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DAVID RABER  
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AZ CORP COMMISSION  
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## Staff Memorandum

To: THE COMMISSION

DOCKET NO. RR-03639A-08-0054

From: Safety Division

Date: November 7, 2008

RE: IN THE MATTER OF THE APPLICATION OF THE UNION PACIFIC RAILROAD COMPANY TO ALTER ONE CROSSING OF THE UNION PACIFIC RAILROAD AT RUTHRAUFF ROAD.

### Background

On January 28, 2008 the Union Pacific Railroad Company ("Railroad") filed with the Arizona Corporation Commission ("Commission") an application for approval for the Railroad to alter one crossing of the Railroad in the City of Tucson ("City") at Ruthrauff Road, DOT/AAR No. 741-104-C. Pima County (County) is the road authority for Ruthrauff. This application is part of the Railroad's double tracking effort for their Sunset Route across Arizona.

Commission records do not indicate a Commission Decision approving the installation of automatic devices at Ruthrauff Road. However, inventory records do indicate the presence of flashing lights, automatic gates and bells as early as 1974.

On February 28, 2007, Staff, the Railroad, County, and the City participated in diagnostic review of the proposed improvements at Ruthrauff Road. All parties present were in agreement to the proposed improvements at the crossing. The following is a break down of the crossing in this application, including information about the crossing that was provided to Staff by the Railroad and its contractors.

### Geographical Information

Ruthrauff Road is located in Pima County within the city limits of Tucson. A July 2006 estimate by the U.S. Census Bureau puts the City's population at 518,956, with a metropolitan area of 946,362. In 2005, Tucson ranked as the 32nd largest city and 52nd largest metropolitan area in the U.S. It is the largest city in southern Arizona and the second largest in the State.

The rail line in this area runs in a southeast to northwest direction, parallel to Interstate 10 (I-10) and the I-10 Frontage Road. Ruthrauff Road is an east to west main

arterial with an interchange at I-10. The general area surrounding the railroad crossing is a mix of commercial and industrial businesses. (See Appendix "A")

### **Ruthrauff Road**

The proposed new main track will be located on the south side of the existing main line. The Railroad will re-profile a portion of the four lane urban asphalt road to meet the new tracks. The Railroad's proposed upgrades will replace the existing incandescent flashing lights, gate mechanisms, bells and detection circuitry, with the latest in industry standards to include: 12 inch LED flashing lights, a cantilever with 12 inch LED flashing lights for westbound traffic, gates, bells, and constant warning time circuitry. A new concrete crossing surface will be added, along with replacing any impacted pavement markings. The proposed measures are consistent with safety measures employed at similar at-grade crossings in the state. The estimated cost of the proposed railroad crossing upgrade is \$392,640. The Railroad is paying for the entire cost of the crossing improvements, broken down by signal and crossing surface work, with the signal work costing \$300,000 and the crossing surface \$92,640.

Traffic data for Ruthrauff Road was provided to the Railroad by Jennifer Crumbliss of HDR Engineering and Tom Cooney of the Pima Association of Governments (PAG). The data provided showed the Average Daily Traffic (ADT) for 2006 to be 22,400 vpd. Data provided indicated the estimated ADT for the year 2030 to be 41,600 vpd. In October 2008, Staff received updated traffic counts from PAG for current and projected traffic data. According to PAG, the ADT in the year 2007 was 24,195 and the estimated ADT for the year 2030 is 44,000. The current Level of Service ("LOS") for this four lane road is LOS A for eastbound AM peak hour traffic and LOS B for eastbound PM peak hour traffic. For westbound traffic, the LOS for AM peak hour traffic is level D and for PM peak hour travel, LOS C. The existing AM peak hour volumes for eastbound traffic on Ruthrauff Road are 978 vehicles per hour and 1,018 vehicles per hour for westbound travel. The existing PM peak hour volumes for eastbound travel are 1,059 vehicles per hour and 1,017 vehicles per hour for westbound travel.

**Note:** The American Association of State Highway and Transportation Officials (AASHTO) Geometric Design of Highways and Streets, 2004, states that the Level of Service characterizes the operating conditions on a facility in terms of traffic performance measures related to speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. This is a measure of roadway congestion ranging from LOS A--least congested--to LOS F--most congested. LOS is one of the most common terms used to describe how "good" or how "bad" traffic is projected to be.

