Arizona High Speed Rail Feasibility Study

EXECUTIVE SUMMARY

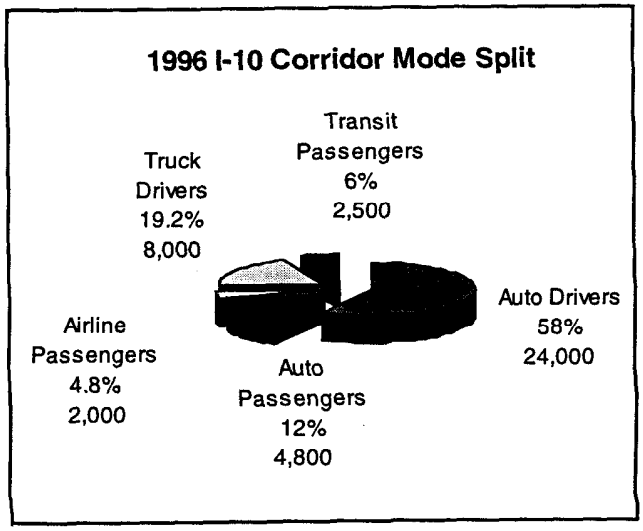
Purpose of the study

The Arizona Department of Transportation conducted a high speed rail feasibility study to develop and evaluate long range transportation alternatives for the I-10 corridor between Phoenix and Tucson. The study area included Maricopa, Pinal and Pima counties. A 39-member task force appointed by former Governor Fife Symington participated in the development of the study. Kimley-Horn and Associates, was the consultant to the project. The study began in July 1997 and was completed in March 1998.

Background

In May 1997, at a keynote speech during the 70th Arizona Town Hall meeting in Prescott, Arizona, former Arizona Governor Fife Symington presented his vision for creating a multi-modal transportation system for the State in the 21st century. One of the cornerstones of his vision was the establishment of a high-speed passenger rail service between the Phoenix and Tucson metropolitan areas. While earlier studies came to mixed conclusions about the feasibility of passenger rail service in the State, a number of factors have made passenger rail service more attractive. Urban mobility, congestion, air quality, and economic development concerns have become more prominent in recent years.

As population and employment in the Phoenix-Tucson corridor continue to increase between now and 2020, the transportation infrastructure, with heavy congestion in many areas, will reach capacity unless significant improvements are made. This will result in *increased congestion, slower travel speeds, increases in accidents, and a worsening of air quality and the fragile desert-oriented quality of life in the corridor.* Without action, travel conditions between Phoenix and Tucson for auto-dependent and transit-dependent citizens will continue to worsen.



Transportation alternatives evaluated

- No-build
- Highway Widening
- Conventional Rail - Minor Upgrade
- Conventional Rail - Major Upgrade
- High Speed Rail - Electric
- High Speed Rail - Magnetic Levitation

Study conclusions

Based on the evaluation of the six alternatives, the Study Steering Committee and Task Force arrived at the following long-term vision:

In final phase: Implement a partially elevated, yet exclusive R-O-W, high speed rail – electric passenger service utilizing the existing UP Railroad alignment between Phoenix and Tucson. In initial phase, implement minor upgrades to the existing UP Railroad, using conventional diesel-electric locomotives and push-pull style passenger cars. Future upgrades to the passenger rail service, particularly regarding grade separations and higher operating speeds, would be implemented incrementally, as ridership develops and funding becomes available.

The following operating assumptions were made: In the initial, or Minor Upgrade, phase, service would be provided five times daily in each direction. Travel time, including stops, would be just under two hours. In the final phase, high speed electric trains would depart Phoenix every hour on the hour and depart Tucson every hour on the half-hour between the hours of 5:00 AM and 11:00 PM. High speed electric trains could travel the distance in 61 minutes.

The estimated capital cost of the Conventional Rail - Minor Upgrade is $378 million and the partially elevated High Speed - Electric is $3.84 billion. The annual operating and maintenance cost for the Conventional Rail - Minor Upgrade is $17.6 million and the partially elevated High Speed - Electric is $140 million.

