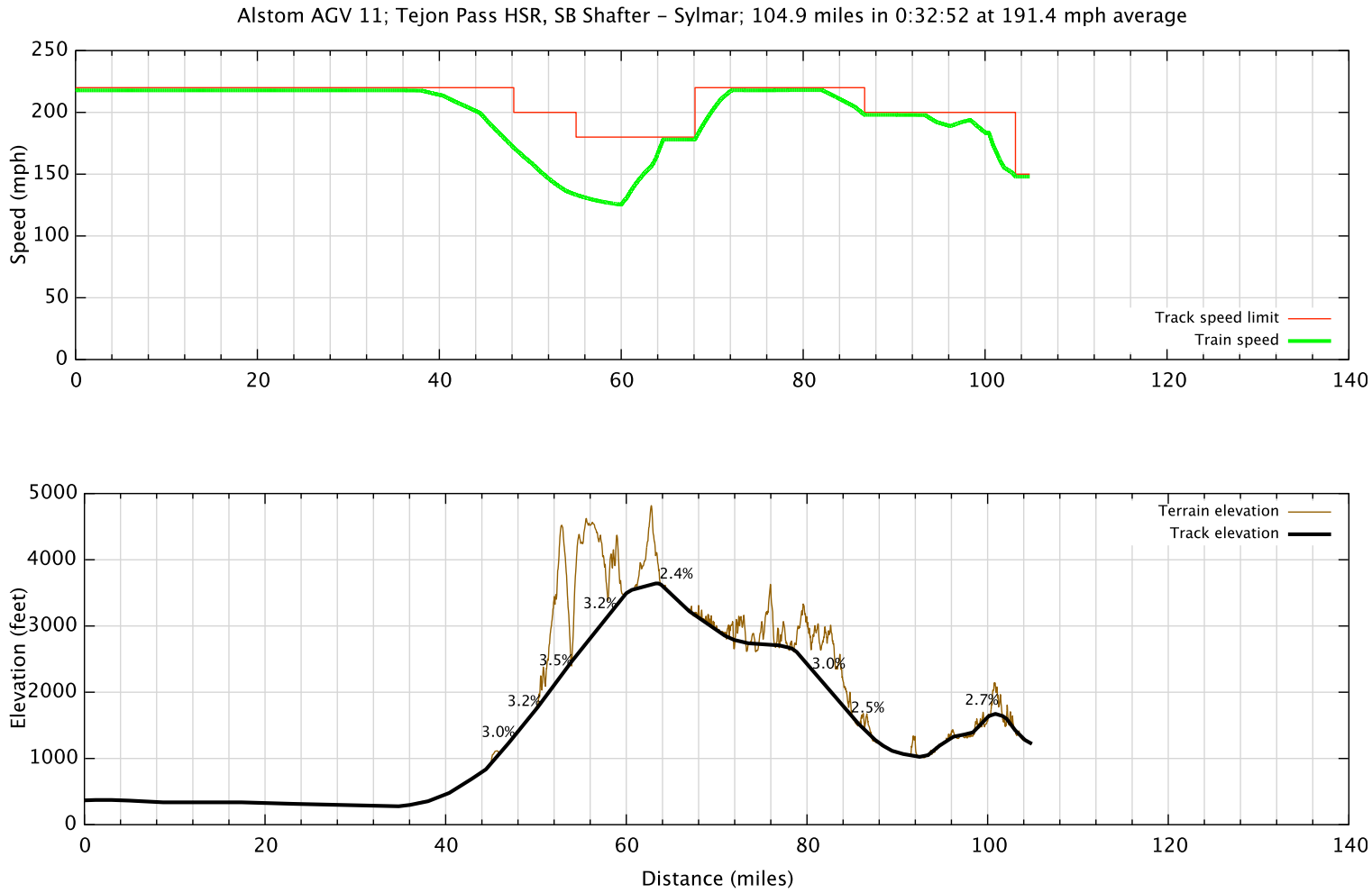
Southbound comparison:

Shafter – Sylmar via Antelope Valley in 0:44:33



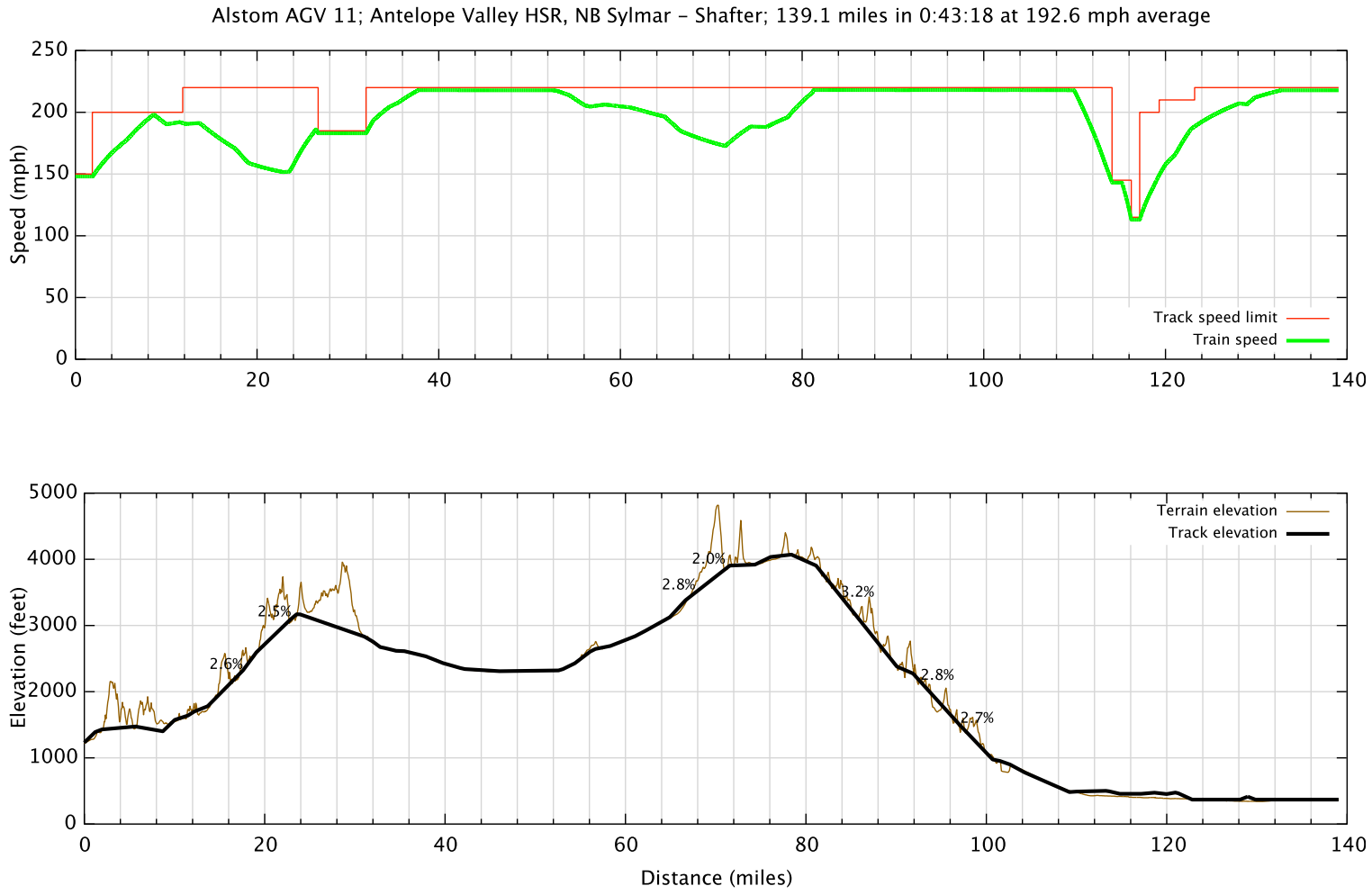
Southbound comparison:

Shafter – Sylmar via Tejon Pass in 0:32:52



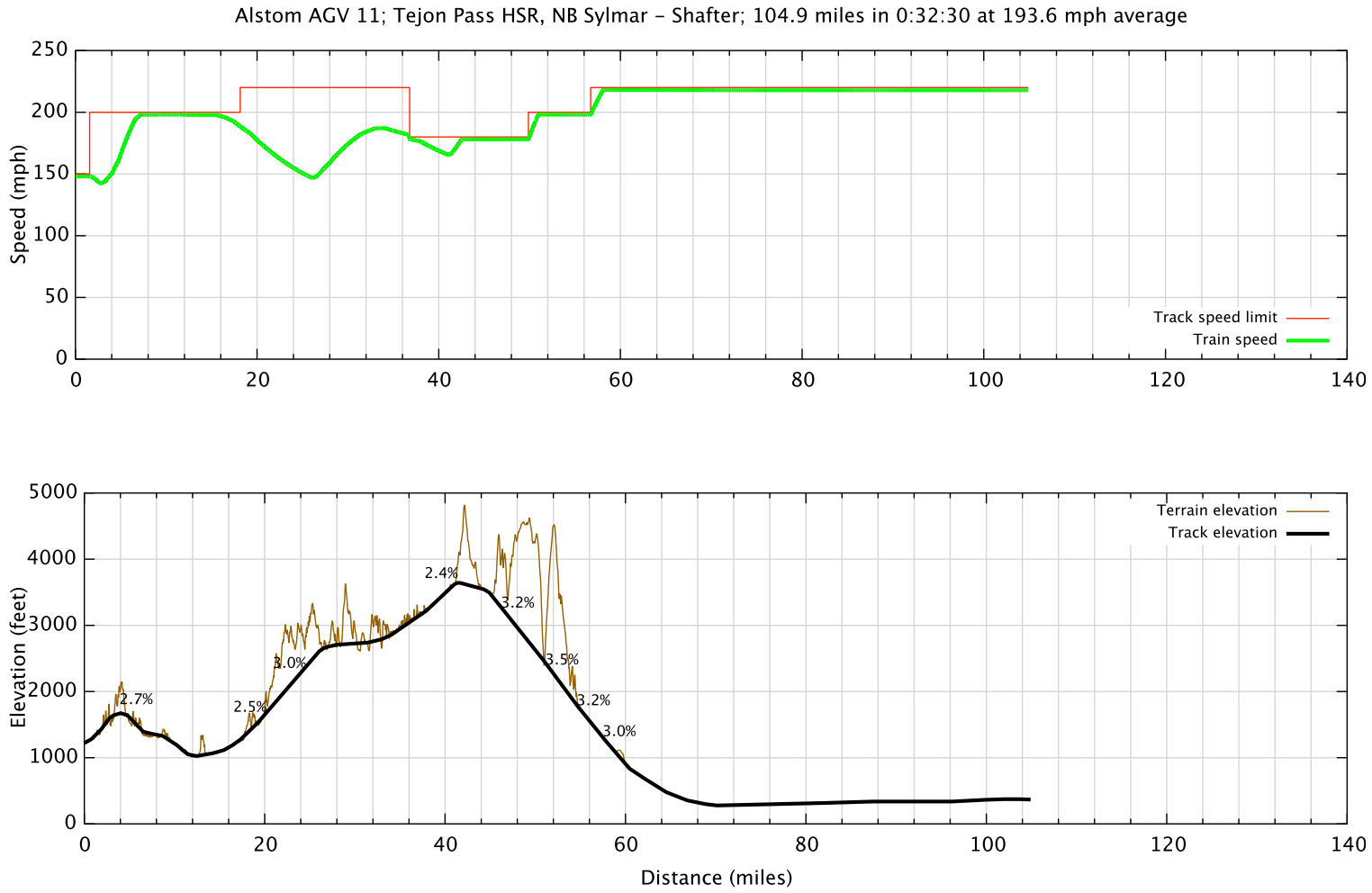
Northbound comparison:

Sylmar – Shafter via Antelope Valley in 0:43:18



Northbound comparison:

Sylmar – Shafter via Tejon Pass in 0:32:30



Trip time conclusions

- Tejon Pass is much faster than Antelope Valley
- With 220 mph downhill speeds:
  - SB Tejon is 11 minutes 41 seconds faster
  - NB Tejon is 10 minutes 48 seconds faster
  - Average: Tejon is **11 minutes 15 seconds faster**

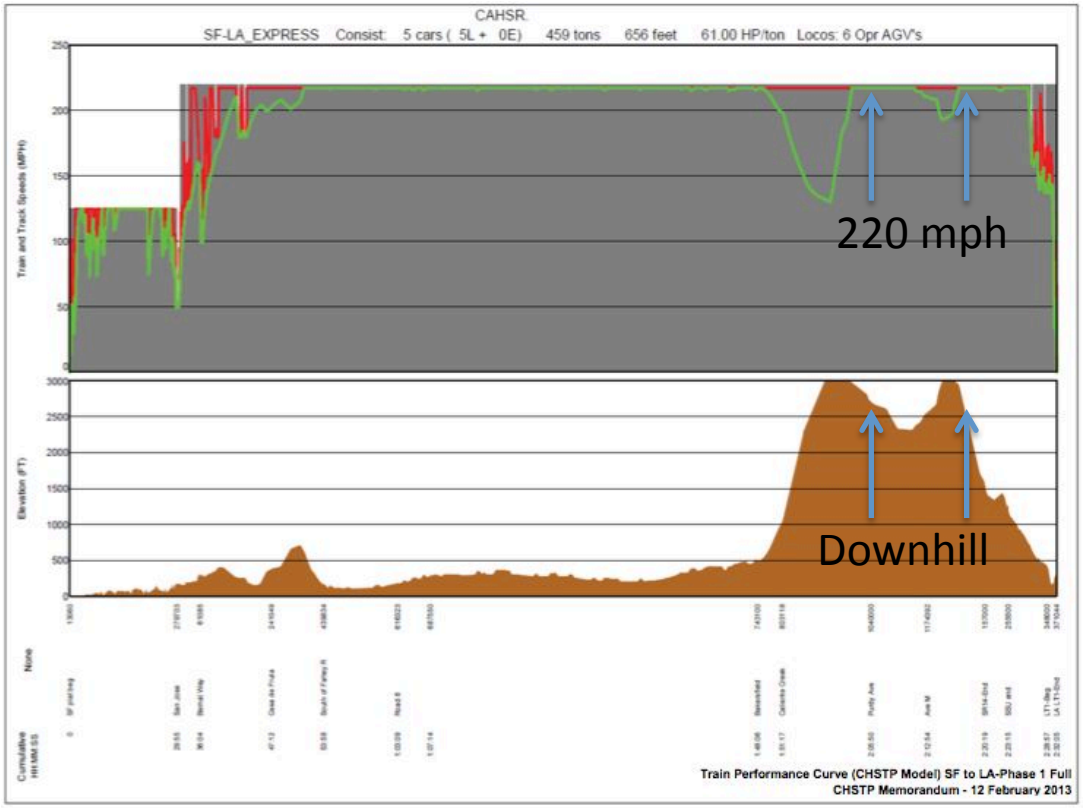
Table 7.2-1 Bakersfield to Sylmar travel times