The posted speed limit on Ruthrauff Road is 45 MPH. Commission Rail Safety Section records, as well as Federal Railroad Administration ("FRA") accident/incident records indicate three accidents at this crossing with one fatality. The first accident occurred on 3/19/1979 as a result of an auto stopping on the tracks and being struck by a train. No injuries or fatalities occurred in this accident. The second accident occurred on

12/15/1990, as a result of an auto stopping on the tracks and being struck by a train. No injuries or fatalities were reported. The third incident occurred on 6/12/2004, resulting in a pedestrian fatality. Records indicate the warning devices were reported to be working as intended in all three accidents.

Alternative routes from this crossing are as follows; to the west 2.15 miles is Joiner Road, an at-grade crossing and to the east 1.81 miles is Prince Road, also an at grade crossing.

### **Train Data**

Data provided by the railroad regarding train movements through this crossing are as follows:

**Train Count:** 48 total average trains per day (46 freight, and 2 passenger trains)

**Train Speed:** 79 mph passenger / 70 mph freight

**Thru Freight/Switching Moves:** All moves through this crossing are thru freight. (According to UP Senior MTO Sam Lopez Sr., there are no switching moves across this crossing.) This crossing is used by Amtrak twice per day, three times per week.

### **Schools and Bus Routes**

There are several schools within the City that are near the Ruthrauff Road crossing. They are:

- ✓ Laguna Elementary School @ 5001 N Shannon Rd, Tucson, AZ 85705
- ✓ Walter Douglas Elementary School @ 3302 N Flowing Wells Rd, Tucson, AZ 85705.
- ✓ Homer Davie Elementary School @ 4250 N Romero Rd, Tucson, AZ 85705.
- ✓ Flowing Wells High School @ 3725 N Flowing Wells Rd, Tucson, AZ 85705.

Ruthrauff Road is crossed 8 times per day by local school buses, along with additional crossings for special field trips. On 10/31/2008, Staff spoke with Lewis Carloss, Transportation Director for the Flowing Wells Unified School District. Mr. Carloss stated that busses cross several times a day due to the fact that part of their district is west of the tracks at this location. Mr. Carloss also voiced his concern regarding the period of construction of the second main track and how the closure of Ruthrauff Road would affect the school district. He also stated that the Flowing Wells School District has had Operation Lifesaver presentations in the past, but would welcome an updated presentation. Staff will work with Operation Lifesaver and Flowing Wells School District to set up new presentations for their bus drivers.

### **Hospitals**

The nearest hospital to the Ruthrauff Road crossing is Northwest Medical Center in Marana, which is approximately 3 miles northeast of Ruthrauff Road.

### **Hazardous Materials**

The railroad gave the following response when asked about hazardous materials crossing this crossing:

*Union Pacific has been unable to obtain any information responsive to this request. It is Union Pacific's understanding that any vehicle carrying hazardous materials may utilize public crossings unless otherwise posted, but Union Pacific knows of no way it can investigate or determine whether such vehicles use these crossings or with what frequency.*

**Zoning**

Staff requested the Railroad provide information regarding the type of zoning in adjacent areas from the crossing. The following was their response:

*Union Pacific believes that the second part of CW 2.7 calls for speculation as to whether new housing developments, industrial parks, or other developments will occur in the future. In addition, Union Pacific does not have access to such information, but instead must rely on information provided by others. With those caveats, Union Pacific responds as follows:*

*Pima Association of Governments has a 2007 Land Use Map that matches the field diagnostic observations. The observed land use from the field diagnostics are shown below:*

<i>Crossing</i>	<i>2007 Observed Land Use</i>	<i>2007 Existing Pima County Land Use</i>
<i>Ruthrauff Road</i>	<i>Commercial/Industrial</i>	<i>Commercial/Industrial</i>

*Pima Association of Governments planning department can better answer the question of future developments. They review development impact studies and regulate zoning.*

**Spur Lines**

The Union Pacific gave the following answer regarding spur lines located in the area:

*Using the definition of a "spur line" or "spur track" as "a stub track of indefinite length diverging from a main track or other track," ACC Regulation R14-5-101(20), no spur lines have been removed within the last three years inside a 10-mile radius of the crossing covered in this application.*