The Conventional Rail - Minor Upgrade Alternative is recommended for **initial** implementation for the following reasons:

- Most cost-effective rail alternative;
- Earliest to place in operation (rolling stock and fixed plant equipment are readily available);
- Does not preclude Conventional Rail - Major Upgrade or high speed technology in future;
- Can be supplemented to achieve higher operating speed from the beginning;
- Does not preclude local LRT system in Phoenix and Tempe;
- Can be used to generate public interest and support for passenger rail travel;

- Provides a safer alternative to automobile travel; and
- Less environmental impact than the No-Build and Highway Widening Alternatives.

Furthermore, the partially elevated High Speed - Electric Alternative is recommended for incremental implementation for the following reasons:

- More competitive with automobile and airline travel than the Conventional Rail - Major Upgrade Alternative;
- Proven technology;
- Construction does not interfere with on-going operations of the initial Conventional Rail - Minor Upgrade service; and
- Provides travel time that is significantly faster than the legal automobile travel time and which is competitive with airline travel time.

Financing Plan

The construction of the rail system improvements would require a major expenditure of funds and will necessitate that all potential sources of revenue be identified, quantified, and evaluated as the project proceeds through the planning and programming process. For a project of this magnitude, Federal, State, local, and private sources of revenue would need to be pooled to form a package that would:

- be large enough to fund the project,
- meet prudent public fiscal policies, and
- have a reasonable return on private investment.

Based on recent experience and trends, the Federal share for a project of this type would be expected to be in the order of at least 50 percent. The proposed project would need to satisfy Federal criteria on eligibility and cost effectiveness and would need to compete nationally against other transit projects.

At the State and local level, the funding needs for the high speed rail project would be far in excess of any amounts contained in current transportation funding programs. At the State level, there are no sources of funds specifically allocated to public transportation projects. The use for high speed rail of existing transportation funding programs, such as the Highway User Revenue Funds (HURF), Surface Transportation Program (STP), and Lottery Transportation Assistance Fund (LTAF), would necessitate major shifts in emphasis and public policy and legislative actions to permit the use of some of these funds for high speed rail purposes.

To create a new State level funding source, legislative action would be needed. For such Statewide legislative action, appropriate public policy would need to be formulated, and the high speed rail project would need to compete with other Statewide infrastructure needs for other public works projects. At the local level, existing funding sources would need to be augmented and expanded to create local funds to help fund high speed rail. Any such increase in funding at the local level would require a vote of the public in the affected areas.

Preferred

Initial Phase

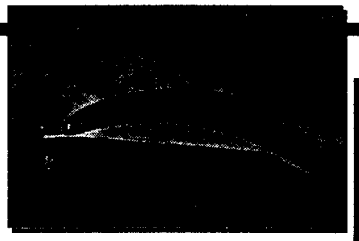
Conventional Rail—Minor Upgrade

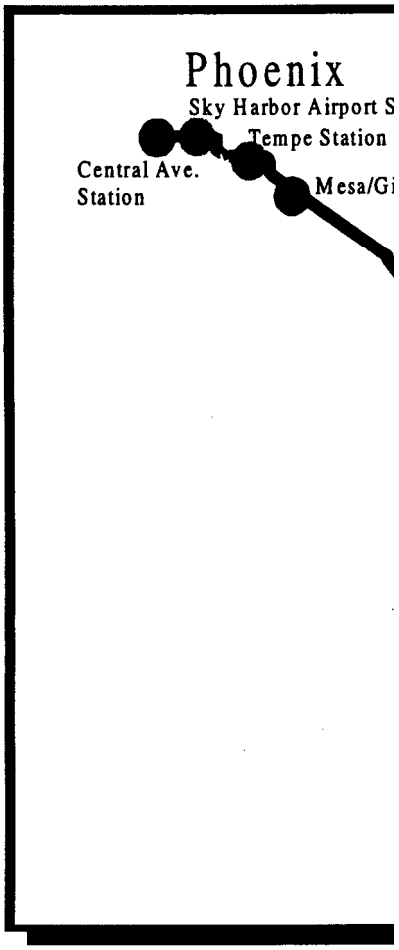
- **Use of UP Railroad Right-of-Way**
- **Diesel Locomotives**
- **80 MPH Maximum Speed**
- **62 MPH Average Speed**
- **117 Minutes Travel Time**
- **$378 Million to Construct**

Incremental I

Improve system a rants and funding

- **Add grade sepa**
- **Electrify**
- **Add Tracks**
- **Increase operat**





Is the project feasible?