Travel time for a non-stop train (min:sec)	I-5 Grapevine		Antelope Valley	
	Faster	Slower	Faster	Slower
Southbound	33:15	34:34	39:07	40:31
Northbound	32:06	33:20	35:17	36:21
Average	32:40	33:57	37:21	38:26

Misleading – Wrong Assumptions

Myth #10

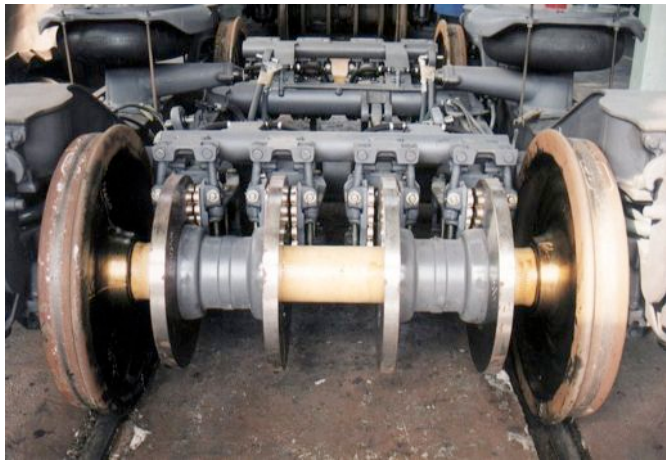
- HSR can operate at 220 mph on long and steep down grades



CHSRA / PB Simulations

HSR brakes

- HSR wheel brakes convert massive amounts of kinetic energy into heat during an emergency stop
  - Because kinetic energy goes as the square of speed, HSR brakes must have very high heat capacity
  - Typically more than 20 megajoules per disk
- Even with huge brakes, emergency stop from 220 mph takes more than 2 miles



Brakes on a TGV: four huge steel disks on each axle

HSR brakes and grades

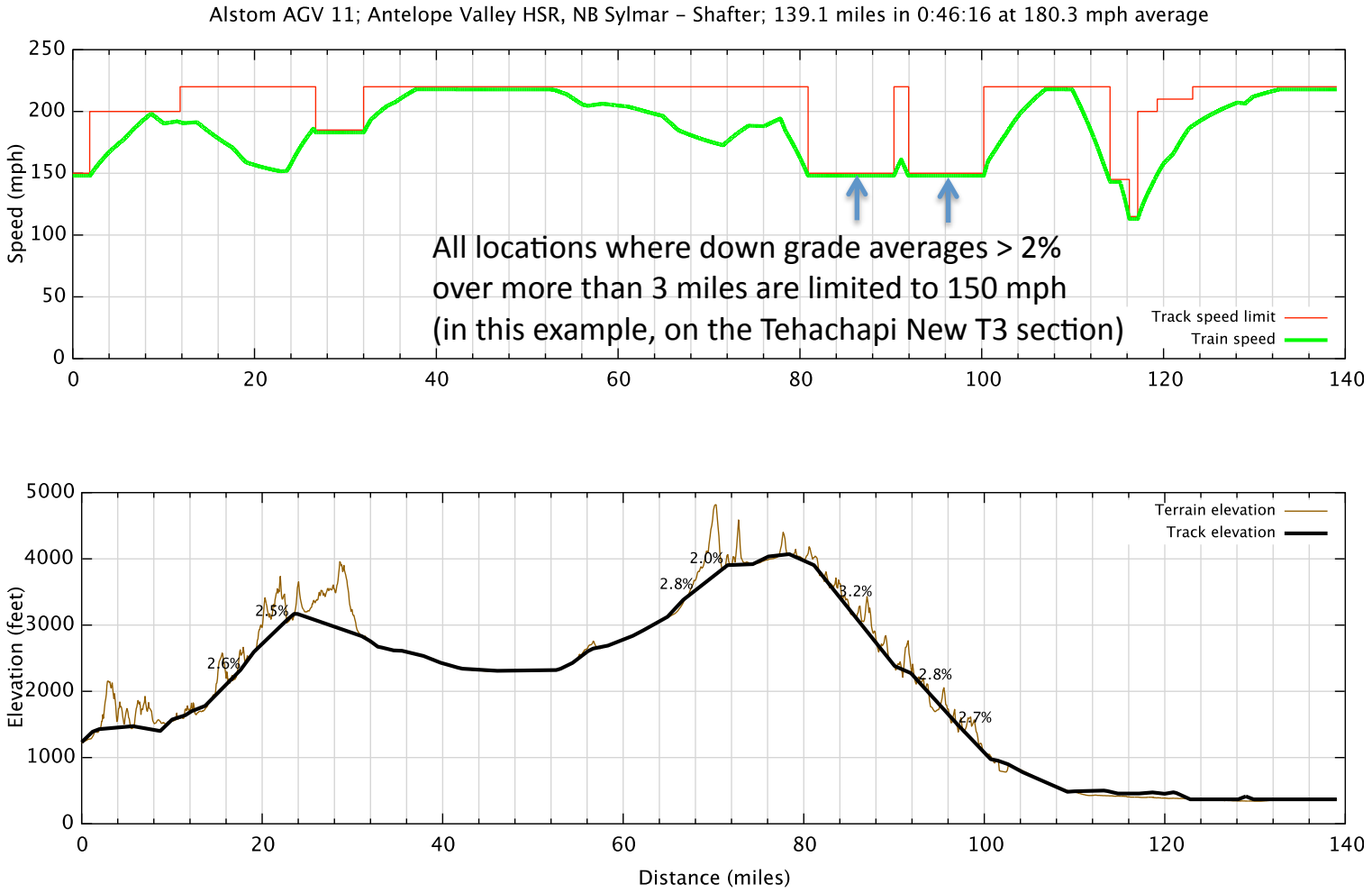
- When emergency braking on downhill track, the brakes must absorb not only the kinetic energy of the train, but also the gravitational potential energy from altitude lost over the braking distance
- This can quickly overwhelm the heat capacity of the brakes and lead to unacceptable safety margins
- Two solutions:
  - Speed limit on long downhill grades: limits train's kinetic energy to begin with
  - Magnetic eddy current brake technology: reduces energy absorbed by wheel brakes by dumping energy (heat) overboard into a fixed rail through the physical principle of magnetic induction… in short: gets rid of the heat!
- CHSRA/PB envision eddy current brakes, but this technology is not yet developed for the speeds and short headways planned in CA.
- REMEMBER: California will have some of the toughest mountain crossings in <u>any HSR system worldwide</u>