**FHWA Guidelines Regarding Grade Separation**

The Federal Highway Administration (FHWA) Railroad-Highway Grade Crossing Handbook (Revised Second Edition August 2007) provides nine criteria for determining whether highway-rail crossings should be considered for grade separation or otherwise

eliminated across the railroad right of way. The Crossing Handbook indicates that grade separation or crossing elimination should be considered whenever one or more of the nine conditions are met. The nine criteria are applied to this crossing application as follows:

		<b>Ruthrauff Road</b>
The highway is a part of the designated Interstate Highway System	Crossing Currently meets the criteria	No
	Crossing meets the criteria by 2030	No
The highway is otherwise designed to have full controlled access	Crossing Currently meets the criteria	No
	Crossing meets the criteria by 2030	No
The posted highway speed equals or exceeds 70 mph	Crossing Currently meets the criteria	No
	Crossing meets the criteria by 2030	No
AADT exceeds 100,000 in urban areas or 50,000 in rural areas	Crossing Currently meets the criteria	No
	Crossing meets the criteria by 2030	No
Maximum authorized train speed exceeds 110 mph	Crossing Currently meets the criteria	No
	Crossing meets the criteria by 2030	No
An average of 150 or more trains per day or 300 million gross tons/year	Crossing Currently meets the criteria	No
	Crossing meets the criteria by 2030 <sup>1</sup>	Yes
Crossing exposure (trains/day x AADT) exceeds 1M in urban or 250k in rural; or passenger train crossing exposure exceeds 800k in urban or 200k in rural	Crossing Currently meets the criteria <sup>2</sup>	Yes
	Crossing meets the criteria by 2030 <sup>3</sup>	Yes
Expected accident frequency for active devices with gates, as calculated by the US DOT Accident Prediction Formula including five-year accident history, exceeds 0.5	Crossing Currently meets the criteria	No
	Crossing meets the criteria by 2030	N/A
Vehicle delay exceeds 40 vehicle hours per day	Crossing Currently meets the criteria	No
	Crossing meets the criteria by 2030 <sup>4</sup>	Yes

N/A = Information was not available.

This table utilizes the most recent projected ADT data for Ruthrauff Road – 44,000 vpd for the year 2030.

<sup>1</sup>The Railroad is projected to exceed 300 million gross tons as of 2016. This projection is based on the fact that the Railroad is currently exceeding 217 million gross tons with 46 trains per day and is projected to run twice the number of trains (at lengths of up to 8,000 feet instead of the current length of 6,000 feet) by 2016.

<sup>2</sup>The current crossing exposure for Ruthrauff Road is 1.2 million

<sup>3</sup> The projected crossing exposure utilizing the most recent projected VPD data for Ruthrauff Road is 3.7 million

<sup>4</sup>Projected vehicle delay hours per day utilizing the most recent projected VPD data for Ruthrauff Road are 102.2 hours.

## **Vehicular Delays at Crossings**

Based on the current single track configuration, the railroad gave the following response about delay time for vehicles at the crossing in this application. The delay time is measured from the point that the warning devices are activated at the crossing to the time after the train has cleared the crossing and the warning devices are reset.

*Delays for vehicular (roadway) traffic caused by trains occupying a crossing depend on the length and speed of each train traversing the crossing. Because each train can be unique for these values it would be impossible for Union Pacific accurately to provide the time of delay for vehicular traffic either while allowing trains to pass the crossing or because trains are stopped in the crossing. With that caveat, Union Pacific responds as follows:*

*Union Pacific operations are governed by maximum allowable speeds as identified by timetable. Trains at the crossing involved in this application operate at timetable speeds of 65 mph and the average length of trains is approximately 6,000 feet. At that train length and speed, the average delay for vehicular traffic (1) to allow the train to pass at this crossing, measured from the point that the warning devices are activated at the crossing to the time after the train has cleared the crossing and the warning devices are reset, is approximately 1.549 minutes.*

*The average time vehicular traffic is delayed (2) due to trains stopped on the track for any purpose, measured from the point that the warning devices are activated at the crossing to the time after the train has cleared the crossing and the warning devices are reset, varies according to the condition creating the blockage. These varied conditions include mechanical failure such as a broken air hose, a grade crossing accident, or operations such as trains meeting or passing. Given the variety of possible conditions causing trains to be stopped on a crossing, Union Pacific does not catalog the average time vehicular traffic is delayed by stopped trains.*