The High Speed Rail Passenger Project is determined to be feasible if all of the following conditions exist:

- One or more of the project route alternatives identified and evaluated during this study is determined to be technically feasible, ie. able to be constructed in the Phoenix-Tucson transportation corridor; AND
- The technically possible alternatives meet the project goals and objectives of high speed rail passenger service that is less in required travel time than automotive travel between Phoenix and Tucson; AND
- The high speed passenger rail service will provide a travel alternative that will attract a sufficient number of passengers to warrant additional studies to refine the location, passenger projections, travel needs, and sources of passenger demand; AND

Alternative

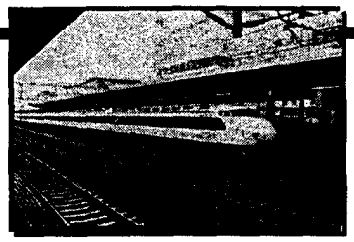
End Phase
Partially Elevated
High speed Rail—Electric

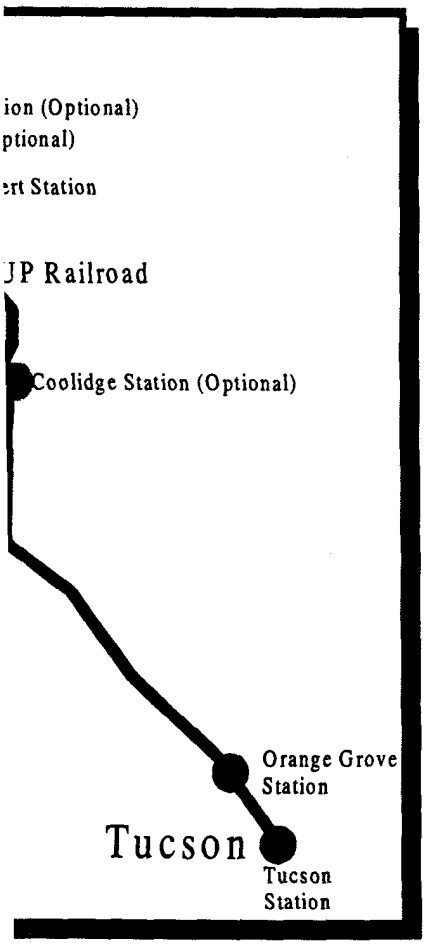
ıplementation

ridership war-
levelops:
ıtions

g speed

- **Exclusive track**
- **High Speed Technology**
- **175 MPH Maximum Speed**
- **120 MPH Average Speed**
- **61 Minutes Travel Time**
- **$3.76 Billion to Construct**





- The high speed passenger rail service will meet acceptable environmental standards; AND
- The high speed passenger rail service can garner enough public support, as determined from extensive public involvement in the study process, to continue project planning and refinement; AND
- The high speed passenger rail service will be affordable, assuming the reasonable availability of existing and projected public and private revenue sources; AND
- The high speed passenger rail service will be cost-effective and will achieve a favorable balance between benefits and costs.

Participation by the private sector in the fiscal package would be highly desirable. Opportunities for private participation may come in the form of a design/build consortium that might include the manufacturer of the high speed rail system, land owners/developers in the corridor, landowners/developers in the major metropolitan areas that may be granted land use intensification rights, landowners/developers in station areas, the Union Pacific Railroad, and others.

The development of a successful funding package will require a strong coalition and the consensus of leaders in the public and private sectors. Consensus and public opinion support will be essential in bringing about the necessary legislative actions and the public vote to develop a funding package to implement the project.