The realistic solution

- When a train encounters a long downhill grade, speed must be limited to maintain enough brake heat margin to conduct safe emergency stops
  - Common practice on foreign HSR systems
  - For a train capable of 220 mph, the downhill speed limit is in the range of 150 mph
- What happens to trip times if we impose a 150 mph speed limit whenever there is a > 2% down grade longer than 3 miles?

Example brake-limited speed profile

NB Antelope Valley in 0:46:16 instead of 0:43:18 – a three minute hit



Brake limit results

- Antelope Valley
  - Northbound 2:58 slower
  - Southbound 2:37 slower
  - On average 2:47 slower
- Tejon Pass
  - Northbound 1:55 slower
  - Southbound 1:55 slower

Trip times: Tejon wins again

- Downhill speed limits cause a larger penalty for Antelope Valley than Tejon Pass
  - Penalty is 0:52 worse for Antelope Valley
  - Difference is due to double-hump profile (two downhill sections) of AV, requiring more braking
- With realistic downhill speed limits:
  - SB Tejon is 11 minutes 41 seconds faster
  - NB Tejon is 12 minutes 23 seconds faster
  - **On average, Tejon is 12 minutes faster than Antelope Valley**

Myth #11

- Tejon Pass HSR costs about the same as Antelope Valley HSR

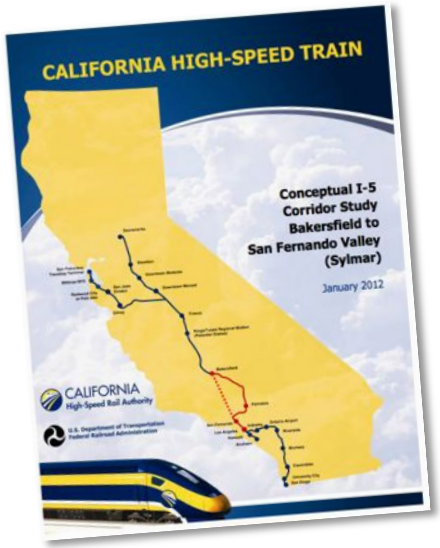


Table 6.3-2 Risk Adjusted Costs

Cost Estimate Type	I-5 Alignment
Base Cost Estimate (BCE)	**$13.5B**
Risk Adjusted Cost Estimate	**$15.1B**

The cost of a 34-mile detour

- Capital Cost:
  - HSR costs about $50M/route-mile
    - ICS: 29 miles for $1B, or $35M/route-mile without systems or electrification
    - $50M does not include extensive bridges and tunnels required for mountainous terrain
  - In round numbers: +34 route-miles = +$1.7B
- Operating & Maintenance Cost:
  - Infrastructure: $8.5M/year (scaled from I-5 study)
  - Rolling Stock: $60M/year (scaled from I-5 study)
  - Palmdale Station: $4M/year (from 2012 Business Plan)

The cost of extra tunnels and bridges

- The Antelope Valley Route will require far more civil structures than Tejon Pass (see Myth #3)
  - I-5 study got this completely wrong, and closed the cost gap using a “risk adjustment” to make Tejon = AV
  - Tunnels cost about $150M per mile (see Myth #2)
    - Including construction overhead costs
  - Bridges cost about $100M per mile
    - About $70M per mile plus overhead costs
  - +10 miles of tunnel and +20 miles of bridge = $1.5B + $2B = $3.5B

The cost of a 12-minute detour

- What is the revenue impact of +12 minutes?
  - From I-5 study: *"… The revenue increase directly attributable to the 5 minute time saving is $50M per year, and this can be assumed to be proportional to the travel time saving and factored for different travel times. …"*
    - +12 minutes = $120M/year of lost long-distance revenue (offset by a small amount of revenue from local Palmdale trips)
  - From 2000 Ridership / Revenue Study:

    "… Option B (through the Grapevine) produces both higher ridership and higher revenue than Option A (through Palmdale). Ridership and revenue are higher by 5.7 percent and 4.7 percent …"
    - 5% of ~$2.3B annual revenue is $115M/year of lost revenue
  - In round numbers: +12 minutes = $100M/year lost

The total cost of serving Palmdale

- Capital Cost: $5 billion
  - $1.7B for additional 34 miles of HSR route
  - $3.5B in additional tunnels and bridges
- Operating & Maintenance Cost:
  - $60M/year for additional train miles
  - $8M/year for infrastructure
  - $4M/year for Palmdale station
- Revenue Loss:
  - $100M/year lost due to 12 minute longer trips

Cost conclusions

- The additional cost of serving Palmdale with HSR:
  - $5 billion up front
  - $175M every year after
    - $100M revenue loss + $75M operating & maintenance cost
- Private investors understandably have legitimate concerns about HSR via the Antelope Valley
  - It costs a lot more and earns less!
- Private investment in California's HSR system is unlikely to occur without a switch to Tejon Pass

Myth #12

- Tejon Pass HSR screws Palmdale.
  Palmdale will never get a fast rail connection to Los Angeles unless it is on the HSR main line

Palmdale HSR frequency

- A profit-driven HSR operator will limit Palmdale frequencies during peak commute hours
  - Every seat sold from Palmdale – LA is a seat that can't easily be filled from SF – Palmdale
    - Only shorter, lower yield trips can use the same seat
    - Long-distance, high-yield SF-LA passengers are cut out
  - Private operator will address this problem with low Palmdale frequency (1/hour) and very high price to discourage low-yielding Palmdale passengers
- HSR service will fall short of Palmdale's hopes

A better solution

- We should invest a small portion of the savings from *not* routing HSR via Palmdale to build a fast and frequent conventional rail link between Palmdale and the Antelope Valley to the LA Basin
  - Using high-speed tilting DMUs operating on existing Metrolink tracks
  - With cross-platform HSR connection at Sylmar

"Look ma, no wires"

Palmdale conclusions

- HSR is the wrong solution for Palmdale
  - Frequency will be low
  - Ticket prices will be very high (yield management)
- High-speed tilting DMUs are a better solution
  - Not quite as fast, but cheaper to ride and far more frequent!
  - Much cheaper to build than HSR (see Myth #11)
  - Can be built much sooner than HSR

One slide on the politics

- Is Palmdale *really* a political no-brainer, as often claimed?
  - The Las Vegas connection and Harry Reid
    - Express West is floundering, and even Harry Reid's connections in Washington haven't unlocked federal loans. Should California taxpayers be funding a casino train?
  - Lawsuits from Palmdale
    - Once Palmdale understands that its economic interests are better served by conventional rail service to LA, for less capital investment and far sooner than HSR, such lawsuits might not be forthcoming
  - Lawsuits from Tejon Ranch
    - The case for traversing Tejon Mountain Village is technically very strong, and a perfect example of where expropriation makes sense. Any lawsuit is sure to be won by CHSRA since savings to the taxpayer are greater than the entire market capitalization of the Tejon Ranch Company
  - Unraveling the conservation deals made with Tejon Mountain Village
    - HSR through TMV is not the end of TMV. Environmental groups will understand the environmental benefits of a faster CA HSR backbone that stays close to an already-impacted transportation corridor.

On refinements and optimizations

"… The study team used the Quantm program to evaluate thousands of potential alignments. These runs were then refined to optimize potential outcomes. …"

- The runs were indeed refined quite a bit, and the outcome heavily optimized
  - PB/CHSRA threw out all the promising Tejon Pass alignments for a variety of specious or invalid reasons, resulting in a very poor comparison
- The I-5 study is a finely crafted web of distortions

Tejon Pass HSR conclusion

- Tejon Pass alignment is:
  - **12 minutes faster**
  - 34 miles shorter
  - 10+ miles less tunnels
  - 20 miles less bridges
  - $5 billion cheaper to build
  - $175 million/year more profitable to operate

- Tejon Pass is Faster, Better, AND Cheaper
  - It will help HSR attract vital private investment