*With that caveat, Union Pacific responds as follows: A.R.S. § 40-852 requires that, except in cases of unavoidable accident, a train blocking a crossing for more than 15 minutes must be cut to facilitate traffic flow. ACC Regulation R14-5-104(C)(7) and Union Pacific's operating practices allow a train to block a public grade crossing for no more than 10 continuous minutes, unless the train is continuously moving in the same direction during the entire time it occupies the crossing, or the blockage is caused by wrecks, derailments, acts of nature, mechanical failure, or other emergency conditions.*

Based on the railroads double tracking project, and the projected number of 84 trains per day through this crossing by the year 2016, the railroad gave this response as to what future delay times would be for vehicles at the crossing in this application:

*Delays for vehicular (roadway) traffic caused by trains occupying a crossing depend on the length and speed of each train traversing the crossing. Because each train can be unique for these values it would be impossible for Union Pacific accurately to provide the time of delay for vehicular traffic either while allowing trains to pass the crossing or because trains are stopped in the crossing. With that caveat, Union Pacific responds as follows:*

*Union Pacific operations are governed by maximum allowable speeds as identified by timetable. Trains at the crossing involved in this application are projected to operate at timetable speeds of 65 mph and the average length of trains is projected to be approximately 8,000 feet. At that train length and speed, the average delay for vehicular traffic at this crossing in 2016 (1) to allow the train to pass at the crossing, measured from the point that the warning devices are activated at the crossing to the time after the train has cleared the crossing and the warning devices are reset, is projected to be approximately 1.899 minutes.*

*The average time vehicular traffic is delayed (2) due to trains stopped on the track for any purpose, measured from the point that the warning devices are activated at the crossing to the time after the train has cleared the crossing and the warning devices are reset, varies according to the condition creating the blockage. These varied conditions include mechanical failure such as a broken air hose, a grade crossing accident, or operations such as trains meeting or passing. Given the variety of possible conditions causing trains to be stopped on a crossing, Union Pacific does not catalog the average time vehicular traffic is delayed by stopped trains.*

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A traffic delay and queuing analysis was performed by Staff for this application utilizing formulas found in the Transportation and Traffic Engineering Handbook, Second Edition. This document is published by the Institute of Transportation Engineers (ITE). Using the most current ADT data available, it was determined that the current daily vehicle delays for the Ruthrauff Road crossing is 13.2 hours of delay per day.

Using the most current data regarding projected future ADT and the Railroad's projection of 84 trains per day, it was determined that daily vehicle delays at Ruthrauff Road in the year 2030 may be 102.2 hours of delay per day.

Current delays fall well below the FHWA recommended threshold of 40 delay hours per day. Future delays exceed 40 hours at this crossing. It is very likely that the road authority would entertain some kind of roadway project to address the traffic delays before they got to this point.

Another commonly used measure outlined in the FHWA Guidelines; the so-called Crossing Exposure Index (which is simply the product of the number of trains per day multiplied by the number of vehicles crossing daily) is currently met at this crossing. It should be noted that the criteria identified in the FHWA material are not mandates, but guidelines established by the Federal Highway Administration, which serve to alert those having jurisdiction that potential problems may arise.

### **Grade Separation**

With regard to grade separating this crossing, the Railroad gave the following response:

*Union Pacific understands that whether a grade separation is needed is primarily a question of mobility and convenience for vehicular traffic on the roadway, not safety. That is because an at-grade crossing can be safe without constructing a grade separation and eliminating the grade crossing. Based on this understanding, Union Pacific believes the question of whether a grade separation is needed is irrelevant to Union Pacific's application to add a second mainline track at this grade crossing. With that caveat, Union Pacific responds as follows:*