Construction Strategies

Many options exist to either designate an existing agency or establish a new authority to implement the recommended project. The following existing State-created organizations could act as an overall project administrator:

- Arizona Department of Transportation (ADOT);
- The Regional Public Transportation Authority (RPTA) in Maricopa County, or the Regional Transportation Authority (RTA) in Pima County; or
- A "coalition of counties" created by an inter-local agreement.

How the alternatives were evaluated

The six alternatives were evaluated using qualitative and quantitative measures. Below is a list of some of the measures used to evaluate the alternatives:

- Number of users
- Travel times
- Operating revenues
- Capital costs
- Operating and maintenance costs
- Cost – effectiveness
- Level of community support
- Level of railroad support
- Affordability
- Environmental impacts
- Economic development potential
- Tourism potential
- Public safety

Alternative Comparison:

	Highway Widening	Minor Upgrade	Major Upgrade	High Speed - Electric	High Speed - Maglev
Length (miles)	112	121	121	121	121
Top Speed (mph)	75	80	125	175	250
One-way Trip Time (min)	103	117	82	61	49
Average Fare	N/A	$12	$28	$32	$36
Annual Users	6,424,000*	1,277,500	2,482,000	3,212,000	4,270,500
Annual Revenue	N/A	$15 mil	$69 mil	$102 mil	$153 mil

* Reflects annual users of the new lanes only.

These organizations have, or could readily be given, the necessary powers to execute the project.

The State Legislature could also establish a new "State rail passenger authority", "a joint powers authority," or "a public-private consortium" with the ability to collect revenues; design, build and operate the system; acquire real estate; and other political powers necessary for implementing a project. The new authority could be controlled by a board of directors representing all parts of the project area.

Operations Strategies

There are two general approaches to providing actual day to day service: 1) direct operations using public agency employees; or 2) contract operations to a private company. Both approaches are common nationally. It is recommended that the administrating agency initially contract with an experienced passenger rail operator. This would relieve the owner from hiring personnel that are more cost-effectively provided by a service agreement.

The following actions are recommended to further develop the recommendations outlined above:

- ADOT should incorporate the results of this study into the I-10 Corridor Profile Study, now underway. Although this study assumes that some of the problems will be solved by widening I-10, other capacity-increasing options should be investigated and compared to a widening program. These options should include a wide variety of Intelligent Transportation System (ITS) measures, addressing both the general traffic as well as the truck traffic congestion.
- ADOT, in cooperation with the local governments in the corridor, should conduct a more detailed study of the passenger rail recommendations outlined herein, including planning for, and study of, feeder systems. The recommendation for further detailed study ought not to begin until ADOT has completed the I-10 corridor profile study referenced above. Depending on Federal funding expectations, this next step would follow one of two processes:
  - If discretionary Federal funding is pursued, a Major Investment Study (MIS) is required. Current Federal law requires that an MIS be conducted in accordance with ISTEA guidance in order for a project of this magnitude to be eligible for Federal financial support; or
  - If Federal funding is not pursued, the project can proceed in a variety of ways. The most logical next step would be to define the project in more detail by preparing an initial level of engineering, often referred to as "conceptual engineering" or "project definition." This phase would include topographic base mapping, schematic design concepts for the trackway and structures, station concepts, more refined cost estimates, more specific right-of-way definition, etc.
- The purpose of either of these efforts (Federal MIS or not) would be to allow decision-makers another milestone in the project development process to re-assess the feasibility of the project.
- The State should establish a Statewide policy regarding acquisition and/or preservation of abandoned railroad right-of-way. The policy should address the public benefits accrued by preserving valuable corridors for long-range transportation purposes. Portions of the Preferred Alternative described in this study should benefit from such a policy.
- The State should actively support and assist local governments in their efforts to implement major local transit initiatives, such as the East Valley LRT proposal and bus system expansions. These local efforts will become essential components of an Arizona High Speed Rail system by collecting and distributing residents and visitors to their final destinations.

This Study was conducted at a very conceptual level. The findings and conclusions are intended to help guide decision-making to the next level of study. Final decisions on specific alignment locations, station locations, equipment selection, operating plans, fares, and the many other decisions that define a project will happen over a period of many years and with the involvement of many more participants in the Arizona community. This Study is an important first step in that process.

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