Backup Charts

Train Performance Calculator notes

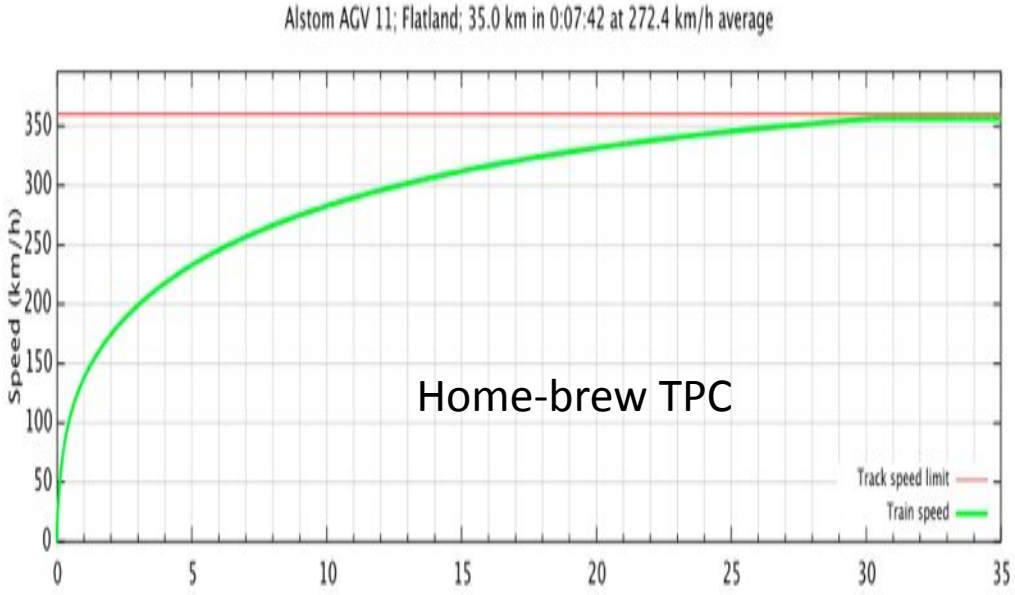
- Excellent simulation match was obtained without any tweaking or tuning of the TPC model
  - Terrain data is freely available
  - Train performance parameters of PB model are known (published in various HSR Technical Memoranda as well as Alstom website)
  - Differential equations of motion are straightforward to integrate
  - Train motion is not difficult to model

TPC model validation

- Acceleration to 360 km/h in ~30 km in flat terrain

Alstom / Parsons Brinckerhoff

Train is 11-car AGV with 12 powered axles



Home-brew TPC

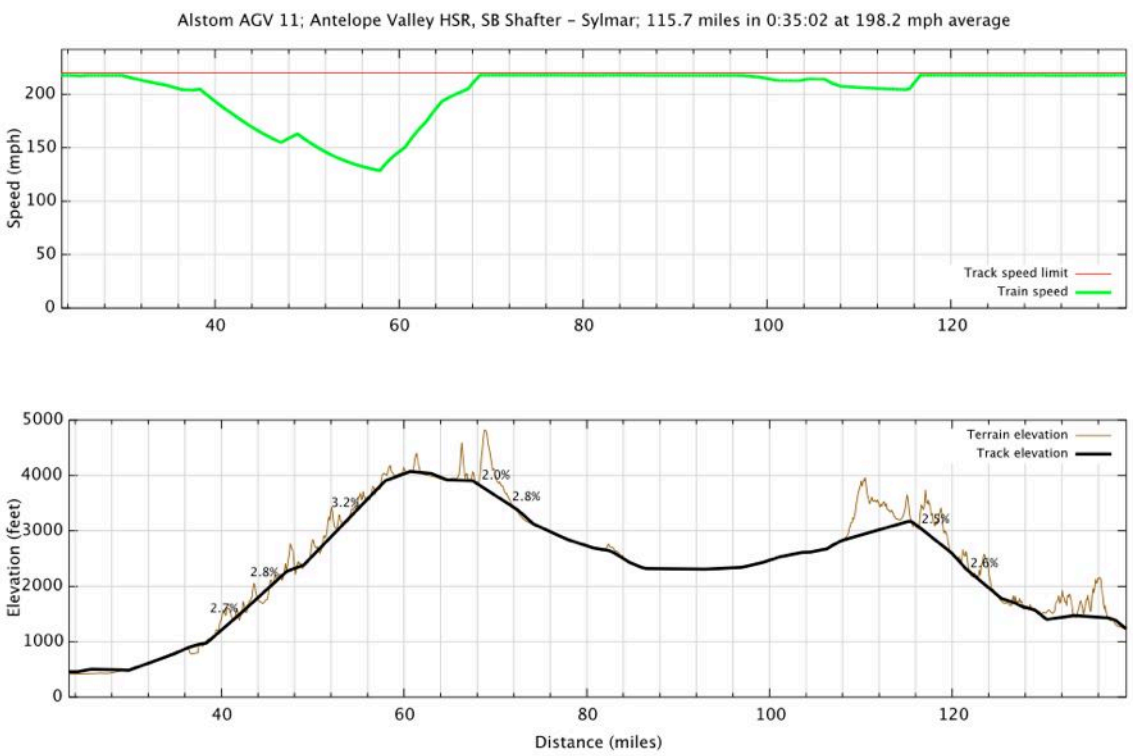
Excellent Match

TPC track profile extraction method

- Lay out horizontal alignment in Google Earth
- Export as KML path
- Extract elevation profile of the path using Google Elevation API
- Trace out vertical alignment by comparing terrain height to track height
  - Excellent match (< 5 ft) with published DEIR and AA alignment plan and profile appendices
  - Maintain 3.5% grade constraint
  - Maintain at-grade fault crossing constraint