*Union Pacific is aware that the Arizona Department of Transportation has proposed a grade separation at this crossing as part of its Interstate 10 traffic interchange project, according to the 2030 Regional Transportation Plan published by the Pima Association of Governments Regional Transportation Authority. It is Union Pacific's understanding that the roadway authority, other planning agencies, and surrounding communities are studying these matters outside the context of Union Pacific's applications for grade crossing alterations, but have not finally determined when the proposed grade separation at this crossing is to be designed, funded, and constructed. Grade separation was not decided on at this time because these entities should decide the timing of the proposed grade separation. Before they have done so, it would be premature to consider grade separation now in connection with Union Pacific's application to double-track and improve this crossing.*

*Furthermore, Union Pacific believes the crossing involved in this application is currently safe without constructing a grade separation. This conclusion is supported by the fact that the Federal Highway Administration authorizes the use of gates and lights at multiple-track grade crossings as proposed in this application.*

Staff has utilized the FHWA Guidelines to determine the potential need for grade separation at this crossing. Based on existing conditions, the crossing in this application meets one of the nine criteria for consideration of grade separation. Projected data indicates that this crossing may meet three of the nine criteria by the year 2030.

### **Crossing Closure**

The area surrounding this crossing is highly developed with both commercial and industrial businesses. To close this crossing would have a negative affect on many of the local businesses. Therefore, Staff would not recommend closure of this crossing at this time.

### **Future Ruthrauff Road Grade Separation**

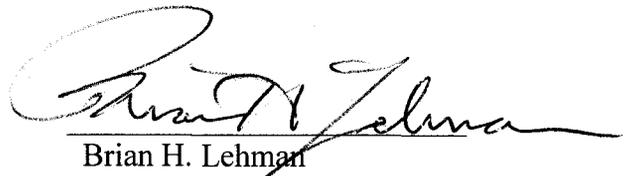
According to a discussion with Paul Casertano, Transportation Systems Senior Planner with PAG on October 7, 2008, there are plans to grade separate Ruthrauff Road in the future. The estimated cost for a grade separation at Ruthrauff Road in 2008 was around \$60 million. Pima County will construct a new grade separation using Regional Transportation Authority (RTA) funds. On May 16, 2006, voters in Pima County approved a half-cent excise tax to fund specific transportation projects. The tax became effective July 1, 2006, throughout Pima County and projects funded by this tax are overseen by the RTA. A grade separation project will not likely commence before FY 2017.

### **Staff Conclusions**

Having reviewed all applicable data, Staff generally supports the Railroad's application. Staff believes that the upgrades are in the public interest and are reasonable. Staff understands that the decision to grade separate is a complex one involving multiple parties, a number of years of time for planning and construction as well as substantial monetary resources. Having said that, Staff believes that the measures proposed by the Railroad are consistent with other similar at-grade crossings in the State and will provide for the public's safety. Therefore, Staff recommends approval of the Railroad's application.