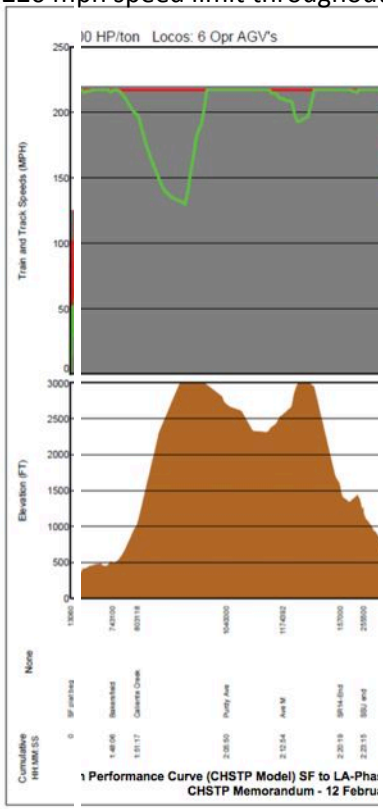
Cross-checking of TPC runs (1 of 2)

Bakersfield Station – Sylmar Station non-stop, Southbound



Min speed ~130 mph
Bakersfield – Sylmar in 35:02

220 mph speed limit throughout

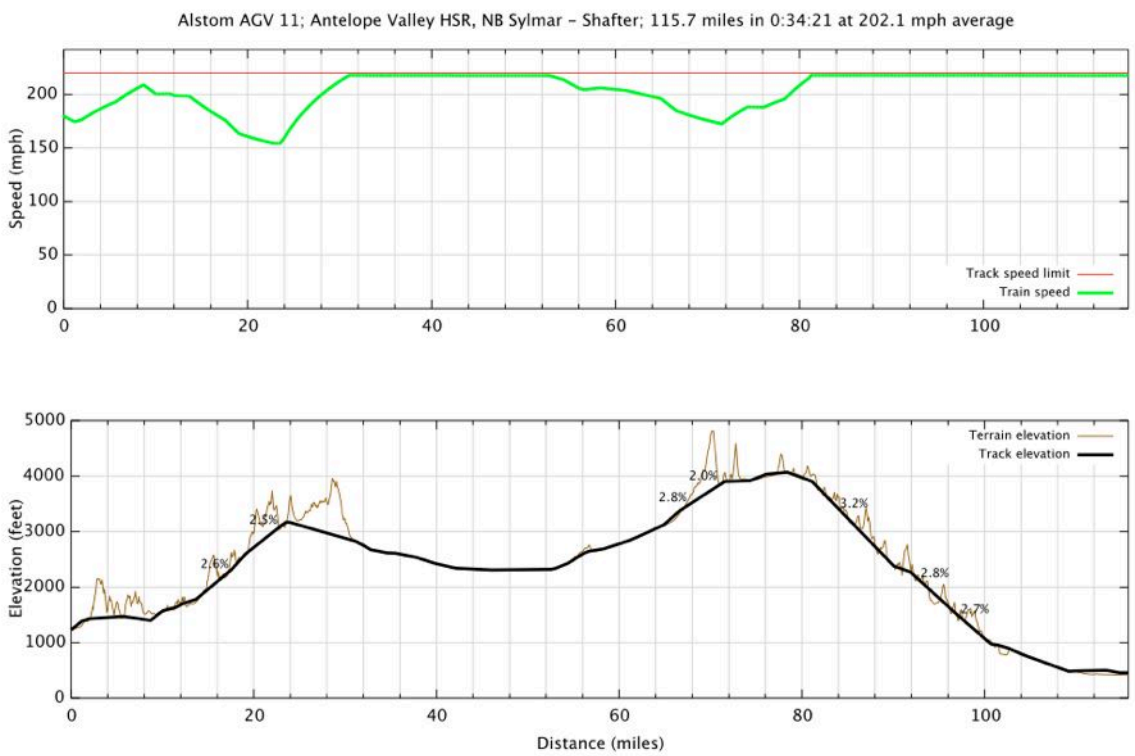


Min speed ~130 mph
Bakersfield – Sylmar in 35:09

Excellent Match

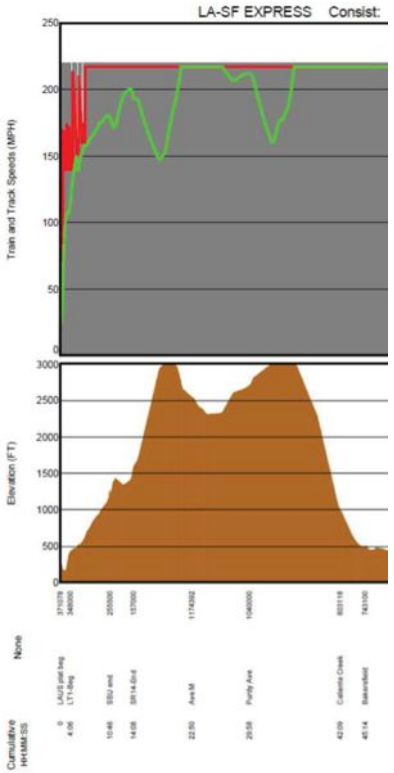
Cross-checking of TPC runs (2 of 2)

Sylmar Station – Bakersfield Station non-stop, Northbound



Starting speed ~180 mph
Min speed ~150 mph
Sylmar – Bakersfield in 34:21

220 mph speed limit throughout



Starting speed ~180 mph
Min speed ~150 mph
Sylmar – Bakersfield in 34:28

Excellent Match