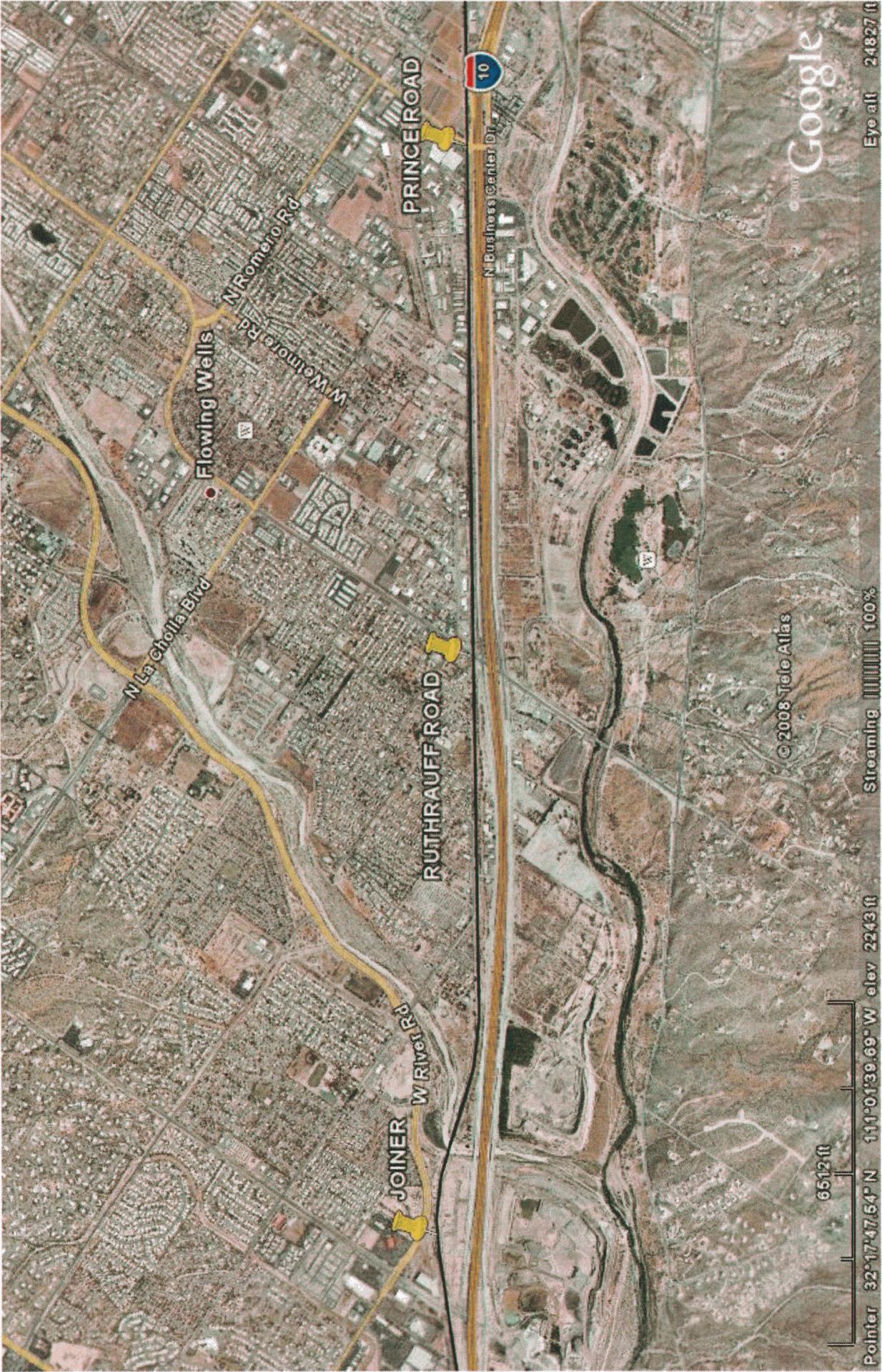


Dave Raber



Brian H. Lehman

# **Appendix “A”**



Eye alt 24827 ft

Google

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Streaming 100%

Pointer 32°17'47.64" N 111°01'39.69" W elev 2243 ft

6512 ft

PRINCER ROAD

RUTHRAUFF ROAD

JOINER

Flowing Wells

N La Cholla Blvd

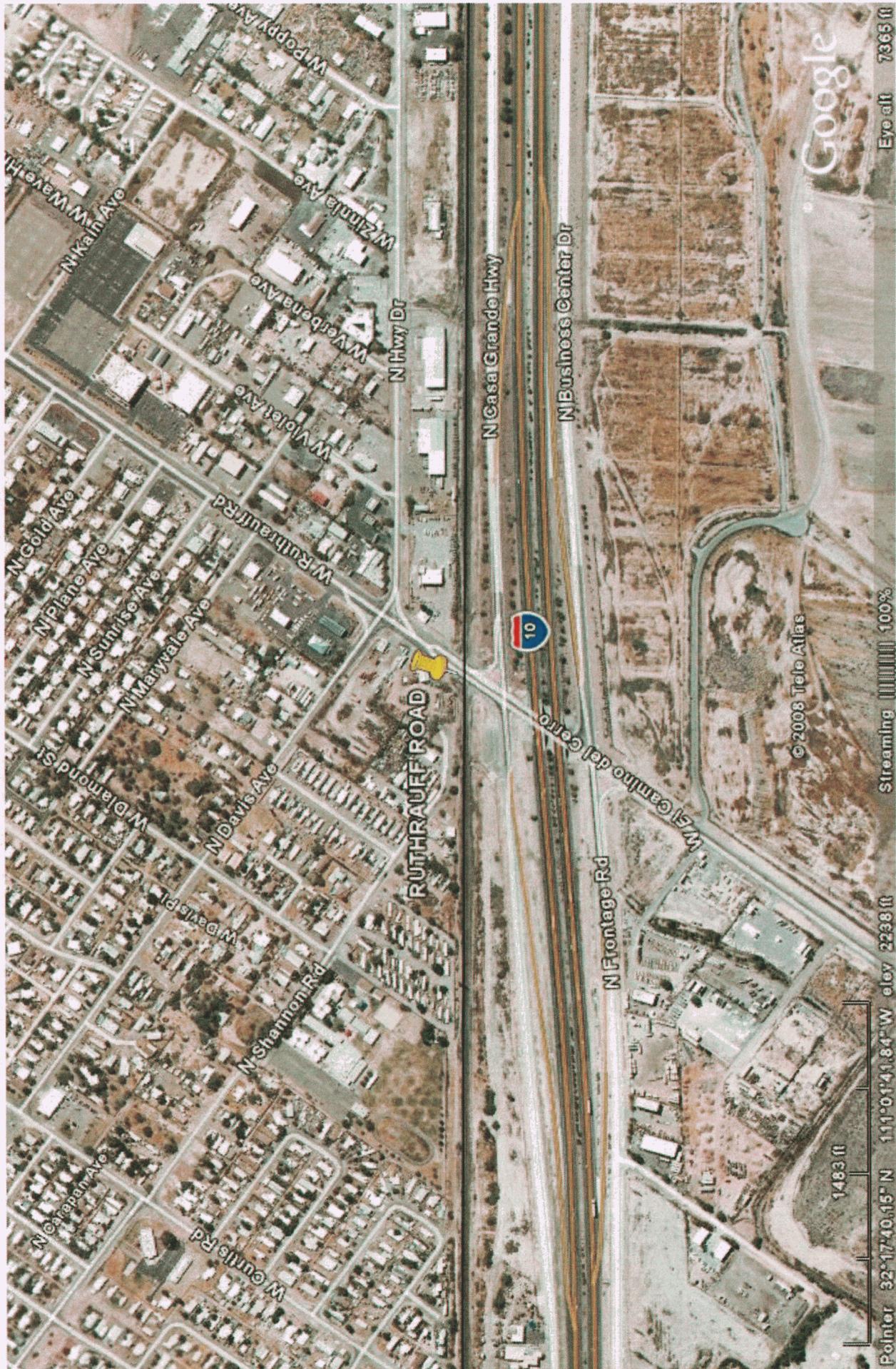
N Romero Rd

W Wainwright Rd

W River Rd

10

N Business Center Dr



Google

Eye alt 7365 ft

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Pointer 32°17'40.15" N 111°01'41.84" W elev 2238 ft

1483 ft

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Docket Control  
Arizona Corporation Commission  
1200 West Washington Street  
Phoenix, Arizona 85007

Copy of the foregoing mailed  
this 7th day of November, 2008 to:

Aziz Aman P.E.  
Union Pacific Railroad  
2073 E Jade Dr.  
Chandler, AZ. 85286

Anthony J. Hancock, Esq.  
Terrance L. Sims, Esq.  
Beaugureau, Zukowski & Hancock, P.C.  
302 East Coronado  
Phoenix, Arizona 85004  
Attorney for Union Pacific Railroad Company

Robert Travis, PE  
State Railroad Liaison  
Arizona Department of Transportation  
205 S 17th Ave, Room 357  
MD 618E  
Phoenix, AZ 85007

Albert Letzkus, P.E. PTOE  
Division Manager, Traffic Engineering  
Pima County  
1313 S. Mission Road  
Tucson, Arizona 85713-1398

Bob Roggenthen, P.E.  
Traffic Engineering Division  
Pima County Department of Transportation  
1313 S. Mission Road  
Tucson, Arizona, 85713-1398

Jim Glock  
City of Tucson Department of Transportation  
201 N. Stone Ave., 6<sup>th</sup> Floor, North Wing  
P.O. Box 27210  
Tucson, Arizona 85726-7210

Andre C. Dinauer  
Engineering Administrator, Engineering Division  
City of Tucson Department of Transportation  
201 N. Stone Ave., 3<sup>rd</sup> Floor  
Tucson, Arizona 85726-1207

Paul Casertano  
Pima Association of Governments  
177 N. Church Avenue, # 405  
Tucson, AZ 85701